DEFENDANTS' INVALIDITY CONTENTIONS FOR U.S. PAT. 11,694,053

EXHIBIT C:
Yamazaki-279, Kim-329, Yamazaki-454, Park-846, Park-589, Park-942, Matsuo, Kowalski, Akaida, Florek-442, Florek-677, Honkanen, Hasegawa, and Claessen

As demonstrated in the claim charts below, the claims of U.S. Patent No. 11,694,053 ("the '053 patent") are invalid (a) under 35 U.S.C. § 103 as obvious over each of U.S. Pub. No. 2007/0229279 ("Yamazaki-279"), U.S. Pub. No. 2008/0278329 ("Kim-329"), U.S. Pub. No. 2008/0093454 ("Yamazaki-454"), K.R. 2004/0040846 ("Park-846"), U.S. Pub. No. 2005/0224589 ("Park-589"), K.R. 2007/0002942 ("Park-942"), U.S. Pub. No. 2007/0232232 ("Matsuo"), U.S. Pub. No. 2008/0245851 ("Kowalski"), U.S. Pub. No. 2005/0161508 ("Akaida"), W.O. 2010/128442 ("Florek-442"), U.S. Pub. No. 2010/0274677 ("Florek-677"), U.S. Pub. No. 2008/0309490 ("Honkanen"), J.P. 2008/008763 ("Hasegawa"), and U.S. Pub. No. 2008/0150687 ("Claessen") and (b) under 35 U.S.C. § 103(a) as obvious over Yamazaki-279, Kim-329, Yamazaki-454, Park-846, Park-589, Park-942, Matsuo, Kowalski, Akaida, Florek-442, Florek-677, Honkanen, Hasegawa, and Claessen combined with the knowledge of a person of ordinary skill in the art, Applicant's Admitted Prior Art, and/or the additional prior art references discussed in Exhibits C and C1–C9, the contents of which are hereby incorporated by reference into this chart. One of ordinary skill in the art, as of the priority date of the '053 patent, would have known to combine the prior art elements disclosed by the foregoing references using known methods, and to use these elements according to their established functions in order to achieve a known and predictable result.

Defendants have conducted the invalidity analysis herein based at least in part and in some instance entirely upon Plaintiff's apparent application of the claims of the '053 patent. By charting the prior art against the claims and limitations herein, Defendants are not admitting or agreeing to Plaintiff's application of the claims at issue in this case, and these charts should not be interpreted as an admission or concession by Defendants that any particular construction or application of any claim limitation by Plaintiff is correct or proper. Additionally, these charts provide representative examples of portions of the charted references that disclose the indicated limitations of the claims; additional portions of these references other than the representative examples provided herein may also disclose the indicated limitation(s) and Defendants contend that the asserted claims are invalid in light of the charted reference(s) as a whole in its or their entirety. Where a particular figure is cited, the citation should be understood to encompass the caption and description of the figure as well as any text relating to or describing the figure. Conversely, where particular text referring to a figure is cited, the citation should be understood to include the figure as well.

Claim Element	**Exemplary Citations to Yamazaki-279, Kim-329, Yamazaki-454, Park-846, Park-589, Park-942, Matsuo, Kowalski, Akaida, Florek-442, Florek-677, Honkanen, Hasegawa, and Claessen**
1[pre]. A mobile device comprising:	Yamazaki–279 at [0001], [0002], [0114], [0215], and [0219]. Matsuo at Abstract, Figure 1, Figure 2, Figure 3, Figure 4, Figure 5, Figure 7, Figure 10, Figure 11, Figure 12, Figure 13, Figure 14, [0005], [0010], [0011], [0012], [0015], [0033], [0034], [0035], [0036], [0037], [0038], [0039], [0040], [0041], [0042], [0047], [0049], [0051], [0053], [0055], [0057], [0058], [0062], [0063], [0064], [0066], [0067], [0068], [0069], [0070], [0075], [0077], [0078], [0081], [0082], [0083], [0086], [0087], [0088], and [0089].

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Samsung v. iCashe (IPR2025-00641)
Page 001

Claim Element	Exemplary Citations to Yamazaki-279, Kim-329, Yamazaki-454, Park-846, Park-589, Park-942, Matsuo, Kowalski, Akaida, Florek-442, Florek-677, Honkanen, Hasegawa, and Claessen
	Kowalski at Figure 5, Figure 6, Figure 8, Figure 9, Figure 28A, [0004], [0006], [0007], [0009], [0013], [0015], [0017], [0021], [0026], [0027], [0030], [0031], [0032], [0037], [0045], [0050], [0085], [0093], [0129], [0131], [0133], [0134], [0140], [0145], [0148], [0149], and [0152]. Park–846 at Figure 6a, Figure 6b, [0009], [0025], [0039], [0065], [0066], [0067], [0068], and [0069]. Florek–442 at Abstract, 1:7–15, 2:18–24, 3:10–19, 4:21–31, 4:32–5:6, 5:7–15, 5:16–28, 5:29–6:4, 6:11–22, 8:4–12, 9:1–16, 10:15–20, 10:29–11:6, 11:21–24, 12:24–13:2, 13:15–14:4, 14:16–29, 16:1–16, 16:17–22, 16:31–17:4, 18:22–28, 18:29–34, 19:21–20:9, 20:10–29, 22:9–12, 22:20–26, 22:27–23:16, 24:2–11, 24:24–34, 25:14–29, 27:10–12, 27:13–17, Figure 2, Figure 5, Figure 6, Figure 7, Figure 8, Figure 10, Figure 11, and Figure 14. Park–589 at [0036]. *See also* Park–589 at [0008] and [0087]. Yamazaki–454 at Abstract, Figure 2, Figure 6, Figure 10, Figure 13, Figure 26B, Figure 26C, Figure 26D, Figure 27A, Figure 27B, Figure 27C, Figure 27D, Figure 27E, [0012], [0033], [0065], [0067], [0069], [0117], [0140], [0275], [0276], [0277], [0278], [0279], [0280], [0281], [0282], and [0283]. *See also* Yamazaki–454 at [0056], [0057], [0071], [0105], [0115], [0119], [0137], and [0273]. Hasegawa at Abstract, [0001], [0003], [0005], [0006], [0008], [0010], [0013], [0045], [0051], [0053], [0092], [0113], [0128], [0129], [0146], [0148], [0159], [0163], [0165], [0168], [0186], [0197], [0200], [0220], [0223], [0238], [0244], and [0261]. Park–942 at Abstract, Figure 17, 3–4, 4–5, 8–9, 9–10, 10–11, 12, 12–13, 13–14, 14, and 15. Akaida at Figure 9, [0014], [0018], [0029], [0030], [0050], [0051], and [0052]. Honkanen at Figure 1, Figure 2b, Figure 3c, [0005], [0009], [0012], [0018], [0030], [0031], [0032], [0033], [0034], [0035], [0036], [0037], [0038], [0041], [0044], [0045], [0047], [0051], [0052], [0056], [0057], and [0118]. Florek–677 at Abstract, Figure 1, Figure 2, [0001], [0003], [0004], [0006], [0008], [0010], [0012], [0020], [0023], [0024], [0025], and [0027]. Kim–329 at Figure 2, Figure 3, [0008], [0037], [0040], [0043], [0045], and [0046]. Claessen at [0002], [0013], [0026], and [0041].

Claim Element	Exemplary Citations to Yamazaki-279, Kim-329, Yamazaki-454, Park-846, Park-589, Park-942, Matsuo, Kowalski, Akaida, Florek-442, Florek-677, Honkanen, Hasegawa, and Claessen
[1a] a power source;	Yamazaki–279 at Abstract, Figure 1, Figure 2, Figure 12, Figure 13, Figure 14, Figure 15, [0001], [0004], [0005], [0010], [0011], [0019], [0022], [0023], [0059], [0060], [0072], [0075], [0082], [0085], [0086], [0091], [0092], [0094], [0096], [0103], [0104], [0108], [0113], [0114], and [0201]. *See also* Yamazaki–279 at [0012], [0013], [0014], [0015], [0016], [0017], and [0018]. Matsuo at Figure 6, [0048], [0049], [0062], [0063], [0066], and [0068]. Kowalski at Figure 9, [0027], [0045], [0100], and [0112]. *See also* Kowalski at [0004] and [0085]. Park–846 at Abstract, Figure 2, Figure 3a, Figure 3b, Figure 4a, Figure 4b, Figure 5a, Figure 5b, Figure 6a, Figure 6b, [0018], [0031], [0032], [0034], [0039], [0056], [0065], [0066], [0067], [0069], and [0071]. Florek–442 at 5:29–6:4 and 9:1–16. Yamazaki–454 at [0061]. Hasegawa at [0005], [0200], and [0238]. Park–942 at 9–10, 10, 13–14, and 14. Honkanen at [0031], [0118], [0144], and [0176]. Kim–329 at [0042].
[1b] a smartcard controller coupled to the power source to receive power;	Yamazaki–279 at Figure 1, Figure 2, Figure 12, Figure 13, Figure 14, Figure 15, [0004], [0005], [0010], [0019], [0023], [0060], [0072], [0075], [0082], and [0091]. *See also* Yamazaki–279 at Abstract. Matsuo at Figure 6, [0049], [0063], and [0066]. *See also* Matsuo at [0048] and [0068]. Kowalski at [0027] and [0112]. *See also* Kowalski at [0004].

Claim Element	Exemplary Citations to Yamazaki-279, Kim-329, Yamazaki-454, Park-846, Park-589, Park-942, Matsuo, Kowalski, Akaida, Florek-442, Florek-677, Honkanen, Hasegawa, and Claessen
	Park–846 at Abstract, Figure 2, Figure 3a, Figure 3b, Figure 4a, Figure 4b, Figure 5a, Figure 5b, Figure 6a, Figure 6b, [0018], [0031], [0032], [0034], [0039], [0056], [0065], [0066], [0067], [0069], and [0071]. Florek–442 at 5:29–6:4 and 9:1–16. Yamazaki–454 at [0061]. Hasegawa at [0005]. Park–942 at 10 and 14. Honkanen at [0144] and [0176].
[1c] an antenna tuned to operate at substantially 13.56 MHz, wherein the antenna interacts with a Near Field Communication (NFC) reader external to the mobile device; and	Yamazaki–279 at Abstract, Figure 1, Figure 2, Figure 12, Figure 13, Figure 14, Figure 15, [0001], [0005], [0006], [0008], [0010], [0011], [0012], [0016], [0017], [0018], [0020], [0023], [0059], [0060], [0061], [0062], [0063], [0068], [0069], [0070], [0076], [0077], [0080], [0081], [0082], [0086], [0089], [0091], [0092], [0094], [0096], [0099], [0103], [0104], and [0114]. *See also* Yamazaki–279 at [0013], [0014], [0015], [0072], [0108], and [0201]. Matsuo at Figure 2, Figure 6, [0003], [0007], [0008], [0009], [0010], [0012], [0014], [0015], [0016], [0038], [0039], [0040], [0042], [0047], [0048], [0049], [0051], [0053], [0054], [0055], [0056], [0057], [0058], [0059], [0060], [0061], [0063], [0066], [0067], [0068], [0069], [0070], [0077], [0078], [0083], [0086], [0087], [0088], and [0089]. *See also* Matsuo at Abstract, [0005], [0034], and [0037]. Kowalski at Abstract, Figure 5, Figure 6, Figure 8, Figure 9, Figure 28A, [0002]–[0003], [0004], [0006], [0009], [0012], [0013], [0015], [0016], [0017], [0026], [0030], [0031], [0032], [0035], [0036], [0037], [0046], [0050], [0083], [0085], [0091], [0094], [0095], [0100], [0101], [0102], [0103], [0108], [0110], [0112], [0114], [0115], [0118], [0122], [0124], [0127], [0133], [0136], [0145], [0147], [0148], and [0149]. *See also* Kowalski at [0020]. Park–846 at Abstract, Figure 2, Figure 3a, Figure 3b, [0022], [0025], [0031], [0032], [0034], [0035], [0036], [0039], [0040], [0050], [0056], [0058], [0060], [0067], [0069], and [0071].

Claim Element	Exemplary Citations to Yamazaki-279, Kim-329, Yamazaki-454, Park-846, Park-589, Park-942, Matsuo, Kowalski, Akaida, Florek-442, Florek-677, Honkanen, Hasegawa, and Claessen
	Florek–442 at 2:18–24, 9:1–16, 13:15–14:4, 14:16–29, 18:11–15, 18:29–34, 19:21–20:9, 22:9–12, 24:24–34, 25:1–5, 26:16–19, 27:13–17, Figure 2, Figure 3, Figure 6, Figure 7, Figure 8, Figure 10, Figure 13, and Figure 14. *See also* Florek–442 at 1:7–15. Park–589 at Abstract, Figure 1, Figure 2, Figure 4, Figure 5, Figure 6, Figure 7, [0006]–[0007], [0010], [0011], [0012], [0019], [0020], [0024], [0026], [0027], [0032], [0033], [0034], [0046], [0047], [0048], [0050], [0052], [0054], [0055], [0056], [0058], [0059], [0060], [0073], [0075], [0081], [0084], claim 1, claim 6, claim 8, claim 11, claim 13, claim 14, claim 15, and claim 17. *See also* Park–589 at [0017], [0049], and [0087]. Yamazaki–454 at Figure 5, [0008], [0009], [0013], [0020], [0025], [0026], [0055], [0061], [0062], [0064], [0070], [0071], [0074], [0111], [0112], [0114], [0121], [0137], [0167], [0271], and [0273]. *See also* Yamazaki–454 at Abstract, Figure 1, Figure 9, [0065], [0255], [0256], [0257], [0258], [0259], [0260], [0263], and [0279]. Hasegawa at Abstract, [0001], [0003], [0004], [0005], [0006], [0008], [0010], [0013], [0021], [0045], [0051], [0052], [0053], [0059], [0067], [0094], [0113], [0128], [0129], [0146], [0163], [0186], [0197], [0200], [0220], and [0238]. Park–942 at Abstract, 2, 3–4, 4–5, 5, 5–6, 7, 7–8, 8–9, 9–10, 10–11, 11–12, 12, and 12–13. Akaida at Figure 1, Figure 3, Figure 4, Figure 5, Figure 8, Figure 9, [0008], [0010], [0012], [0016], [0017], [0018], [0029], [0030], [0031], [0036], [0038], [0039], [0045], [0046], and [0056]. Honkanen at Figure 1, Figure 2b, Figure 3c, [0005], [0006], [0012], [0031], [0032], [0033], [0034], [0035], [0037], [0044], [0057], [0061], and [0144]. Florek–677 at Figure 2, [0010], [0023], [0024], and [0025]. Kim–329 at Abstract, Figure 2, Figure 3, [0008], [0022], [0037], [0039], [0040], [0041], [0042], [0043], [0044], and [0045]. Claessen at [0002], [0003], [0005], [0011], [0013], [0026], and [0041].

Claim Element	Exemplary Citations to Yamazaki-279, Kim-329, Yamazaki-454, Park-846, Park-589, Park-942, Matsuo, Kowalski, Akaida, Florek-442, Florek-677, Honkanen, Hasegawa, and Claessen
[1d] an active transmit driver circuit coupled to the power source to receive the power, wherein the active transmit driver circuit affects transmission of data between the antenna and the NFC reader.	Yamazaki–279 at Figure 1, Figure 2, Figure 12, Figure 13, Figure 14, Figure 15, [0004], [0005], [0006], [0010], [0012], [0016], [0017], [0018], [0019], [0023], [0059], [0060], [0070], [0072], [0073], [0075], [0076], [0080], [0081], [0082], [0091], [0092], and [0108]. *See also* Yamazaki–279 at Abstract. Matsuo at Figure 6, [0015], [0048], [0049], [0058], [0059], [0060], [0063], [0066], [0067], and [0068]. Kowalski at Figure 8, Figure 9, [0027], [0085], [0094], [0100], [0102], [0112], [0149], and [0152]. *See also* Kowalski at [0004]. Park–846 at Abstract, Figure 2, Figure 3a, Figure 3b, Figure 4a, Figure 4b, Figure 5a, Figure 5b, Figure 6a, Figure 6b, [0018], [0031], [0032], [0034], [0035], [0036], [0039], [0050], [0056], [0058], [0065], [0066], [0067], [0069], and [0071]. Florek–442 at 5:29–6:4 and 9:1–16. Park–589 at Figure 2, [0019], [0024], [0032], [0034], and [0048]. *See also* Park–589 at [0010], [0012], [0050], and [0084]. Yamazaki–454 at [0060], [0061], [0062], [0064], [0074], [0110], [0111], and [0112]. Hasegawa at Abstract, [0003], [0005], [0013], [0045], [0053], [0092], [0113], [0128], [0129], [0163], [0165], [0168], and [0200]. Park–942 at 5–6, 6–7, 7, 7–8, 9–10, 10, 12, 13–14, and 14. Akaida at Figure 8, Figure 9, [0042], and [0043]. Honkanen at Figure 1, [0032], [0035], [0144], [0155], [0158], [0159], and [0176]. Kim–329 at Figure 3, [0008], [0022], [0044], [0045], and [0046]. *See also* Kim–329 at [0041]. Claessen at [0005], [0013], and [0026].
2. The mobile device of claim 1, wherein the transmitted data	Yamazaki–279 at [0219] and [0220].

Claim Element	Exemplary Citations to Yamazaki-279, Kim-329, Yamazaki-454, Park-846, Park-589, Park-942, Matsuo, Kowalski, Akaida, Florek-442, Florek-677, Honkanen, Hasegawa, and Claessen
includes ticketing information for a mass transit system.	Kowalski at [0004] and [0007]. Park–589 at [0009]. *See also* Park–589 at [0003], [0008], and [0090]. Park–942 at 14. *See also* claim 1 above.
3. The mobile device of claim 1, wherein the transmitted data includes transaction information for a mobile payment.	Yamazaki–279 at [0219]. Kowalski at [0004], [0007], [0009], [0013], and [0148]. Park–846 at [0066] and [0073]. Florek–442 at Abstract, 1:7–15, 1:33–2:12, 2:18–24, 3:10–19, 4:21–31, 4:32–5:6, 5:7–15, 5:29–6:4, 6:11–22, 7:22–33, 8:1–3, 8:17–32, 9:1–16, 9:17–25, 10:29–11:6, 11:7–20, 12:24–13:2, 13:15–14:4, 14:5–15, 14:16–29, 15:18–30, 16:17–22, 18:8–10, 19:21–20:9, 20:10–29, 22:27–23:16, 24:2–11, 24:24–34, 25:14–29, 26:16–19, Figure 2, Figure 3, Figure 4, Figure 6, Figure 7, Figure 8, Figure 10, Figure 11, and Figure 14. Park–589 at Abstract and [0009]. *See also* Park–589 at [0003], [0006]–[0007], [0008], and [0090]. Florek–677 at Abstract, Figure 1, Figure 2, [0001], [0003], [0004], [0006], [0008], [0010], [0012], [0020], [0023], [0024], [0025], and [0027]. *See also* claim 1 above.
4. The mobile device of claim 1, wherein the NFC reader is a point-of-sale NFC reader.	Kowalski at [0009] and [0148]. *See also* Kowalski at [0007]. Park–846 at [0066] and [0073]. Park–589 at [0009] and [0090]. *See also* claim 1 above.

Claim Element	Exemplary Citations to Yamazaki-279, Kim-329, Yamazaki-454, Park-846, Park-589, Park-942, Matsuo, Kowalski, Akaida, Florek-442, Florek-677, Honkanen, Hasegawa, and Claessen
5. The mobile device of claim 1, wherein the antenna includes an inductive element.	Yamazaki–279 at [0008], [0020], [0062], [0068], [0069], [0072], [0082], [0086], [0089], [0092], [0094], [0096], [0103], [0104], and [0108]. *See also* Yamazaki–279 at [0001], [0005], [0006], [0010], [0011], [0023], [0060], [0061], [0081], [0114], and [0201]. Matsuo at Figure 6, [0008], [0048], [0049], [0053], [0054], [0055], [0060], [0061], [0066], [0069], and [0070]. Kowalski at Abstract, Figure 5, Figure 6, Figure 8, Figure 9, Figure 28A, [0002]–[0003], [0009], [0012], [0015], [0017], [0026], [0030], [0032], [0037], [0050], [0083], [0085], [0091], [0095], [0100], [0101], [0102], [0110], [0114], [0115], [0118], [0122], [0124], [0127], [0133], [0136], and [0145]. Park–846 at [0035]. Florek–442 at 9:1–16, 19:21–20:9, and Figure 3. Park–589 at [0006]–[0007], [0047], [0054], and [0059]. Yamazaki–454 at [0008], [0061], [0065], [0071], [0073], [0074], [0111], [0114], [0121], [0259], and [0269]. Hasegawa at [0005], [0094], and [0186]. Park–942 at Abstract, 2, 3–4, 4–5, 5, 5–6, 9–10, 10–11, 11–12, 12, and 12–13. Akaida at Figure 8, Figure 9, and [0008]. Honkanen at Figure 1, [0005], [0031], [0032], [0034], [0037], [0057], and [0061]. Florek–677 at [0010] and [0023]. Kim–329 at [0008], [0042], and [0043]. *See also* claim 1 above.
6. The mobile device of claim 1, wherein the active transmit driver circuit includes one or more of an amplifier filter, oscillator, and/or modulator.	Yamazaki–279 at [0005], [0059], [0070], [0076], [0081], and [0091]. Kowalski at [0100] and [0102]. Park–846 at Figure 3a, [0032], [0037], and [0049].

Claim Element	Exemplary Citations to Yamazaki-279, Kim-329, Yamazaki-454, Park-846, Park-589, Park-942, Matsuo, Kowalski, Akaida, Florek-442, Florek-677, Honkanen, Hasegawa, and Claessen
	Park–589 at Figure 4, [0047], [0048], and [0049]. Yamazaki–454 at [0074] and [0121]. Park–942 at 5–6, 7–8, 9–10, and 11–12. Akaida at Figure 8, Figure 9, [0042], and [0043]. Kim–329 at Figure 3, [0043], and [0044]. Claessen at [0004] and [0005]. *See also* claim 1 above.
7. The mobile device of claim 1 comprising an amplifier coupled to the power source to receive the power, wherein the amplifier is further coupled to the antenna.	Yamazaki–279 at Figure 1, Figure 2, Figure 12, Figure 13, Figure 14, Figure 15, [0004], [0005], [0006], [0010], [0019], [0023], [0059], [0060], [0061], [0072], [0075], [0076], [0077], [0080], [0082], [0091], and [0092]. *See also* Yamazaki–279 at Abstract. Matsuo at [0059], [0061], [0063], and [0066]. Kowalski at [0112] and [0147]. *See also* Kowalski at [0004] and [0027]. Park–846 at Abstract, Figure 2, Figure 3a, Figure 3b, Figure 4a, Figure 4b, Figure 5a, Figure 5b, Figure 6a, Figure 6b, [0018], [0031], [0032], [0034], [0039], [0056], [0065], [0066], [0067], [0069], and [0071]. Park–589 at Figure 2, [0025], [0047], and [0052]. Yamazaki–454 at [0061], [0074], and [0121]. Hasegawa at [0005], [0021], and [0059]. Park–942 at 5–6, 10, 11–12, 12, and 14. Akaida at [0030]. Honkanen at [0144] and [0176]. Kim–329 at Figure 6.

Claim Element	Exemplary Citations to Yamazaki-279, Kim-329, Yamazaki-454, Park-846, Park-589, Park-942, Matsuo, Kowalski, Akaida, Florek-442, Florek-677, Honkanen, Hasegawa, and Claessen
	See also claim 1 above.
8. The mobile device of claim 7, wherein the amplifier amplifies a signal received at the antenna and generates an amplified signal, and provides the amplified signal to the smartcard controller.	Yamazaki–279 at Figure 1, Figure 2, Figure 12, Figure 13, Figure 14, Figure 15, [0005], [0006], [0077], [0080], [0091], and [0092]. Kowalski at [0147]. Park–589 at Figure 3, Figure 4, [0047], [0052], claim 6, and claim 11. Yamazaki–454 at Figure 5, [0074], and [0121]. Hasegawa at [0021] and [0059]. Park–942 at 5–6 and 11–12. Akaida at Figure 1, Figure 4, Figure 5, Figure 8, Figure 9, [0018], [0039], and [0056]. *See also* claim 7 above.
17[pre]. A method of near field communication between a mobile device and an NFC reader, the method comprising:	*See* above at [1d]. Yamazaki–279 at [0001], [0002], [0114], [0215], and [0219]. Matsuo at Abstract, Figure 1, Figure 2, Figure 3, Figure 4, Figure 5, Figure 7, Figure 10, Figure 11, Figure 12, Figure 13, Figure 14, [0005], [0010], [0011], [0012], [0015], [0033], [0034], [0035], [0036], [0037], [0038], [0039], [0040], [0041], [0042], [0047], [0049], [0051], [0053], [0055], [0057], [0058], [0062], [0063], [0064], [0066], [0067], [0068], [0069], [0070], [0075], [0077], [0078], [0081], [0082], [0083], [0086], [0087], [0088], and [0089]. Kowalski at Figure 5, Figure 6, Figure 8, Figure 9, Figure 28A, [0004], [0006], [0007], [0009], [0013], [0015], [0017], [0021], [0026], [0027], [0030], [0031], [0032], [0037], [0045], [0050], [0085], [0093], [0129], [0131], [0133], [0134], [0140], [0145], [0148], [0149], and [0152]. Park–846 at Figure 6a, Figure 6b, [0009], [0025], [0039], [0065], [0066], [0067], [0068], [0069], and [0073]. Florek–442 at Abstract, 1:7–15, 1:33–2:12, 2:18–24, 3:10–19, 4:21–31, 4:32–5:6, 5:7–15, 5:16–28, 5:29–6:4, 6:11–22, 7:22–33, 8:1–3, 8:4–12, 8:17–32, 9:1–16, 9:17–25, 10:15–20, 10:29–11:6, 11:7–20, 11:21–24, 12:24–13:2, 13:15–14:4, 14:5–15, 14:16–29, 15:18–30, 16:1–16, 16:17–22, 16:31–17:4, 18:8–10, 18:22–28, 18:29–34, 19:21–20:9, 20:10–29, 22:9–12, 22:20–26, 22:27–23:16, 24:2–11, 24:24–34, 25:14–29, 26:16–19,

Claim Element	Exemplary Citations to Yamazaki-279, Kim-329, Yamazaki-454, Park-846, Park-589, Park-942, Matsuo, Kowalski, Akaida, Florek-442, Florek-677, Honkanen, Hasegawa, and Claessen
	27:10–12, 27:13–17, Figure 2, Figure 3, Figure 4, Figure 5, Figure 6, Figure 7, Figure 8, Figure 10, Figure 11, and Figure 14. Park–589 at Abstract, [0009], and [0036]. *See also* Park–589 at [0003], [0006]–[0007], [0008], [0087], and [0090]. Yamazaki–454 at Abstract, Figure 2, Figure 6, Figure 10, Figure 13, Figure 26B, Figure 26C, Figure 26D, Figure 27A, Figure 27B, Figure 27C, Figure 27D, Figure 27E, [0012], [0033], [0065], [0067], [0069], [0117], [0140], [0275], [0276], [0277], [0278], [0279], [0280], [0281], [0282], and [0283]. *See also* Yamazaki–454 at [0056], [0057], [0071], [0105], [0115], [0119], [0137], and [0273]. Hasegawa at Abstract, [0001], [0003], [0005], [0006], [0008], [0010], [0013], [0045], [0051], [0053], [0092], [0113], [0128], [0129], [0146], [0148], [0159], [0163], [0165], [0168], [0186], [0197], [0200], [0220], [0223], [0238], [0244], and [0261]. Park–942 at Abstract, Figure 17, 3–4, 4–5, 8–9, 9–10, 10–11, 12, 12–13, 13–14, 14, and 15. Akaida at Figure 9, [0014], [0018], [0029], [0030], [0050], [0051], and [0052]. Honkanen at Figure 1, Figure 2b, Figure 3c, [0005], [0009], [0012], [0018], [0030], [0031], [0032], [0033], [0034], [0035], [0036], [0037], [0038], [0041], [0044], [0045], [0047], [0051], [0052], [0056], [0057], and [0118]. Florek–677 at Abstract, Figure 1, Figure 2, [0001], [0003], [0004], [0006], [0008], [0010], [0012], [0020], [0023], [0024], [0025], and [0027]. Kim–329 at Figure 2, Figure 3, [0008], [0037], [0040], [0043], [0045], and [0046]. Claessen at [0002], [0013], [0026], and [0041].
[17a] coupling a smartcard controller and an active transmit driver circuit to a power source of the mobile device;	Yamazaki–279 at Abstract, Figure 1, Figure 2, Figure 12, Figure 13, Figure 14, Figure 15, [0001], [0004], [0005], [0010], [0011], [0019], [0022], [0023], [0059], [0060], [0072], [0075], [0082], [0085], [0086], [0091], [0092], [0094], [0096], [0103], [0104], [0108], [0113], [0114], and [0201]. *See also* Yamazaki–279 at [0012], [0013], [0014], [0015], [0016], [0017], and [0018]. Matsuo at Figure 6, [0048], [0049], [0062], [0063], and [0066].

Claim Element	Exemplary Citations to Yamazaki-279, Kim-329, Yamazaki-454, Park-846, Park-589, Park-942, Matsuo, Kowalski, Akaida, Florek-442, Florek-677, Honkanen, Hasegawa, and Claessen
	See also Matsuo at [0068]. Kowalski at Figure 9, [0027], [0045], [0100], and [0112]. *See also* Kowalski at [0004] and [0085]. Park–846 at Abstract, Figure 2, Figure 3a, Figure 3b, Figure 4a, Figure 4b, Figure 5a, Figure 5b, Figure 6a, Figure 6b, [0018], [0031], [0032], [0034], [0039], [0056], [0065], [0066], [0067], [0069], and [0071]. Florek–442 at 5:29–6:4 and 9:1–16. Yamazaki–454 at [0061]. Hasegawa at [0005], [0200], and [0238]. Park–942 at 9–10, 10, 13–14, and 14. Honkanen at [0031], [0118], [0144], and [0176]. Kim–329 at [0042].
[17b] providing power to the smartcard controller and the active transmit driver circuit from the power source of the mobile device;	*See* above at [17a]. Yamazaki–279 at Figure 1, Figure 2, Figure 12, Figure 13, Figure 14, Figure 15, [0004], [0005], [0010], [0019], [0023], [0060], [0072], [0075], [0082], [0091], and [0108]. *See also* Yamazaki–279 at Abstract. Matsuo at Figure 6, [0049], [0063], and [0066]. *See also* Matsuo at [0048] and [0068]. Kowalski at [0027] and [0112]. *See also* Kowalski at [0004]. Park–846 at Abstract, Figure 2, Figure 3a, Figure 3b, Figure 4a, Figure 4b, Figure 5a, Figure 5b, Figure 6a, Figure 6b, [0018], [0031], [0032], [0034], [0039], [0056], [0065], [0066], [0067], [0069], and [0071]. Florek–442 at 5:29–6:4 and 9:1–16. Yamazaki–454 at [0061].

Claim Element	Exemplary Citations to Yamazaki-279, Kim-329, Yamazaki-454, Park-846, Park-589, Park-942, Matsuo, Kowalski, Akaida, Florek-442, Florek-677, Honkanen, Hasegawa, and Claessen
	Hasegawa at [0005]. Park–942 at 10 and 14. Honkanen at [0144] and [0176].
[17c] coupling the active transmit driver circuit to an antenna of the mobile device, wherein the antenna is tuned to operate at substantially 13.56 MHz; and	*See* above at [1c]. Yamazaki–279 at Figure 1, Figure 2, Figure 12, Figure 13, Figure 14, Figure 15, [0004], [0005], [0006], [0010], [0012], [0016], [0017], [0018], [0019], [0023], [0059], [0060], [0070], [0072], [0073], [0076], [0080], [0081], [0082], [0092], and [0108]. Matsuo at Figure 2, Figure 6, [0003], [0015], [0047], [0048], [0049], [0051], [0057], [0058], [0059], [0060], [0066], [0067], [0068], [0077], [0078], [0083], [0086], [0087], [0088], and [0089]. *See also* Matsuo at Abstract, [0005], [0034], [0037], [0038], and [0042]. Kowalski at Figure 8, Figure 9, [0002]–[0003], [0015], [0027], [0046], [0085], [0091], [0094], [0100], [0101], [0102], [0112], [0149], and [0152]. Park–846 at Figure 5b, Figure 6a, Figure 6b, [0031], [0035], [0036], [0050], and [0058]. Florek–442 at 13:15–14:4, 14:16–29, 18:29–34, 19:21–20:9, 22:9–12, 25:1–5, 27:13–17, Figure 3, Figure 6, Figure 8, and Figure 13. *See also* Florek–442 at 1:7–15 and 9:1–16. Park–589 at Figure 2, [0006]–[0007], [0019], [0024], [0032], [0034], [0047], [0048], [0052], and [0055]. *See also* Park–589 at [0010], [0012], [0017], [0049], [0050], and [0084]. Yamazaki–454 at [0060], [0061], [0062], [0064], [0074], [0110], [0111], and [0112]. *See also* Yamazaki–454 at Figure 1 and Figure 9. Hasegawa at Abstract, [0003], [0004], [0005], [0013], [0045], [0051], [0053], [0092], [0113], [0128], [0129], [0163], [0165], [0168], and [0200]. Park–942 at 5–6, 6–7, 7, 7–8, 9–10, 10, 12, and 13–14. Akaida at Figure 8, Figure 9, [0042], and [0043].

Claim Element	Exemplary Citations to Yamazaki-279, Kim-329, Yamazaki-454, Park-846, Park-589, Park-942, Matsuo, Kowalski, Akaida, Florek-442, Florek-677, Honkanen, Hasegawa, and Claessen
	Honkanen at Figure 1, [0005], [0006], [0031], [0032], [0033], [0035], [0144], [0155], [0158], and [0159]. *See also* Honkanen at [0061]. Florek–677 at [0010], [0023], [0024], and [0025]. Kim–329 at Figure 3, [0008], [0022], [0042], [0044], [0045], and [0046]. *See also* Kim–329 at [0041]. Claessen at [0005], [0013], and [0026].
[17d] driving transmission of data by the active transmit driver circuit from the antenna to the NFC reader.	*See* above at [1d]. Yamazaki–279 at Figure 1, Figure 2, Figure 12, Figure 13, Figure 14, Figure 15, [0004], [0005], [0006], [0010], [0012], [0016], [0017], [0018], [0019], [0023], [0059], [0060], [0070], [0072], [0073], [0076], [0080], [0081], [0082], [0092], and [0108]. Matsuo at Figure 6, [0015], [0048], [0058], [0059], [0060], [0066], [0067], and [0068]. Kowalski at Figure 8, Figure 9, [0027], [0085], [0094], [0100], [0102], [0112], [0149], and [0152]. Park–846 at Figure 5b, Figure 6a, Figure 6b, [0031], [0035], [0036], [0050], and [0058]. Park–589 at Figure 2, [0019], [0024], [0032], [0034], and [0048]. *See also* Park–589 at [0010], [0012], [0050], and [0084]. Yamazaki–454 at [0060], [0061], [0062], [0064], [0074], [0110], [0111], and [0112]. Hasegawa at Abstract, [0003], [0005], [0013], [0045], [0053], [0092], [0113], [0128], [0129], [0163], [0165], [0168], and [0200]. Park–942 at 5–6, 6–7, 7, 7–8, 9–10, 10, 12, and 13–14. Akaida at Figure 8, Figure 9, [0042], and [0043]. Honkanen at Figure 1, [0032], [0035], [0144], [0155], [0158], and [0159]. Kim–329 at Figure 3, [0008], [0022], [0044], [0045], and [0046]. *See also* Kim–329 at [0041].

Claim Element	Exemplary Citations to Yamazaki-279, Kim-329, Yamazaki-454, Park-846, Park-589, Park-942, Matsuo, Kowalski, Akaida, Florek-442, Florek-677, Honkanen, Hasegawa, and Claessen
	Claessen at [0005], [0013], and [0026].
18[pre]. The method of claim 17 further comprising:	*See* claim 17 above.
[18a] amplifying a signal received from the antenna to generate an amplified signal; and	Yamazaki–279 at Figure 1, Figure 2, Figure 12, Figure 13, Figure 14, Figure 15, [0005], [0006], [0059], [0061], [0076], [0077], [0080], [0091], and [0092]. Matsuo at [0059] and [0061]. Kowalski at [0147]. Park–589 at Figure 2, Figure 3, Figure 4, [0025], [0047], [0052], claim 6, and claim 11. Yamazaki–454 at Figure 5, [0074], and [0121]. Hasegawa at [0021] and [0059]. Park–942 at 5–6, 11–12, and 12. Akaida at Abstract, Figure 1, Figure 4, Figure 5, Figure 8, Figure 9, [0010], [0016], [0017], [0018], [0030], [0032], [0039], and [0056]. Kim–329 at Figure 6. *See also* claim 8 and claim 17 above.
[18b] providing the amplified signal to the smartcard controller.	*See* above at [18a] and claim 8. *See also* claim 17 above.
19. The method of claim 10 or 17, wherein the transmitted data includes ticketing information for a mass transit system.	*See* above at claim 2. *See also* claim 10 and claim 17 above.
20. The method of claim 10 or 17, wherein the transmitted data	*See* above at claim 3.

Claim Element	Exemplary Citations to Yamazaki-279, Kim-329, Yamazaki-454, Park-846, Park-589, Park-942, Matsuo, Kowalski, Akaida, Florek-442, Florek-677, Honkanen, Hasegawa, and Claessen
includes transaction information for a mobile payment.	*See also* claim 10 and claim 17 above.

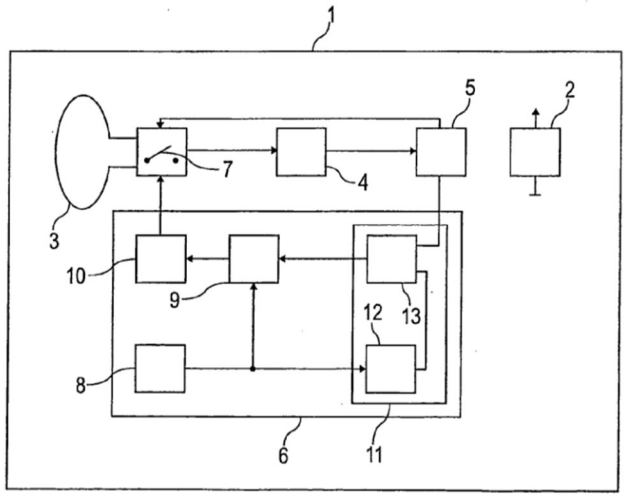
DEFENDANTS' INVALIDITY CONTENTIONS FOR U.S. PAT. 11,694,053

EXHIBIT C01: U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")

As demonstrated in the claim charts below, the claims of U.S. Patent No. 11,694,053 ("the '053 patent") are invalid (a) under one or more sections of 35 U.S.C. § 102 as anticipated by Finkenzeller and (b) under 35 U.S.C. § 103(a) as obvious over Finkenzeller standing alone and as set forth herein, and/or combined with the knowledge of a person of ordinary skill in the art, Applicant's Admitted Prior Art, and/or the additional prior art references discussed in Exhibit C and Exhibits C01–C09, the contents of which are hereby incorporated by reference into this chart. One of ordinary skill in the art, as of the priority date of the '053 patent, would have known to combine the prior art elements disclosed by the foregoing references using known methods, and to use these elements according to their established functions in order to achieve a known and predictable result.

Defendants have conducted the invalidity analysis herein based at least in part and in some instance entirely upon Plaintiff's apparent application of the claims of the '053 patent. By charting the prior art against the claims and limitations herein, Defendants are not admitting or agreeing to Plaintiff's application of the claims at issue in this case, and these charts should not be interpreted as an admission or concession by Defendants that any particular construction or application of any claim limitation by Plaintiff is correct or proper. Additionally, these charts provide representative examples of portions of the charted references that disclose the indicated limitations of the claims; additional portions of these references other than the representative examples provided herein may also disclose the indicated limitation(s) and Defendants contend that the asserted claims are invalid in light of the charted reference(s) as a whole in its or their entirety. Where a particular figure is cited, the citation should be understood to encompass the caption and description of the figure as well as any text relating to or describing the figure. Conversely, where particular text referring to a figure is cited, the citation should be understood to include the figure as well.

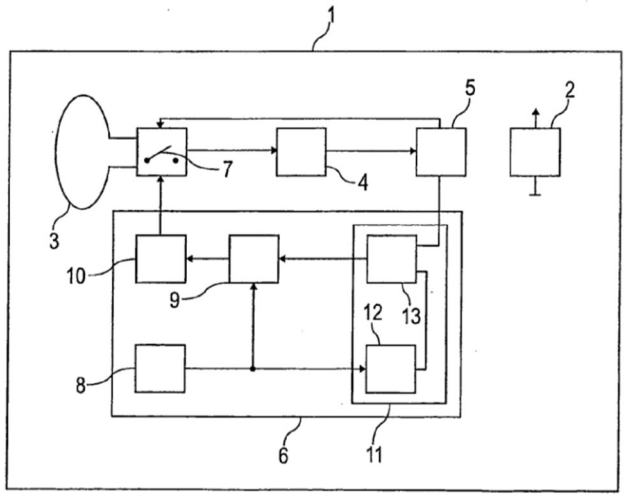
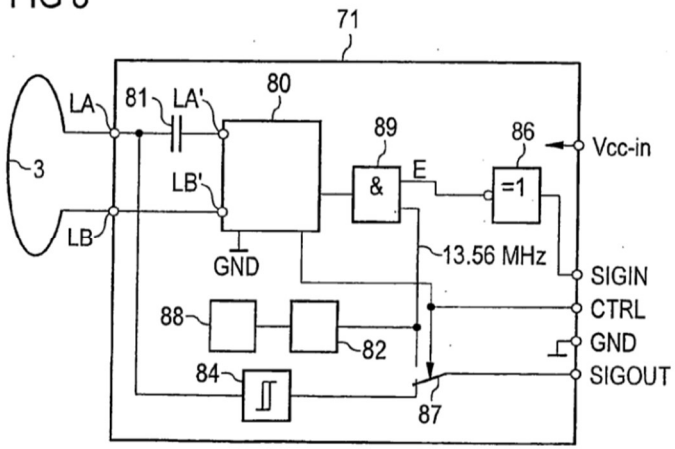
Claim Element	**Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")**
1[pre]. A mobile device comprising:	By providing this disclosure, Defendants do not take a position on whether the preamble is a claim limitation. Finkenzeller discloses or renders obvious "[a] mobile device." For example: Finkenzeller at Abstract The invention relates to a transponder unit (1) and to a method for data transfer between the transponder unit and a reading device (100). To increase the range of data transfer from the transponder unit (1) to the reading device (100), the transponder unit (1) has means integrated therein for actively sending a signal to the reading device (100) which can be evaluated by the reading device (100) like a modulation of its own field (110) by a transponder. Finkenzeller at Figure 2

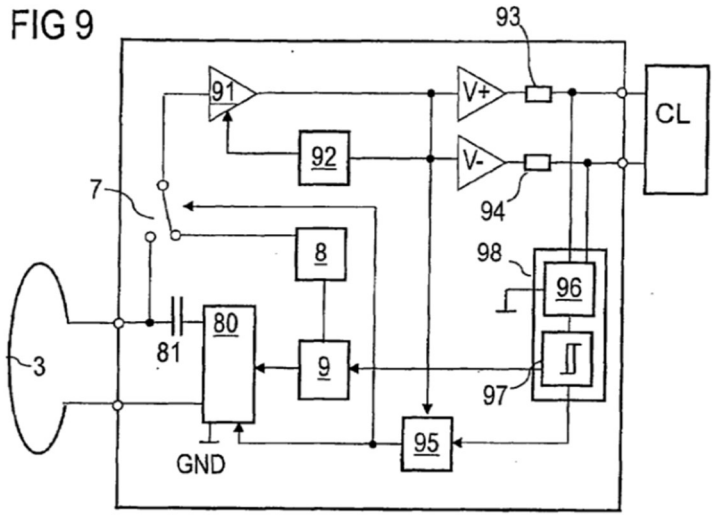
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	FIG 2  Finkenzeller at [0006] For simple and fast contactless communication between two devices, the companies Philips and Sony have developed an inductive transmission technology which is known as so-called near field communication (NFC). This technology is integrated for example in mobile telephones or PDAs to permit communication between the devices or with a computer. The coupling of the two devices is effected via coils, the carrier frequency being 13.56 MHz as in RFID systems. As described more closely in the NFC standard ECMA 340, NFC systems have an active communication mode and a passive communication mode. In the active mode, two NFC units alternately generate their own RF field as a signal carrier, thus switching back and forth, coordinated with each other, between transmit mode and receive mode as in a classic mobile phone system. In the passive mode, however, the two NFC units must agree on which unit acts as a reading device and generates a field which the other unit can then influence by means of load modulation. Primarily due to the small antenna diameters used, NFC systems only permit small communication ranges of up to 20 cm. Finkenzeller at [0027] The possibility of reading the inventive transponder unit over very large distances is not always desired, for example for privacy protection. It is therefore provided in one embodiment that the inventive circuit

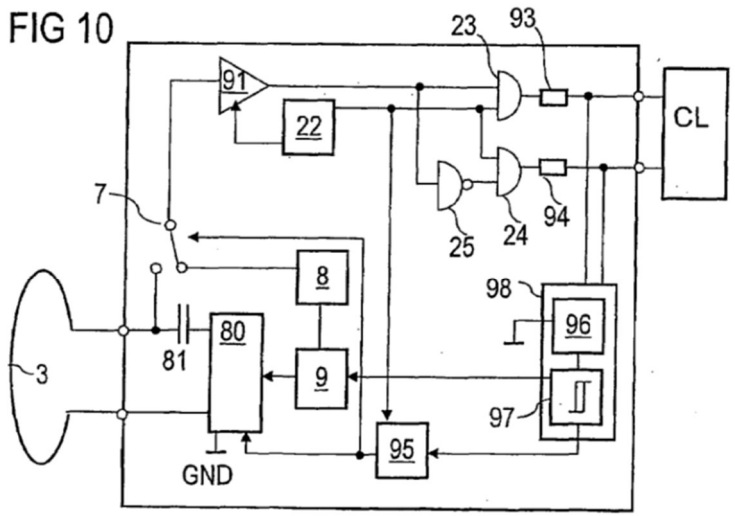
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	configuration can be activated manually if communication over a long range is explicitly desired. Otherwise, communication can be effected via a load modulator provided in the transponder unit, which is usable only for short distances. If no load modulator is provided in the trans-ponder unit, it can be provided for example that the transponder unit is activated for sending data only if the signal emitted by the reading device contains a predetermined code. Finkenzeller at [0028] The transponder unit can also be part of a mobile terminal, for example a mobile telephone. The transponder unit can have its own antenna or use an antenna of the terminal. Finkenzeller at [0032] The transponder unit is preferably integrated in a card or data carrier insertable into the mobile terminal. For example, the transponder unit can be integrated in a SIM card. The advantage is that the mobile terminal, for example a mobile phone or PDA, into which the card with the inventive transponder unit is inserted requires no additional (integrated) antenna to be usable as an RFID unit. Finkenzeller at [0047] Depending on a type of system used, data can be transferred from the trans-ponders 200, 300 to the reading device 100 either by means of load modulation (inductive coupling) or by means of modulated backscatter cross section (electromagnetic backscatter coupling). Embodiments will preferably be described hereinafter for systems that transfer data to the reading device on the principle of load modulation. However, the individual aspects of the embodiments are largely also applicable analogously to systems that work on the principle of modulated backscatter cross sections of the transponder unit. Finkenzeller at [0048] The transponder unit 1 sends for data transfer to the reading device 100 a signal which the reading device 100 can evaluate as a signal of a transponder which carries out a load modulation of the field 110 of the reading device 100. Unlike the conventional transponders 200, 300 which modulate the field 110 of the reading device 100 into a modulated reading device field 102, 103, the transponder unit 1 thus generates and sends its own modulated field 20 as the signal for data transfer. The transponder unit 1 thus uses its own energy for the purpose of data transfer. Finkenzeller at [0054]

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	Further, a mobile terminal comprising an inventive transponder unit could be used as a maintenance or monitoring unit for checking for operability, or remotely maintaining, a multiplicity of RFID reading devices, for example at the cash registers of a supermarket or an access system. Finkenzeller at [0055] FIG. 2 shows purely schematically the transponder unit 1, for example in the form of an inductively coupled chip card, which comprises the usual components not shown explicitly here. For simplification, only one inventive RFID transponder unit in a chip card is shown. The transponder unit has a battery 2, an inductive antenna 3 and an electronic circuit 4, 5, 6, 7. The electronic circuit consists substantially of three functional blocks, a receiver 4, a controller 5 and a transmitter 6. A switch 7 is used for switching the antenna 3 between the receiver 4 and the transmitter 6. Finkenzeller at [0065] The transponder unit 1 is operated in a first (active) operating mode as an actively sending transponder. In a second (passive) operating mode, however, the trans-ponder unit works like an ordinary passive transponder performing a load modulation on the field of the reading device. Finkenzeller at [0124] The interface module adapted to be coupled inductively and a further antenna connected thereto (see reference sign 3 in FIG. 10) can be disposed in a terminal. The range of an ordinary transponder can be increased with the help of such a terminal. The owner of a mobile telephone could for example set up a communication between his transponder and a reading device that is unfavorably disposed or inconvenient to reach for other reasons by holding the transponder against his mobile telephone provided according to the invention with an interface module adapted to be coupled inductively. Finkenzeller at [0129] Thus, an NFC unit could be adapted to behave according to the present solutions in its passive mode in the role ("being card") in which the NFC unit is to perform a load modulation. The NFC unit could for example always act as a component actively emitting its own field. Likewise, the NFC unit could also distinguish, and optionally switch, between a first submode corresponding to a conventional load modulation and an actively sending, second submode in which the load modulation is simulated. A thus improved NFC unit can also communicate with ordinary RFID reading devices over a higher range with the help of the changed passive operating mode. Since NFC units will already have certain units—such as an oscillator, an amplifier and a controller—for independent sending in their conventional active mode,

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	comparatively few modifications of an NFC circuit are required to realize a circuit according to the present application in an NFC unit. Finkenzeller at [0131] The individual functional components of the transponder unit—antenna, interface unit, chip and optionally voltage supply unit—can be disposed in all sorts of combinations separately from each other or integrated jointly in one unit. An inventive transponder unit can be formed for example as a specially designed transponder, in a portable data carrier, in particular a chip card, which optionally has a battery. A portable data carrier, in particular SIM card, with a chip and an interface unit can be connected in a mobile terminal to an external voltage source and/or an external antenna. The interface unit can be disposed in a terminal, connected to its own or an external antenna, and communicate with a chip which is disposed reversibly or firmly in the terminal or temporarily on the terminal. *See also* Finkenzeller at [0010], [0011], [0012], [0020], [0021], [0022], [0024], [0029], [0030], [0040], [0049], [0058], [0060], [0063], [0066], [0081], [0092], [0093], [0106], [0127], and claim 19. To the extent this limitation is not disclosed by Finkenzeller, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Finkenzeller, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[1a] a power source;	Finkenzeller discloses or renders obvious "a power source." For example: Finkenzeller at Figure 2

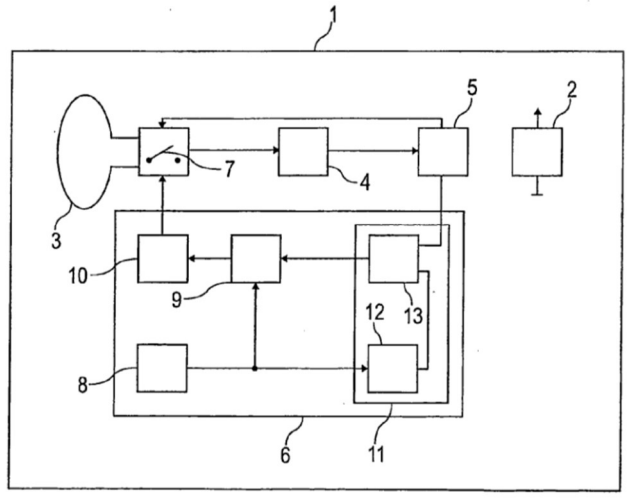
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	FIG 2  Finkenzeller at Figure 8 FIG 8 

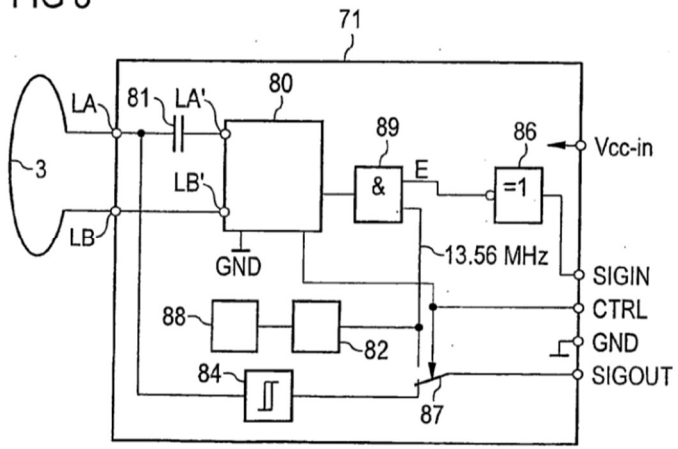
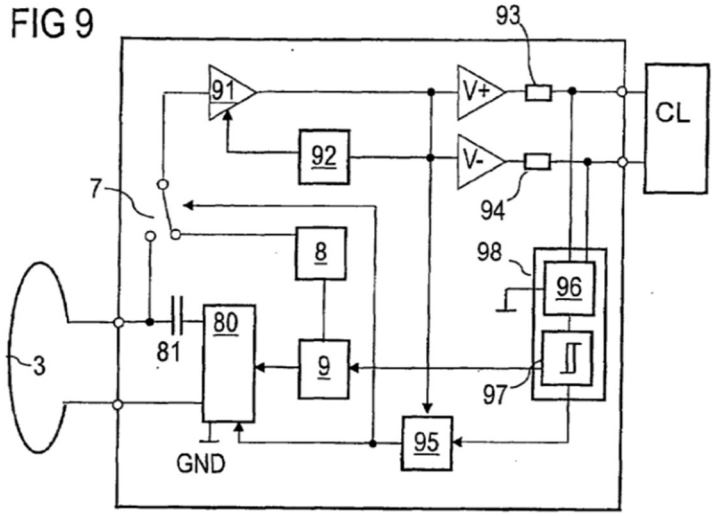
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	Finkenzeller at Figure 9  Finkenzeller at Figure 10

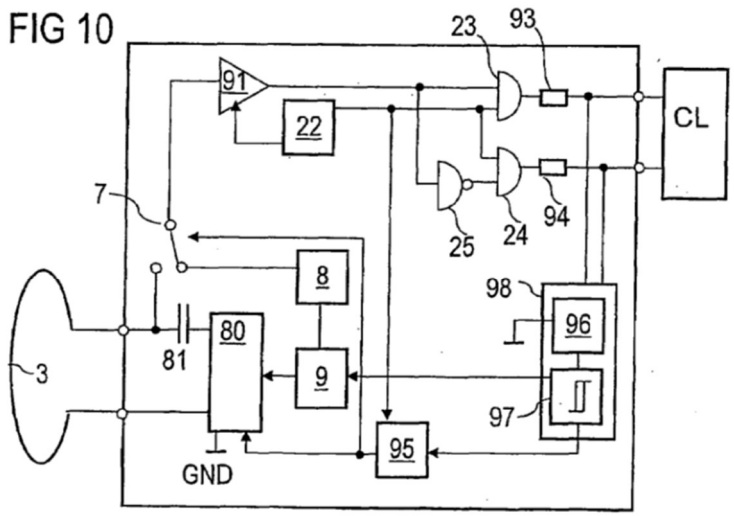
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	 Finkenzeller at [0004] The range within which communication is possible in the system by data transfer can be increased by using active transponders, that is, transponders with their own energy supply. The energy supply of the active transponder, for example in form of a battery, operates its electronic circuit. Conventional transponders without their own energy supply are referred to as passive transponders, in contrast. Finkenzeller at [0011] In an advantageous embodiment, an inventive RFID transponder unit has its own energy supply, at least one antenna for transmitting signals from and/or to a reading device, and an electronic circuit. The electronic circuit of the inventive transponder unit comprises a transmitter consisting of an oscillator and a modulator. Finkenzeller at [0048] The transponder unit 1 sends for data transfer to the reading device 100 a signal which the reading device 100 can evaluate as a signal of a transponder which carries out a load modulation of the field 110 of the reading device 100. Unlike the conventional transponders 200, 300 which modulate the field 110 of the reading device 100 into a modulated reading device field 102, 103, the transponder unit 1 thus generates

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	and sends its own modulated field 20 as the signal for data transfer. The transponder unit 1 thus uses its own energy for the purpose of data transfer. Finkenzeller at [0055] FIG. 2 shows purely schematically the transponder unit 1, for example in the form of an inductively coupled chip card, which comprises the usual components not shown explicitly here. For simplification, only one inventive RFID transponder unit in a chip card is shown. The transponder unit has a battery 2, an inductive antenna 3 and an electronic circuit 4, 5, 6, 7. The electronic circuit consists substantially of three functional blocks, a receiver 4, a controller 5 and a transmitter 6. A switch 7 is used for switching the antenna 3 between the receiver 4 and the transmitter 6. Finkenzeller at [0060] To supply the active components of the transponder unit at least partly with energy and to increase the energy range between the transponder unit 1 and the reading device 100, the inventive transponder unit has a battery 2. Finkenzeller at [0063] At the output of the ring modulator 9 an output signal is then available that contains the two modulation side bands and is identical (exactly enough) to a signal generated by load modulation or backscatter modulation. The output signal generated by the ring modulator 9 can then be optionally amplified by means of the amplifier 10, and be supplied to the antenna 3 for sending the data to be sent, via the switch 7 which is switched to the transmit mode of the transponder unit by a signal of the controller 5. Finkenzeller at [0065] The transponder unit 1 is operated in a first (active) operating mode as an actively sending transponder. In a second (passive) operating mode, however, the trans-ponder unit works like an ordinary passive transponder performing a load modulation on the field of the reading device. Finkenzeller at [0066] For example, the receiver 4 can additionally be formed as a conventional load modulator driven by the controller 5. The controller 5 then either switches the transmitter 6 on and the load modulator off, or the load modulator on and the transmitter 6 off. The switch 7 is switched accordingly. The criterion used for switching from a passive to an active operating state can be for example the received signal strength, the presence and/or sufficiency of an external voltage supply (on an optional connection Vcc not shown), or the sufficiency of an internal voltage supply (state of charge of the battery 2). It is thus for example

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	possible to first operate a transponder unit 1 passively and switch it to an active operating mode if for example the distance from the reading device unintentionally increases. Finkenzeller at [0093] Both the interface module 71 and the chip 75 can draw their supply voltage from the device in which they are disposed preferably reversibly. The interface module 71 can act as an ordinary transponder in a second operating mode and supply the chip with an operating voltage Vcc_RF. Finkenzeller at [0127] It was ascertained that small antennas, e.g. in a SIM card with its own antenna (approx. 15×25 mm^2), obtain very low read ranges with a conventional load modulation. It is frequently even impossible to communicate with a contactless reading device when the SIM card with an antenna is disposed for example in a mobile telephone. If one of the inventive transmitters is used in a mobile terminal the range is not clearly increased. Moreover, it can be advantageously exploited that mobile terminals such as mobile telephones, PDAs, etc., have their own energy supply (battery) which can also be used for supplying an inventive circuit. Finkenzeller at [0129] Thus, an NFC unit could be adapted to behave according to the present solutions in its passive mode in the role ("being card") in which the NFC unit is to perform a load modulation. The NFC unit could for example always act as a component actively emitting its own field. Likewise, the NFC unit could also distinguish, and optionally switch, between a first submode corresponding to a conventional load modulation and an actively sending, second submode in which the load modulation is simulated. A thus improved NFC unit can also communicate with ordinary RFID reading devices over a higher range with the help of the changed passive operating mode. Since NFC units will already have certain units—such as an oscillator, an amplifier and a controller—for independent sending in their conventional active mode, comparatively few modifications of an NFC circuit are required to realize a circuit according to the present application in an NFC unit. Finkenzeller at [0131] The individual functional components of the transponder unit—antenna, interface unit, chip and optionally voltage supply unit—can be disposed in all sorts of combinations separately from each other or integrated jointly in one unit. An inventive transponder unit can be formed for example as a specially designed transponder, in a portable data carrier, in particular a chip card, which optionally has a battery. A portable data carrier, in particular SIM card, with a chip and an interface unit can be connected in a

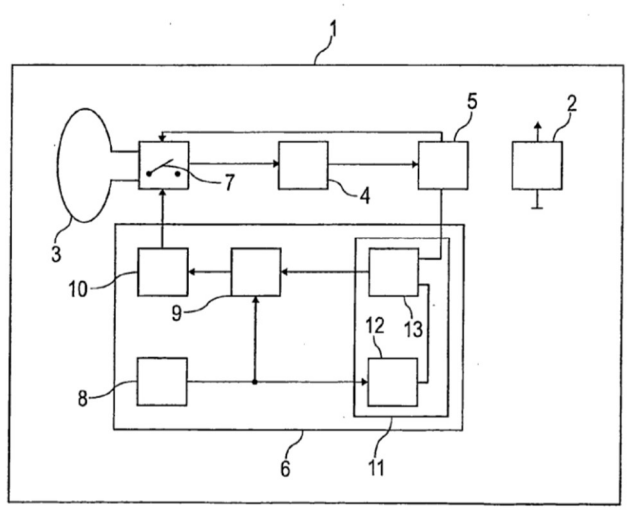
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	mobile terminal to an external voltage source and/or an external antenna. The interface unit can be disposed in a terminal, connected to its own or an external antenna, and communicate with a chip which is disposed reversibly or firmly in the terminal or temporarily on the terminal. Finkenzeller at claim 20 20. The transponder unit according to claim 16, including an energy supply associated with the transponder unit. To the extent this limitation is not disclosed by Finkenzeller, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Finkenzeller, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[1b] a smartcard controller coupled to the power source to receive power;	Finkenzeller discloses or renders obvious "a smartcard controller coupled to the power source to receive power." For example: Finkenzeller at Figure 2 FIG 2  Finkenzeller at Figure 8

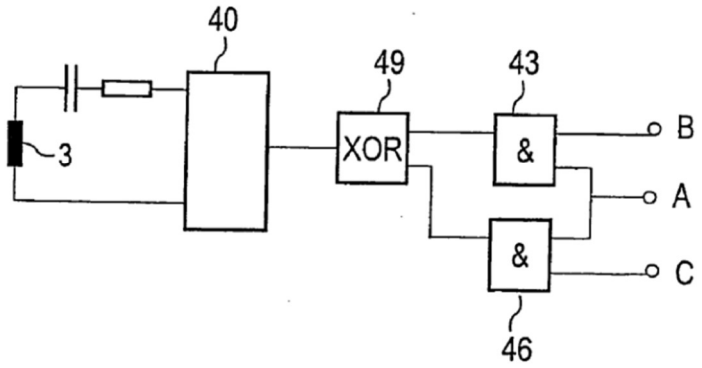
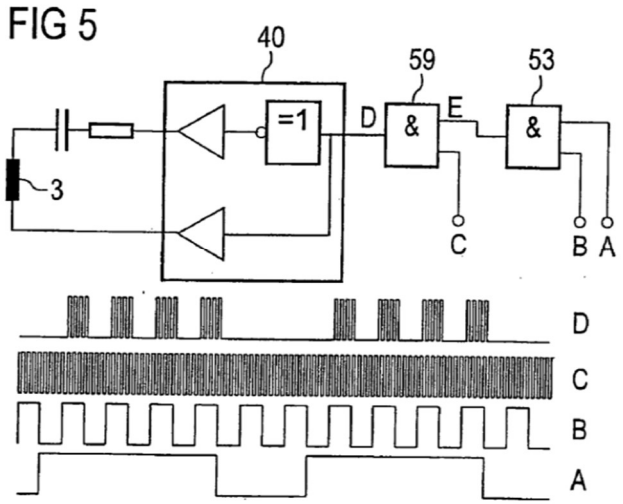
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	FIG 8  Finkenzeller at Figure 9 FIG 9 

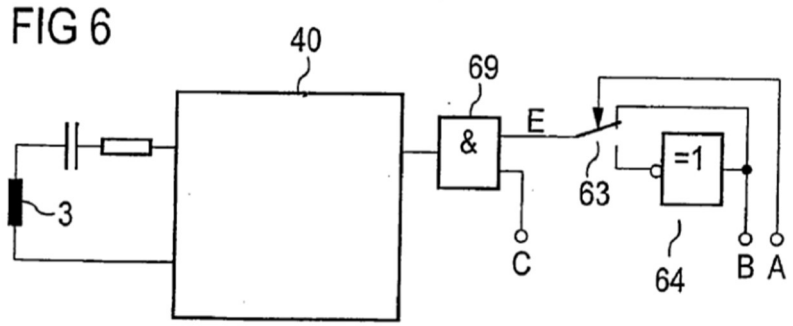
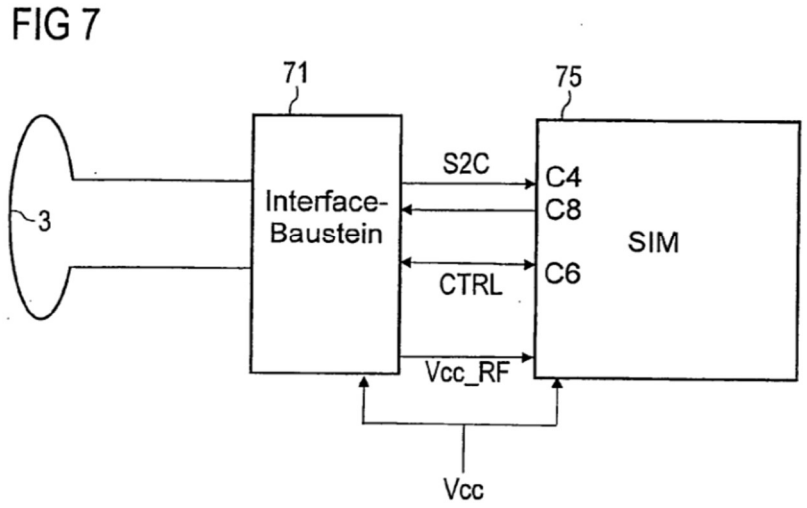
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	Finkenzeller at Figure 10  Finkenzeller at [0011] In an advantageous embodiment, an inventive RFID transponder unit has its own energy supply, at least one antenna for transmitting signals from and/or to a reading device, and an electronic circuit. The electronic circuit of the inventive transponder unit comprises a transmitter consisting of an oscillator and a modulator. Finkenzeller at [0048] The transponder unit 1 sends for data transfer to the reading device 100 a signal which the reading device 100 can evaluate as a signal of a transponder which carries out a load modulation of the field 110 of the reading device 100. Unlike the conventional transponders 200, 300 which modulate the field 110 of the reading device 100 into a modulated reading device field 102, 103, the transponder unit 1 thus generates and sends its own modulated field 20 as the signal for data transfer. The transponder unit 1 thus uses its own energy for the purpose of data transfer. Finkenzeller at [0055]

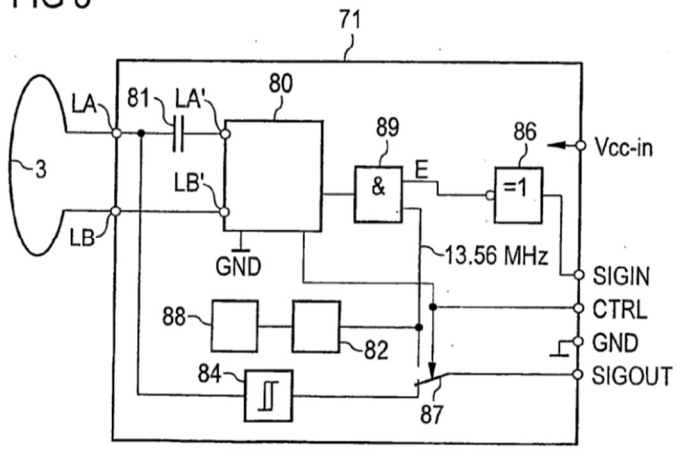
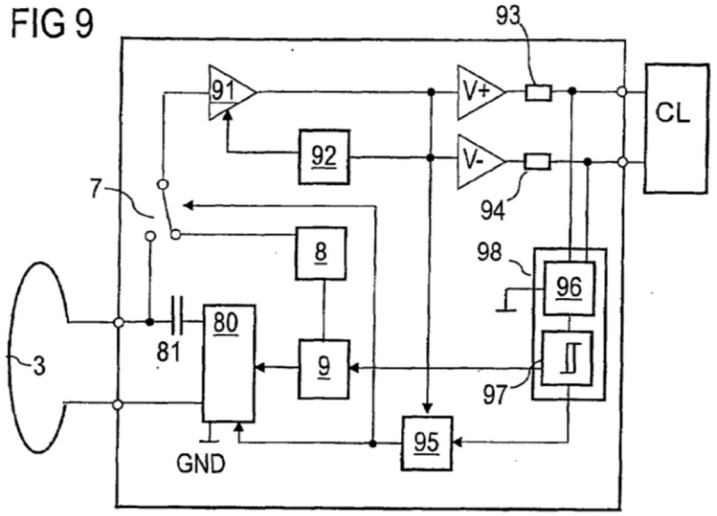
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	FIG. 2 shows purely schematically the transponder unit 1, for example in the form of an inductively coupled chip card, which comprises the usual components not shown explicitly here. For simplification, only one inventive RFID transponder unit in a chip card is shown. The transponder unit has a battery 2, an inductive antenna 3 and an electronic circuit 4, 5, 6, 7. The electronic circuit consists substantially of three functional blocks, a receiver 4, a controller 5 and a transmitter 6. A switch 7 is used for switching the antenna 3 between the receiver 4 and the transmitter 6. Finkenzeller at [0060] To supply the active components of the transponder unit at least partly with energy and to increase the energy range between the transponder unit 1 and the reading device 100, the inventive transponder unit has a battery 2. Finkenzeller at [0063] At the output of the ring modulator 9 an output signal is then available that contains the two modulation side bands and is identical (exactly enough) to a signal generated by load modulation or backscatter modulation. The output signal generated by the ring modulator 9 can then be optionally amplified by means of the amplifier 10, and be supplied to the antenna 3 for sending the data to be sent, via the switch 7 which is switched to the transmit mode of the transponder unit by a signal of the controller 5. Finkenzeller at [0065] The transponder unit 1 is operated in a first (active) operating mode as an actively sending transponder. In a second (passive) operating mode, however, the trans-ponder unit works like an ordinary passive transponder performing a load modulation on the field of the reading device. Finkenzeller at [0066] For example, the receiver 4 can additionally be formed as a conventional load modulator driven by the controller 5. The controller 5 then either switches the transmitter 6 on and the load modulator off, or the load modulator on and the transmitter 6 off. The switch 7 is switched accordingly. The criterion used for switching from a passive to an active operating state can be for example the received signal strength, the presence and/or sufficiency of an external voltage supply (on an optional connection Vcc not shown), or the sufficiency of an internal voltage supply (state of charge of the battery 2). It is thus for example possible to first operate a transponder unit 1 passively and switch it to an active operating mode if for example the distance from the reading device unintentionally increases. Finkenzeller at [0093]

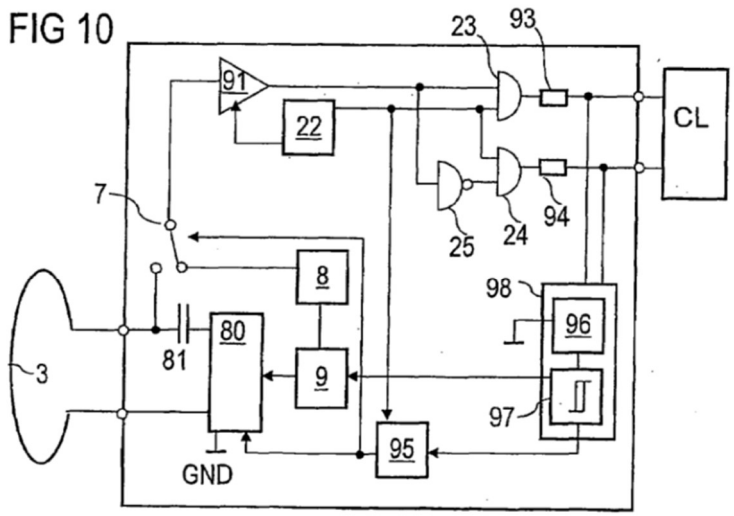
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	Both the interface module 71 and the chip 75 can draw their supply voltage from the device in which they are disposed preferably reversibly. The interface module 71 can act as an ordinary transponder in a second operating mode and supply the chip with an operating voltage Vcc_RF. Finkenzeller at [0127] It was ascertained that small antennas, e.g. in a SIM card with its own antenna (approx. 15×25 mm^2), obtain very low read ranges with a conventional load modulation. It is frequently even impossible to communicate with a contactless reading device when the SIM card with an antenna is disposed for example in a mobile telephone. If one of the inventive transmitters is used in a mobile terminal the range is not clearly increased. Moreover, it can be advantageously exploited that mobile terminals such as mobile telephones, PDAs, etc., have their own energy supply (battery) which can also be used for supplying an inventive circuit. Finkenzeller at [0129] Thus, an NFC unit could be adapted to behave according to the present solutions in its passive mode in the role ("being card") in which the NFC unit is to perform a load modulation. The NFC unit could for example always act as a component actively emitting its own field. Likewise, the NFC unit could also distinguish, and optionally switch, between a first submode corresponding to a conventional load modulation and an actively sending, second submode in which the load modulation is simulated. A thus improved NFC unit can also communicate with ordinary RFID reading devices over a higher range with the help of the changed passive operating mode. Since NFC units will already have certain units—such as an oscillator, an amplifier and a controller—for independent sending in their conventional active mode, comparatively few modifications of an NFC circuit are required to realize a circuit according to the present application in an NFC unit. Finkenzeller at [0131] The individual functional components of the transponder unit—antenna, interface unit, chip and optionally voltage supply unit—can be disposed in all sorts of combinations separately from each other or integrated jointly in one unit. An inventive transponder unit can be formed for example as a specially designed transponder, in a portable data carrier, in particular a chip card, which optionally has a battery. A portable data carrier, in particular SIM card, with a chip and an interface unit can be connected in a mobile terminal to an external voltage source and/or an external antenna. The interface unit can be disposed in a terminal, connected to its own or an external antenna, and communicate with a chip which is disposed reversibly or firmly in the terminal or temporarily on the terminal.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	To the extent this limitation is not disclosed by Finkenzeller, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Finkenzeller, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[1c] an antenna tuned to operate at substantially 13.56 MHz, wherein the antenna interacts with a Near Field Communication (NFC) reader external to the mobile device; and	Finkenzeller discloses or renders obvious "an antenna tuned to operate at substantially 13.56 MHz, wherein the antenna interacts with a Near Field Communication (NFC) reader external to the mobile device." For example: Finkenzeller at Abstract The invention relates to a transponder unit (1) and to a method for data transfer between the transponder unit and a reading device (100). To increase the range of data transfer from the transponder unit (1) to the reading device (100), the transponder unit (1) has means integrated therein for actively sending a signal to the reading device (100) which can be evaluated by the reading device (100) like a modulation of its own field (110) by a transponder. Finkenzeller at Figure 2 FIG 2  Finkenzeller at Figure 4

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	FIG 4  Finkenzeller at Figure 5 FIG 5 

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	Finkenzeller at Figure 6  Finkenzeller at Figure 7  Finkenzeller at Figure 8

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	FIG 8  Finkenzeller at Figure 9 FIG 9 

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	Finkenzeller at Figure 10  Finkenzeller at [0001] The present invention relates to a transponder unit which is integrated for example as a transponder in chip cards, value documents or mobile telephones, to a method for data transfer between the transponder unit and a transponder reading device, and to a system comprising the unit and the reading device. Finkenzeller at [0002] Transponders are used for example in radio frequency identification (RFID) systems. Conventionally, both the energy supply to a transponder in an RFID system and the data interchange between the transponder and a reading device are effected using magnetic or electromagnetic fields. RFID transponders have an electronic circuit and, depending on the frequency domain, an antenna coil (e.g. 13.56 MHz) or an electromagnetic antenna (e.g. 868 MHz). Via the antenna the energy required for operating the transponder can be taken from the field of the reading device, as well as the data transfer carried out. Finkenzeller at [0006]

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	For simple and fast contactless communication between two devices, the companies Philips and Sony have developed an inductive transmission technology which is known as so-called near field communication (NFC). This technology is integrated for example in mobile telephones or PDAs to permit communication between the devices or with a computer. The coupling of the two devices is effected via coils, the carrier frequency being 13.56 MHz as in RFID systems. As described more closely in the NFC standard ECMA 340, NFC systems have an active communication mode and a passive communication mode. In the active mode, two NFC units alternately generate their own RF field as a signal carrier, thus switching back and forth, coordinated with each other, between transmit mode and receive mode as in a classic mobile phone system. In the passive mode, however, the two NFC units must agree on which unit acts as a reading device and generates a field which the other unit can then influence by means of load modulation. Primarily due to the small antenna diameters used, NFC systems only permit small communication ranges of up to 20 cm. Finkenzeller at [0010] According to the invention, a transponder unit sends a signal to a transponder reading device, which can communicate with the transponders by means of modulation of its own field by transponders, in such a way that the reading device can evaluate the signal as modulation by a conventional transponder. Instead of performing a load modulation or backscatter modulation of a field of the reading device, the transponder unit itself thus emits a field that simulates for the reading device a modulation of the reading device field by a transponder. An inventive transponder unit has means for sending the accordingly modulated signal. The total range of the system is consequently no longer limited by the communication range of the reading device, but is extended therebeyond up to a transmit range of the transponder unit. Finkenzeller at [0011] In an advantageous embodiment, an inventive RFID transponder unit has its own energy supply, at least one antenna for transmitting signals from and/or to a reading device, and an electronic circuit. The electronic circuit of the inventive transponder unit comprises a transmitter consisting of an oscillator and a modulator. Finkenzeller at [0015] Both modulators (ring modulator and ASK modulator) modulate the oscillator signal by means of the (modulated) data signal and deliver an output signal which is then transmitted to the reading device via the receive antenna or a separate transmitting antenna. Finkenzeller at [0017]

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	A special advantage of using the described modulators is their compatibility to the prior art, since they deliver an output signal to be sent to the reading device whose (frequency and amplitude) spectrum is very similar to that of a load or backscatter modulation, as described above. Therefore, no technical changes must be performed on conventional reading devices. The inventive transponder can thus be operated with commercially available RFID reading devices, the communication range being many times that of passive or even active transponders. For example, a commercially available ISO 14443 reading device which can communicate with an inductively coupled, contactless chip card according to the prior art over a distance of approx. 10 cm could communicate with an inventive transponder unit over many times this distance. Finkenzeller at [0022] The voltage induced on the antenna of the transponder unit can be a problem for the operation of the inventive modulator circuits if the distance between trans-ponder unit and reading device is small and the induced voltage is therefore accordingly great. Therefore, the data to be sent to the reading device which are generated in the controller are supplied alternatively to the load modulator or to the inventive circuit configuration with a modulator. The switchover between the load modulator and the circuit configuration is preferably effected automatically, in dependence on the level of voltage induced on the antenna. The switchover is effected in such a way that the load modulator is used within the normal communication range, and the inventive modulator outside the normal communication range. Finkenzeller at [0024] Furthermore, the transponder unit of the present invention can have a voltage limiter which is provided for limiting the voltage induced on the antenna by the reading device. This makes it possible, among other things, to avoid the above-described problem of overload when the transponder unit and the reading device are disposed a small distance apart. The voltage limiter used can be for example a shunt regulator. Finkenzeller at [0025] In particular for communication according to the standard ISO 14443 type A, exact timing is important. With conventional passive transponders, timing is ensured even in the transmit mode (load modulation) by the timing signal (13.56 MHz) continually received from the reading device. However, such a signal is no longer available in the transmit mode of an inventive circuit configuration. In one embodiment of the invention, an oscillator is therefore provided for example in the form of a quartz oscillator. Finkenzeller at [0026] To avoid a quartz oscillator, which has a large mounting form, an improved embodiment of the invention has the oscillator coupled in phase lock to the signal received from the reading device via a phase locked

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	loop (PLL) circuit when the trans-ponder unit is in the receive mode. In the transmit mode of the transponder unit, that is, during data transfer from the transponder unit to the reading device, the control voltage of the PLL circuit is kept constant so that the frequency of the oscillator is maintained as stable as possible. The PLL can also be referred to as tracking synchronization. The oscillator is so regulated that it follows in phase a reference signal, in the present case the timing signal of the reading device. The regulation circuit continuously compares the phase relationship of the two signals and adjusts that of the oscillator in case of an error signal. A PLL circuit is used primarily for frequency stabilization or synchronization of the oscillator. Additionally, it is possible to also supply the signal generated by the oscillator to the controller and use it as a timing signal relevant for timing. Finkenzeller at [0028] The transponder unit can also be part of a mobile terminal, for example a mobile telephone. The transponder unit can have its own antenna or use an antenna of the terminal. Finkenzeller at [0046] The conventional reading device 100 can exchange data with conventional passive transponders 200 within the energy range ER and with conventional active transponders 300 within the communication range KR. Finkenzeller at [0047] Depending on a type of system used, data can be transferred from the trans-ponders 200, 300 to the reading device 100 either by means of load modulation (inductive coupling) or by means of modulated backscatter cross section (electromagnetic backscatter coupling). Embodiments will preferably be described hereinafter for systems that transfer data to the reading device on the principle of load modulation. However, the individual aspects of the embodiments are largely also applicable analogously to systems that work on the principle of modulated backscatter cross sections of the transponder unit. Finkenzeller at [0048] The transponder unit 1 sends for data transfer to the reading device 100 a signal which the reading device 100 can evaluate as a signal of a transponder which carries out a load modulation of the field 110 of the reading device 100. Unlike the conventional transponders 200, 300 which modulate the field 110 of the reading device 100 into a modulated reading device field 102, 103, the transponder unit 1 thus generates and sends its own modulated field 20 as the signal for data transfer. The transponder unit 1 thus uses its own energy for the purpose of data transfer.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	Finkenzeller at [0049] To obtain a better signal-to-noise ratio, in an inductive system with a carrier frequency f_T of the RFID reading device of for example 13.56 MHz a subcarrier f_H with $f_H<f_T$, for example f_H=212 kHz, is used in the known way. The load resistance in the transponder unit is switched on and off at the frequency f_H, so that two subcarrier signals spaced $+/-f_H$ arise in the signal spectrum besides the strong signal of the carrier frequency f_T of the reading device. When the subcarrier is now modulated in the transponder unit 1 according to the data to be transferred, the modulation side bands carrying the information arise in the spectrum below and above the two subcarriers. The data to be transferred are thus contained equally in the side bands of the sub-carriers which are disposed on both sides of the two corresponding spectral lines in each case. Data transfer is effected here by ASK, FSK or PSK modulation of the sub-carrier in time with the data flow. In contrast to load modulation without a subcarrier, by which data are transferred in side bands around the carrier frequency of the reading device, the subcarrier signal can be filtered out and demodulated better in the reading device to thereby retrieve the data. Finkenzeller at [0055] FIG. 2 shows purely schematically the transponder unit 1, for example in the form of an inductively coupled chip card, which comprises the usual components not shown explicitly here. For simplification, only one inventive RFID transponder unit in a chip card is shown. The transponder unit has a battery 2, an inductive antenna 3 and an electronic circuit 4, 5, 6, 7. The electronic circuit consists substantially of three functional blocks, a receiver 4, a controller 5 and a transmitter 6. A switch 7 is used for switching the antenna 3 between the receiver 4 and the transmitter 6. Finkenzeller at [0056] The receiver 4 is provided for demodulating a signal transmitted from the reading device 100 to extract data therefrom. The extracted data are passed on to the controller 5 which processes them and generates data to be sent to the reading device 100. Furthermore, the controller 5 transmits a control signal to the switch 7 which switches between receive mode and transmit mode of the transponder unit. However, a separate antenna can instead be provided for sending. The controller 5 used can be for example a part of the operating system of a portable data carrier, such as a chip card. Finkenzeller at [0057] The transmitter 6 consists of an oscillator 8, a modulator, an execution as a ring modulator 9 first being described, and a terminal repeater 10. Furthermore, the transmitter 6 of the transponder unit shown in FIG. 2 is extended by an electronic assembly 11 for generating and modulating a subcarrier signal to carry

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	out the data transfer from the transponder unit to a reading device 100 with a subcarrier signal. Depending on the use of the transponder unit, the subcarrier signal can have different frequencies, for example 848 kHz according to ISO 14443, 424 kHz according to ISO 15693 and 212 kHz for LEGIC, but might also be completely omitted. Finkenzeller at [0063] At the output of the ring modulator 9 an output signal is then available that contains the two modulation side bands and is identical (exactly enough) to a signal generated by load modulation or backscatter modulation. The output signal generated by the ring modulator 9 can then be optionally amplified by means of the amplifier 10, and be supplied to the antenna 3 for sending the data to be sent, via the switch 7 which is switched to the transmit mode of the transponder unit by a signal of the controller 5. Finkenzeller at [0064] The direct connection of the ring modulator output to the antenna is likewise possible. However, it is then necessary to adapt the antenna accordingly, and take account of a possible reaction of the signal coupled in from the reading device on the ring modulator, since the same antenna is normally used for sending and receiving, and since the reading device sends continually. Finkenzeller at [0065] The transponder unit 1 is operated in a first (active) operating mode as an actively sending transponder. In a second (passive) operating mode, however, the trans-ponder unit works like an ordinary passive transponder performing a load modulation on the field of the reading device. Finkenzeller at [0066] For example, the receiver 4 can additionally be formed as a conventional load modulator driven by the controller 5. The controller 5 then either switches the transmitter 6 on and the load modulator off, or the load modulator on and the transmitter 6 off. The switch 7 is switched accordingly. The criterion used for switching from a passive to an active operating state can be for example the received signal strength, the presence and/or sufficiency of an external voltage supply (on an optional connection Vcc not shown), or the sufficiency of an internal voltage supply (state of charge of the battery 2). It is thus for example possible to first operate a transponder unit 1 passively and switch it to an active operating mode if for example the distance from the reading device unintentionally increases. Finkenzeller at [0069]

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	The input HF of the ring modulator 9 is fed with the high-frequency output signal of the oscillator 8. The frequency of the oscillator signal preferably corresponds exactly to the transmitting frequency of the reading device 100 (e.g. 13.56 MHz). The input NF of the ring modulator 9 is fed with a data signal in the baseband (e.g. for Felica system) or with a modulated subcarrier (e.g. for ISO 14443, ISO 15693), as described above. Finkenzeller at [0076] The signal D emitted by an antenna 3 to a reading device has a frequency spectrum that is like a frequency spectrum resulting by means of load modulation. The signal D can optionally be amplified by means of an amplifier 40. The amplifier 40 can be for example a push-pull amplifier with digital push-pull output amplifiers. Finkenzeller at [0078] In the transmitter according to FIG. 5 an amplitude-modulated subcarrier signal is generated, while the transmitter shown in FIG. 6 generates a phase-modulated subcarrier signal. This transmitter, like the transmitter of FIG. 5, is preferably used in an inventive transponder unit only when the data signal A is a binary signal. Correspondingly, the transmitter shown generates a BPSK signal (2-PSK, binary phase shift keying). A subcarrier signal B (e.g. 848 kHz for ISO/IEC 14443) and a carrier signal C (e.g. 13.56 MHz for ISO/IEC 14443) are thereby ANDed by means of the circuit 69. The data signal A in the baseband (e.g. NRZ or Manchester signal) switches the subcarrier signal B between an inverted and a non-inverted state with the help of a switch 63 and an inverter 64. This has an effect corresponding to a phase modulation by 180° (BPSK, binary phase keying). Finkenzeller at [0080] The following table shows a survey of logic operation on signals, electricity consumption and range for different digital modulation circuits (carrier frequency TF=13.56 MHz; subcarrier frequency HT=868 kHz and modulation signal MS in the baseband, Manchester 106 kbit/s). Finkenzeller at [0081] Upon data transfer from a transponder to the reading device an ASK-modulated subcarrier (OOK, on-off keying: HT r>MS) is used according to ISO/IEC 14443-3/type A at the initialization bit rate of 106 kbit/s. When this signal is simulated actively according to the inventive method, the required side bands can be generated most effectively with a ring modulator. The resulting double side band modulation (DSB) should show the best results with regard to communication range, since the carrier frequency (13.56 MHz) is suppressed and the available energy is provided in the side bands.

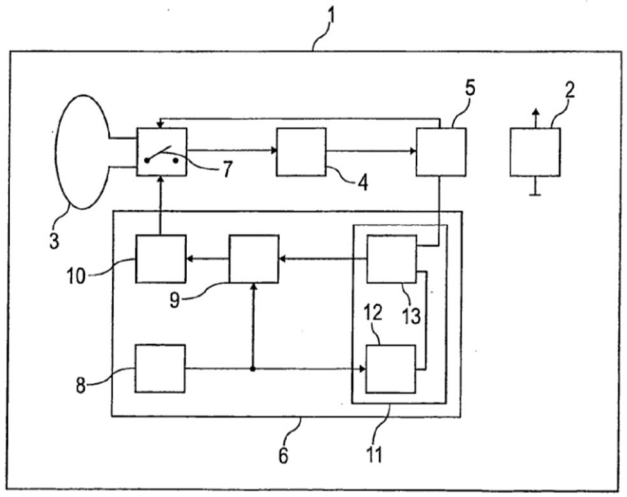
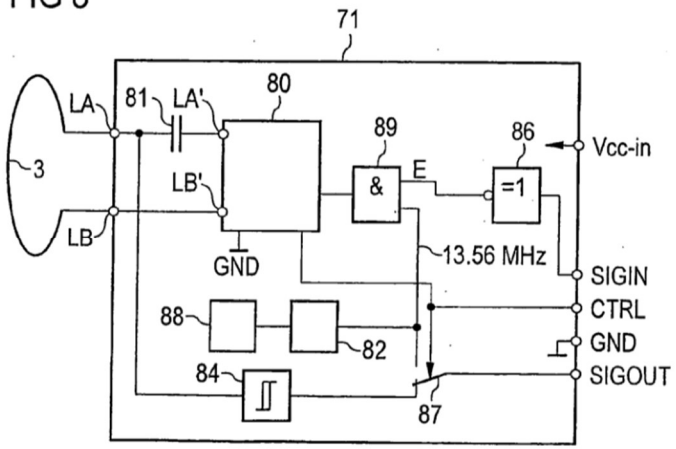
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	Finkenzeller at [0095] The interface module 71 is equipped with a signal input SIGIN and a signal output SIGOUT for passing signals from the antenna to the chip (not shown) and from the chip, which generates the modulated subcarrier signal, to the antenna. A signal at SIGOUT consists of a 13.56 MHz TTL signal which optionally contains a modulation signal of a remote reading device. Finkenzeller at [0098] When the interface module is in the transmit mode, i.e. there is a contactless data transfer to an external reading device or an NFC device, a modulated subcarrier signal is fed in at the signal input SIGIN by the smart card chip and optionally inverted in an inverter 86. The inverted signal E is combined with a 13.56 MHz carrier frequency signal in the AND gate 89 as the carrier frequency modulator, and supplied to the amplifier 80. Finkenzeller at [0100] Further, the smart card chip can be supplied a constant 13.56 MHz timing signal from the oscillator 88 via the output SIGOUT in the transmit mode via the switch 87, if it requires such an (external) timing signal for operation to keep exact timing. As described above, this is necessary for communication according to the standard ISO 14443 type A. Finkenzeller at [0101] In the receive mode, the smart card chip is supplied a digitized received signal tapped from the antenna 1, via the switch 87 and the output SIGOUT. The signal shaper 84 acts here as an amplifier to be able to receive even weak signals, and as a threshold switch to provide a digital output signal at the output of the signal shaper. For example, the threshold switch used can be a Schmitt trigger which outputs a clear high or low level depending on the over- or undershooting of a predetermined threshold value. Finkenzeller at [0102] Via the control input of the push-pull amplifier 80 the push-pull outputs of the output drivers (see amplifier units in FIG. 5) are switched to GND, so that the antenna 3 and the capacitor 41 result in a parallel-resonant circuit. To save energy, the amplifier 80 can be switched to a power save mode in the receive mode of the interface module. Finkenzeller at [0103]

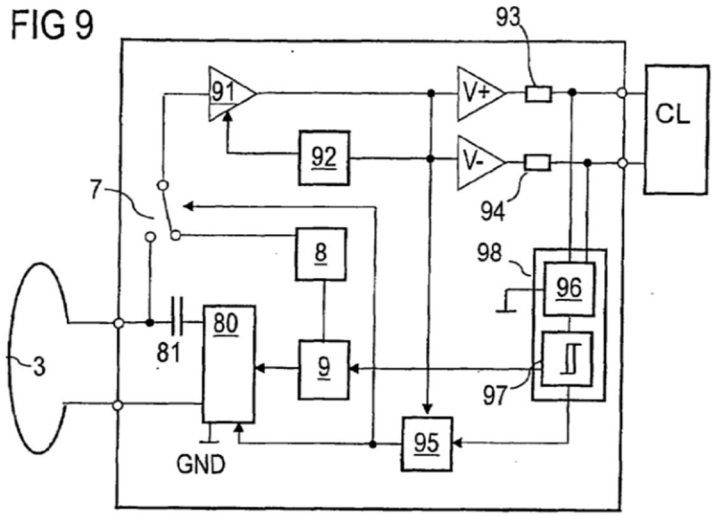
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	The oscillator 88 generates the 13.56 MHz carrier frequency signal required in the transmit mode. If the oscillator cannot be switched off in the receive mode since its building-up transient might last too long, the oscillator is operated in the receive mode of the interface module preferably at a multiple N of the carrier frequency signal (e.g. 27.120 MHz) so as not to disturb the possibly weak received signal by crosstalk. In the transmit mode the required 13.56 MHz signal can then be generated by dividing the oscillator signal by N by means of an optional divider 82. Finkenzeller at [0106] The inventive active transponder unit has a receive branch and a transmit branch. The receive branch consists of an antenna 3, an input amplifier 91, an automatic gain control 92 and an amplifier which is preferably designed as a push-pull amplifier (V+, V−). Further, a transponder chip CL is connected via its antenna connections to the push-pull amplifier. Finkenzeller at [0107] The transponder chip CL is a conventional RFID chip according to the prior art. It is normally connected at its connections with an antenna, e.g. in a chip card. Further, the transponder chip CL is so designed that data transfer from the transponder unit to a reading device is carried out by means of load modulation. This is almost always the case in usual RFID systems used at 13.56 MHz or also 125 kHz (e.g. ISO/IEC 14443, ISO/IEC 15693, ISO/IEC 18000-3). Finkenzeller at [0108] The transmit branch consists of a demodulation circuit 97, a modulator circuit 9, an oscillator 8 (e.g. 13.56 MHz), a controller 95, and a transmitter amplifier 80 connected to the antenna 3. The demodulation circuit 98 can consist for example of a rectifier 96 and a threshold switch 97. Finkenzeller at [0109] In the receive mode a voltage is induced in the antenna 3 by the magnetic field of a remote RFID reading device. Together with the capacitor 81 the antenna 3 forms a parallel-resonant circuit whose resonant frequency corresponds approximately to the transmitting frequency of the RFID reading device. The voltage thus available on the resonant circuit is supplied to the input amplifier 91 via the switch 7. Via a gain control 92 the gain factor of the input amplifier 91 is now so adjusted that the output amplitude of the voltage amplified by the input amplifier 91 remains largely constant. The time constant of the control is preferably so adjusted here that the output voltage of the amplifier 91 remains constant in case of varying distance from the reading device (i.e. different levels of induced voltage in the coil 3), but modulation signals (e.g. 10% ASK with 106 kbit/s) are not suppressed by excessively fast control.

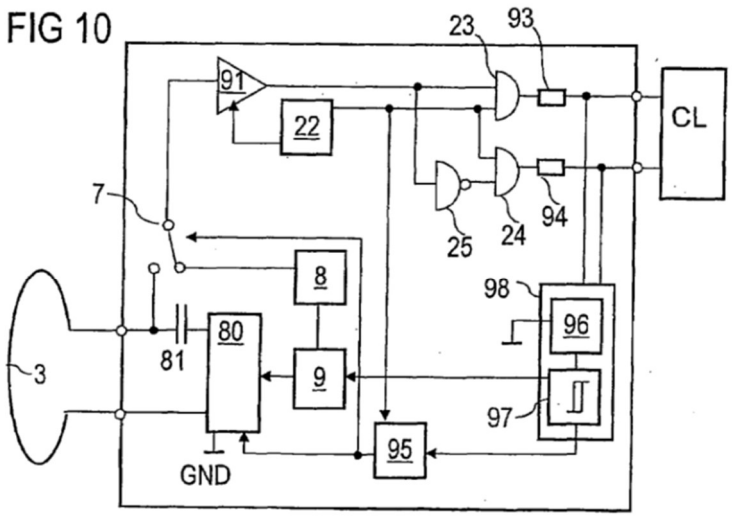
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	Finkenzeller at [0112] As soon as the RFID chip CL has received and processed a command, it tries to send a response back to the remote reading device. For this purpose the RFID chip normally uses a load modulation, i.e. an additional parallel resistor in the chip is switched on and off in time with the modulation signal. This leads to measurable fluctuations in the voltage drop across the resistors 93, 94. In other words, the HF alternating voltage at the connections is modulated in amplitude. By the demodulator circuit 98 this amplitude-modulated alternating voltage signal is demodulated and the original modulation signal thus reconstructed again. Finkenzeller at [0114] The modulation signal reconstructed by the demodulation circuit 97 is also supplied to a controller 95. The latter switches the inventive circuit with the first edge of the modulation signal to a transmit mode without delay if possible, so that the data generated by the RFID chip CL can also be transferred to the remote reading device. For this purpose, the switch 7 is first switched from the antenna 3 to the oscillator 8 (13.56 MHz). This is necessary to be able to keep supplying the RFID chip CL with an alternating voltage of the right frequency. At the same time the amplifier 80 is activated by the controller 95. Finkenzeller at [0115] The reconstructed modulation signal and the signal of the oscillator 8 are supplied to the modulator circuit 9. The exact function of such a circuit has already been described in detail. The output signal of the modulator circuit 9 is supplied to the amplifier 80 and sent via the antenna 3 to the remote reading device. Finkenzeller at [0117] An important role is played by the signal received by the controller 95 from the receive branch (91, 92 V+, V−). When a reading device sends data to the trans-ponder unit by means of an amplitude modulation of the emitted field (e.g. 150/IEC 14443-A: 100% ASK, ISO/IEC 14443-B: 10% ASK), this modulation is also passed on to the transponder chip CL. The demodulation circuit 98 can possibly not distinguish here between a modulation signal from a reading device and a load modulation of the RFID chip CL, since both are expressed as amplitude modulation of the HF signal on the connections of the RFID chip CL. Finkenzeller at [0119] A second way of distinguishing is to evaluate the modulation depth of the signal on the connections of the RFID chip. By load modulation a modulation depth less than 100% is obtained. In the breadboard setup approx. 25% was determined, other values arise from combining different resistors 93, 94 with different

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	RFID chips CL. It is therefore provided to distinguish between the load modulation and the modulation of the reading device by determining modulation depth with reference to given switching thresholds. If the strength of the modulation signal is above a first, high threshold, a signal from the reading device is present. If the modulation signal is smaller than the first switching threshold and optionally greater than a second switching threshold, however, it is recognized that a load modulation is present. A switch-over to the transmit mode is effected if the modulation was caused by a load modulation. Finkenzeller at [0123] For an inductive coupling, the circuit has an additional antenna 29 which can be made to resonate with the working frequency (e.g. 13.56 MHz) by means of a capacitor 26. A transponder comprising a transponder chip CL and an antenna 28 is positioned in immediate proximity to the antenna 29, so as to obtain the best possible magnetic coupling between the antennas 28 and 29. A load modulation of the transponder chip CL can also be detected easily with this arrangement. Finkenzeller at [0124] The interface module adapted to be coupled inductively and a further antenna connected thereto (see reference sign 3 in FIG. 10) can be disposed in a terminal. The range of an ordinary transponder can be increased with the help of such a terminal. The owner of a mobile telephone could for example set up a communication between his transponder and a reading device that is unfavorably disposed or inconvenient to reach for other reasons by holding the transponder against his mobile telephone provided according to the invention with an interface module adapted to be coupled inductively. Finkenzeller at [0127] It was ascertained that small antennas, e.g. in a SIM card with its own antenna (approx. 15×25 mm^2), obtain very low read ranges with a conventional load modulation. It is frequently even impossible to communicate with a contactless reading device when the SIM card with an antenna is disposed for example in a mobile telephone. If one of the inventive transmitters is used in a mobile terminal the range is not clearly increased. Moreover, it can be advantageously exploited that mobile terminals such as mobile telephones, PDAs, etc., have their own energy supply (battery) which can also be used for supplying an inventive circuit. Finkenzeller at [0129] Thus, an NFC unit could be adapted to behave according to the present solutions in its passive mode in the role ("being card") in which the NFC unit is to perform a load modulation. The NFC unit could for example always act as a component actively emitting its own field. Likewise, the NFC unit could also

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	distinguish, and optionally switch, between a first submode corresponding to a conventional load modulation and an actively sending, second submode in which the load modulation is simulated. A thus improved NFC unit can also communicate with ordinary RFID reading devices over a higher range with the help of the changed passive operating mode. Since NFC units will already have certain units—such as an oscillator, an amplifier and a controller—for independent sending in their conventional active mode, comparatively few modifications of an NFC circuit are required to realize a circuit according to the present application in an NFC unit. Finkenzeller at [0131] The individual functional components of the transponder unit—antenna, interface unit, chip and optionally voltage supply unit—can be disposed in all sorts of combinations separately from each other or integrated jointly in one unit. An inventive transponder unit can be formed for example as a specially designed transponder, in a portable data carrier, in particular a chip card, which optionally has a battery. A portable data carrier, in particular SIM card, with a chip and an interface unit can be connected in a mobile terminal to an external voltage source and/or an external antenna. The interface unit can be disposed in a terminal, connected to its own or an external antenna, and communicate with a chip which is disposed reversibly or firmly in the terminal or temporarily on the terminal. *See also* Finkenzeller at [0007], [0021], [0073], [0075], [0092], [0096], [0099], [0126], and claim 19. To the extent this limitation is not disclosed by Finkenzeller, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Finkenzeller, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[1d] an active transmit driver circuit coupled to the power source to receive the power, wherein the active transmit driver circuit affects transmission of data between the antenna and the NFC reader.	Finkenzeller discloses or renders obvious "an active transmit driver circuit coupled to the power source to receive the power, wherein the active transmit driver circuit affects transmission of data between the antenna and the NFC reader." For example: Finkenzeller at Figure 2

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	FIG 2  Finkenzeller at Figure 8 FIG 8 

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	Finkenzeller at Figure 9  Finkenzeller at Figure 10

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	FIG 10  Finkenzeller at [0004] The range within which communication is possible in the system by data transfer can be increased by using active transponders, that is, transponders with their own energy supply. The energy supply of the active transponder, for example in form of a battery, operates its electronic circuit. Conventional transponders without their own energy supply are referred to as passive transponders, in contrast. Finkenzeller at [0006] For simple and fast contactless communication between two devices, the companies Philips and Sony have developed an inductive transmission technology which is known as so-called near field communication (NFC). This technology is integrated for example in mobile telephones or PDAs to permit communication between the devices or with a computer. The coupling of the two devices is effected via coils, the carrier frequency being 13.56 MHz as in RFID systems. As described more closely in the NFC standard ECMA 340, NFC systems have an active communication mode and a passive communication mode. In the active mode, two NFC units alternately generate their own RF field as a signal carrier, thus switching back and forth, coordinated with each other, between transmit mode and receive mode as in a classic mobile phone system. In the passive mode, however, the two NFC units must agree on which unit acts as a reading device and generates a field which the other unit can then influence by means of load

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	modulation. Primarily due to the small antenna diameters used, NFC systems only permit small communication ranges of up to 20 cm. Finkenzeller at [0010] According to the invention, a transponder unit sends a signal to a transponder reading device, which can communicate with the transponders by means of modulation of its own field by transponders, in such a way that the reading device can evaluate the signal as modulation by a conventional transponder. Instead of performing a load modulation or backscatter modulation of a field of the reading device, the transponder unit itself thus emits a field that simulates for the reading device a modulation of the reading device field by a transponder. An inventive transponder unit has means for sending the accordingly modulated signal. The total range of the system is consequently no longer limited by the communication range of the reading device, but is extended therebeyond up to a transmit range of the transponder unit. Finkenzeller at [0011] In an advantageous embodiment, an inventive RFID transponder unit has its own energy supply, at least one antenna for transmitting signals from and/or to a reading device, and an electronic circuit. The electronic circuit of the inventive transponder unit comprises a transmitter consisting of an oscillator and a modulator. Finkenzeller at [0015] Both modulators (ring modulator and ASK modulator) modulate the oscillator signal by means of the (modulated) data signal and deliver an output signal which is then transmitted to the reading device via the receive antenna or a separate transmitting antenna. Finkenzeller at [0017] A special advantage of using the described modulators is their compatibility to the prior art, since they deliver an output signal to be sent to the reading device whose (frequency and amplitude) spectrum is very similar to that of a load or backscatter modulation, as described above. Therefore, no technical changes must be performed on conventional reading devices. The inventive transponder can thus be operated with commercially available RFID reading devices, the communication range being many times that of passive or even active transponders. For example, a commercially available ISO 14443 reading device which can communicate with an inductively coupled, contactless chip card according to the prior art over a distance of approx. 10 cm could communicate with an inventive transponder unit over many times this distance. Finkenzeller at [0021]

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	In a development, the inventive transponder unit has a load modulator according to the prior art, in addition to the above-described circuit having a receiver, a controller, an oscillator and a modulator. Finkenzeller at [0022] The voltage induced on the antenna of the transponder unit can be a problem for the operation of the inventive modulator circuits if the distance between trans-ponder unit and reading device is small and the induced voltage is therefore accordingly great. Therefore, the data to be sent to the reading device which are generated in the controller are supplied alternatively to the load modulator or to the inventive circuit configuration with a modulator. The switchover between the load modulator and the circuit configuration is preferably effected automatically, in dependence on the level of voltage induced on the antenna. The switchover is effected in such a way that the load modulator is used within the normal communication range, and the inventive modulator outside the normal communication range. Finkenzeller at [0027] The possibility of reading the inventive transponder unit over very large distances is not always desired, for example for privacy protection. It is therefore provided in one embodiment that the inventive circuit configuration can be activated manually if communication over a long range is explicitly desired. Otherwise, communication can be effected via a load modulator provided in the transponder unit, which is usable only for short distances. If no load modulator is provided in the trans-ponder unit, it can be provided for example that the transponder unit is activated for sending data only if the signal emitted by the reading device contains a predetermined code. Finkenzeller at [0048] The transponder unit 1 sends for data transfer to the reading device 100 a signal which the reading device 100 can evaluate as a signal of a transponder which carries out a load modulation of the field 110 of the reading device 100. Unlike the conventional transponders 200, 300 which modulate the field 110 of the reading device 100 into a modulated reading device field 102, 103, the transponder unit 1 thus generates and sends its own modulated field 20 as the signal for data transfer. The transponder unit 1 thus uses its own energy for the purpose of data transfer. Finkenzeller at [0055] FIG. 2 shows purely schematically the transponder unit 1, for example in the form of an inductively coupled chip card, which comprises the usual components not shown explicitly here. For simplification, only one inventive RFID transponder unit in a chip card is shown. The transponder unit has a battery 2, an inductive antenna 3 and an electronic circuit 4, 5, 6, 7. The electronic circuit consists substantially of three

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	functional blocks, a receiver 4, a controller 5 and a transmitter 6. A switch 7 is used for switching the antenna 3 between the receiver 4 and the transmitter 6. Finkenzeller at [0056] The receiver 4 is provided for demodulating a signal transmitted from the reading device 100 to extract data therefrom. The extracted data are passed on to the controller 5 which processes them and generates data to be sent to the reading device 100. Furthermore, the controller 5 transmits a control signal to the switch 7 which switches between receive mode and transmit mode of the transponder unit. However, a separate antenna can instead be provided for sending. The controller 5 used can be for example a part of the operating system of a portable data carrier, such as a chip card. Finkenzeller at [0057] The transmitter 6 consists of an oscillator 8, a modulator, an execution as a ring modulator 9 first being described, and a terminal repeater 10. Furthermore, the transmitter 6 of the transponder unit shown in FIG. 2 is extended by an electronic assembly 11 for generating and modulating a subcarrier signal to carry out the data transfer from the transponder unit to a reading device 100 with a subcarrier signal. Depending on the use of the transponder unit, the subcarrier signal can have different frequencies, for example 848 kHz according to ISO 14443, 424 kHz according to ISO 15693 and 212 kHz for LEGIC, but might also be completely omitted. Finkenzeller at [0060] To supply the active components of the transponder unit at least partly with energy and to increase the energy range between the transponder unit 1 and the reading device 100, the inventive transponder unit has a battery 2. Finkenzeller at [0063] At the output of the ring modulator 9 an output signal is then available that contains the two modulation side bands and is identical (exactly enough) to a signal generated by load modulation or backscatter modulation. The output signal generated by the ring modulator 9 can then be optionally amplified by means of the amplifier 10, and be supplied to the antenna 3 for sending the data to be sent, via the switch 7 which is switched to the transmit mode of the transponder unit by a signal of the controller 5. Finkenzeller at [0065]

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	The transponder unit 1 is operated in a first (active) operating mode as an actively sending transponder. In a second (passive) operating mode, however, the trans-ponder unit works like an ordinary passive transponder performing a load modulation on the field of the reading device. Finkenzeller at [0066] For example, the receiver 4 can additionally be formed as a conventional load modulator driven by the controller 5. The controller 5 then either switches the transmitter 6 on and the load modulator off, or the load modulator on and the transmitter 6 off. The switch 7 is switched accordingly. The criterion used for switching from a passive to an active operating state can be for example the received signal strength, the presence and/or sufficiency of an external voltage supply (on an optional connection Vcc not shown), or the sufficiency of an internal voltage supply (state of charge of the battery 2). It is thus for example possible to first operate a transponder unit 1 passively and switch it to an active operating mode if for example the distance from the reading device unintentionally increases. Finkenzeller at [0073] Just as in the structure according to FIG. 2, the binary data signal A is combined with a subcarrier signal B by an AND gate 43. The combined signal is available at a ring modulator 49. The digital ring modulator 49 used can be an XOR element. Departing from the structure of the transmitter in FIG. 2, a carrier signal C is not applied directly to the input of the ring modulator 49. Instead, the carrier signal C is first combined with a data signal A in an AND gate 46. This arrangement obtains better efficiency, as to be described more closely below. The output signal of the ring modulator 49 is amplified in an amplifier 40 before being emitted via the antenna 3 as the field of the transponder unit. The signal types A to C will hereinafter be described more closely by way of example with reference to FIG. 5. Finkenzeller at [0076] The signal D emitted by an antenna 3 to a reading device has a frequency spectrum that is like a frequency spectrum resulting by means of load modulation. The signal D can optionally be amplified by means of an amplifier 40. The amplifier 40 can be for example a push-pull amplifier with digital push-pull output amplifiers. Finkenzeller at [0093] Both the interface module 71 and the chip 75 can draw their supply voltage from the device in which they are disposed preferably reversibly. The interface module 71 can act as an ordinary transponder in a second operating mode and supply the chip with an operating voltage Vcc_RF.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	Finkenzeller at [0096] The interface module 71 comprises an amplifier 80, an AND gate 89, an oscillator 88, a frequency divider 82, a signal shaper 84 and a switch 87. The amplifier 80 can be for example a push-pull amplifier with (digital) push-pull output amplifiers (not shown). The interface module also has two antenna connections LA and LB and a series capacitor 81. Furthermore, the interface module 71 has connections Vcc-in and GND for energy supply and a control input CTRL for switching between a transmit mode and a receive mode of the interface module by means of the switch 87. Finkenzeller at [0098] When the interface module is in the transmit mode, i.e. there is a contactless data transfer to an external reading device or an NFC device, a modulated subcarrier signal is fed in at the signal input SIGIN by the smart card chip and optionally inverted in an inverter 86. The inverted signal E is combined with a 13.56 MHz carrier frequency signal in the AND gate 89 as the carrier frequency modulator, and supplied to the amplifier 80. Finkenzeller at [0099] The antenna 3 and the series capacitor 81 form a series-resonant circuit which is connected to the outputs LA′ and LB′ of the amplifier 80, so that the HF current flowing in case of resonance is limited in the antenna resonant circuit only by the ohmic resistances in the lines and in the amplifier 80. This obtains a greatest possible transmit power of the interface module. Finkenzeller at [0100] Further, the smart card chip can be supplied a constant 13.56 MHz timing signal from the oscillator 88 via the output SIGOUT in the transmit mode via the switch 87, if it requires such an (external) timing signal for operation to keep exact timing. As described above, this is necessary for communication according to the standard ISO 14443 type A. Finkenzeller at [0103] The oscillator 88 generates the 13.56 MHz carrier frequency signal required in the transmit mode. If the oscillator cannot be switched off in the receive mode since its building-up transient might last too long, the oscillator is operated in the receive mode of the interface module preferably at a multiple N of the carrier frequency signal (e.g. 27.120 MHz) so as not to disturb the possibly weak received signal by crosstalk. In the transmit mode the required 13.56 MHz signal can then be generated by dividing the oscillator signal by N by means of an optional divider 82.

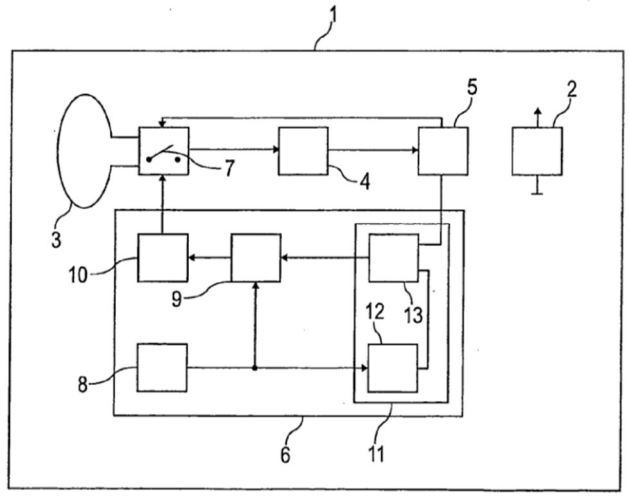
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	Finkenzeller at [0127] It was ascertained that small antennas, e.g. in a SIM card with its own antenna (approx. 15×25 mm^2), obtain very low read ranges with a conventional load modulation. It is frequently even impossible to communicate with a contactless reading device when the SIM card with an antenna is disposed for example in a mobile telephone. If one of the inventive transmitters is used in a mobile terminal the range is not clearly increased. Moreover, it can be advantageously exploited that mobile terminals such as mobile telephones, PDAs, etc., have their own energy supply (battery) which can also be used for supplying an inventive circuit. Finkenzeller at [0129] Thus, an NFC unit could be adapted to behave according to the present solutions in its passive mode in the role ("being card") in which the NFC unit is to perform a load modulation. The NFC unit could for example always act as a component actively emitting its own field. Likewise, the NFC unit could also distinguish, and optionally switch, between a first submode corresponding to a conventional load modulation and an actively sending, second submode in which the load modulation is simulated. A thus improved NFC unit can also communicate with ordinary RFID reading devices over a higher range with the help of the changed passive operating mode. Since NFC units will already have certain units—such as an oscillator, an amplifier and a controller—for independent sending in their conventional active mode, comparatively few modifications of an NFC circuit are required to realize a circuit according to the present application in an NFC unit. Finkenzeller at [0131] The individual functional components of the transponder unit—antenna, interface unit, chip and optionally voltage supply unit—can be disposed in all sorts of combinations separately from each other or integrated jointly in one unit. An inventive transponder unit can be formed for example as a specially designed transponder, in a portable data carrier, in particular a chip card, which optionally has a battery. A portable data carrier, in particular SIM card, with a chip and an interface unit can be connected in a mobile terminal to an external voltage source and/or an external antenna. The interface unit can be disposed in a terminal, connected to its own or an external antenna, and communicate with a chip which is disposed reversibly or firmly in the terminal or temporarily on the terminal. To the extent this limitation is not disclosed by Finkenzeller, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Finkenzeller, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

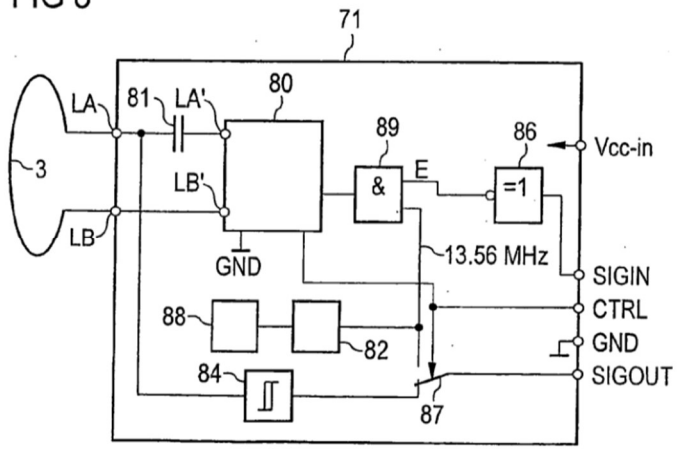
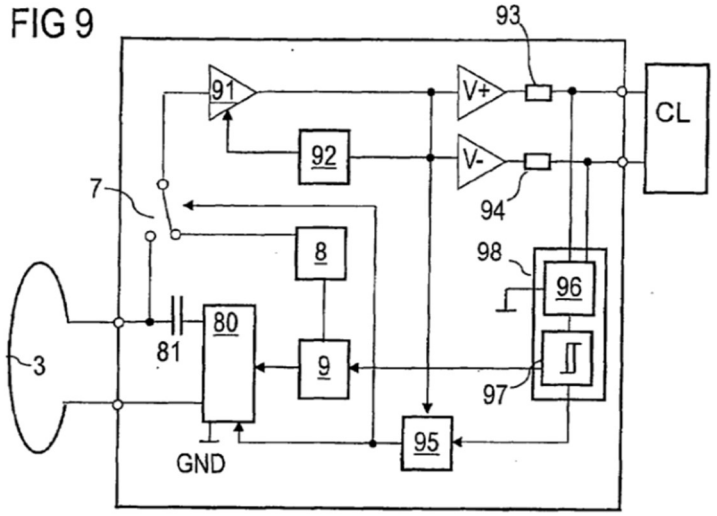
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
2. The mobile device of claim 1, wherein the transmitted data includes ticketing information for a mass transit system.	To the extent this limitation is not disclosed by Finkenzeller, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Finkenzeller, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 1 above.
3. The mobile device of claim 1, wherein the transmitted data includes transaction information for a mobile payment.	Finkenzeller discloses or renders obvious "[t]he mobile device of claim 1, wherein the transmitted data includes transaction information for a mobile payment." For example: Finkenzeller at [0054] Further, a mobile terminal comprising an inventive transponder unit could be used as a maintenance or monitoring unit for checking for operability, or remotely maintaining, a multiplicity of RFID reading devices, for example at the cash registers of a supermarket or an access system. To the extent this limitation is not disclosed by Finkenzeller, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Finkenzeller, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.\ *See also* claim 1 above.
4. The mobile device of claim 1, wherein the NFC reader is a point-of-sale NFC reader.	Finkenzeller discloses or renders obvious "[t]he mobile device of claim 1, wherein the NFC reader is a point-of-sale NFC reader." For example: Finkenzeller at [0054] Further, a mobile terminal comprising an inventive transponder unit could be used as a maintenance or monitoring unit for checking for operability, or remotely maintaining, a multiplicity of RFID reading devices, for example at the cash registers of a supermarket or an access system. To the extent this limitation is not disclosed by Finkenzeller, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Finkenzeller, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 1 above.
5. The mobile device of claim 1, wherein the antenna includes an inductive element.	Finkenzeller discloses or renders obvious "[t]he mobile device of claim 1, wherein the antenna includes an inductive element." For example: Finkenzeller at [0002]

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	Transponders are used for example in radio frequency identification (RFID) systems. Conventionally, both the energy supply to a transponder in an RFID system and the data interchange between the transponder and a reading device are effected using magnetic or electromagnetic fields. RFID transponders have an electronic circuit and, depending on the frequency domain, an antenna coil (e.g. 13.56 MHz) or an electromagnetic antenna (e.g. 868 MHz). Via the antenna the energy required for operating the transponder can be taken from the field of the reading device, as well as the data transfer carried out. Finkenzeller at [0004] The range within which communication is possible in the system by data transfer can be increased by using active transponders, that is, transponders with their own energy supply. The energy supply of the active transponder, for example in form of a battery, operates its electronic circuit. Conventional transponders without their own energy supply are referred to as passive transponders, in contrast. Finkenzeller at [0006] For simple and fast contactless communication between two devices, the companies Philips and Sony have developed an inductive transmission technology which is known as so-called near field communication (NFC). This technology is integrated for example in mobile telephones or PDAs to permit communication between the devices or with a computer. The coupling of the two devices is effected via coils, the carrier frequency being 13.56 MHz as in RFID systems. As described more closely in the NFC standard ECMA 340, NFC systems have an active communication mode and a passive communication mode. In the active mode, two NFC units alternately generate their own RF field as a signal carrier, thus switching back and forth, coordinated with each other, between transmit mode and receive mode as in a classic mobile phone system. In the passive mode, however, the two NFC units must agree on which unit acts as a reading device and generates a field which the other unit can then influence by means of load modulation. Primarily due to the small antenna diameters used, NFC systems only permit small communication ranges of up to 20 cm. Finkenzeller at [0007] Even with active transponders there is the problem that data transfer from the transponder to the reading device is limited by the signals becoming weaker with increasing distance between reading device and transponder. As a rule, ranges no longer than 1 to 2 m can therefore be obtained even with an active transponder for example in inductively coupled systems which transfer data to the reading device on the principle of load modulation. For RFID systems working on the principle of backscatter, however, communication ranges of 10 m are typically obtained.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	Finkenzeller at [0022] The voltage induced on the antenna of the transponder unit can be a problem for the operation of the inventive modulator circuits if the distance between trans-ponder unit and reading device is small and the induced voltage is therefore accordingly great. Therefore, the data to be sent to the reading device which are generated in the controller are supplied alternatively to the load modulator or to the inventive circuit configuration with a modulator. The switchover between the load modulator and the circuit configuration is preferably effected automatically, in dependence on the level of voltage induced on the antenna. The switchover is effected in such a way that the load modulator is used within the normal communication range, and the inventive modulator outside the normal communication range. Finkenzeller at [0024] Furthermore, the transponder unit of the present invention can have a voltage limiter which is provided for limiting the voltage induced on the antenna by the reading device. This makes it possible, among other things, to avoid the above-described problem of overload when the transponder unit and the reading device are disposed a small distance apart. The voltage limiter used can be for example a shunt regulator. Finkenzeller at [0049] To obtain a better signal-to-noise ratio, in an inductive system with a carrier frequency f_T of the RFID reading device of for example 13.56 MHz a subcarrier f_H with $f_H<f_T$, for example f_H=212 kHz, is used in the known way. The load resistance in the transponder unit is switched on and off at the frequency f_H, so that two subcarrier signals spaced $+/-f_H$ arise in the signal spectrum besides the strong signal of the carrier frequency f_T of the reading device. When the subcarrier is now modulated in the transponder unit 1 according to the data to be transferred, the modulation side bands carrying the information arise in the spectrum below and above the two subcarriers. The data to be transferred are thus contained equally in the side bands of the sub-carriers which are disposed on both sides of the two corresponding spectral lines in each case. Data transfer is effected here by ASK, FSK or PSK modulation of the sub-carrier in time with the data flow. In contrast to load modulation without a subcarrier, by which data are transferred in side bands around the carrier frequency of the reading device, the subcarrier signal can be filtered out and demodulated better in the reading device to thereby retrieve the data. Finkenzeller at [0055] FIG. 2 shows purely schematically the transponder unit 1, for example in the form of an inductively coupled chip card, which comprises the usual components not shown explicitly here. For simplification, only one inventive RFID transponder unit in a chip card is shown. The transponder unit has a battery 2, an

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	inductive antenna 3 and an electronic circuit 4, 5, 6, 7. The electronic circuit consists substantially of three functional blocks, a receiver 4, a controller 5 and a transmitter 6. A switch 7 is used for switching the antenna 3 between the receiver 4 and the transmitter 6. Finkenzeller at [0123] For an inductive coupling, the circuit has an additional antenna 29 which can be made to resonate with the working frequency (e.g. 13.56 MHz) by means of a capacitor 26. A transponder comprising a transponder chip CL and an antenna 28 is positioned in immediate proximity to the antenna 29, so as to obtain the best possible magnetic coupling between the antennas 28 and 29. A load modulation of the transponder chip CL can also be detected easily with this arrangement. Finkenzeller at [0124] The interface module adapted to be coupled inductively and a further antenna connected thereto (see reference sign 3 in FIG. 10) can be disposed in a terminal. The range of an ordinary transponder can be increased with the help of such a terminal. The owner of a mobile telephone could for example set up a communication between his transponder and a reading device that is unfavorably disposed or inconvenient to reach for other reasons by holding the transponder against his mobile telephone provided according to the invention with an interface module adapted to be coupled inductively. Finkenzeller at [0126] As can be seen from the table, long communication ranges are achieved with the inventive method even with very small antennas. Finkenzeller at [0127] It was ascertained that small antennas, e.g. in a SIM card with its own antenna (approx. 15×25 mm^2), obtain very low read ranges with a conventional load modulation. It is frequently even impossible to communicate with a contactless reading device when the SIM card with an antenna is disposed for example in a mobile telephone. If one of the inventive transmitters is used in a mobile terminal the range is not clearly increased. Moreover, it can be advantageously exploited that mobile terminals such as mobile telephones, PDAs, etc., have their own energy supply (battery) which can also be used for supplying an inventive circuit. To the extent this limitation is not disclosed by Finkenzeller, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Finkenzeller, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	See also claim 1 above.
6. The mobile device of claim 1, wherein the active transmit driver circuit includes one or more of an amplifier filter, oscillator, and/or modulator.	Finkenzeller discloses or renders obvious "[t]he mobile device of claim 1, wherein the active transmit driver circuit includes one or more of an amplifier filter, oscillator, and/or modulator." For example: Finkenzeller at Figure 2 FIG 2  Finkenzeller at Figure 8

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	FIG 8  Finkenzeller at Figure 9 FIG 9 

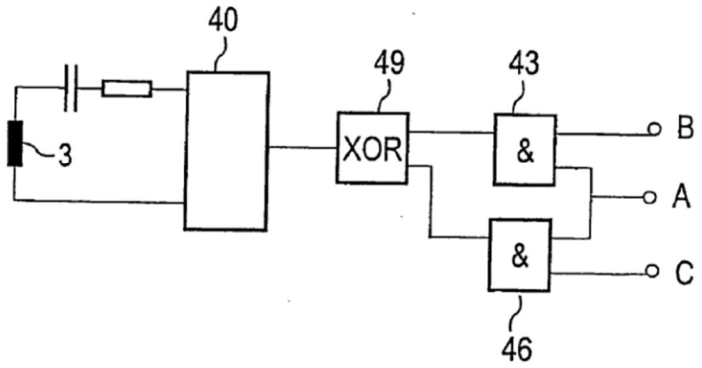
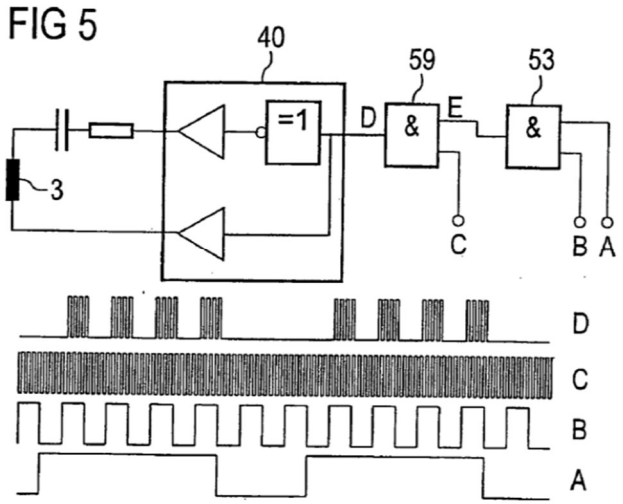
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	Finkenzeller at [0011] In an advantageous embodiment, an inventive RFID transponder unit has its own energy supply, at least one antenna for transmitting signals from and/or to a reading device, and an electronic circuit. The electronic circuit of the inventive transponder unit comprises a transmitter consisting of an oscillator and a modulator. Finkenzeller at [0012] In a first alternative, the modulator comprises a ring modulator. The oscillator is coupled with the battery and provided to deliver an oscillator signal to the ring modulator. Furthermore, the ring modulator is supplied via a second input the data signal which either is generated in a controller of the transponder unit or which the transponder unit feeds in externally. Before being supplied to the ring modulator, the data signal can be modulated with a subcarrier. It is characteristic of the ring modulator that it performs a DSB modulation (double side-band modulation) and is usable independently of the form of the data signal (analog or digital). Finkenzeller at [0014] In a second alternative, the modulator performs a logical ANDing of a carrier frequency signal with a modulated subcarrier signal. This modulator for logically combining two signals is preferably used only when the data signal is a binary signal (2-ASK, BPSK). In this case, the ring modulator can be omitted in the transponder unit. An analog ring modulator must only be used in case of a multilevel modulation (e.g. 4-ASK, 16-ASK, 4-PSK, 16-ASK, etc.) or analog signals, to increase the range of data transfer compared with conventional systems. An advantage of a modulator for logical ANDing of two signals is that it is simpler to realize in comparison with an analog ring modulator. Finkenzeller at [0016] In a preferred embodiment, the modulator comprises a carrier frequency modulator, for example in the form of the ring modulator or ASK modulator, and a subcarrier modulator. Finkenzeller at [0021] In a development, the inventive transponder unit has a load modulator according to the prior art, in addition to the above-described circuit having a receiver, a controller, an oscillator and a modulator. Finkenzeller at [0022]

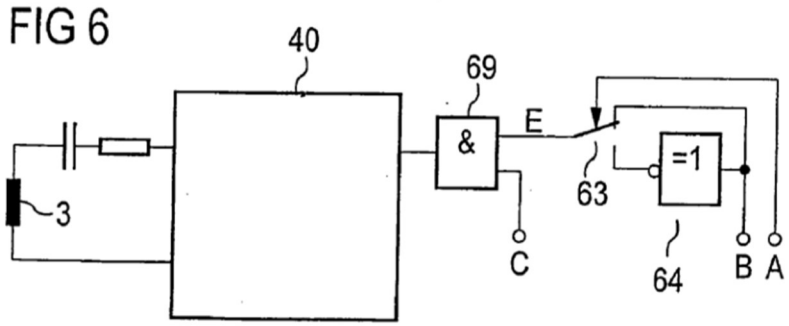
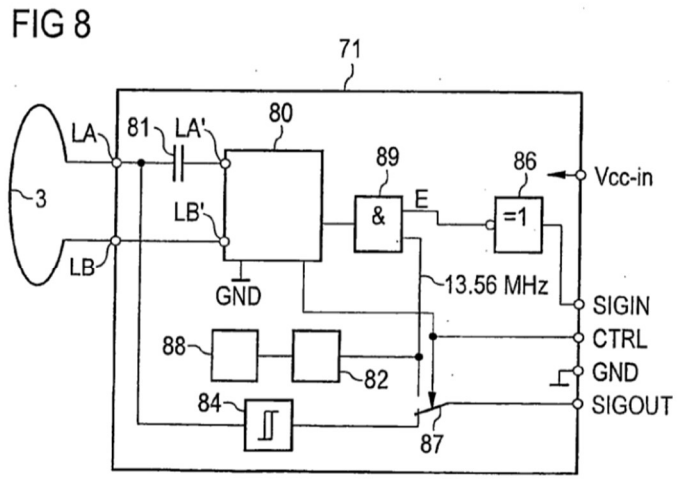
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	The voltage induced on the antenna of the transponder unit can be a problem for the operation of the inventive modulator circuits if the distance between trans-ponder unit and reading device is small and the induced voltage is therefore accordingly great. Therefore, the data to be sent to the reading device which are generated in the controller are supplied alternatively to the load modulator or to the inventive circuit configuration with a modulator. The switchover between the load modulator and the circuit configuration is preferably effected automatically, in dependence on the level of voltage induced on the antenna. The switchover is effected in such a way that the load modulator is used within the normal communication range, and the inventive modulator outside the normal communication range. Finkenzeller at [0025] In particular for communication according to the standard ISO 14443 type A, exact timing is important. With conventional passive transponders, timing is ensured even in the transmit mode (load modulation) by the timing signal (13.56 MHz) continually received from the reading device. However, such a signal is no longer available in the transmit mode of an inventive circuit configuration. In one embodiment of the invention, an oscillator is therefore provided for example in the form of a quartz oscillator. Finkenzeller at [0057] The transmitter 6 consists of an oscillator 8, a modulator, an execution as a ring modulator 9 first being described, and a terminal repeater 10. Furthermore, the transmitter 6 of the transponder unit shown in FIG. 2 is extended by an electronic assembly 11 for generating and modulating a subcarrier signal to carry out the data transfer from the transponder unit to a reading device 100 with a subcarrier signal. Depending on the use of the transponder unit, the subcarrier signal can have different frequencies, for example 848 kHz according to ISO 14443, 424 kHz according to ISO 15693 and 212 kHz for LEGIC, but might also be completely omitted. Finkenzeller at [0058] In the transponder unit shown in FIG. 2 it is provided that the assembly 11 divides the oscillator frequency by a certain factor by means of a frequency divider 12, for example by binary division. The resulting subcarrier signal is modulated with the data to be sent which are supplied to the assembly 11 by the controller 5. Finkenzeller at [0061] Both the oscillator signal and the ASK-modulated signal generated in the assembly 11 are supplied to the ring modulator 9, whose circuit arrangement will be described more closely below with reference to FIG. 3.

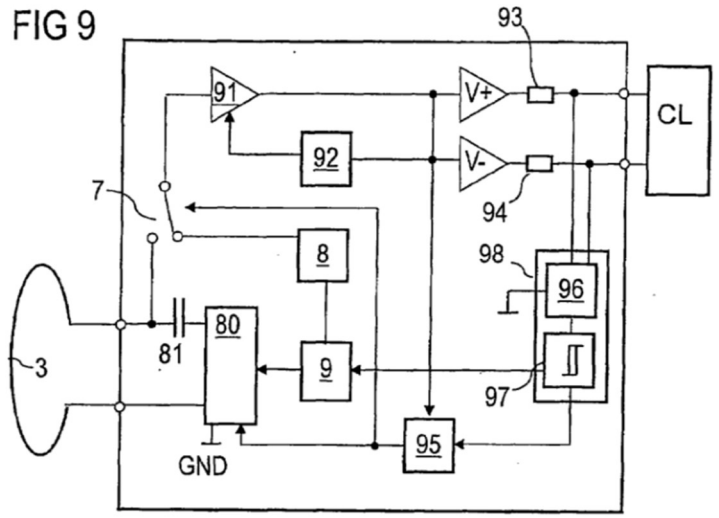
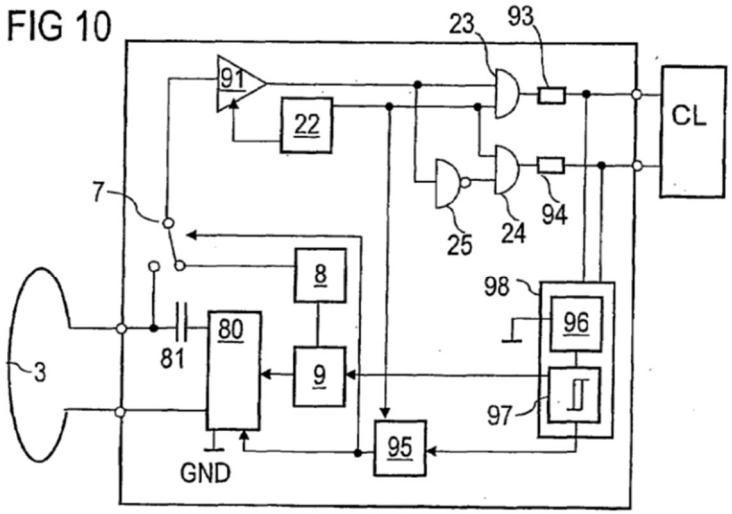
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	Finkenzeller at [0063] At the output of the ring modulator 9 an output signal is then available that contains the two modulation side bands and is identical (exactly enough) to a signal generated by load modulation or backscatter modulation. The output signal generated by the ring modulator 9 can then be optionally amplified by means of the amplifier 10, and be supplied to the antenna 3 for sending the data to be sent, via the switch 7 which is switched to the transmit mode of the transponder unit by a signal of the controller 5. Finkenzeller at [0064] The direct connection of the ring modulator output to the antenna is likewise possible. However, it is then necessary to adapt the antenna accordingly, and take account of a possible reaction of the signal coupled in from the reading device on the ring modulator, since the same antenna is normally used for sending and receiving, and since the reading device sends continually. Finkenzeller at [0069] The input HF of the ring modulator 9 is fed with the high-frequency output signal of the oscillator 8. The frequency of the oscillator signal preferably corresponds exactly to the transmitting frequency of the reading device 100 (e.g. 13.56 MHz). The input NF of the ring modulator 9 is fed with a data signal in the baseband (e.g. for Felica system) or with a modulated subcarrier (e.g. for ISO 14443, ISO 15693), as described above. Finkenzeller at [0073] Just as in the structure according to FIG. 2, the binary data signal A is combined with a subcarrier signal B by an AND gate 43. The combined signal is available at a ring modulator 49. The digital ring modulator 49 used can be an XOR element. Departing from the structure of the transmitter in FIG. 2, a carrier signal C is not applied directly to the input of the ring modulator 49. Instead, the carrier signal C is first combined with a data signal A in an AND gate 46. This arrangement obtains better efficiency, as to be described more closely below. The output signal of the ring modulator 49 is amplified in an amplifier 40 before being emitted via the antenna 3 as the field of the transponder unit. The signal types A to C will hereinafter be described more closely by way of example with reference to FIG. 5. Finkenzeller at [0085] For an external HF interface—for example with the S2C interface described more closely below—an ASK modulator should preferably be used, since the power consumption is the lowest here. If the HF interface is integrated into a smart card chip, or an HF interface providing the signal (TF ∩MS) is used,

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	the optimized ring modulator will preferably be used in case of sufficient energy. If energy is to be saved, however, the ASK modulator can be used here too. Finkenzeller at [0087] In the active simulation of such a signal, a ring modulator provides the best results with regard to communication range here too. The digital ring modulator shows good behavior with regard to carrier suppression. However, the relative current consumption is 100%, since HF energy is radiated for the total duration of a bit. Finkenzeller at [0096] The interface module 71 comprises an amplifier 80, an AND gate 89, an oscillator 88, a frequency divider 82, a signal shaper 84 and a switch 87. The amplifier 80 can be for example a push-pull amplifier with (digital) push-pull output amplifiers (not shown). The interface module also has two antenna connections LA and LB and a series capacitor 81. Furthermore, the interface module 71 has connections Vcc-in and GND for energy supply and a control input CTRL for switching between a transmit mode and a receive mode of the interface module by means of the switch 87. Finkenzeller at [0100] Further, the smart card chip can be supplied a constant 13.56 MHz timing signal from the oscillator 88 via the output SIGOUT in the transmit mode via the switch 87, if it requires such an (external) timing signal for operation to keep exact timing. As described above, this is necessary for communication according to the standard ISO 14443 type A. Finkenzeller at [0103] The oscillator 88 generates the 13.56 MHz carrier frequency signal required in the transmit mode. If the oscillator cannot be switched off in the receive mode since its building-up transient might last too long, the oscillator is operated in the receive mode of the interface module preferably at a multiple N of the carrier frequency signal (e.g. 27.120 MHz) so as not to disturb the possibly weak received signal by crosstalk. In the transmit mode the required 13.56 MHz signal can then be generated by dividing the oscillator signal by N by means of an optional divider 82. Finkenzeller at [0108] The transmit branch consists of a demodulation circuit 97, a modulator circuit 9, an oscillator 8 (e.g. 13.56 MHz), a controller 95, and a transmitter amplifier 80 connected to the antenna 3. The demodulation circuit 98 can consist for example of a rectifier 96 and a threshold switch 97.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	Finkenzeller at [0114] The modulation signal reconstructed by the demodulation circuit 97 is also supplied to a controller 95. The latter switches the inventive circuit with the first edge of the modulation signal to a transmit mode without delay if possible, so that the data generated by the RFID chip CL can also be transferred to the remote reading device. For this purpose, the switch 7 is first switched from the antenna 3 to the oscillator 8 (13.56 MHz). This is necessary to be able to keep supplying the RFID chip CL with an alternating voltage of the right frequency. At the same time the amplifier 80 is activated by the controller 95. Finkenzeller at [0115] The reconstructed modulation signal and the signal of the oscillator 8 are supplied to the modulator circuit 9. The exact function of such a circuit has already been described in detail. The output signal of the modulator circuit 9 is supplied to the amplifier 80 and sent via the antenna 3 to the remote reading device. Finkenzeller at [0132] A suitable modulator circuit can be selected in the above-mentioned component combinations, for example, with respect to the application case. The different kinds of subcarrier modulators and carrier frequency modulators shown can also be combined in a modulator theoretically as desired. Whether a passive operating mode is provided, and under which conditions, and how a switchover is effected, are likewise selectable depending on the application case. *See also* Finkenzeller at [0015], [0017], [0026], [0075], claim 7, and claim 8. To the extent this limitation is not disclosed by Finkenzeller, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Finkenzeller, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 1 above.
7. The mobile device of claim 1 comprising an amplifier coupled to the power source to receive the power, wherein the amplifier is further coupled to the antenna.	Finkenzeller discloses or renders obvious "[t]he mobile device of claim 1 comprising an amplifier coupled to the power source to receive the power, wherein the amplifier is further coupled to the antenna." For example: Finkenzeller at Figure 4

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	FIG 4  Finkenzeller at Figure 5 FIG 5 

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	Finkenzeller at Figure 6  Finkenzeller at Figure 8  Finkenzeller at Figure 9

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	FIG 9  Finkenzeller at Figure 10 FIG 10 

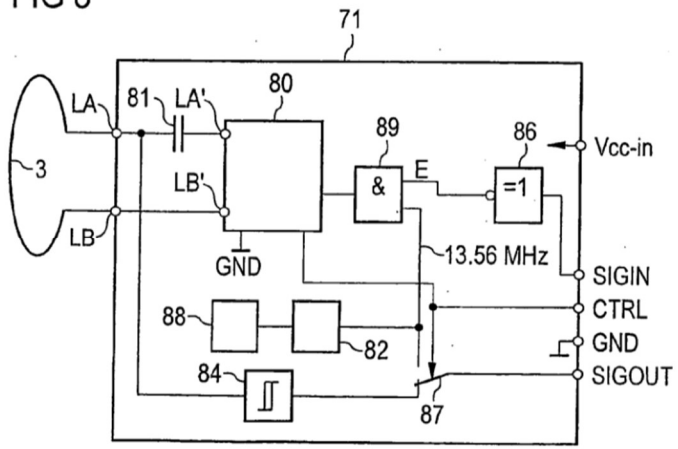
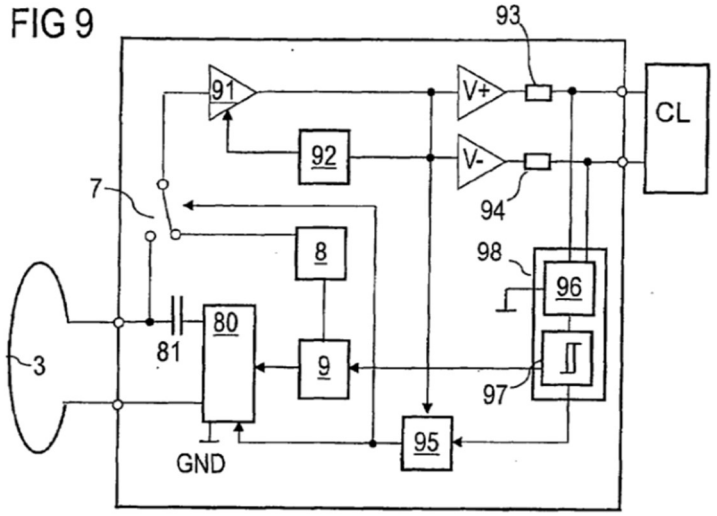
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	Finkenzeller at [0048] The transponder unit 1 sends for data transfer to the reading device 100 a signal which the reading device 100 can evaluate as a signal of a transponder which carries out a load modulation of the field 110 of the reading device 100. Unlike the conventional transponders 200, 300 which modulate the field 110 of the reading device 100 into a modulated reading device field 102, 103, the transponder unit 1 thus generates and sends its own modulated field 20 as the signal for data transfer. The transponder unit 1 thus uses its own energy for the purpose of data transfer. Finkenzeller at [0060] To supply the active components of the transponder unit at least partly with energy and to increase the energy range between the transponder unit 1 and the reading device 100, the inventive transponder unit has a battery 2. Finkenzeller at [0063] At the output of the ring modulator 9 an output signal is then available that contains the two modulation side bands and is identical (exactly enough) to a signal generated by load modulation or backscatter modulation. The output signal generated by the ring modulator 9 can then be optionally amplified by means of the amplifier 10, and be supplied to the antenna 3 for sending the data to be sent, via the switch 7 which is switched to the transmit mode of the transponder unit by a signal of the controller 5. Finkenzeller at [0065] The transponder unit 1 is operated in a first (active) operating mode as an actively sending transponder. In a second (passive) operating mode, however, the trans-ponder unit works like an ordinary passive transponder performing a load modulation on the field of the reading device. Finkenzeller at [0066] For example, the receiver 4 can additionally be formed as a conventional load modulator driven by the controller 5. The controller 5 then either switches the transmitter 6 on and the load modulator off, or the load modulator on and the transmitter 6 off. The switch 7 is switched accordingly. The criterion used for switching from a passive to an active operating state can be for example the received signal strength, the presence and/or sufficiency of an external voltage supply (on an optional connection Vcc not shown), or the sufficiency of an internal voltage supply (state of charge of the battery 2). It is thus for example possible to first operate a transponder unit 1 passively and switch it to an active operating mode if for example the distance from the reading device unintentionally increases.

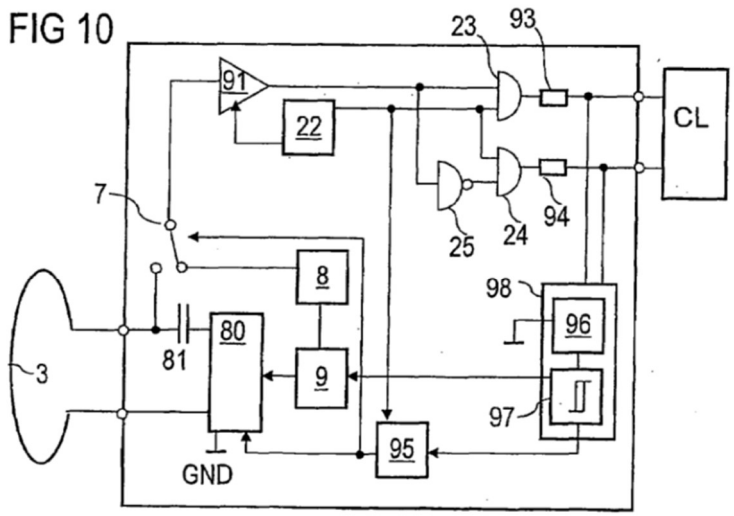
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	Finkenzeller at [0073] Just as in the structure according to FIG. 2, the binary data signal A is combined with a subcarrier signal B by an AND gate 43. The combined signal is available at a ring modulator 49. The digital ring modulator 49 used can be an XOR element. Departing from the structure of the transmitter in FIG. 2, a carrier signal C is not applied directly to the input of the ring modulator 49. Instead, the carrier signal C is first combined with a data signal A in an AND gate 46. This arrangement obtains better efficiency, as to be described more closely below. The output signal of the ring modulator 49 is amplified in an amplifier 40 before being emitted via the antenna 3 as the field of the transponder unit. The signal types A to C will hereinafter be described more closely by way of example with reference to FIG. 5. Finkenzeller at [0076] The signal D emitted by an antenna 3 to a reading device has a frequency spectrum that is like a frequency spectrum resulting by means of load modulation. The signal D can optionally be amplified by means of an amplifier 40. The amplifier 40 can be for example a push-pull amplifier with digital push-pull output amplifiers. Finkenzeller at [0093] Both the interface module 71 and the chip 75 can draw their supply voltage from the device in which they are disposed preferably reversibly. The interface module 71 can act as an ordinary transponder in a second operating mode and supply the chip with an operating voltage Vcc_RF. Finkenzeller at [0096] The interface module 71 comprises an amplifier 80, an AND gate 89, an oscillator 88, a frequency divider 82, a signal shaper 84 and a switch 87. The amplifier 80 can be for example a push-pull amplifier with (digital) push-pull output amplifiers (not shown). The interface module also has two antenna connections LA and LB and a series capacitor 81. Furthermore, the interface module 71 has connections Vcc-in and GND for energy supply and a control input CTRL for switching between a transmit mode and a receive mode of the interface module by means of the switch 87. Finkenzeller at [0098] When the interface module is in the transmit mode, i.e. there is a contactless data transfer to an external reading device or an NFC device, a modulated subcarrier signal is fed in at the signal input SIGIN by the smart card chip and optionally inverted in an inverter 86. The inverted signal E is combined with a 13.56

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	MHz carrier frequency signal in the AND gate 89 as the carrier frequency modulator, and supplied to the amplifier 80. Finkenzeller at [0099] The antenna 3 and the series capacitor 81 form a series-resonant circuit which is connected to the outputs LA′ and LB′ of the amplifier 80, so that the HF current flowing in case of resonance is limited in the antenna resonant circuit only by the ohmic resistances in the lines and in the amplifier 80. This obtains a greatest possible transmit power of the interface module. Finkenzeller at [0101] In the receive mode, the smart card chip is supplied a digitized received signal tapped from the antenna 1, via the switch 87 and the output SIGOUT. The signal shaper 84 acts here as an amplifier to be able to receive even weak signals, and as a threshold switch to provide a digital output signal at the output of the signal shaper. For example, the threshold switch used can be a Schmitt trigger which outputs a clear high or low level depending on the over- or undershooting of a predetermined threshold value. Finkenzeller at [0102] Via the control input of the push-pull amplifier 80 the push-pull outputs of the output drivers (see amplifier units in FIG. 5) are switched to GND, so that the antenna 3 and the capacitor 41 result in a parallel-resonant circuit. To save energy, the amplifier 80 can be switched to a power save mode in the receive mode of the interface module. Finkenzeller at [0106] The inventive active transponder unit has a receive branch and a transmit branch. The receive branch consists of an antenna 3, an input amplifier 91, an automatic gain control 92 and an amplifier which is preferably designed as a push-pull amplifier (V+, V−). Further, a transponder chip CL is connected via its antenna connections to the push-pull amplifier. Finkenzeller at [0108] The transmit branch consists of a demodulation circuit 97, a modulator circuit 9, an oscillator 8 (e.g. 13.56 MHz), a controller 95, and a transmitter amplifier 80 connected to the antenna 3. The demodulation circuit 98 can consist for example of a rectifier 96 and a threshold switch 97. Finkenzeller at [0109]

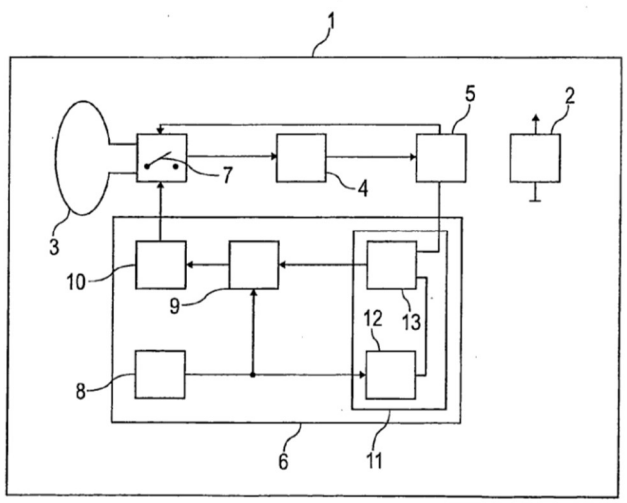
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	In the receive mode a voltage is induced in the antenna 3 by the magnetic field of a remote RFID reading device. Together with the capacitor 81 the antenna 3 forms a parallel-resonant circuit whose resonant frequency corresponds approximately to the transmitting frequency of the RFID reading device. The voltage thus available on the resonant circuit is supplied to the input amplifier 91 via the switch 7. Via a gain control 92 the gain factor of the input amplifier 91 is now so adjusted that the output amplitude of the voltage amplified by the input amplifier 91 remains largely constant. The time constant of the control is preferably so adjusted here that the output voltage of the amplifier 91 remains constant in case of varying distance from the reading device (i.e. different levels of induced voltage in the coil 3), but modulation signals (e.g. 10% ASK with 106 kbit/s) are not suppressed by excessively fast control. Finkenzeller at [0110] The output signal of the amplifier 91 is supplied to a further amplifier, preferably a push-pull amplifier (V+, V−). The output signal of the push-pull amplifier is supplied to the connections of the contactless RFID chip CL via (at least) one series resistor 93. The amplitude of the output signal of the push-pull amplifier V+/V− is so selected here that the RFID chip CL can be supplied with sufficient energy for operation by the output signal. Finkenzeller at [0114] The modulation signal reconstructed by the demodulation circuit 97 is also supplied to a controller 95. The latter switches the inventive circuit with the first edge of the modulation signal to a transmit mode without delay if possible, so that the data generated by the RFID chip CL can also be transferred to the remote reading device. For this purpose, the switch 7 is first switched from the antenna 3 to the oscillator 8 (13.56 MHz). This is necessary to be able to keep supplying the RFID chip CL with an alternating voltage of the right frequency. At the same time the amplifier 80 is activated by the controller 95. Finkenzeller at [0115] The reconstructed modulation signal and the signal of the oscillator 8 are supplied to the modulator circuit 9. The exact function of such a circuit has already been described in detail. The output signal of the modulator circuit 9 is supplied to the amplifier 80 and sent via the antenna 3 to the remote reading device. Finkenzeller at [0127] It was ascertained that small antennas, e.g. in a SIM card with its own antenna (approx. 15×25 mm^2), obtain very low read ranges with a conventional load modulation. It is frequently even impossible to communicate with a contactless reading device when the SIM card with an antenna is disposed for example in a mobile telephone. If one of the inventive transmitters is used in a mobile terminal the range

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	is not clearly increased. Moreover, it can be advantageously exploited that mobile terminals such as mobile telephones, PDAs, etc., have their own energy supply (battery) which can also be used for supplying an inventive circuit. Finkenzeller at [0129] Thus, an NFC unit could be adapted to behave according to the present solutions in its passive mode in the role ("being card") in which the NFC unit is to perform a load modulation. The NFC unit could for example always act as a component actively emitting its own field. Likewise, the NFC unit could also distinguish, and optionally switch, between a first submode corresponding to a conventional load modulation and an actively sending, second submode in which the load modulation is simulated. A thus improved NFC unit can also communicate with ordinary RFID reading devices over a higher range with the help of the changed passive operating mode. Since NFC units will already have certain units—such as an oscillator, an amplifier and a controller—for independent sending in their conventional active mode, comparatively few modifications of an NFC circuit are required to realize a circuit according to the present application in an NFC unit. *See also* Finkenzeller at [0004] and [0011]. To the extent this limitation is not disclosed by Finkenzeller, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Finkenzeller, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 1 above.
8. The mobile device of claim 7, wherein the amplifier amplifies a signal received at the antenna and generates an amplified signal, and provides the amplified signal to the smartcard controller.	Finkenzeller discloses or renders obvious "[t]he mobile device of claim 7, wherein the amplifier amplifies a signal received at the antenna and generates an amplified signal, and provides the amplified signal to the smartcard controller." For example: Finkenzeller at Figure 8

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	FIG 8  Finkenzeller at Figure 9 FIG 9 

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	Finkenzeller at Figure 10  Finkenzeller at [0101] In the receive mode, the smart card chip is supplied a digitized received signal tapped from the antenna 1, via the switch 87 and the output SIGOUT. The signal shaper 84 acts here as an amplifier to be able to receive even weak signals, and as a threshold switch to provide a digital output signal at the output of the signal shaper. For example, the threshold switch used can be a Schmitt trigger which outputs a clear high or low level depending on the over- or undershooting of a predetermined threshold value. Finkenzeller at [0102] Via the control input of the push-pull amplifier 80 the push-pull outputs of the output drivers (see amplifier units in FIG. 5) are switched to GND, so that the antenna 3 and the capacitor 41 result in a parallel-resonant circuit. To save energy, the amplifier 80 can be switched to a power save mode in the receive mode of the interface module. Finkenzeller at [0106]

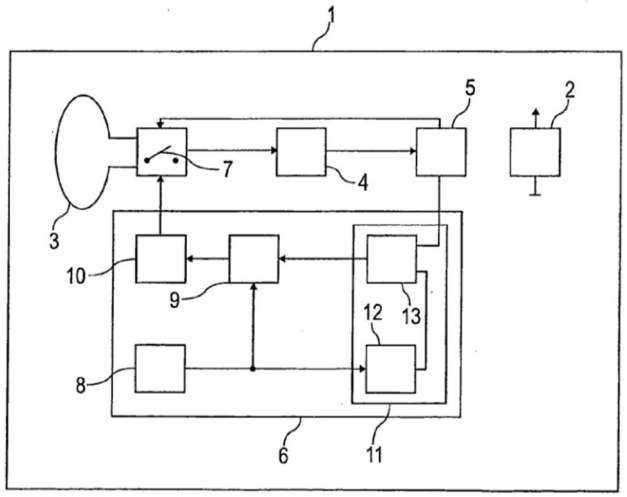
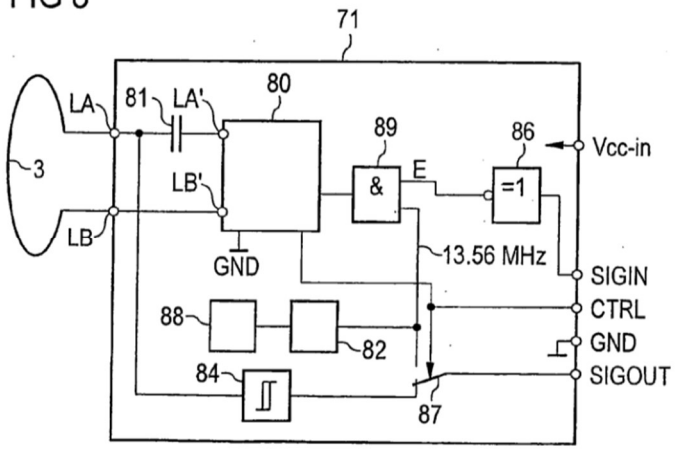
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	The inventive active transponder unit has a receive branch and a transmit branch. The receive branch consists of an antenna 3, an input amplifier 91, an automatic gain control 92 and an amplifier which is preferably designed as a push-pull amplifier (V+, V−). Further, a transponder chip CL is connected via its antenna connections to the push-pull amplifier. Finkenzeller at [0109] In the receive mode a voltage is induced in the antenna 3 by the magnetic field of a remote RFID reading device. Together with the capacitor 81 the antenna 3 forms a parallel-resonant circuit whose resonant frequency corresponds approximately to the transmitting frequency of the RFID reading device. The voltage thus available on the resonant circuit is supplied to the input amplifier 91 via the switch 7. Via a gain control 92 the gain factor of the input amplifier 91 is now so adjusted that the output amplitude of the voltage amplified by the input amplifier 91 remains largely constant. The time constant of the control is preferably so adjusted here that the output voltage of the amplifier 91 remains constant in case of varying distance from the reading device (i.e. different levels of induced voltage in the coil 3), but modulation signals (e.g. 10% ASK with 106 kbit/s) are not suppressed by excessively fast control. Finkenzeller at [0110] The output signal of the amplifier 91 is supplied to a further amplifier, preferably a push-pull amplifier (V+, V−). The output signal of the push-pull amplifier is supplied to the connections of the contactless RFID chip CL via (at least) one series resistor 93. The amplitude of the output signal of the push-pull amplifier V+/V− is so selected here that the RFID chip CL can be supplied with sufficient energy for operation by the output signal. To the extent this limitation is not disclosed by Finkenzeller, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Finkenzeller, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 7 above.
17[pre]. A method of near field communication between a mobile device and an NFC reader, the method comprising:	Finkenzeller discloses or renders obvious "[a] method of near field communication between a mobile device and an NFC reader, the method." For example: *See* [1d] above. Finkenzeller at Abstract

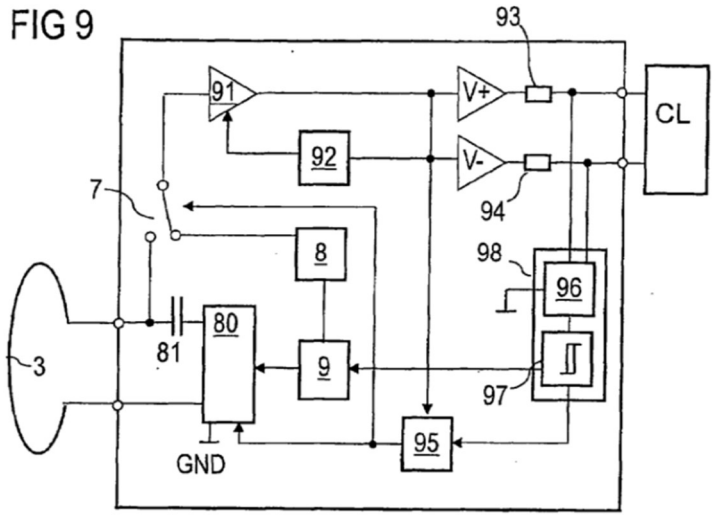
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	The invention relates to a transponder unit (1) and to a method for data transfer between the transponder unit and a reading device (100). To increase the range of data transfer from the transponder unit (1) to the reading device (100), the transponder unit (1) has means integrated therein for actively sending a signal to the reading device (100) which can be evaluated by the reading device (100) like a modulation of its own field (110) by a transponder. Finkenzeller at Figure 2 FIG 2  Finkenzeller at [0006] For simple and fast contactless communication between two devices, the companies Philips and Sony have developed an inductive transmission technology which is known as so-called near field communication (NFC). This technology is integrated for example in mobile telephones or PDAs to permit communication between the devices or with a computer. The coupling of the two devices is effected via coils, the carrier frequency being 13.56 MHz as in RFID systems. As described more closely in the NFC standard ECMA 340, NFC systems have an active communication mode and a passive communication mode. In the active mode, two NFC units alternately generate their own RF field as a signal carrier, thus switching back and forth, coordinated with each other, between transmit mode and receive mode as in a classic mobile phone system. In the passive mode, however, the two NFC units must agree on which unit

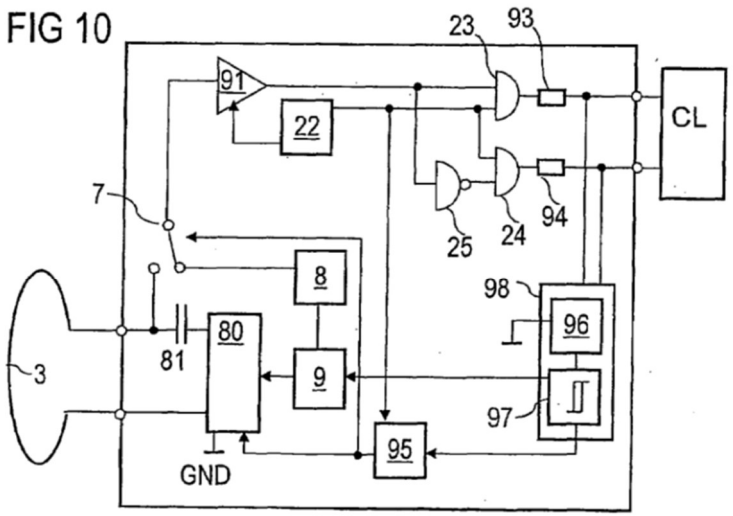
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	acts as a reading device and generates a field which the other unit can then influence by means of load modulation. Primarily due to the small antenna diameters used, NFC systems only permit small communication ranges of up to 20 cm. Finkenzeller at [0027] The possibility of reading the inventive transponder unit over very large distances is not always desired, for example for privacy protection. It is therefore provided in one embodiment that the inventive circuit configuration can be activated manually if communication over a long range is explicitly desired. Otherwise, communication can be effected via a load modulator provided in the transponder unit, which is usable only for short distances. If no load modulator is provided in the trans-ponder unit, it can be provided for example that the transponder unit is activated for sending data only if the signal emitted by the reading device contains a predetermined code. Finkenzeller at [0028] The transponder unit can also be part of a mobile terminal, for example a mobile telephone. The transponder unit can have its own antenna or use an antenna of the terminal. Finkenzeller at [0032] The transponder unit is preferably integrated in a card or data carrier insertable into the mobile terminal. For example, the transponder unit can be integrated in a SIM card. The advantage is that the mobile terminal, for example a mobile phone or PDA, into which the card with the inventive transponder unit is inserted requires no additional (integrated) antenna to be usable as an RFID unit. Finkenzeller at [0047] Depending on a type of system used, data can be transferred from the trans-ponders 200, 300 to the reading device 100 either by means of load modulation (inductive coupling) or by means of modulated backscatter cross section (electromagnetic backscatter coupling). Embodiments will preferably be described hereinafter for systems that transfer data to the reading device on the principle of load modulation. However, the individual aspects of the embodiments are largely also applicable analogously to systems that work on the principle of modulated backscatter cross sections of the transponder unit. Finkenzeller at [0048] The transponder unit 1 sends for data transfer to the reading device 100 a signal which the reading device 100 can evaluate as a signal of a transponder which carries out a load modulation of the field 110 of the reading device 100. Unlike the conventional transponders 200, 300 which modulate the field 110 of the

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	reading device 100 into a modulated reading device field 102, 103, the transponder unit 1 thus generates and sends its own modulated field 20 as the signal for data transfer. The transponder unit 1 thus uses its own energy for the purpose of data transfer. Finkenzeller at [0054] Further, a mobile terminal comprising an inventive transponder unit could be used as a maintenance or monitoring unit for checking for operability, or remotely maintaining, a multiplicity of RFID reading devices, for example at the cash registers of a supermarket or an access system. Finkenzeller at [0055] FIG. 2 shows purely schematically the transponder unit 1, for example in the form of an inductively coupled chip card, which comprises the usual components not shown explicitly here. For simplification, only one inventive RFID transponder unit in a chip card is shown. The transponder unit has a battery 2, an inductive antenna 3 and an electronic circuit 4, 5, 6, 7. The electronic circuit consists substantially of three functional blocks, a receiver 4, a controller 5 and a transmitter 6. A switch 7 is used for switching the antenna 3 between the receiver 4 and the transmitter 6. Finkenzeller at [0065] The transponder unit 1 is operated in a first (active) operating mode as an actively sending transponder. In a second (passive) operating mode, however, the trans-ponder unit works like an ordinary passive transponder performing a load modulation on the field of the reading device. Finkenzeller at [0124] The interface module adapted to be coupled inductively and a further antenna connected thereto (see reference sign 3 in FIG. 10) can be disposed in a terminal. The range of an ordinary transponder can be increased with the help of such a terminal. The owner of a mobile telephone could for example set up a communication between his transponder and a reading device that is unfavorably disposed or inconvenient to reach for other reasons by holding the transponder against his mobile telephone provided according to the invention with an interface module adapted to be coupled inductively. Finkenzeller at [0129] Thus, an NFC unit could be adapted to behave according to the present solutions in its passive mode in the role ("being card") in which the NFC unit is to perform a load modulation. The NFC unit could for example always act as a component actively emitting its own field. Likewise, the NFC unit could also distinguish, and optionally switch, between a first submode corresponding to a conventional load

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	modulation and an actively sending, second submode in which the load modulation is simulated. A thus improved NFC unit can also communicate with ordinary RFID reading devices over a higher range with the help of the changed passive operating mode. Since NFC units will already have certain units—such as an oscillator, an amplifier and a controller—for independent sending in their conventional active mode, comparatively few modifications of an NFC circuit are required to realize a circuit according to the present application in an NFC unit. Finkenzeller at [0131] The individual functional components of the transponder unit—antenna, interface unit, chip and optionally voltage supply unit—can be disposed in all sorts of combinations separately from each other or integrated jointly in one unit. An inventive transponder unit can be formed for example as a specially designed transponder, in a portable data carrier, in particular a chip card, which optionally has a battery. A portable data carrier, in particular SIM card, with a chip and an interface unit can be connected in a mobile terminal to an external voltage source and/or an external antenna. The interface unit can be disposed in a terminal, connected to its own or an external antenna, and communicate with a chip which is disposed reversibly or firmly in the terminal or temporarily on the terminal. *See also* Finkenzeller at [0010], [0011], [0012], [0020], [0021], [0022], [0024], [0029], [0030], [0040], [0049], [0058], [0060], [0063], [0066], [0081], [0092], [0093], [0106], [0127], and claim 19. To the extent this limitation is not disclosed by Finkenzeller, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Finkenzeller, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[17a] coupling a smartcard controller and an active transmit driver circuit to a power source of the mobile device;	Finkenzeller discloses or renders obvious "coupling a smartcard controller and an active transmit driver circuit to a power source of the mobile device." For example: Finkenzeller at Figure 2

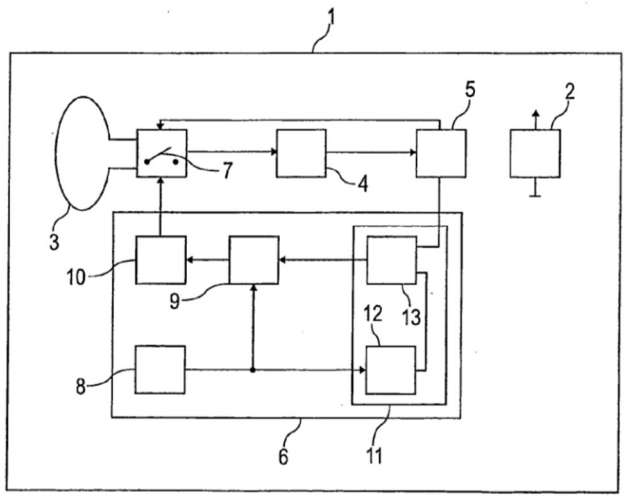
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	FIG 2  Finkenzeller at Figure 8 FIG 8 

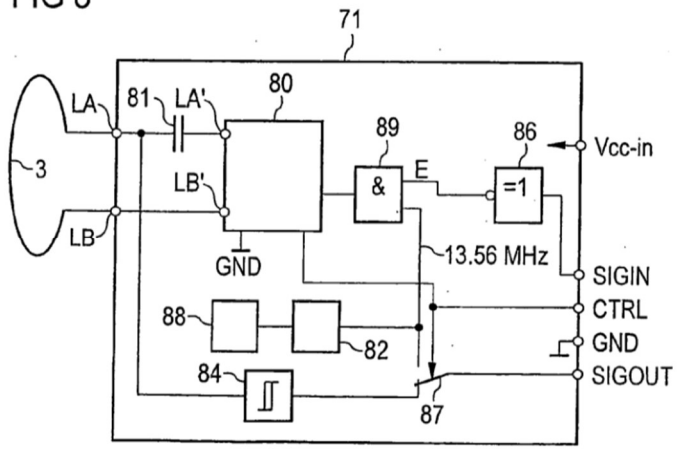
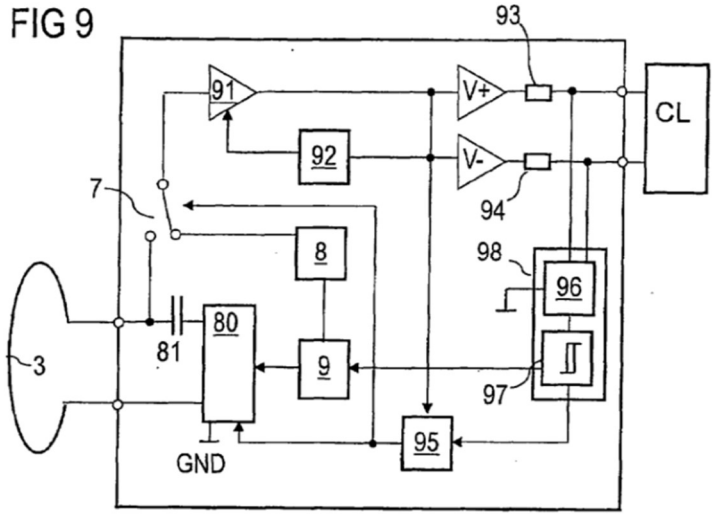
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	Finkenzeller at Figure 9  Finkenzeller at Figure 10

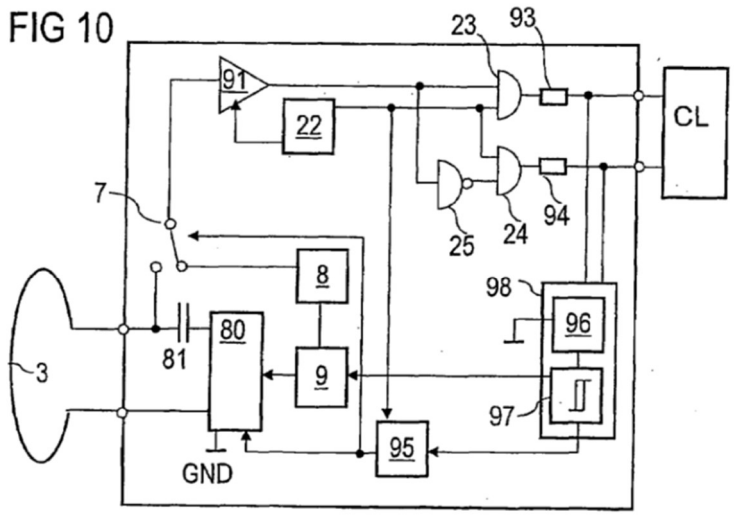
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	 Finkenzeller at [0004] The range within which communication is possible in the system by data transfer can be increased by using active transponders, that is, transponders with their own energy supply. The energy supply of the active transponder, for example in form of a battery, operates its electronic circuit. Conventional transponders without their own energy supply are referred to as passive transponders, in contrast. Finkenzeller at [0011] In an advantageous embodiment, an inventive RFID transponder unit has its own energy supply, at least one antenna for transmitting signals from and/or to a reading device, and an electronic circuit. The electronic circuit of the inventive transponder unit comprises a transmitter consisting of an oscillator and a modulator. Finkenzeller at [0048] The transponder unit 1 sends for data transfer to the reading device 100 a signal which the reading device 100 can evaluate as a signal of a transponder which carries out a load modulation of the field 110 of the reading device 100. Unlike the conventional transponders 200, 300 which modulate the field 110 of the reading device 100 into a modulated reading device field 102, 103, the transponder unit 1 thus generates

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	and sends its own modulated field 20 as the signal for data transfer. The transponder unit 1 thus uses its own energy for the purpose of data transfer. Finkenzeller at [0055] FIG. 2 shows purely schematically the transponder unit 1, for example in the form of an inductively coupled chip card, which comprises the usual components not shown explicitly here. For simplification, only one inventive RFID transponder unit in a chip card is shown. The transponder unit has a battery 2, an inductive antenna 3 and an electronic circuit 4, 5, 6, 7. The electronic circuit consists substantially of three functional blocks, a receiver 4, a controller 5 and a transmitter 6. A switch 7 is used for switching the antenna 3 between the receiver 4 and the transmitter 6. Finkenzeller at [0060] To supply the active components of the transponder unit at least partly with energy and to increase the energy range between the transponder unit 1 and the reading device 100, the inventive transponder unit has a battery 2. Finkenzeller at [0063] At the output of the ring modulator 9 an output signal is then available that contains the two modulation side bands and is identical (exactly enough) to a signal generated by load modulation or backscatter modulation. The output signal generated by the ring modulator 9 can then be optionally amplified by means of the amplifier 10, and be supplied to the antenna 3 for sending the data to be sent, via the switch 7 which is switched to the transmit mode of the transponder unit by a signal of the controller 5. Finkenzeller at [0065] The transponder unit 1 is operated in a first (active) operating mode as an actively sending transponder. In a second (passive) operating mode, however, the trans-ponder unit works like an ordinary passive transponder performing a load modulation on the field of the reading device. Finkenzeller at [0066] For example, the receiver 4 can additionally be formed as a conventional load modulator driven by the controller 5. The controller 5 then either switches the transmitter 6 on and the load modulator off, or the load modulator on and the transmitter 6 off. The switch 7 is switched accordingly. The criterion used for switching from a passive to an active operating state can be for example the received signal strength, the presence and/or sufficiency of an external voltage supply (on an optional connection Vcc not shown), or the sufficiency of an internal voltage supply (state of charge of the battery 2). It is thus for example

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	possible to first operate a transponder unit 1 passively and switch it to an active operating mode if for example the distance from the reading device unintentionally increases. Finkenzeller at [0093] Both the interface module 71 and the chip 75 can draw their supply voltage from the device in which they are disposed preferably reversibly. The interface module 71 can act as an ordinary transponder in a second operating mode and supply the chip with an operating voltage Vcc_RF. Finkenzeller at [0127] It was ascertained that small antennas, e.g. in a SIM card with its own antenna (approx. 15×25 mm^2), obtain very low read ranges with a conventional load modulation. It is frequently even impossible to communicate with a contactless reading device when the SIM card with an antenna is disposed for example in a mobile telephone. If one of the inventive transmitters is used in a mobile terminal the range is not clearly increased. Moreover, it can be advantageously exploited that mobile terminals such as mobile telephones, PDAs, etc., have their own energy supply (battery) which can also be used for supplying an inventive circuit. Finkenzeller at [0129] Thus, an NFC unit could be adapted to behave according to the present solutions in its passive mode in the role ("being card") in which the NFC unit is to perform a load modulation. The NFC unit could for example always act as a component actively emitting its own field. Likewise, the NFC unit could also distinguish, and optionally switch, between a first submode corresponding to a conventional load modulation and an actively sending, second submode in which the load modulation is simulated. A thus improved NFC unit can also communicate with ordinary RFID reading devices over a higher range with the help of the changed passive operating mode. Since NFC units will already have certain units—such as an oscillator, an amplifier and a controller—for independent sending in their conventional active mode, comparatively few modifications of an NFC circuit are required to realize a circuit according to the present application in an NFC unit. Finkenzeller at [0131] The individual functional components of the transponder unit—antenna, interface unit, chip and optionally voltage supply unit—can be disposed in all sorts of combinations separately from each other or integrated jointly in one unit. An inventive transponder unit can be formed for example as a specially designed transponder, in a portable data carrier, in particular a chip card, which optionally has a battery. A portable data carrier, in particular SIM card, with a chip and an interface unit can be connected in a

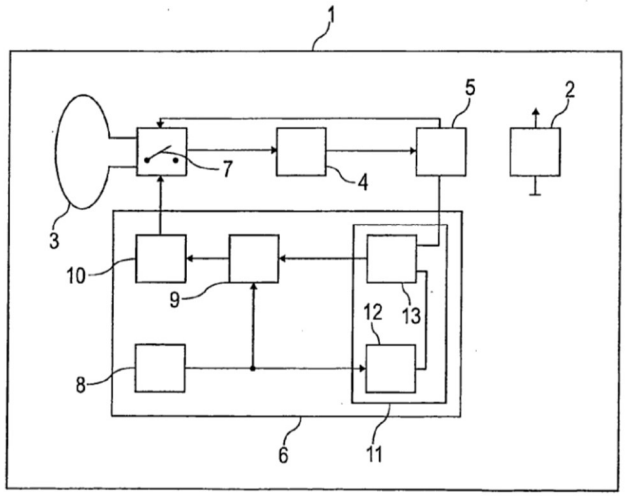
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	mobile terminal to an external voltage source and/or an external antenna. The interface unit can be disposed in a terminal, connected to its own or an external antenna, and communicate with a chip which is disposed reversibly or firmly in the terminal or temporarily on the terminal. Finkenzeller at claim 20 20. The transponder unit according to claim 16, including an energy supply associated with the transponder unit. To the extent this limitation is not disclosed by Finkenzeller, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Finkenzeller, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[17b] providing power to the smartcard controller and the active transmit driver circuit from the power source of the mobile device;	Finkenzeller discloses or renders obvious "providing power to the smartcard controller and the active transmit driver circuit from the power source of the mobile device." For example: *See* [17a] above. Finkenzeller at Figure 2 FIG 2  Finkenzeller at Figure 8

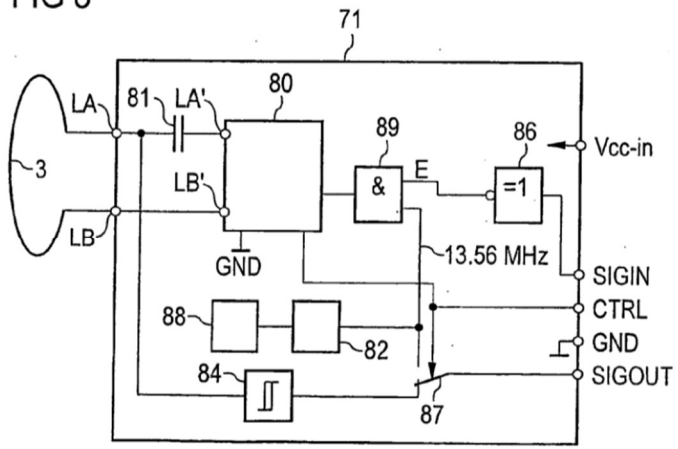
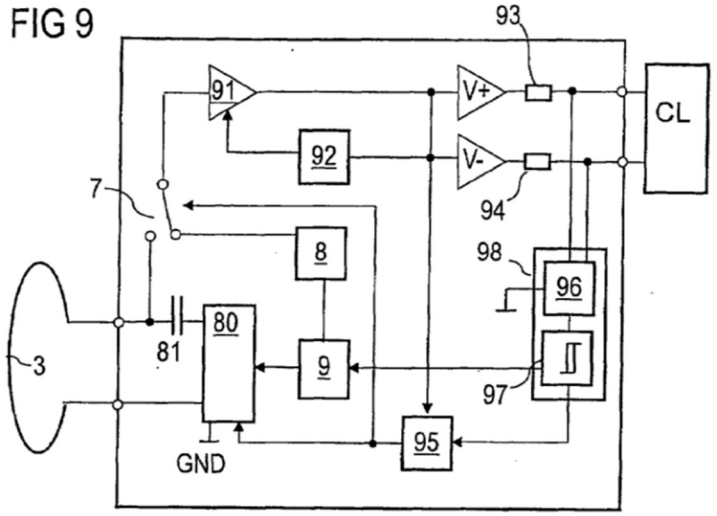
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	FIG 8  Finkenzeller at Figure 9 FIG 9 

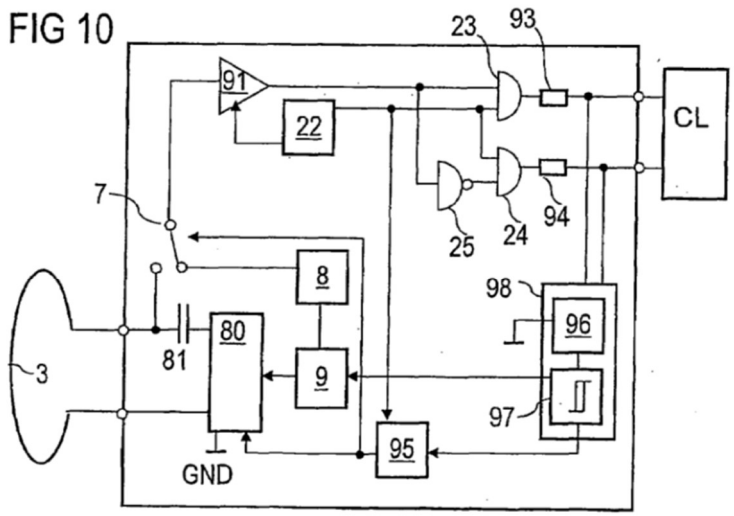
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	Finkenzeller at Figure 10  Finkenzeller at [0004] The range within which communication is possible in the system by data transfer can be increased by using active transponders, that is, transponders with their own energy supply. The energy supply of the active transponder, for example in form of a battery, operates its electronic circuit. Conventional transponders without their own energy supply are referred to as passive transponders, in contrast. Finkenzeller at [0011] In an advantageous embodiment, an inventive RFID transponder unit has its own energy supply, at least one antenna for transmitting signals from and/or to a reading device, and an electronic circuit. The electronic circuit of the inventive transponder unit comprises a transmitter consisting of an oscillator and a modulator. Finkenzeller at [0048] The transponder unit 1 sends for data transfer to the reading device 100 a signal which the reading device 100 can evaluate as a signal of a transponder which carries out a load modulation of the field 110 of the

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	reading device 100. Unlike the conventional transponders 200, 300 which modulate the field 110 of the reading device 100 into a modulated reading device field 102, 103, the transponder unit 1 thus generates and sends its own modulated field 20 as the signal for data transfer. The transponder unit 1 thus uses its own energy for the purpose of data transfer. Finkenzeller at [0055] FIG. 2 shows purely schematically the transponder unit 1, for example in the form of an inductively coupled chip card, which comprises the usual components not shown explicitly here. For simplification, only one inventive RFID transponder unit in a chip card is shown. The transponder unit has a battery 2, an inductive antenna 3 and an electronic circuit 4, 5, 6, 7. The electronic circuit consists substantially of three functional blocks, a receiver 4, a controller 5 and a transmitter 6. A switch 7 is used for switching the antenna 3 between the receiver 4 and the transmitter 6. Finkenzeller at [0060] To supply the active components of the transponder unit at least partly with energy and to increase the energy range between the transponder unit 1 and the reading device 100, the inventive transponder unit has a battery 2. Finkenzeller at [0063] At the output of the ring modulator 9 an output signal is then available that contains the two modulation side bands and is identical (exactly enough) to a signal generated by load modulation or backscatter modulation. The output signal generated by the ring modulator 9 can then be optionally amplified by means of the amplifier 10, and be supplied to the antenna 3 for sending the data to be sent, via the switch 7 which is switched to the transmit mode of the transponder unit by a signal of the controller 5. Finkenzeller at [0065] The transponder unit 1 is operated in a first (active) operating mode as an actively sending transponder. In a second (passive) operating mode, however, the trans-ponder unit works like an ordinary passive transponder performing a load modulation on the field of the reading device. Finkenzeller at [0066] For example, the receiver 4 can additionally be formed as a conventional load modulator driven by the controller 5. The controller 5 then either switches the transmitter 6 on and the load modulator off, or the load modulator on and the transmitter 6 off. The switch 7 is switched accordingly. The criterion used for switching from a passive to an active operating state can be for example the received signal strength, the

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	presence and/or sufficiency of an external voltage supply (on an optional connection Vcc not shown), or the sufficiency of an internal voltage supply (state of charge of the battery 2). It is thus for example possible to first operate a transponder unit 1 passively and switch it to an active operating mode if for example the distance from the reading device unintentionally increases. Finkenzeller at [0093] Both the interface module 71 and the chip 75 can draw their supply voltage from the device in which they are disposed preferably reversibly. The interface module 71 can act as an ordinary transponder in a second operating mode and supply the chip with an operating voltage Vcc_RF. Finkenzeller at [0127] It was ascertained that small antennas, e.g. in a SIM card with its own antenna (approx. 15×25 mm^2), obtain very low read ranges with a conventional load modulation. It is frequently even impossible to communicate with a contactless reading device when the SIM card with an antenna is disposed for example in a mobile telephone. If one of the inventive transmitters is used in a mobile terminal the range is not clearly increased. Moreover, it can be advantageously exploited that mobile terminals such as mobile telephones, PDAs, etc., have their own energy supply (battery) which can also be used for supplying an inventive circuit. Finkenzeller at [0129] Thus, an NFC unit could be adapted to behave according to the present solutions in its passive mode in the role ("being card") in which the NFC unit is to perform a load modulation. The NFC unit could for example always act as a component actively emitting its own field. Likewise, the NFC unit could also distinguish, and optionally switch, between a first submode corresponding to a conventional load modulation and an actively sending, second submode in which the load modulation is simulated. A thus improved NFC unit can also communicate with ordinary RFID reading devices over a higher range with the help of the changed passive operating mode. Since NFC units will already have certain units—such as an oscillator, an amplifier and a controller—for independent sending in their conventional active mode, comparatively few modifications of an NFC circuit are required to realize a circuit according to the present application in an NFC unit. Finkenzeller at [0131] The individual functional components of the transponder unit—antenna, interface unit, chip and optionally voltage supply unit—can be disposed in all sorts of combinations separately from each other or integrated jointly in one unit. An inventive transponder unit can be formed for example as a specially

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	designed transponder, in a portable data carrier, in particular a chip card, which optionally has a battery. A portable data carrier, in particular SIM card, with a chip and an interface unit can be connected in a mobile terminal to an external voltage source and/or an external antenna. The interface unit can be disposed in a terminal, connected to its own or an external antenna, and communicate with a chip which is disposed reversibly or firmly in the terminal or temporarily on the terminal. To the extent this limitation is not disclosed by Finkenzeller, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Finkenzeller, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[17c] coupling the active transmit driver circuit to an antenna of the mobile device, wherein the antenna is tuned to operate at substantially 13.56 MHz; and	Finkenzeller discloses or renders obvious "coupling the active transmit driver circuit to an antenna of the mobile device, wherein the antenna is tuned to operate at substantially 13.56 MHz." For example: *See* [1c] above. Finkenzeller at Figure 2 FIG 2  Finkenzeller at Figure 8

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	FIG 8  Finkenzeller at Figure 9 FIG 9 

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	Finkenzeller at Figure 10  Finkenzeller at [0002] Transponders are used for example in radio frequency identification (RFID) systems. Conventionally, both the energy supply to a transponder in an RFID system and the data interchange between the transponder and a reading device are effected using magnetic or electromagnetic fields. RFID transponders have an electronic circuit and, depending on the frequency domain, an antenna coil (e.g. 13.56 MHz) or an electromagnetic antenna (e.g. 868 MHz). Via the antenna the energy required for operating the transponder can be taken from the field of the reading device, as well as the data transfer carried out. Finkenzeller at [0006] For simple and fast contactless communication between two devices, the companies Philips and Sony have developed an inductive transmission technology which is known as so-called near field communication (NFC). This technology is integrated for example in mobile telephones or PDAs to permit communication between the devices or with a computer. The coupling of the two devices is effected via coils, the carrier frequency being 13.56 MHz as in RFID systems. As described more closely in the NFC

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	standard ECMA 340, NFC systems have an active communication mode and a passive communication mode. In the active mode, two NFC units alternately generate their own RF field as a signal carrier, thus switching back and forth, coordinated with each other, between transmit mode and receive mode as in a classic mobile phone system. In the passive mode, however, the two NFC units must agree on which unit acts as a reading device and generates a field which the other unit can then influence by means of load modulation. Primarily due to the small antenna diameters used, NFC systems only permit small communication ranges of up to 20 cm. Finkenzeller at [0010] According to the invention, a transponder unit sends a signal to a transponder reading device, which can communicate with the transponders by means of modulation of its own field by transponders, in such a way that the reading device can evaluate the signal as modulation by a conventional transponder. Instead of performing a load modulation or backscatter modulation of a field of the reading device, the transponder unit itself thus emits a field that simulates for the reading device a modulation of the reading device field by a transponder. An inventive transponder unit has means for sending the accordingly modulated signal. The total range of the system is consequently no longer limited by the communication range of the reading device, but is extended therebeyond up to a transmit range of the transponder unit. Finkenzeller at [0011] In an advantageous embodiment, an inventive RFID transponder unit has its own energy supply, at least one antenna for transmitting signals from and/or to a reading device, and an electronic circuit. The electronic circuit of the inventive transponder unit comprises a transmitter consisting of an oscillator and a modulator. Finkenzeller at [0015] Both modulators (ring modulator and ASK modulator) modulate the oscillator signal by means of the (modulated) data signal and deliver an output signal which is then transmitted to the reading device via the receive antenna or a separate transmitting antenna. Finkenzeller at [0017] A special advantage of using the described modulators is their compatibility to the prior art, since they deliver an output signal to be sent to the reading device whose (frequency and amplitude) spectrum is very similar to that of a load or backscatter modulation, as described above. Therefore, no technical changes must be performed on conventional reading devices. The inventive transponder can thus be operated with commercially available RFID reading devices, the communication range being many times that of passive

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	or even active transponders. For example, a commercially available ISO 14443 reading device which can communicate with an inductively coupled, contactless chip card according to the prior art over a distance of approx. 10 cm could communicate with an inventive transponder unit over many times this distance. Finkenzeller at [0021] In a development, the inventive transponder unit has a load modulator according to the prior art, in addition to the above-described circuit having a receiver, a controller, an oscillator and a modulator. Finkenzeller at [0022] The voltage induced on the antenna of the transponder unit can be a problem for the operation of the inventive modulator circuits if the distance between trans-ponder unit and reading device is small and the induced voltage is therefore accordingly great. Therefore, the data to be sent to the reading device which are generated in the controller are supplied alternatively to the load modulator or to the inventive circuit configuration with a modulator. The switchover between the load modulator and the circuit configuration is preferably effected automatically, in dependence on the level of voltage induced on the antenna. The switchover is effected in such a way that the load modulator is used within the normal communication range, and the inventive modulator outside the normal communication range. Finkenzeller at [0025] In particular for communication according to the standard ISO 14443 type A, exact timing is important. With conventional passive transponders, timing is ensured even in the transmit mode (load modulation) by the timing signal (13.56 MHz) continually received from the reading device. However, such a signal is no longer available in the transmit mode of an inventive circuit configuration. In one embodiment of the invention, an oscillator is therefore provided for example in the form of a quartz oscillator. Finkenzeller at [0027] The possibility of reading the inventive transponder unit over very large distances is not always desired, for example for privacy protection. It is therefore provided in one embodiment that the inventive circuit configuration can be activated manually if communication over a long range is explicitly desired. Otherwise, communication can be effected via a load modulator provided in the transponder unit, which is usable only for short distances. If no load modulator is provided in the trans-ponder unit, it can be provided for example that the transponder unit is activated for sending data only if the signal emitted by the reading device contains a predetermined code. Finkenzeller at [0048]

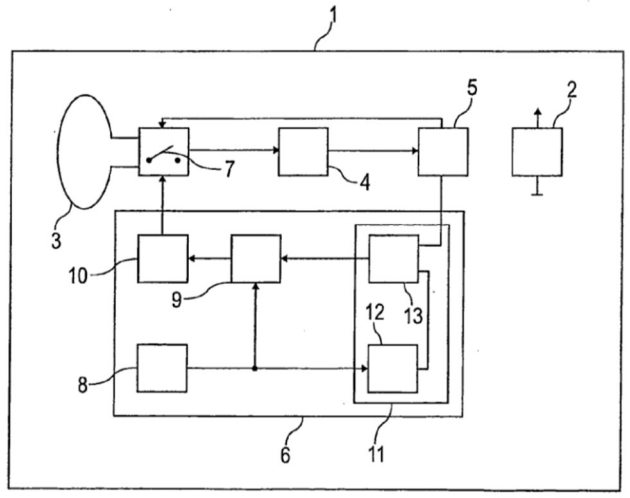
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	The transponder unit 1 sends for data transfer to the reading device 100 a signal which the reading device 100 can evaluate as a signal of a transponder which carries out a load modulation of the field 110 of the reading device 100. Unlike the conventional transponders 200, 300 which modulate the field 110 of the reading device 100 into a modulated reading device field 102, 103, the transponder unit 1 thus generates and sends its own modulated field 20 as the signal for data transfer. The transponder unit 1 thus uses its own energy for the purpose of data transfer. Finkenzeller at [0056] The receiver 4 is provided for demodulating a signal transmitted from the reading device 100 to extract data therefrom. The extracted data are passed on to the controller 5 which processes them and generates data to be sent to the reading device 100. Furthermore, the controller 5 transmits a control signal to the switch 7 which switches between receive mode and transmit mode of the transponder unit. However, a separate antenna can instead be provided for sending. The controller 5 used can be for example a part of the operating system of a portable data carrier, such as a chip card. Finkenzeller at [0057] The transmitter 6 consists of an oscillator 8, a modulator, an execution as a ring modulator 9 first being described, and a terminal repeater 10. Furthermore, the transmitter 6 of the transponder unit shown in FIG. 2 is extended by an electronic assembly 11 for generating and modulating a subcarrier signal to carry out the data transfer from the transponder unit to a reading device 100 with a subcarrier signal. Depending on the use of the transponder unit, the subcarrier signal can have different frequencies, for example 848 kHz according to ISO 14443, 424 kHz according to ISO 15693 and 212 kHz for LEGIC, but might also be completely omitted. Finkenzeller at [0060] To supply the active components of the transponder unit at least partly with energy and to increase the energy range between the transponder unit 1 and the reading device 100, the inventive transponder unit has a battery 2. Finkenzeller at [0063] At the output of the ring modulator 9 an output signal is then available that contains the two modulation side bands and is identical (exactly enough) to a signal generated by load modulation or backscatter modulation. The output signal generated by the ring modulator 9 can then be optionally amplified by means of the amplifier 10, and be supplied to the antenna 3 for sending the data to be sent, via the switch 7 which is switched to the transmit mode of the transponder unit by a signal of the controller 5.

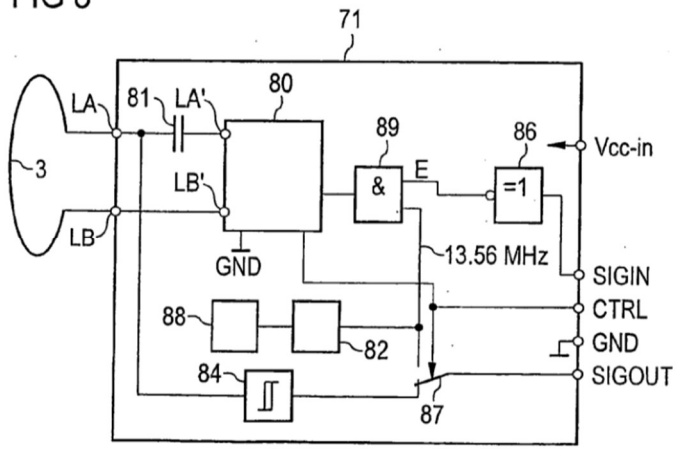
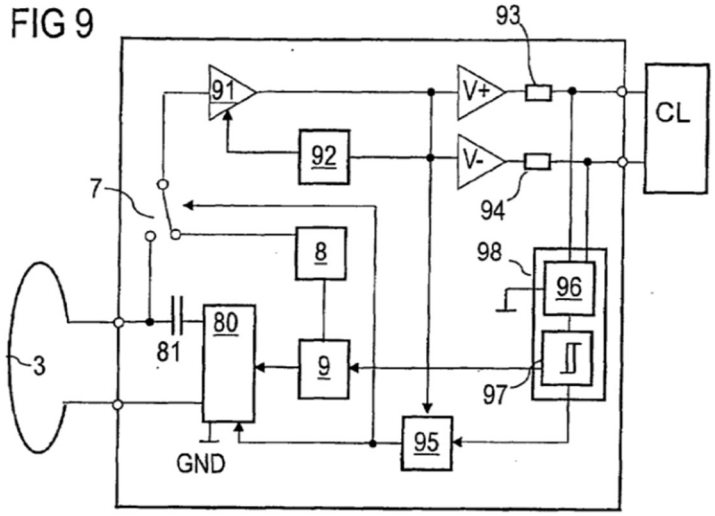
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	Finkenzeller at [0065] The transponder unit 1 is operated in a first (active) operating mode as an actively sending transponder. In a second (passive) operating mode, however, the trans-ponder unit works like an ordinary passive transponder performing a load modulation on the field of the reading device. Finkenzeller at [0066] For example, the receiver 4 can additionally be formed as a conventional load modulator driven by the controller 5. The controller 5 then either switches the transmitter 6 on and the load modulator off, or the load modulator on and the transmitter 6 off. The switch 7 is switched accordingly. The criterion used for switching from a passive to an active operating state can be for example the received signal strength, the presence and/or sufficiency of an external voltage supply (on an optional connection Vcc not shown), or the sufficiency of an internal voltage supply (state of charge of the battery 2). It is thus for example possible to first operate a transponder unit 1 passively and switch it to an active operating mode if for example the distance from the reading device unintentionally increases. Finkenzeller at [0069] The input HF of the ring modulator 9 is fed with the high-frequency output signal of the oscillator 8. The frequency of the oscillator signal preferably corresponds exactly to the transmitting frequency of the reading device 100 (e.g. 13.56 MHz). The input NF of the ring modulator 9 is fed with a data signal in the baseband (e.g. for Felica system) or with a modulated subcarrier (e.g. for ISO 14443, ISO 15693), as described above. Finkenzeller at [0073] Just as in the structure according to FIG. 2, the binary data signal A is combined with a subcarrier signal B by an AND gate 43. The combined signal is available at a ring modulator 49. The digital ring modulator 49 used can be an XOR element. Departing from the structure of the transmitter in FIG. 2, a carrier signal C is not applied directly to the input of the ring modulator 49. Instead, the carrier signal C is first combined with a data signal A in an AND gate 46. This arrangement obtains better efficiency, as to be described more closely below. The output signal of the ring modulator 49 is amplified in an amplifier 40 before being emitted via the antenna 3 as the field of the transponder unit. The signal types A to C will hereinafter be described more closely by way of example with reference to FIG. 5. Finkenzeller at [0076]

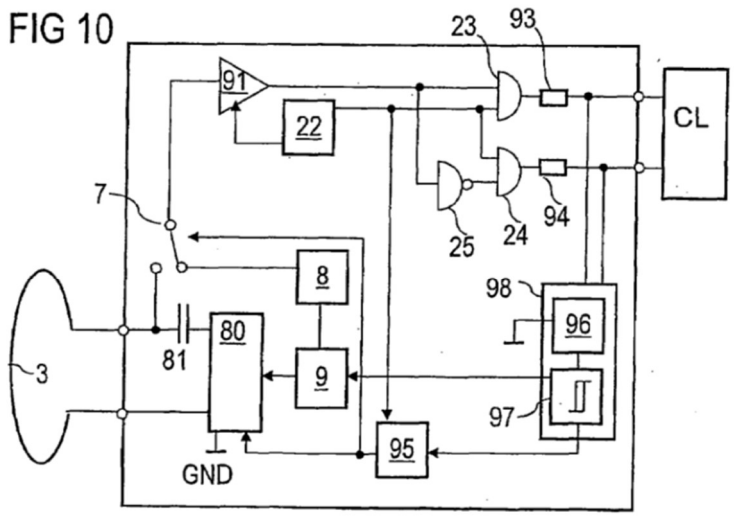
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	The signal D emitted by an antenna 3 to a reading device has a frequency spectrum that is like a frequency spectrum resulting by means of load modulation. The signal D can optionally be amplified by means of an amplifier 40. The amplifier 40 can be for example a push-pull amplifier with digital push-pull output amplifiers. Finkenzeller at [0078] In the transmitter according to FIG. 5 an amplitude-modulated subcarrier signal is generated, while the transmitter shown in FIG. 6 generates a phase-modulated subcarrier signal. This transmitter, like the transmitter of FIG. 5, is preferably used in an inventive transponder unit only when the data signal A is a binary signal. Correspondingly, the transmitter shown generates a BPSK signal (2-PSK, binary phase shift keying). A subcarrier signal B (e.g. 848 kHz for ISO/IEC 14443) and a carrier signal C (e.g. 13.56 MHz for ISO/IEC 14443) are thereby ANDed by means of the circuit 69. The data signal A in the baseband (e.g. NRZ or Manchester signal) switches the subcarrier signal B between an inverted and a non-inverted state with the help of a switch 63 and an inverter 64. This has an effect corresponding to a phase modulation by 180° (BPSK, binary phase keying). Finkenzeller at [0080] The following table shows a survey of logic operation on signals, electricity consumption and range for different digital modulation circuits (carrier frequency TF=13.56 MHz; subcarrier frequency HT=868 kHz and modulation signal MS in the baseband, Manchester 106 kbit/s). Finkenzeller at [0081] Upon data transfer from a transponder to the reading device an ASK-modulated subcarrier (OOK, on-off keying: HT r>MS) is used according to ISO/IEC 14443-3/type A at the initialization bit rate of 106 kbit/s. When this signal is simulated actively according to the inventive method, the required side bands can be generated most effectively with a ring modulator. The resulting double side band modulation (DSB) should show the best results with regard to communication range, since the carrier frequency (13.56 MHz) is suppressed and the available energy is provided in the side bands. Finkenzeller at [0095] The interface module 71 is equipped with a signal input SIGIN and a signal output SIGOUT for passing signals from the antenna to the chip (not shown) and from the chip, which generates the modulated subcarrier signal, to the antenna. A signal at SIGOUT consists of a 13.56 MHz TTL signal which optionally contains a modulation signal of a remote reading device.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	Finkenzeller at [0096] The interface module 71 comprises an amplifier 80, an AND gate 89, an oscillator 88, a frequency divider 82, a signal shaper 84 and a switch 87. The amplifier 80 can be for example a push-pull amplifier with (digital) push-pull output amplifiers (not shown). The interface module also has two antenna connections LA and LB and a series capacitor 81. Furthermore, the interface module 71 has connections Vcc-in and GND for energy supply and a control input CTRL for switching between a transmit mode and a receive mode of the interface module by means of the switch 87. Finkenzeller at [0098] When the interface module is in the transmit mode, i.e. there is a contactless data transfer to an external reading device or an NFC device, a modulated subcarrier signal is fed in at the signal input SIGIN by the smart card chip and optionally inverted in an inverter 86. The inverted signal E is combined with a 13.56 MHz carrier frequency signal in the AND gate 89 as the carrier frequency modulator, and supplied to the amplifier 80. Finkenzeller at [0099] The antenna 3 and the series capacitor 81 form a series-resonant circuit which is connected to the outputs LA′ and LB′ of the amplifier 80, so that the HF current flowing in case of resonance is limited in the antenna resonant circuit only by the ohmic resistances in the lines and in the amplifier 80. This obtains a greatest possible transmit power of the interface module. Finkenzeller at [0100] Further, the smart card chip can be supplied a constant 13.56 MHz timing signal from the oscillator 88 via the output SIGOUT in the transmit mode via the switch 87, if it requires such an (external) timing signal for operation to keep exact timing. As described above, this is necessary for communication according to the standard ISO 14443 type A. Finkenzeller at [0103] The oscillator 88 generates the 13.56 MHz carrier frequency signal required in the transmit mode. If the oscillator cannot be switched off in the receive mode since its building-up transient might last too long, the oscillator is operated in the receive mode of the interface module preferably at a multiple N of the carrier frequency signal (e.g. 27.120 MHz) so as not to disturb the possibly weak received signal by crosstalk. In the transmit mode the required 13.56 MHz signal can then be generated by dividing the oscillator signal by N by means of an optional divider 82.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	Finkenzeller at [0107] The transponder chip CL is a conventional RFID chip according to the prior art. It is normally connected at its connections with an antenna, e.g. in a chip card. Further, the transponder chip CL is so designed that data transfer from the transponder unit to a reading device is carried out by means of load modulation. This is almost always the case in usual RFID systems used at 13.56 MHz or also 125 kHz (e.g. ISO/IEC 14443, ISO/IEC 15693, ISO/IEC 18000-3). Finkenzeller at [0108] The transmit branch consists of a demodulation circuit 97, a modulator circuit 9, an oscillator 8 (e.g. 13.56 MHz), a controller 95, and a transmitter amplifier 80 connected to the antenna 3. The demodulation circuit 98 can consist for example of a rectifier 96 and a threshold switch 97. Finkenzeller at [0114] The modulation signal reconstructed by the demodulation circuit 97 is also supplied to a controller 95. The latter switches the inventive circuit with the first edge of the modulation signal to a transmit mode without delay if possible, so that the data generated by the RFID chip CL can also be transferred to the remote reading device. For this purpose, the switch 7 is first switched from the antenna 3 to the oscillator 8 (13.56 MHz). This is necessary to be able to keep supplying the RFID chip CL with an alternating voltage of the right frequency. At the same time the amplifier 80 is activated by the controller 95. Finkenzeller at [0123] For an inductive coupling, the circuit has an additional antenna 29 which can be made to resonate with the working frequency (e.g. 13.56 MHz) by means of a capacitor 26. A transponder comprising a transponder chip CL and an antenna 28 is positioned in immediate proximity to the antenna 29, so as to obtain the best possible magnetic coupling between the antennas 28 and 29. A load modulation of the transponder chip CL can also be detected easily with this arrangement. Finkenzeller at [0129] Thus, an NFC unit could be adapted to behave according to the present solutions in its passive mode in the role ("being card") in which the NFC unit is to perform a load modulation. The NFC unit could for example always act as a component actively emitting its own field. Likewise, the NFC unit could also distinguish, and optionally switch, between a first submode corresponding to a conventional load modulation and an actively sending, second submode in which the load modulation is simulated. A thus improved NFC unit can also communicate with ordinary RFID reading devices over a higher range with

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	the help of the changed passive operating mode. Since NFC units will already have certain units—such as an oscillator, an amplifier and a controller—for independent sending in their conventional active mode, comparatively few modifications of an NFC circuit are required to realize a circuit according to the present application in an NFC unit. *See also* Finkenzeller at [0049] and [0075]. To the extent this limitation is not disclosed by Finkenzeller, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Finkenzeller, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[17d] driving transmission of data by the active transmit driver circuit from the antenna to the NFC reader.	Finkenzeller discloses or renders obvious "driving transmission of data by the active transmit driver circuit from the antenna to the NFC reader." For example: *See* [1d] above. Finkenzeller at Figure 2 FIG 2  Finkenzeller at Figure 8

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	FIG 8  Finkenzeller at Figure 9 FIG 9 

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	Finkenzeller at Figure 10  Finkenzeller at [0006] For simple and fast contactless communication between two devices, the companies Philips and Sony have developed an inductive transmission technology which is known as so-called near field communication (NFC). This technology is integrated for example in mobile telephones or PDAs to permit communication between the devices or with a computer. The coupling of the two devices is effected via coils, the carrier frequency being 13.56 MHz as in RFID systems. As described more closely in the NFC standard ECMA 340, NFC systems have an active communication mode and a passive communication mode. In the active mode, two NFC units alternately generate their own RF field as a signal carrier, thus switching back and forth, coordinated with each other, between transmit mode and receive mode as in a classic mobile phone system. In the passive mode, however, the two NFC units must agree on which unit acts as a reading device and generates a field which the other unit can then influence by means of load modulation. Primarily due to the small antenna diameters used, NFC systems only permit small communication ranges of up to 20 cm. Finkenzeller at [0010]

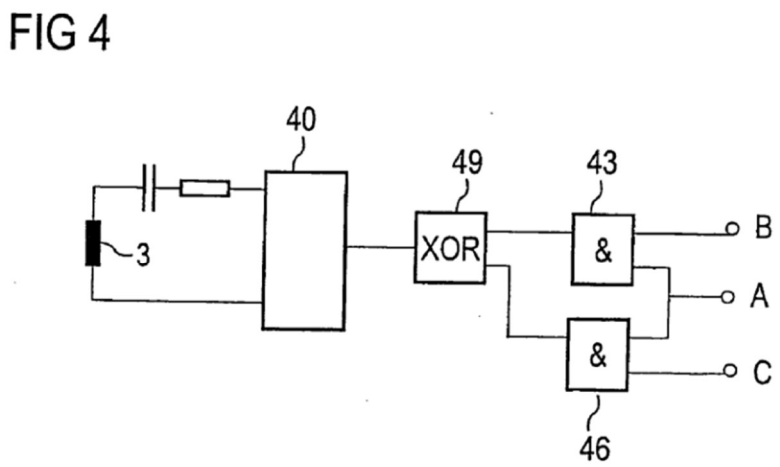
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	According to the invention, a transponder unit sends a signal to a transponder reading device, which can communicate with the transponders by means of modulation of its own field by transponders, in such a way that the reading device can evaluate the signal as modulation by a conventional transponder. Instead of performing a load modulation or backscatter modulation of a field of the reading device, the transponder unit itself thus emits a field that simulates for the reading device a modulation of the reading device field by a transponder. An inventive transponder unit has means for sending the accordingly modulated signal. The total range of the system is consequently no longer limited by the communication range of the reading device, but is extended therebeyond up to a transmit range of the transponder unit. Finkenzeller at [0011] In an advantageous embodiment, an inventive RFID transponder unit has its own energy supply, at least one antenna for transmitting signals from and/or to a reading device, and an electronic circuit. The electronic circuit of the inventive transponder unit comprises a transmitter consisting of an oscillator and a modulator. Finkenzeller at [0015] Both modulators (ring modulator and ASK modulator) modulate the oscillator signal by means of the (modulated) data signal and deliver an output signal which is then transmitted to the reading device via the receive antenna or a separate transmitting antenna. Finkenzeller at [0017] A special advantage of using the described modulators is their compatibility to the prior art, since they deliver an output signal to be sent to the reading device whose (frequency and amplitude) spectrum is very similar to that of a load or backscatter modulation, as described above. Therefore, no technical changes must be performed on conventional reading devices. The inventive transponder can thus be operated with commercially available RFID reading devices, the communication range being many times that of passive or even active transponders. For example, a commercially available ISO 14443 reading device which can communicate with an inductively coupled, contactless chip card according to the prior art over a distance of approx. 10 cm could communicate with an inventive transponder unit over many times this distance. Finkenzeller at [0021] In a development, the inventive transponder unit has a load modulator according to the prior art, in addition to the above-described circuit having a receiver, a controller, an oscillator and a modulator. Finkenzeller at [0022]

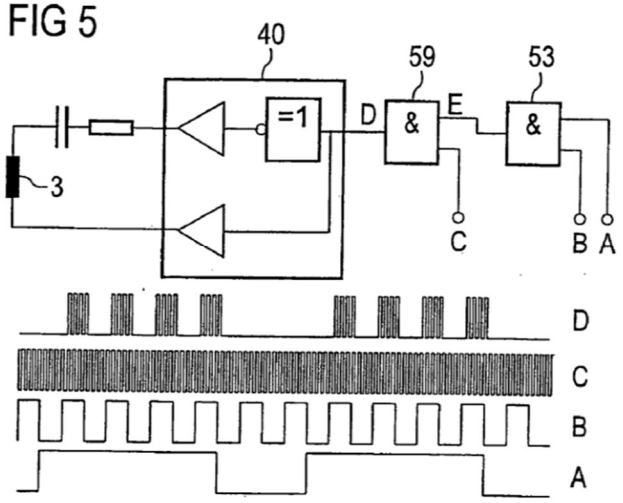
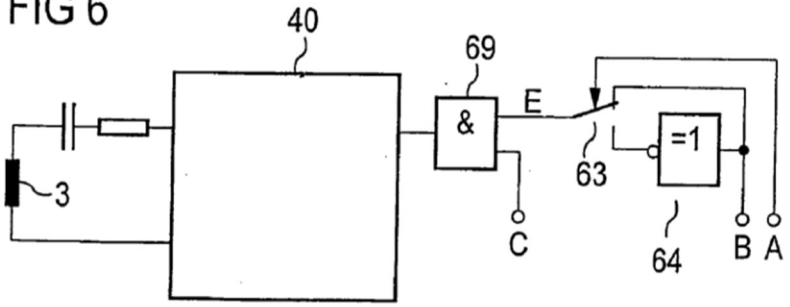
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	The voltage induced on the antenna of the transponder unit can be a problem for the operation of the inventive modulator circuits if the distance between trans-ponder unit and reading device is small and the induced voltage is therefore accordingly great. Therefore, the data to be sent to the reading device which are generated in the controller are supplied alternatively to the load modulator or to the inventive circuit configuration with a modulator. The switchover between the load modulator and the circuit configuration is preferably effected automatically, in dependence on the level of voltage induced on the antenna. The switchover is effected in such a way that the load modulator is used within the normal communication range, and the inventive modulator outside the normal communication range. Finkenzeller at [0027] The possibility of reading the inventive transponder unit over very large distances is not always desired, for example for privacy protection. It is therefore provided in one embodiment that the inventive circuit configuration can be activated manually if communication over a long range is explicitly desired. Otherwise, communication can be effected via a load modulator provided in the transponder unit, which is usable only for short distances. If no load modulator is provided in the trans-ponder unit, it can be provided for example that the transponder unit is activated for sending data only if the signal emitted by the reading device contains a predetermined code. Finkenzeller at [0048] The transponder unit 1 sends for data transfer to the reading device 100 a signal which the reading device 100 can evaluate as a signal of a transponder which carries out a load modulation of the field 110 of the reading device 100. Unlike the conventional transponders 200, 300 which modulate the field 110 of the reading device 100 into a modulated reading device field 102, 103, the transponder unit 1 thus generates and sends its own modulated field 20 as the signal for data transfer. The transponder unit 1 thus uses its own energy for the purpose of data transfer. Finkenzeller at [0056] The receiver 4 is provided for demodulating a signal transmitted from the reading device 100 to extract data therefrom. The extracted data are passed on to the controller 5 which processes them and generates data to be sent to the reading device 100. Furthermore, the controller 5 transmits a control signal to the switch 7 which switches between receive mode and transmit mode of the transponder unit. However, a separate antenna can instead be provided for sending. The controller 5 used can be for example a part of the operating system of a portable data carrier, such as a chip card. Finkenzeller at [0057]

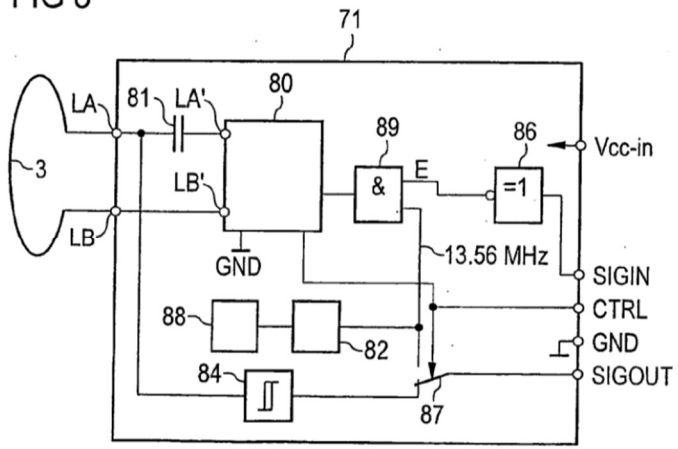
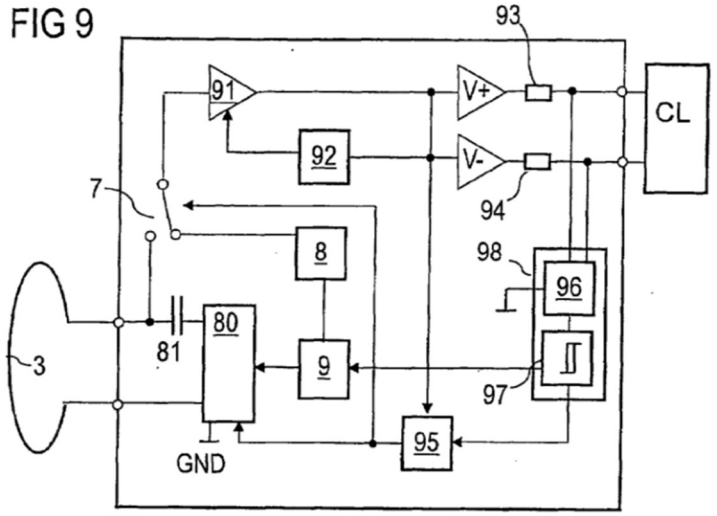
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	The transmitter 6 consists of an oscillator 8, a modulator, an execution as a ring modulator 9 first being described, and a terminal repeater 10. Furthermore, the transmitter 6 of the transponder unit shown in FIG. 2 is extended by an electronic assembly 11 for generating and modulating a subcarrier signal to carry out the data transfer from the transponder unit to a reading device 100 with a subcarrier signal. Depending on the use of the transponder unit, the subcarrier signal can have different frequencies, for example 848 kHz according to ISO 14443, 424 kHz according to ISO 15693 and 212 kHz for LEGIC, but might also be completely omitted. Finkenzeller at [0060] To supply the active components of the transponder unit at least partly with energy and to increase the energy range between the transponder unit 1 and the reading device 100, the inventive transponder unit has a battery 2. Finkenzeller at [0063] At the output of the ring modulator 9 an output signal is then available that contains the two modulation side bands and is identical (exactly enough) to a signal generated by load modulation or backscatter modulation. The output signal generated by the ring modulator 9 can then be optionally amplified by means of the amplifier 10, and be supplied to the antenna 3 for sending the data to be sent, via the switch 7 which is switched to the transmit mode of the transponder unit by a signal of the controller 5. Finkenzeller at [0065] The transponder unit 1 is operated in a first (active) operating mode as an actively sending transponder. In a second (passive) operating mode, however, the trans-ponder unit works like an ordinary passive transponder performing a load modulation on the field of the reading device. Finkenzeller at [0066] For example, the receiver 4 can additionally be formed as a conventional load modulator driven by the controller 5. The controller 5 then either switches the transmitter 6 on and the load modulator off, or the load modulator on and the transmitter 6 off. The switch 7 is switched accordingly. The criterion used for switching from a passive to an active operating state can be for example the received signal strength, the presence and/or sufficiency of an external voltage supply (on an optional connection Vcc not shown), or the sufficiency of an internal voltage supply (state of charge of the battery 2). It is thus for example possible to first operate a transponder unit 1 passively and switch it to an active operating mode if for example the distance from the reading device unintentionally increases.

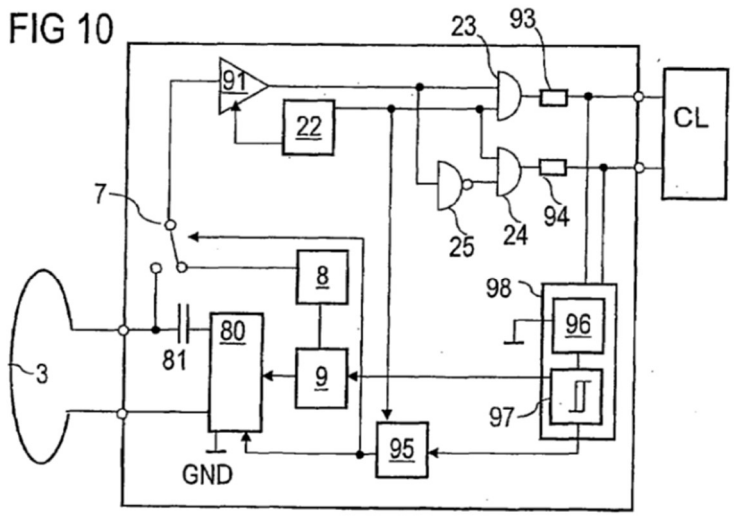
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	Finkenzeller at [0073] Just as in the structure according to FIG. 2, the binary data signal A is combined with a subcarrier signal B by an AND gate 43. The combined signal is available at a ring modulator 49. The digital ring modulator 49 used can be an XOR element. Departing from the structure of the transmitter in FIG. 2, a carrier signal C is not applied directly to the input of the ring modulator 49. Instead, the carrier signal C is first combined with a data signal A in an AND gate 46. This arrangement obtains better efficiency, as to be described more closely below. The output signal of the ring modulator 49 is amplified in an amplifier 40 before being emitted via the antenna 3 as the field of the transponder unit. The signal types A to C will hereinafter be described more closely by way of example with reference to FIG. 5. Finkenzeller at [0076] The signal D emitted by an antenna 3 to a reading device has a frequency spectrum that is like a frequency spectrum resulting by means of load modulation. The signal D can optionally be amplified by means of an amplifier 40. The amplifier 40 can be for example a push-pull amplifier with digital push-pull output amplifiers. Finkenzeller at [0096] The interface module 71 comprises an amplifier 80, an AND gate 89, an oscillator 88, a frequency divider 82, a signal shaper 84 and a switch 87. The amplifier 80 can be for example a push-pull amplifier with (digital) push-pull output amplifiers (not shown). The interface module also has two antenna connections LA and LB and a series capacitor 81. Furthermore, the interface module 71 has connections Vcc-in and GND for energy supply and a control input CTRL for switching between a transmit mode and a receive mode of the interface module by means of the switch 87. Finkenzeller at [0098] When the interface module is in the transmit mode, i.e. there is a contactless data transfer to an external reading device or an NFC device, a modulated subcarrier signal is fed in at the signal input SIGIN by the smart card chip and optionally inverted in an inverter 86. The inverted signal E is combined with a 13.56 MHz carrier frequency signal in the AND gate 89 as the carrier frequency modulator, and supplied to the amplifier 80. Finkenzeller at [0099] The antenna 3 and the series capacitor 81 form a series-resonant circuit which is connected to the outputs LA′ and LB′ of the amplifier 80, so that the HF current flowing in case of resonance is limited in the

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	antenna resonant circuit only by the ohmic resistances in the lines and in the amplifier 80. This obtains a greatest possible transmit power of the interface module. Finkenzeller at [0100] Further, the smart card chip can be supplied a constant 13.56 MHz timing signal from the oscillator 88 via the output SIGOUT in the transmit mode via the switch 87, if it requires such an (external) timing signal for operation to keep exact timing. As described above, this is necessary for communication according to the standard ISO 14443 type A. Finkenzeller at [0103] The oscillator 88 generates the 13.56 MHz carrier frequency signal required in the transmit mode. If the oscillator cannot be switched off in the receive mode since its building-up transient might last too long, the oscillator is operated in the receive mode of the interface module preferably at a multiple N of the carrier frequency signal (e.g. 27.120 MHz) so as not to disturb the possibly weak received signal by crosstalk. In the transmit mode the required 13.56 MHz signal can then be generated by dividing the oscillator signal by N by means of an optional divider 82. Finkenzeller at [0129] Thus, an NFC unit could be adapted to behave according to the present solutions in its passive mode in the role ("being card") in which the NFC unit is to perform a load modulation. The NFC unit could for example always act as a component actively emitting its own field. Likewise, the NFC unit could also distinguish, and optionally switch, between a first submode corresponding to a conventional load modulation and an actively sending, second submode in which the load modulation is simulated. A thus improved NFC unit can also communicate with ordinary RFID reading devices over a higher range with the help of the changed passive operating mode. Since NFC units will already have certain units—such as an oscillator, an amplifier and a controller—for independent sending in their conventional active mode, comparatively few modifications of an NFC circuit are required to realize a circuit according to the present application in an NFC unit. To the extent this limitation is not disclosed by Finkenzeller, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Finkenzeller, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
18[pre]. The method of claim 17 further comprising:	Finkenzeller discloses or renders obvious "[t]he method of claim 17 further comprising." *See* claim 17 above.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
[18a] amplifying a signal received from the antenna to generate an amplified signal; and	Finkenzeller discloses or renders obvious "amplifying a signal received from the antenna to generate an amplified signal." For example: Finkenzeller at Figure 4  Finkenzeller at Figure 5

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	FIG 5  Finkenzeller at Figure 6 FIG 6  Finkenzeller at Figure 8

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	FIG 8  Finkenzeller at Figure 9 FIG 9 

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	Finkenzeller at Figure 10  Finkenzeller at [0063] At the output of the ring modulator 9 an output signal is then available that contains the two modulation side bands and is identical (exactly enough) to a signal generated by load modulation or backscatter modulation. The output signal generated by the ring modulator 9 can then be optionally amplified by means of the amplifier 10, and be supplied to the antenna 3 for sending the data to be sent, via the switch 7 which is switched to the transmit mode of the transponder unit by a signal of the controller 5. Finkenzeller at [0073] Just as in the structure according to FIG. 2, the binary data signal A is combined with a subcarrier signal B by an AND gate 43. The combined signal is available at a ring modulator 49. The digital ring modulator 49 used can be an XOR element. Departing from the structure of the transmitter in FIG. 2, a carrier signal C is not applied directly to the input of the ring modulator 49. Instead, the carrier signal C is first combined with a data signal A in an AND gate 46. This arrangement obtains better efficiency, as to be described more closely below. The output signal of the ring modulator 49 is amplified in an amplifier 40

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	before being emitted via the antenna 3 as the field of the transponder unit. The signal types A to C will hereinafter be described more closely by way of example with reference to FIG. 5. Finkenzeller at [0076] The signal D emitted by an antenna 3 to a reading device has a frequency spectrum that is like a frequency spectrum resulting by means of load modulation. The signal D can optionally be amplified by means of an amplifier 40. The amplifier 40 can be for example a push-pull amplifier with digital push-pull output amplifiers. Finkenzeller at [0096] The interface module 71 comprises an amplifier 80, an AND gate 89, an oscillator 88, a frequency divider 82, a signal shaper 84 and a switch 87. The amplifier 80 can be for example a push-pull amplifier with (digital) push-pull output amplifiers (not shown). The interface module also has two antenna connections LA and LB and a series capacitor 81. Furthermore, the interface module 71 has connections Vcc-in and GND for energy supply and a control input CTRL for switching between a transmit mode and a receive mode of the interface module by means of the switch 87. Finkenzeller at [0098] When the interface module is in the transmit mode, i.e. there is a contactless data transfer to an external reading device or an NFC device, a modulated subcarrier signal is fed in at the signal input SIGIN by the smart card chip and optionally inverted in an inverter 86. The inverted signal E is combined with a 13.56 MHz carrier frequency signal in the AND gate 89 as the carrier frequency modulator, and supplied to the amplifier 80. Finkenzeller at [0099] The antenna 3 and the series capacitor 81 form a series-resonant circuit which is connected to the outputs LA′ and LB′ of the amplifier 80, so that the HF current flowing in case of resonance is limited in the antenna resonant circuit only by the ohmic resistances in the lines and in the amplifier 80. This obtains a greatest possible transmit power of the interface module. Finkenzeller at [0101] In the receive mode, the smart card chip is supplied a digitized received signal tapped from the antenna 1, via the switch 87 and the output SIGOUT. The signal shaper 84 acts here as an amplifier to be able to receive even weak signals, and as a threshold switch to provide a digital output signal at the output of the

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	signal shaper. For example, the threshold switch used can be a Schmitt trigger which outputs a clear high or low level depending on the over- or undershooting of a predetermined threshold value. Finkenzeller at [0102] Via the control input of the push-pull amplifier 80 the push-pull outputs of the output drivers (see amplifier units in FIG. 5) are switched to GND, so that the antenna 3 and the capacitor 41 result in a parallel-resonant circuit. To save energy, the amplifier 80 can be switched to a power save mode in the receive mode of the interface module. Finkenzeller at [0106] The inventive active transponder unit has a receive branch and a transmit branch. The receive branch consists of an antenna 3, an input amplifier 91, an automatic gain control 92 and an amplifier which is preferably designed as a push-pull amplifier (V+, V−). Further, a transponder chip CL is connected via its antenna connections to the push-pull amplifier. Finkenzeller at [0108] The transmit branch consists of a demodulation circuit 97, a modulator circuit 9, an oscillator 8 (e.g. 13.56 MHz), a controller 95, and a transmitter amplifier 80 connected to the antenna 3. The demodulation circuit 98 can consist for example of a rectifier 96 and a threshold switch 97. Finkenzeller at [0109] In the receive mode a voltage is induced in the antenna 3 by the magnetic field of a remote RFID reading device. Together with the capacitor 81 the antenna 3 forms a parallel-resonant circuit whose resonant frequency corresponds approximately to the transmitting frequency of the RFID reading device. The voltage thus available on the resonant circuit is supplied to the input amplifier 91 via the switch 7. Via a gain control 92 the gain factor of the input amplifier 91 is now so adjusted that the output amplitude of the voltage amplified by the input amplifier 91 remains largely constant. The time constant of the control is preferably so adjusted here that the output voltage of the amplifier 91 remains constant in case of varying distance from the reading device (i.e. different levels of induced voltage in the coil 3), but modulation signals (e.g. 10% ASK with 106 kbit/s) are not suppressed by excessively fast control. Finkenzeller at [0110] The output signal of the amplifier 91 is supplied to a further amplifier, preferably a push-pull amplifier (V+, V−). The output signal of the push-pull amplifier is supplied to the connections of the contactless RFID chip CL via (at least) one series resistor 93. The amplitude of the output signal of the push-pull

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	amplifier V+/V− is so selected here that the RFID chip CL can be supplied with sufficient energy for operation by the output signal. Finkenzeller at [0114] The modulation signal reconstructed by the demodulation circuit 97 is also supplied to a controller 95. The latter switches the inventive circuit with the first edge of the modulation signal to a transmit mode without delay if possible, so that the data generated by the RFID chip CL can also be transferred to the remote reading device. For this purpose, the switch 7 is first switched from the antenna 3 to the oscillator 8 (13.56 MHz). This is necessary to be able to keep supplying the RFID chip CL with an alternating voltage of the right frequency. At the same time the amplifier 80 is activated by the controller 95. Finkenzeller at [0115] The reconstructed modulation signal and the signal of the oscillator 8 are supplied to the modulator circuit 9. The exact function of such a circuit has already been described in detail. The output signal of the modulator circuit 9 is supplied to the amplifier 80 and sent via the antenna 3 to the remote reading device. Finkenzeller at [0129] Thus, an NFC unit could be adapted to behave according to the present solutions in its passive mode in the role ("being card") in which the NFC unit is to perform a load modulation. The NFC unit could for example always act as a component actively emitting its own field. Likewise, the NFC unit could also distinguish, and optionally switch, between a first submode corresponding to a conventional load modulation and an actively sending, second submode in which the load modulation is simulated. A thus improved NFC unit can also communicate with ordinary RFID reading devices over a higher range with the help of the changed passive operating mode. Since NFC units will already have certain units—such as an oscillator, an amplifier and a controller—for independent sending in their conventional active mode, comparatively few modifications of an NFC circuit are required to realize a circuit according to the present application in an NFC unit. To the extent this limitation is not disclosed by Finkenzeller, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Finkenzeller, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 8 and claim 17 above.
[18b] providing the amplified signal to the smartcard controller.	Finkenzeller discloses or renders obvious "providing the amplified signal to the smartcard controller."

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2009/0040022 ("Finkenzeller")
	See [18a] above. To the extent this limitation is not disclosed by Finkenzeller, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Finkenzeller, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 8 and claim 17 above.
19. The method of claim 10 or 17, wherein the transmitted data includes ticketing information for a mass transit system.	Finkenzeller discloses or renders obvious "[t]he method of claim 10 or 17, wherein the transmitted data includes ticketing information for a mass transit system." *See* claim 2 above. *See also* claims 10 and 17 above.
20. The method of claim 10 or 17, wherein the transmitted data includes transaction information for a mobile payment.	Finkenzeller discloses or renders obvious "[t]he method of claim 10 or 17, wherein the transmitted data includes transaction information for a mobile payment." *See* claim 3 above. *See also* claims 10 and 17 above.

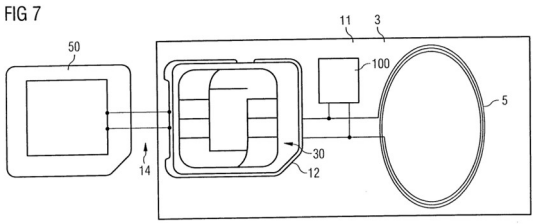
DEFENDANTS' INVALIDITY CONTENTIONS FOR U.S. PAT. 11,694,053

EXHIBIT C02: D.E. 102007019272 ("Gerstenberger")

As demonstrated in the claim charts below, the claims of U.S. Patent No. 11,694,053 ("the '053 patent") are invalid (a) under one or more sections of 35 U.S.C. § 102 as anticipated by Gerstenberger and (b) under 35 U.S.C. § 103(a) as obvious over Gerstenberger standing alone and as set forth herein, and/or combined with the knowledge of a person of ordinary skill in the art, Applicant's Admitted Prior Art, and/or the additional prior art references discussed in Exhibit C and Exhibits C01–C09, the contents of which are hereby incorporated by reference into this chart. One of ordinary skill in the art, as of the priority date of the '053 patent, would have known to combine the prior art elements disclosed by the foregoing references using known methods, and to use these elements according to their established functions in order to achieve a known and predictable result.

Defendants have conducted the invalidity analysis herein based at least in part and in some instance entirely upon Plaintiff's apparent application of the claims of the '053 patent. By charting the prior art against the claims and limitations herein, Defendants are not admitting or agreeing to Plaintiff's application of the claims at issue in this case, and these charts should not be interpreted as an admission or concession by Defendants that any particular construction or application of any claim limitation by Plaintiff is correct or proper. Additionally, these charts provide representative examples of portions of the charted references that disclose the indicated limitations of the claims; additional portions of these references other than the representative examples provided herein may also disclose the indicated limitation(s) and Defendants contend that the asserted claims are invalid in light of the charted reference(s) as a whole in its or their entirety. Where a particular figure is cited, the citation should be understood to encompass the caption and description of the figure as well as any text relating to or describing the figure. Conversely, where particular text referring to a figure is cited, the citation should be understood to include the figure as well.

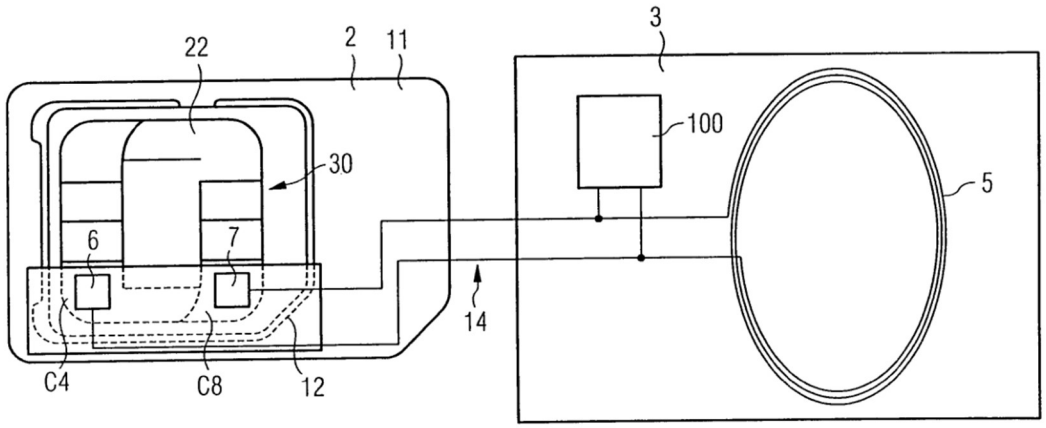
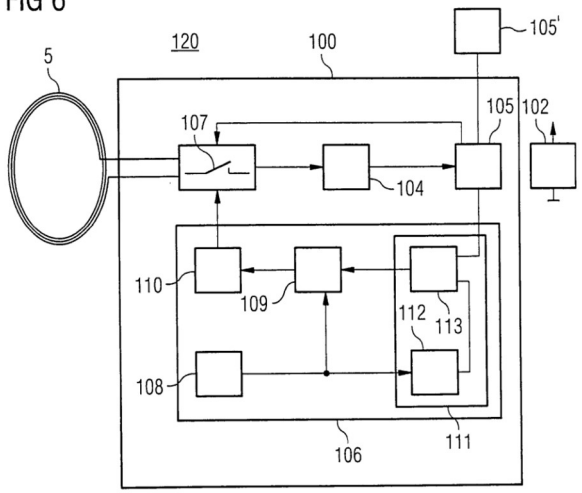
Claim Element	**Exemplary Citations to D.E. 102007019272 ("Gerstenberger")**
1[pre]. A mobile device comprising:	By providing this disclosure, Defendants do not take a position on whether the preamble is a claim limitation. Gerstenberger discloses or renders obvious "[a] mobile device." For example: Gerstenberger at Abstract The adapter (1) has a flexibly designed antenna holder (3) comprising an antenna (5) and an antenna connection connected with the antenna, where the antenna connection is arranged in an antenna connection holder (2). The connection holder is formed to cooperate with a flat side of a data carrier and formed as a foil. A data carrier holder is provided with an accommodation area for accommodating the data carrier, where the area is formed as a flat recess. An independent claim is also included for a system comprising a mobile phone and an antenna adapter. Gerstenberger at Figure 7

Claim Element	Exemplary Citations to D.E. 102007019272 ("Gerstenberger")
	 Gerstenberger at [0001] The invention relates to the technical field of card-shaped data carriers with integrated circuits, which are equipped with an antenna for contactless functionalities. The invention further relates to a system comprising a mobile phone, a SIM card and such an antenna. Gerstenberger at [0002] Card-shaped data carriers with an integrated circuit, in particular chip cards or smart cards, which have an antenna for contactless communication with the integrated circuit of the data carrier, are known in a large number of different embodiments, for example as smart cards with contactless functionality for contactless payment transactions, for ski passes, for access controls or for the use of local public transport. Such functionalities can in principle also be implemented on SIM cards (subscriber identity module). SIM cards are chip cards in a smaller format, usually in the ID-000 format according to GSM11.11 and TS102.221 and are used in mobile phones to authenticate the mobile phone when logging into a mobile network. Since the SIM card is already present in the mobile phone, it makes sense to use the integrated circuit of the SIM card to implement additional contactless functionalities on the mobile phone. Gerstenberger at [0003] In addition to appropriate hardware and software adaptations, an antenna is required for the contactless functionality. Due to their small format, SIM cards do not offer enough space for an integrated antenna with the appropriate range. The location intended for the SIM card in the mobile phone may also be unfavorable for the antenna, for example because of shielding by neighboring components, such as a battery. This

Claim Element	Exemplary Citations to D.E. 102007019272 ("Gerstenberger")
	problem can also occur in a similar way with electronic data storage devices of other types and forms that are used in other devices. Gerstenberger at [0004] In DE 10 2004 029 984 A1 it is proposed to design a portable data carrier, in particular a SIM card for mobile telephones, with an integrated antenna in such a way that the integrated circuit of the data carrier is arranged in a first flat-piece-like region and the antenna is arranged in a second flat-piece-like region, wherein the flat-piece-like antenna region is designed to be flexible. The first flat area has the usual dimensions of a standard SIM card and can be inserted into a mobile phone in the conventional way. The flat antenna area can be bent, for example around a cell phone battery, so that the antenna is not unnecessarily shielded by cell phone components. The surface of the flat-piece-like antenna region can accordingly be formed to be substantially larger than the first flat-piece-like region containing the integrated circuit. Gerstenberger at [0007] This object is achieved by an antenna adapter having the features of claim 1. A system comprising a mobile phone, a SIM card and such an antenna adapter is specified in claim 21. The dependent claims relate to advantageous developments and embodiments of the invention. Gerstenberger at [0008] With the aid of the antenna adapter according to the invention, conventional card-shaped data carriers with an integrated circuit, in particular SIM cards in the form of plug-ins or mini-plug-ins for mobile phones, can be equipped with an antenna for contactless data transfer over medium ranges (for example Near Field Communication NFC). The antenna adapter according to the invention comprises, in accordance with the prior art described above, an antenna which is arranged in a flat, flexible antenna holder, as well as an antenna connection connected to the antenna. Unlike in the prior art, however, the antenna connection is not designed as a plug connection, but is itself located in a flat antenna connection holder, which is connected to the antenna holder, for example, via a cable and which interacts with a flat side of the card-shaped data carrier in order to communicate with the integrated circuit of the data carrier. In this way, it is possible to use the interface device already present in the data carrier, via which the integrated circuit of the data carrier communicates with an external device, for communication with the antenna without any modification of the data carrier being necessary. Rather, conventional data storage devices can be upgraded for additional contactless functionality by appropriately placing the antenna adapter on one of its flat sides.

Claim Element	Exemplary Citations to D.E. 102007019272 ("Gerstenberger")
	Gerstenberger at [0018] The antenna holder carrying the antenna is significantly larger in area than the antenna connection holder and the data carrier holder. The antenna holder of an antenna adapter for a SIM card of a mobile phone is accordingly larger than the SIM card itself, but preferably smaller than the largest side surface of a battery of a mobile phone, so that the antenna holder can be placed on one side of the battery, while the SIM card is located, for example, under or next to the battery. Gerstenberger at [0035] Fig. 3 shows a second embodiment of an antenna adapter 1 according to the invention. Here, the antenna connection holder 2 is designed like a pocket so that the SIM card 20 can be inserted. The adhesive connection 9 can then be dispensed with. This also makes it easier to replace the SIM card 20. The antenna connection holder 2 is again formed by a film which is sufficiently thin that the SIM card 20 with the pocket-shaped antenna connection holder 2 can be inserted into a mobile phone without having to modify the device. It may be expedient to make the pocket open on two sides and, if necessary, to insert the SIM card 20 crosswise instead of lengthwise, as in Fig. 3. Gerstenberger at [0040] For shielding purposes, the antenna adapter 1 of the described embodiments can be designed in multiple layers at least in the area of the antenna holder 3 and, for example, can first have a copper foil and then a ferrite foil on a side facing an interference influence at the installation location. Such an antenna adapter is then particularly suitable for being folded around the battery of a mobile phone, for example. The SIM card 20 or the MiniPlugIn 30 are then located below the battery and the large antenna holder 3 is on the opposite side of the battery. If the battery and the SIM card 20 or the mini plug-in 30 are instead arranged next to one another within the mobile phone, depending on the situation as to whether the antenna holder 3 is to be located above or below the battery, it may be expedient to provide the aforementioned additional shielding layers on the other side of the antenna holder 3. Gerstenberger at [0042] For data transmission, the transponder unit sends a signal to a reader, which the reader can evaluate as a signal from a transponder that performs a load modulation of the reader's field. In contrast to conventional transponders, which modulate the reader field into a modulated reader field, the transponder unit generates and transmits its own modulated field as the data transmission signal. The transponder unit therefore uses its own energy for the purpose of data transmission.

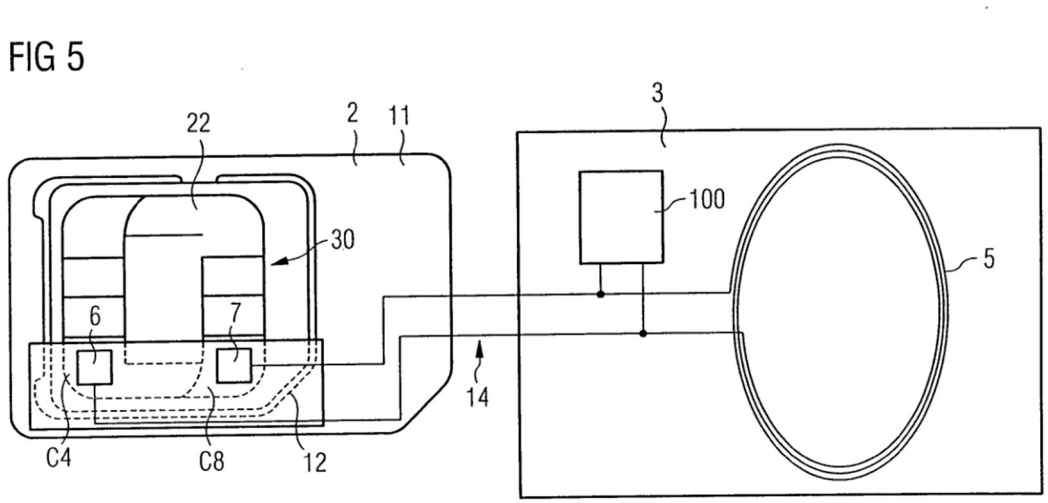
Claim Element	Exemplary Citations to D.E. 102007019272 ("Gerstenberger")
	Gerstenberger at [0043] Fig. 6 shows schematically the actively transmitting transponder unit 120. The transponder unit has a power supply 102, the antenna 5 and the electronic circuit 100. The circuit 100 essentially consists of three functional blocks: a receiver 104, a controller 105 and a transmitter 106. A switch 107 is used to switch the antenna 5 between the receiver 104 and the transmitter 106. The energy supply 102 is normally provided by the battery of the mobile phone into which the data carrier to be coupled with the antenna adapter is inserted. But a simple battery can also serve this purpose. Gerstenberger at [0055] Fig. 7 illustrates a further embodiment of the antenna adapter 1 . The antenna holder 3 and the data carrier holder 11 are integrally formed therein. The circuit 100 is again flat and arranged on the antenna holder 3. The receiving area 12 of the data carrier holder 11 is designed as a base for receiving a SIM card 30 in the size of a mini plug-in. It is also possible to design the receiving area 12 to accommodate card-shaped data carriers of other formats. A device connector 50, which is connected to the receiving area 12 of the data carrier holder 11 via flexible separate cables 14, is inserted into the mobile phone instead of the SIM card and has a corresponding SIM card format. The SIM card 30 receives the signals necessary for operation, such as, for example, the status, via the flexible cables 14. B. VCC, GND, I/O, RESET, CLK, from the device connector 50 . The circuit 100 is supplied with energy from the battery of the mobile phone via the device connection 50. To the extent this limitation is not disclosed by Gerstenberger, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Gerstenberger, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[1a] a power source;	Gerstenberger discloses or renders obvious "a power source." For example: Gerstenberger at Figure 5

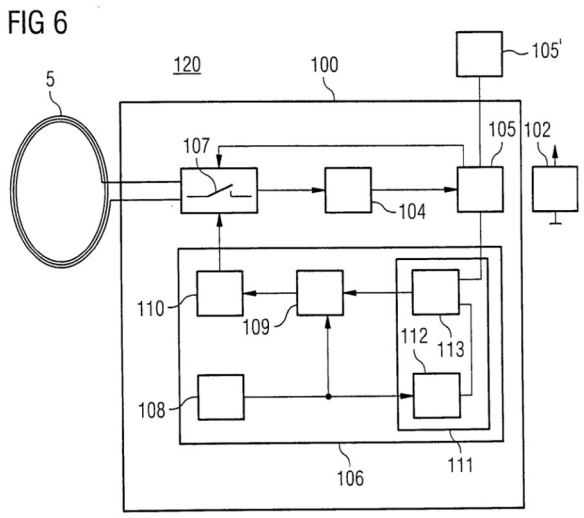
Claim Element	Exemplary Citations to D.E. 102007019272 ("Gerstenberger")
	FIG 5  Gerstenberger at Figure 6 FIG 6 

Claim Element	Exemplary Citations to D.E. 102007019272 ("Gerstenberger")
	Gerstenberger at [0003] In addition to appropriate hardware and software adaptations, an antenna is required for the contactless functionality. Due to their small format, SIM cards do not offer enough space for an integrated antenna with the appropriate range. The location intended for the SIM card in the mobile phone may also be unfavorable for the antenna, for example because of shielding by neighboring components, such as a battery. This problem can also occur in a similar way with electronic data storage devices of other types and forms that are used in other devices. Gerstenberger at [0004] In DE 10 2004 029 984 A1 it is proposed to design a portable data carrier, in particular a SIM card for mobile telephones, with an integrated antenna in such a way that the integrated circuit of the data carrier is arranged in a first flat-piece-like region and the antenna is arranged in a second flat-piece-like region, wherein the flat-piece-like antenna region is designed to be flexible. The first flat area has the usual dimensions of a standard SIM card and can be inserted into a mobile phone in the conventional way. The flat antenna area can be bent, for example around a cell phone battery, so that the antenna is not unnecessarily shielded by cell phone components. The surface of the flat-piece-like antenna region can accordingly be formed to be substantially larger than the first flat-piece-like region containing the integrated circuit. Gerstenberger at [0018] The antenna holder carrying the antenna is significantly larger in area than the antenna connection holder and the data carrier holder. The antenna holder of an antenna adapter for a SIM card of a mobile phone is accordingly larger than the SIM card itself, but preferably smaller than the largest side surface of a battery of a mobile phone, so that the antenna holder can be placed on one side of the battery, while the SIM card is located, for example, under or next to the battery. Gerstenberger at [0021] However, due to the location intended for installation of an antenna for a SIM card between the battery of the mobile phone and the battery cover, in some cases there is not enough space for such a shield with sufficient thickness. Furthermore, the shape and/or material of the shielding layer must be selected differently depending on the type of mobile phone into which the antenna is to be inserted, which prevents cost-effective, uniform

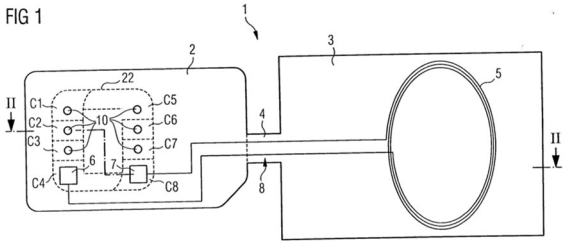
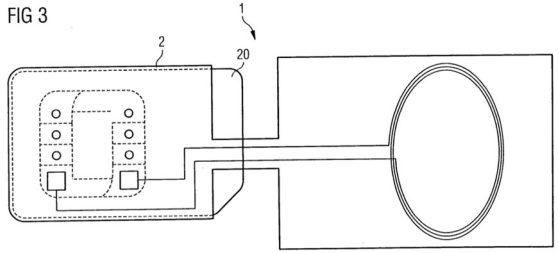
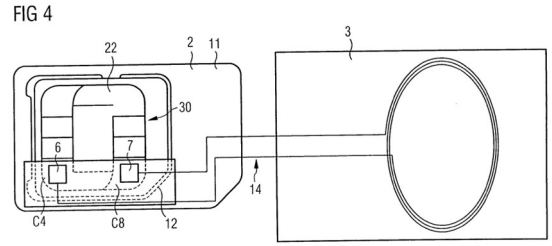
Claim Element	Exemplary Citations to D.E. 102007019272 (“Gerstenberger”)
	production. In order to take this circumstance into account, the antenna adapter can, according to a preferred embodiment of the invention, contain a circuit which, together with the antenna and the integrated circuit of the data carrier, forms an actively transmitting transponder unit in order to be usable even in cramped installation conditions. The circuit is coupled to the antenna and the antenna connector. In this way, as an alternative and/or in addition to the shielding layer, a limitation of the antenna's range caused by possible interference can be counteracted. In a preferred embodiment, the circuit is flat and arranged on the antenna holder of the antenna adapter. The circuit requires practically no additional space and can therefore be used advantageously. Gerstenberger at [0040] For shielding purposes, the antenna adapter 1 of the described embodiments can be designed in multiple layers at least in the area of the antenna holder 3 and, for example, can first have a copper foil and then a ferrite foil on a side facing an interference influence at the installation location. Such an antenna adapter is then particularly suitable for being folded around the battery of a mobile phone, for example. The SIM card 20 or the MiniPlugIn 30 are then located below the battery and the large antenna holder 3 is on the opposite side of the battery. If the battery and the SIM card 20 or the mini plug-in 30 are instead arranged next to one another within the mobile phone, depending on the situation as to whether the antenna holder 3 is to be located above or below the battery, it may be expedient to provide the aforementioned additional shielding layers on the other side of the antenna holder 3. Gerstenberger at [0042] For data transmission, the transponder unit sends a signal to a reader, which the reader can evaluate as a signal from a transponder that performs a load modulation of the reader’s field. In contrast to conventional transponders, which modulate the reader field into a modulated reader field, the transponder unit generates and transmits its own modulated field as the data transmission signal. The transponder unit therefore uses its own energy for the purpose of data transmission. Gerstenberger at [0043] Fig. 6 shows schematically the actively transmitting transponder unit 120. The transponder unit has a power supply 102, the antenna 5 and the electronic circuit 100. The circuit 100 essentially consists of three functional blocks: a receiver 104, a controller 105 and a transmitter 106. A switch 107 is used to switch the antenna 5 between the receiver 104 and the transmitter 106. The energy supply 102 is normally provided by the battery of the mobile phone into which the data carrier to be coupled with the antenna adapter is inserted. But a simple battery can also serve this purpose.

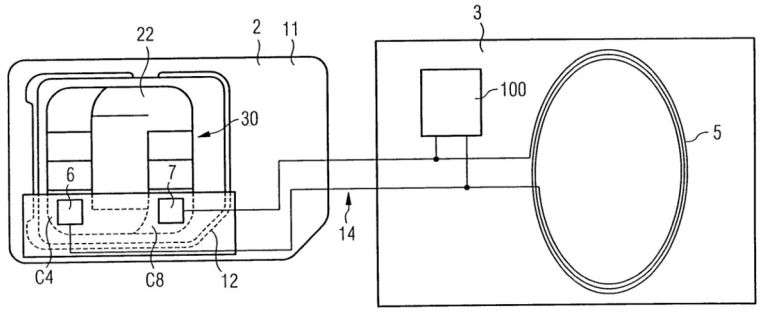
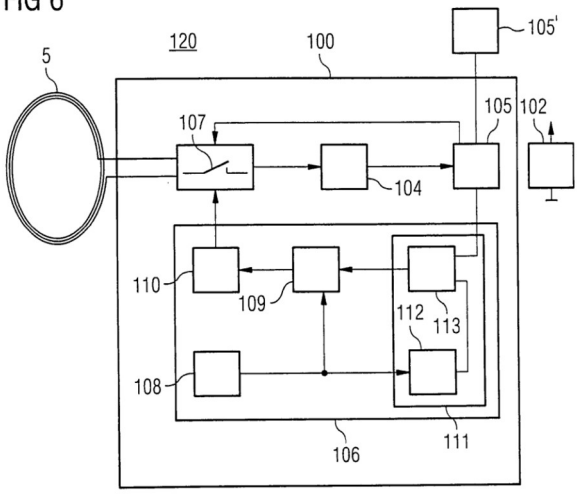
Claim Element	Exemplary Citations to D.E. 102007019272 ("Gerstenberger")
	Gerstenberger at [0051] The transponder unit 120 is operated in a first (active) operating mode as an actively transmitting transponder unit. In a second (passive) operating mode, the transponder unit works like a normal passive transponder, performing load modulation on the field of the reader. For example, the receiver 104 can additionally be designed as a conventional load modulator controlled by the controller 105. The controller then either switches the transmitter 106 on and the load modulator off or switches the transmitter 106 off and the load modulator on. The switch 107 is switched accordingly. The criteria for switching from a passive to an active operating state can be, for example, the received signal strength, the presence and/or sufficiency of an external power supply or the sufficiency of an internal power supply. It is thus possible, for example, to initially operate a transponder unit 120 passively and to switch to an active operating mode if, for example, the distance to the reader unintentionally increases. It can also be provided that the switching is carried out depending on the level of a voltage induced at the antenna 5, e.g. B. automatically when the induced voltage exceeds or falls below a certain value. Gerstenberger at [0055] Fig. 7 illustrates a further embodiment of the antenna adapter 1 . The antenna holder 3 and the data carrier holder 11 are integrally formed therein. The circuit 100 is again flat and arranged on the antenna holder 3. The receiving area 12 of the data carrier holder 11 is designed as a base for receiving a SIM card 30 in the size of a mini plug-in. It is also possible to design the receiving area 12 to accommodate card-shaped data carriers of other formats. A device connector 50, which is connected to the receiving area 12 of the data carrier holder 11 via flexible separate cables 14, is inserted into the mobile phone instead of the SIM card and has a corresponding SIM card format. The SIM card 30 receives the signals necessary for operation, such as, for example, the status, via the flexible cables 14. B. VCC, GND, I/O, RESET, CLK, from the device connector 50 . The circuit 100 is supplied with energy from the battery of the mobile phone via the device connection 50. Gerstenberger at claim 25 25. Antenna adapter (1) according to one of claims 21 to 24, characterized in that the circuit (100) has a power supply (102) independent of an external reading device. To the extent this limitation is not disclosed by Gerstenberger, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Gerstenberger, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

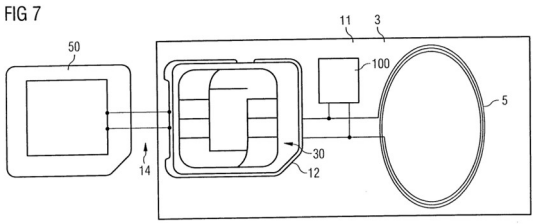
Claim Element	Exemplary Citations to D.E. 102007019272 ("Gerstenberger")
[1b] a smartcard controller coupled to the power source to receive power;	Gerstenberger discloses or renders obvious "a smartcard controller coupled to the power source to receive power." For example: Gerstenberger at Figure 5  Gerstenberger at Figure 6

Claim Element	Exemplary Citations to D.E. 102007019272 ("Gerstenberger")
	 Gerstenberger at [0043] Fig. 6 shows schematically the actively transmitting transponder unit 120. The transponder unit has a power supply 102, the antenna 5 and the electronic circuit 100. The circuit 100 essentially consists of three functional blocks: a receiver 104, a controller 105 and a transmitter 106. A switch 107 is used to switch the antenna 5 between the receiver 104 and the transmitter 106. The energy supply 102 is normally provided by the battery of the mobile phone into which the data carrier to be coupled with the antenna adapter is inserted. But a simple battery can also serve this purpose. Gerstenberger at [0051] The transponder unit 120 is operated in a first (active) operating mode as an actively transmitting transponder unit. In a second (passive) operating mode, the transponder unit works like a normal passive transponder, performing load modulation on the field of the reader. For example, the receiver 104 can additionally be designed as a conventional load modulator controlled by the controller 105. The controller then either switches the transmitter 106 on and the load modulator off or switches the transmitter 106 off and the load modulator on. The switch 107 is switched accordingly. The criteria for switching from a passive to an active operating state can be, for example, the received signal strength, the presence and/or sufficiency of

Claim Element	Exemplary Citations to D.E. 102007019272 ("Gerstenberger")
	an external power supply or the sufficiency of an internal power supply. It is thus possible, for example, to initially operate a transponder unit 120 passively and to switch to an active operating mode if, for example, the distance to the reader unintentionally increases. It can also be provided that the switching is carried out depending on the level of a voltage induced at the antenna 5, e.g. B. automatically when the induced voltage exceeds or falls below a certain value. Gerstenberger at [0055] Fig. 7 illustrates a further embodiment of the antenna adapter 1 . The antenna holder 3 and the data carrier holder 11 are integrally formed therein. The circuit 100 is again flat and arranged on the antenna holder 3. The receiving area 12 of the data carrier holder 11 is designed as a base for receiving a SIM card 30 in the size of a mini plug-in. It is also possible to design the receiving area 12 to accommodate card-shaped data carriers of other formats. A device connector 50, which is connected to the receiving area 12 of the data carrier holder 11 via flexible separate cables 14, is inserted into the mobile phone instead of the SIM card and has a corresponding SIM card format. The SIM card 30 receives the signals necessary for operation, such as, for example, the status, via the flexible cables 14. B. VCC, GND, I/O, RESET, CLK, from the device connector 50 . The circuit 100 is supplied with energy from the battery of the mobile phone via the device connection 50. *See also* Gerstenberger at [0042]. To the extent this limitation is not disclosed by Gerstenberger, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Gerstenberger, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[1c] an antenna tuned to operate at substantially 13.56 MHz, wherein the antenna interacts with a Near Field Communication (NFC) reader external to the mobile device; and	Gerstenberger discloses or renders obvious "an antenna tuned to operate at substantially 13.56 MHz, wherein the antenna interacts with a Near Field Communication (NFC) reader external to the mobile device." For example: Gerstenberger at Abstract The adapter (1) has a flexibly designed antenna holder (3) comprising an antenna (5) and an antenna connection connected with the antenna, where the antenna connection is arranged in an antenna connection holder (2). The connection holder is formed to cooperate with a flat side of a data carrier and formed as a foil. A data carrier holder is provided with an accommodation area for accommodating the data carrier, where the area is formed as a flat recess. An independent claim is also included for a system comprising a mobile phone and an antenna adapter.

Claim Element	Exemplary Citations to D.E. 102007019272 ("Gerstenberger")
	Gerstenberger at Figure 1  Gerstenberger at Figure 3  Gerstenberger at Figure 4  Gerstenberger at Figure 5

Claim Element	Exemplary Citations to D.E. 102007019272 ("Gerstenberger")
	FIG 5  Gerstenberger at Figure 6 FIG 6  Gerstenberger at Figure 7

Claim Element	Exemplary Citations to D.E. 102007019272 ("Gerstenberger")
	 Gerstenberger at [0001] The invention relates to the technical field of card-shaped data carriers with integrated circuits, which are equipped with an antenna for contactless functionalities. The invention further relates to a system comprising a mobile phone, a SIM card and such an antenna. Gerstenberger at [0002] Card-shaped data carriers with an integrated circuit, in particular chip cards or smart cards, which have an antenna for contactless communication with the integrated circuit of the data carrier, are known in a large number of different embodiments, for example as smart cards with contactless functionality for contactless payment transactions, for ski passes, for access controls or for the use of local public transport. Such functionalities can in principle also be implemented on SIM cards (subscriber identity module). SIM cards are chip cards in a smaller format, usually in the ID-000 format according to GSM11.11 and TS102.221 and are used in mobile phones to authenticate the mobile phone when logging into a mobile network. Since the SIM card is already present in the mobile phone, it makes sense to use the integrated circuit of the SIM card to implement additional contactless functionalities on the mobile phone. Gerstenberger at [0003] In addition to appropriate hardware and software adaptations, an antenna is required for the contactless functionality. Due to their small format, SIM cards do not offer enough space for an integrated antenna with the appropriate range. The location intended for the SIM card in the mobile phone may also be unfavorable for the antenna, for example because of shielding by neighboring components, such as a battery. This

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	problem can also occur in a similar way with electronic data storage devices of other types and forms that are used in other devices. Gerstenberger at [0004] In DE 10 2004 029 984 A1 it is proposed to design a portable data carrier, in particular a SIM card for mobile telephones, with an integrated antenna in such a way that the integrated circuit of the data carrier is arranged in a first flat-piece-like region and the antenna is arranged in a second flat-piece-like region, wherein the flat-piece-like antenna region is designed to be flexible. The first flat area has the usual dimensions of a standard SIM card and can be inserted into a mobile phone in the conventional way. The flat antenna area can be bent, for example around a cell phone battery, so that the antenna is not unnecessarily shielded by cell phone components. The surface of the flat-piece-like antenna region can accordingly be formed to be substantially larger than the first flat-piece-like region containing the integrated circuit. Gerstenberger at [0007] This object is achieved by an antenna adapter having the features of claim 1. A system comprising a mobile phone, a SIM card and such an antenna adapter is specified in claim 21. The dependent claims relate to advantageous developments and embodiments of the invention. Gerstenberger at [0008] With the aid of the antenna adapter according to the invention, conventional card-shaped data carriers with an integrated circuit, in particular SIM cards in the form of plug-ins or mini-plug-ins for mobile phones, can be equipped with an antenna for contactless data transfer over medium ranges (for example Near Field Communication NFC). The antenna adapter according to the invention comprises, in accordance with the prior art described above, an antenna which is arranged in a flat, flexible antenna holder, as well as an antenna connection connected to the antenna. Unlike in the prior art, however, the antenna connection is not designed as a plug connection, but is itself located in a flat antenna connection holder, which is connected to the antenna holder, for example, via a cable and which interacts with a flat side of the card-shaped data carrier in order to communicate with the integrated circuit of the data carrier. In this way, it is possible to use the interface device already present in the data carrier, via which the integrated circuit of the data carrier communicates with an external device, for communication with the antenna without any modification of the data carrier being necessary. Rather, conventional data storage devices can be upgraded for additional contactless functionality by appropriately placing the antenna adapter on one of its flat sides.

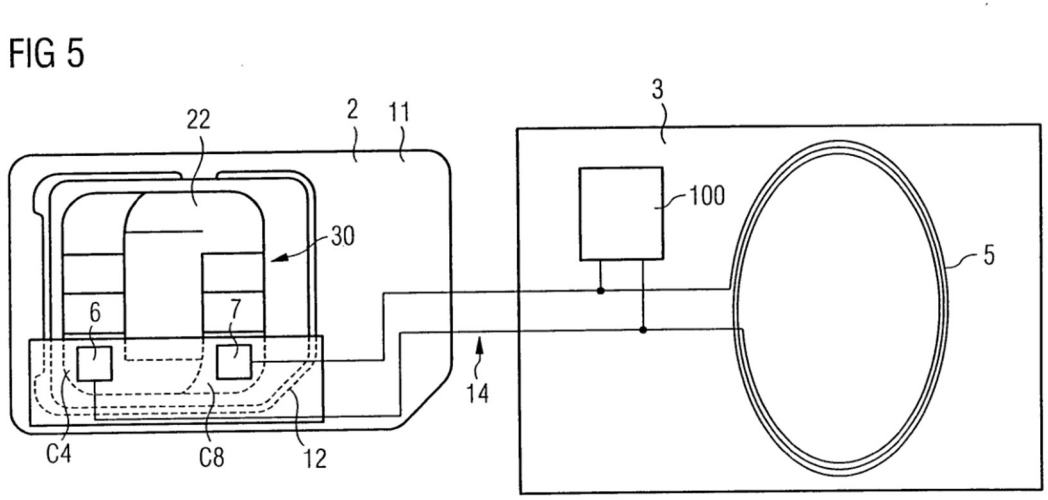
Claim Element	Exemplary Citations to D.E. 102007019272 ("Gerstenberger")
	Gerstenberger at [0009] As a rule, such data carriers have a contact field with six or eight contact surfaces for contact-based data transfer, which are standardized and designated C1 to C8 according to the ISO/IEC 7816-2 standard. Of these contact surfaces, contact surfaces C4 and C8, for example, can be used for antenna contacting. If the integrated circuit of the data carrier has an S2C interface (an interface for NFC devices defined by Philips), the SIGIN connections for the signal input and SIGOUT for the signal output can be addressed equally via the contact surfaces C4 and C8. In the same way, the antenna connections of a dual-interface chip equipped with a passive RFID (radio frequency identification) interface can be contacted via the contact surfaces C4 and C8. Accordingly, the antenna connection holder of the antenna adapter is placed above the contact field in such a way that a galvanic contact is established between the antenna connection and the contact surfaces C4 and C8. Gerstenberger at [0010] Other data carriers are only or additionally (dual interface card) equipped with a contactless interface for contactless data transfer, e.g. B. according to ISO/IEC. The antenna adapter can also communicate with such an interface, which usually works inductively or capacitively, if the antenna connection is designed accordingly for contactless data transfer and is placed in the reception/reading area of the data carrier's interface. Gerstenberger at [0011] The antenna connection holder can be easily designed as a film, for example made of polyimide. A film only adds insignificantly to the overall thickness of the card-shaped data carrier and will generally not hinder the use of the data carrier in the usual device-side data carrier holders. Preferably, the antenna connection holder is designed as an adhesive label, optionally covered by a removable adhesive protective film, so that the antenna connection holder can be easily applied to the flat side of the card-shaped data carrier above the data carrier interface after removing the protective film. Gerstenberger at [0012] In order to facilitate the exact positioning of the antenna connection holder, it is advantageous if the peripheral contour of the antenna connection holder corresponds to the dimensions of the data carrier. In the case of a SIM card, the peripheral contours have ID-000 format and in the case of a mini-plug-in, the size of the 3rd form factor. Gerstenberger at [0014]

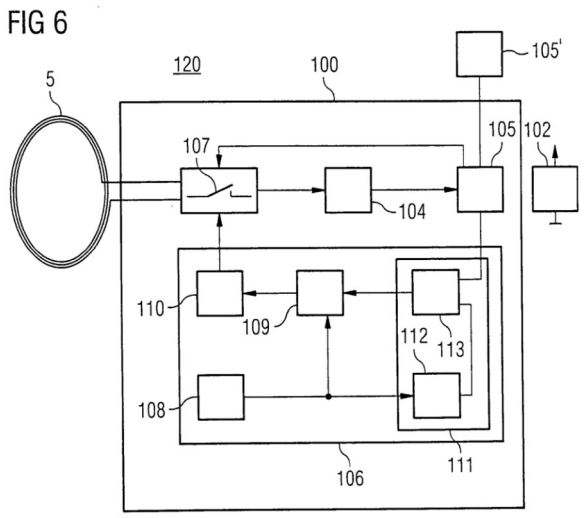
Claim Element	Exemplary Citations to D.E. 102007019272 ("Gerstenberger")
	According to a preferred embodiment of the invention, the antenna adapter has a flat-piece-like data carrier holder with a receiving area for receiving the data carrier. The flat piece-like data carrier holder and the flat piece-like antenna holder can also be realized as an integrally formed flat piece. In the latter case, if the contact surfaces of the data carrier are covered by the data carrier holder during use, the through-holes of the antenna connection used for external contacting are located in the receiving area of the data carrier holder used to hold the data carrier. Gerstenberger at [0017] If the antenna connection holder is not implemented together with the data carrier holder as an integrally formed flat piece, the antenna connection holder, for example in a foil design, is attached at a suitable location above a flat side of the data carrier arranged in the receiving area of the card carrier holder. The data carrier holder and the antenna connection holder can form a pocket for the data carrier. In particular, it is within the scope of the invention if the antenna connection holder is connected, for example glued, to the data carrier holder only after the data carrier has been inserted into the receptacle of the data carrier holder. Gerstenberger at [0018] The antenna holder carrying the antenna is significantly larger in area than the antenna connection holder and the data carrier holder. The antenna holder of an antenna adapter for a SIM card of a mobile phone is accordingly larger than the SIM card itself, but preferably smaller than the largest side surface of a battery of a mobile phone, so that the antenna holder can be placed on one side of the battery, while the SIM card is located, for example, under or next to the battery. Gerstenberger at [0024] Fig. 1 shows a first embodiment of an antenna adapter according to the invention with SIM card schematically in plan view, Gerstenberger at [0028] Fig. 5 shows a fourth embodiment of an antenna adapter according to the invention, similar to that in Fig. 4, with a circuit for actively transmitting a signal, Gerstenberger at [0032]

Claim Element	Exemplary Citations to D.E. 102007019272 ("Gerstenberger")
	The antenna adapter 1 consists of the antenna connection holder 2, an antenna holder 3 and a web 4 connecting the antenna connection holder 2 to the antenna holder 3. B. are formed from a common polyimide film. The web 4 can also be wider and correspond, for example, to the width of the SIM card 2. The antenna holder 3 carries a coil antenna 5 with several turns, and the antenna connection holder 2 carries an antenna connection formed from two contacts 6 and 7, which is galvanically connected to the antenna 5 via a two-wire connecting cable 8. Gerstenberger at [0033] The peripheral contour of the antenna connection holder 2 corresponds to the shape of the SIM card 20 in ID-000 format. It can also be made smaller and must be designed at least in such a way that it can be attached with its contact connections 6, 7 above the contact surfaces C4, C8 of the contact field 22. In the illustrated embodiment, the antenna connection holder 2 is designed as an adhesive label so that it is firmly connected to the upper flat side of the SIM card 20 via an adhesive layer 9. The adhesive layer 9 is penetrated by the contact terminals 6, 7 so that they contact the contact surfaces C4, C8 of the SIM card 20. At the remaining contact surfaces C1 to C3 and C5 to C7, there are through-holes 10 in the antenna connection holder 2, so that contacting of the SIM card 20 with external interfaces remains possible. This means that the top of the film recreates the covered SIM contacts so that the SIM card in the mobile phone works properly. Gerstenberger at [0035] Fig. 3 shows a second embodiment of an antenna adapter 1 according to the invention. Here, the antenna connection holder 2 is designed like a pocket so that the SIM card 20 can be inserted. The adhesive connection 9 can then be dispensed with. This also makes it easier to replace the SIM card 20. The antenna connection holder 2 is again formed by a film which is sufficiently thin that the SIM card 20 with the pocket-shaped antenna connection holder 2 can be inserted into a mobile phone without having to modify the device. It may be expedient to make the pocket open on two sides and, if necessary, to insert the SIM card 20 crosswise instead of lengthwise, as in Fig. 3. Gerstenberger at [0040] For shielding purposes, the antenna adapter 1 of the described embodiments can be designed in multiple layers at least in the area of the antenna holder 3 and, for example, can first have a copper foil and then a ferrite foil on a side facing an interference influence at the installation location.

Claim Element	Exemplary Citations to D.E. 102007019272 ("Gerstenberger")
	Such an antenna adapter is then particularly suitable for being folded around the battery of a mobile phone, for example. The SIM card 20 or the MiniPlugIn 30 are then located below the battery and the large antenna holder 3 is on the opposite side of the battery. If the battery and the SIM card 20 or the mini plug-in 30 are instead arranged next to one another within the mobile phone, depending on the situation as to whether the antenna holder 3 is to be located above or below the battery, it may be expedient to provide the aforementioned additional shielding layers on the other side of the antenna holder 3. Gerstenberger at [0042] For data transmission, the transponder unit sends a signal to a reader, which the reader can evaluate as a signal from a transponder that performs a load modulation of the reader's field. In contrast to conventional transponders, which modulate the reader field into a modulated reader field, the transponder unit generates and transmits its own modulated field as the data transmission signal. The transponder unit therefore uses its own energy for the purpose of data transmission. Gerstenberger at [0043] Fig. 6 shows schematically the actively transmitting transponder unit 120. The transponder unit has a power supply 102, the antenna 5 and the electronic circuit 100. The circuit 100 essentially consists of three functional blocks: a receiver 104, a controller 105 and a transmitter 106. A switch 107 is used to switch the antenna 5 between the receiver 104 and the transmitter 106. The energy supply 102 is normally provided by the battery of the mobile phone into which the data carrier to be coupled with the antenna adapter is inserted. But a simple battery can also serve this purpose. Gerstenberger at [0045] The transmitter 106 consists of an oscillator 108, a modulator 109 and a power amplifier 110. Furthermore, the transmitter 106 is extended by an electronic assembly 111 for generating and modulating a subcarrier signal in order to carry out the data transmission from the transponder unit 120 to the reading device by means of the subcarrier signal. Depending on the use of the transponder unit, the subcarrier signal may have different frequencies or may even be omitted entirely. Gerstenberger at [0050] An output signal is then available at the output of the ring modulator 109, which contains the two modulation sidebands and is combined with a signal generated by load modulation or The signal generated by the cross-section modulation matches (sufficiently accurately). The output signal generated by the ring modulator can then be amplified by means of an amplifier 110 if necessary and fed

Claim Element	Exemplary Citations to D.E. 102007019272 ("Gerstenberger")
	to the antenna 5 for sending the data to be sent via the switch 107, which is switched to transmission mode of the transponder unit 120 by a signal from the controller 105. Gerstenberger at [0055] Fig. 7 illustrates a further embodiment of the antenna adapter 1 . The antenna holder 3 and the data carrier holder 11 are integrally formed therein. The circuit 100 is again flat and arranged on the antenna holder 3. The receiving area 12 of the data carrier holder 11 is designed as a base for receiving a SIM card 30 in the size of a mini plug-in. It is also possible to design the receiving area 12 to accommodate card-shaped data carriers of other formats. A device connector 50, which is connected to the receiving area 12 of the data carrier holder 11 via flexible separate cables 14, is inserted into the mobile phone instead of the SIM card and has a corresponding SIM card format. The SIM card 30 receives the signals necessary for operation, such as, for example, the status, via the flexible cables 14. B. VCC, GND, I/O, RESET, CLK, from the device connector 50 . The circuit 100 is supplied with energy from the battery of the mobile phone via the device connection 50. Gerstenberger at claim 21 21. Antenna adapter (1) according to one of claims 1 to 20, characterized by a circuit (100) which is designed to form an actively transmitting transponder unit (120) together with the antenna (5) and an integrated circuit of the card-shaped data carrier (20; 30) to be coupled to the antenna adapter (1). Gerstenberger at claim 22 22. Antenna adapter (1) according to claim 21, characterized in that the circuit (100) is designed to transmit a signal which can be evaluated by an external reading device as a modulation by a transponder in order to transmit data to the reading device in a first operating mode. Gerstenberger at claim 37 37. System comprising a mobile radio telephone, a SIM card (20; 30) with an integrated circuit, an antenna adapter (1) according to one of claims 1 to 20 and a circuit (100) which, together with the antenna (5) of the antenna adapter (1) and the integrated circuit of the SIM card (20; 30), forms an actively transmitting transponder unit (120), wherein the circuit (100) is arranged integrated in the card-shaped data carrier (20; 30). *See also* Gerstenberger at [0041], [0044], and [0051].

Claim Element	Exemplary Citations to D.E. 102007019272 ("Gerstenberger")
	To the extent this limitation is not disclosed by Gerstenberger, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Gerstenberger, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[1d] an active transmit driver circuit coupled to the power source to receive the power, wherein the active transmit driver circuit affects transmission of data between the antenna and the NFC reader.	Gerstenberger discloses or renders obvious "an active transmit driver circuit coupled to the power source to receive the power, wherein the active transmit driver circuit affects transmission of data between the antenna and the NFC reader." For example: Gerstenberger at Figure 5  Gerstenberger at Figure 6

Claim Element	Exemplary Citations to D.E. 102007019272 ("Gerstenberger")
	 Gerstenberger at [0042] For data transmission, the transponder unit sends a signal to a reader, which the reader can evaluate as a signal from a transponder that performs a load modulation of the reader's field. In contrast to conventional transponders, which modulate the reader field into a modulated reader field, the transponder unit generates and transmits its own modulated field as the data transmission signal. The transponder unit therefore uses its own energy for the purpose of data transmission. Gerstenberger at [0043] Fig. 6 shows schematically the actively transmitting transponder unit 120. The transponder unit has a power supply 102, the antenna 5 and the electronic circuit 100. The circuit 100 essentially consists of three functional blocks: a receiver 104, a controller 105 and a transmitter 106. A switch 107 is used to switch the antenna 5 between the receiver 104 and the transmitter 106. The energy supply 102 is normally provided by the battery of the mobile phone into which the data carrier to be coupled with the antenna adapter is inserted. But a simple battery can also serve this purpose. Gerstenberger at [0045] The transmitter 106 consists of an oscillator 108, a modulator 109 and a power amplifier 110.

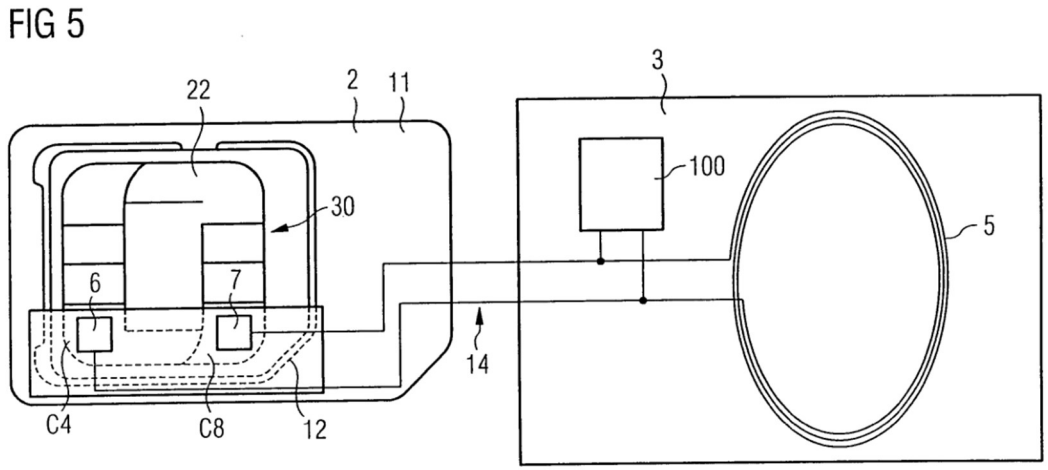
Claim Element	Exemplary Citations to D.E. 102007019272 ("Gerstenberger")
	Furthermore, the transmitter 106 is extended by an electronic assembly 111 for generating and modulating a subcarrier signal in order to carry out the data transmission from the transponder unit 120 to the reading device by means of the subcarrier signal. Depending on the use of the transponder unit, the subcarrier signal may have different frequencies or may even be omitted entirely. Gerstenberger at [0051] The transponder unit 120 is operated in a first (active) operating mode as an actively transmitting transponder unit. In a second (passive) operating mode, the transponder unit works like a normal passive transponder, performing load modulation on the field of the reader. For example, the receiver 104 can additionally be designed as a conventional load modulator controlled by the controller 105. The controller then either switches the transmitter 106 on and the load modulator off or switches the transmitter 106 off and the load modulator on. The switch 107 is switched accordingly. The criteria for switching from a passive to an active operating state can be, for example, the received signal strength, the presence and/or sufficiency of an external power supply or the sufficiency of an internal power supply. It is thus possible, for example, to initially operate a transponder unit 120 passively and to switch to an active operating mode if, for example, the distance to the reader unintentionally increases. It can also be provided that the switching is carried out depending on the level of a voltage induced at the antenna 5, e.g. B. automatically when the induced voltage exceeds or falls below a certain value. Gerstenberger at [0055] Fig. 7 illustrates a further embodiment of the antenna adapter 1 . The antenna holder 3 and the data carrier holder 11 are integrally formed therein. The circuit 100 is again flat and arranged on the antenna holder 3. The receiving area 12 of the data carrier holder 11 is designed as a base for receiving a SIM card 30 in the size of a mini plug-in. It is also possible to design the receiving area 12 to accommodate card-shaped data carriers of other formats. A device connector 50, which is connected to the receiving area 12 of the data carrier holder 11 via flexible separate cables 14, is inserted into the mobile phone instead of the SIM card and has a corresponding SIM card format. The SIM card 30 receives the signals necessary for operation, such as, for example, the status, via the flexible cables 14. B. VCC, GND, I/O, RESET, CLK, from the device connector 50 . The circuit 100 is supplied with energy from the battery of the mobile phone via the device connection 50. To the extent this limitation is not disclosed by Gerstenberger, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Gerstenberger, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

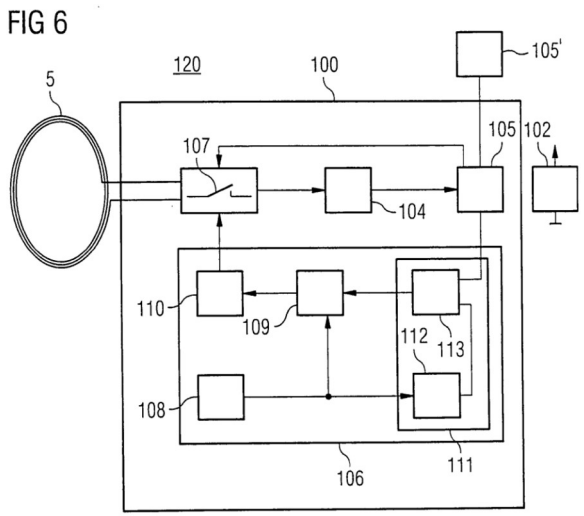
Claim Element	Exemplary Citations to D.E. 102007019272 ("Gerstenberger")
2. The mobile device of claim 1, wherein the transmitted data includes ticketing information for a mass transit system.	Gerstenberger discloses or renders obvious "[t]he mobile device of claim 1, wherein the transmitted data includes ticketing information for a mass transit system." For example: Gerstenberger at [0002] Card-shaped data carriers with an integrated circuit, in particular chip cards or smart cards, which have an antenna for contactless communication with the integrated circuit of the data carrier, are known in a large number of different embodiments, for example as smart cards with contactless functionality for contactless payment transactions, for ski passes, for access controls or for the use of local public transport. Such functionalities can in principle also be implemented on SIM cards (subscriber identity module). SIM cards are chip cards in a smaller format, usually in the ID-000 format according to GSM11.11 and TS102.221 and are used in mobile phones to authenticate the mobile phone when logging into a mobile network. Since the SIM card is already present in the mobile phone, it makes sense to use the integrated circuit of the SIM card to implement additional contactless functionalities on the mobile phone. To the extent this limitation is not disclosed by Gerstenberger, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Gerstenberger, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 1 above.
3. The mobile device of claim 1, wherein the transmitted data includes transaction information for a mobile payment.	Gerstenberger discloses or renders obvious "[t]he mobile device of claim 1, wherein the transmitted data includes transaction information for a mobile payment." For example: Gerstenberger at [0002] Card-shaped data carriers with an integrated circuit, in particular chip cards or smart cards, which have an antenna for contactless communication with the integrated circuit of the data carrier, are known in a large number of different embodiments, for example as smart cards with contactless functionality for contactless payment transactions, for ski passes, for access controls or for the use of local public transport. Such functionalities can in principle also be implemented on SIM cards (subscriber identity module). SIM cards are chip cards in a smaller format, usually in the ID-000 format according to GSM11.11 and TS102.221 and are used in mobile phones to authenticate the mobile phone when logging into a mobile network. Since the SIM card is already present in the mobile phone, it makes sense to use the integrated circuit of the SIM card to implement additional contactless functionalities on the mobile phone.

Claim Element	Exemplary Citations to D.E. 102007019272 ("Gerstenberger")
	To the extent this limitation is not disclosed by Gerstenberger, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Gerstenberger, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.\ *See also* claim 1 above.
4. The mobile device of claim 1, wherein the NFC reader is a point-of-sale NFC reader.	Gerstenberger discloses or renders obvious "[t]he mobile device of claim 1, wherein the NFC reader is a point-of-sale NFC reader." For example: Gerstenberger at [0002] Card-shaped data carriers with an integrated circuit, in particular chip cards or smart cards, which have an antenna for contactless communication with the integrated circuit of the data carrier, are known in a large number of different embodiments, for example as smart cards with contactless functionality for contactless payment transactions, for ski passes, for access controls or for the use of local public transport. Such functionalities can in principle also be implemented on SIM cards (subscriber identity module). SIM cards are chip cards in a smaller format, usually in the ID-000 format according to GSM11.11 and TS102.221 and are used in mobile phones to authenticate the mobile phone when logging into a mobile network. Since the SIM card is already present in the mobile phone, it makes sense to use the integrated circuit of the SIM card to implement additional contactless functionalities on the mobile phone. To the extent this limitation is not disclosed by Gerstenberger, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Gerstenberger, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 1 above.
5. The mobile device of claim 1, wherein the antenna includes an inductive element.	Gerstenberger discloses or renders obvious "[t]he mobile device of claim 1, wherein the antenna includes an inductive element." For example: Gerstenberger at [0003] In addition to appropriate hardware and software adaptations, an antenna is required for the contactless functionality. Due to their small format, SIM cards do not offer enough space for an integrated antenna with the appropriate range. The location intended for the SIM card in the mobile phone may also be unfavorable for the antenna, for example because of shielding by neighboring components, such as a battery. This

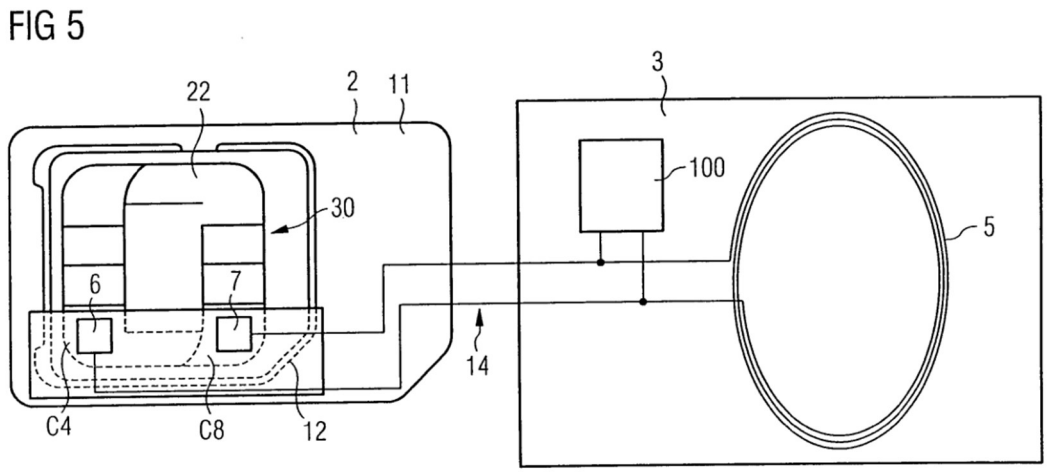
Claim Element	Exemplary Citations to D.E. 102007019272 ("Gerstenberger")
	problem can also occur in a similar way with electronic data storage devices of other types and forms that are used in other devices. Gerstenberger at [0006] The present invention therefore addresses the problem of equipping card-shaped data carriers having an integrated circuit with an antenna in the simplest and most cost-effective manner possible. Gerstenberger at [0010] Other data carriers are only or additionally (dual interface card) equipped with a contactless interface for contactless data transfer, e.g. B. according to ISO/IEC. The antenna adapter can also communicate with such an interface, which usually works inductively or capacitively, if the antenna connection is designed accordingly for contactless data transfer and is placed in the reception/reading area of the data carrier's interface. Gerstenberger at [0021] However, due to the location intended for installation of an antenna for a SIM card between the battery of the mobile phone and the battery cover, in some cases there is not enough space for such a shield with sufficient thickness. Furthermore, the shape and/or material of the shielding layer must be selected differently depending on the type of mobile phone into which the antenna is to be inserted, which prevents cost-effective, uniform production. In order to take this circumstance into account, the antenna adapter can, according to a preferred embodiment of the invention, contain a circuit which, together with the antenna and the integrated circuit of the data carrier, forms an actively transmitting transponder unit in order to be usable even in cramped installation conditions. The circuit is coupled to the antenna and the antenna connector. In this way, as an alternative and/or in addition to the shielding layer, a limitation of the antenna's range caused by possible interference can be counteracted. In a preferred embodiment, the circuit is flat and arranged on the antenna holder of the antenna adapter. The circuit requires practically no additional space and can therefore be used advantageously. Gerstenberger at [0032] The antenna adapter 1 consists of the antenna connection holder 2, an antenna holder 3 and a web 4 connecting the antenna connection holder 2 to the antenna holder 3. B. are formed from a common polyimide film. The web 4 can also be wider and correspond, for example, to the width of the SIM card 2.

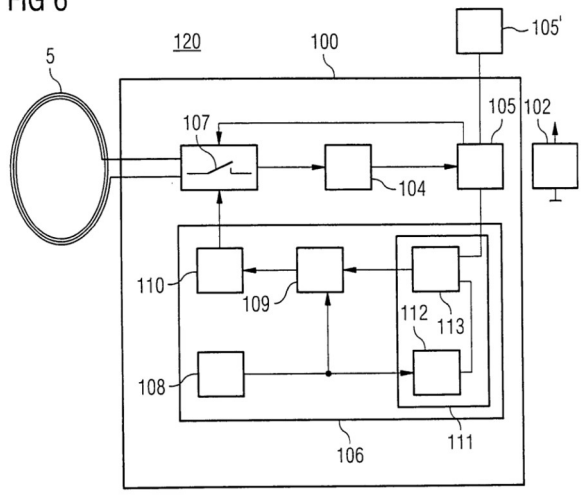
Claim Element	Exemplary Citations to D.E. 102007019272 ("Gerstenberger")
	The antenna holder 3 carries a coil antenna 5 with several turns, and the antenna connection holder 2 carries an antenna connection formed from two contacts 6 and 7, which is galvanically connected to the antenna 5 via a two-wire connecting cable 8. Gerstenberger at [0040] For shielding purposes, the antenna adapter 1 of the described embodiments can be designed in multiple layers at least in the area of the antenna holder 3 and, for example, can first have a copper foil and then a ferrite foil on a side facing an interference influence at the installation location. Such an antenna adapter is then particularly suitable for being folded around the battery of a mobile phone, for example. The SIM card 20 or the MiniPlugIn 30 are then located below the battery and the large antenna holder 3 is on the opposite side of the battery. If the battery and the SIM card 20 or the mini plug-in 30 are instead arranged next to one another within the mobile phone, depending on the situation as to whether the antenna holder 3 is to be located above or below the battery, it may be expedient to provide the aforementioned additional shielding layers on the other side of the antenna holder 3. Gerstenberger at [0041] A further embodiment, shown here on the basis of the embodiment according to Fig. 4, can be seen in Fig. 5 and comprises a circuit 100 which, together with the antenna 5 and the integrated circuit of the mini-plug-in 30, forms an actively transmitting transponder unit. The circuit 100 is flat and arranged on the antenna holder 3. It is also possible to integrate the circuit 100 into the plastic module of the data carrier (20; 30) to be coupled to the antenna adapter 1. In this way, as an alternative and/or in addition to the shielding layer, a limitation of the antenna's range caused by possible interference can be counteracted. Gerstenberger at claim 19 19. Antenna adapter (1) according to one of claims 1 to 18, characterized in that the antenna (5) comprises several antenna turns. *See also* Gerstenberger at [0049] and [0051]. To the extent this limitation is not disclosed by Gerstenberger, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Gerstenberger, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 1 above.

Claim Element	Exemplary Citations to D.E. 102007019272 ("Gerstenberger")
6. The mobile device of claim 1, wherein the active transmit driver circuit includes one or more of an amplifier filter, oscillator, and/or modulator.	Gerstenberger discloses or renders obvious "[t]he mobile device of claim 1, wherein the active transmit driver circuit includes one or more of an amplifier filter, oscillator, and/or modulator." For example: Gerstenberger at Figure 5  Gerstenberger at Figure 6

Claim Element	Exemplary Citations to D.E. 102007019272 ("Gerstenberger")
	 Gerstenberger at [0045] The transmitter 106 consists of an oscillator 108, a modulator 109 and a power amplifier 110. Furthermore, the transmitter 106 is extended by an electronic assembly 111 for generating and modulating a subcarrier signal in order to carry out the data transmission from the transponder unit 120 to the reading device by means of the subcarrier signal. Depending on the use of the transponder unit, the subcarrier signal may have different frequencies or may even be omitted entirely. Gerstenberger at [0047] The modulation of the subcarrier in the module 111 is carried out, for example, in an AND gate 113 by a so-called 100% amplitude key shifting (ASK). The amplitude of the signal generated by frequency division is switched between two states ON and OFF based on the data to be sent. Alternatively, (B)PSK modulation (binary phase key shifting), for example according to ISO 14443 Type B, or FSK modulation (frequency key shifting) can be used. Gerstenberger at [0048] Both the oscillator signal and the ASK-modulated signal generated in the module 111 are fed to the modulator 109.

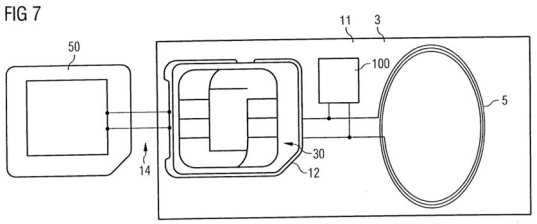
Claim Element	Exemplary Citations to D.E. 102007019272 ("Gerstenberger")
	The modulator 109 can, for example, be designed as a ring modulator 109. Gerstenberger at [0049] The ring modulator 109 has the special feature that it performs a special form of amplitude modulation. As with conventional amplitude modulation, two spectral lines are generated in the frequency spectrum at a distance of the frequency of the ASK-modulated signal around the frequency of the oscillator signal, the so-called carrier frequency. During amplitude modulation in the ring modulator 109, the carrier frequency of the strong and high-energy oscillator signal is largely suppressed. The data to be transmitted contained in the ASK-modulated signal are located in sidebands around the two spectral lines of the auxiliary frequency after the amplitude modulation in the ring modulator 109. Such modulation is called double-side band (DSB) modulation. Called double-side band suppressed carrier (DSSC) modulation. No data is transmitted using the carrier frequency. Rather, by using the ring modulator 109, which suppresses the carrier frequency, the goal of being able to send data to the reader either with low transmission power or with a significantly greater range is achieved. The increased range is especially possible when the entire transmission power is put into the sidebands in which the data to be transmitted is located. The carrier frequency is basically required for demodulating the signal in order to extract the data transmitted by the transponder unit 120 in the reader. However, since the carrier frequency is present in the reader anyway, it is not necessary for the transponder signal itself to contain this frequency. Gerstenberger at [0050] An output signal is then available at the output of the ring modulator 109, which contains the two modulation sidebands and is combined with a signal generated by load modulation or The signal generated by the cross-section modulation matches (sufficiently accurately). The output signal generated by the ring modulator can then be amplified by means of an amplifier 110 if necessary and fed to the antenna 5 for sending the data to be sent via the switch 107, which is switched to transmission mode of the transponder unit 120 by a signal from the controller 105. Gerstenberger at claim 23 23. Antenna adapter (1) according to claim 21 or 22, characterized in that the circuit (100) is arranged to modulate the field of an external reader in order to transmit data to the reader in a second operating mode. Gerstenberger at claim 29 29. Antenna adapter according to one of claims 26 to 28, characterized in that the circuit (100) comprises an oscillator (108) for generating an oscillator signal and a modulator (109) which is configured to

Claim Element	Exemplary Citations to D.E. 102007019272 ("Gerstenberger")
	modulate the oscillator signal by means of data to be transmitted and to generate an output signal therefrom. To the extent this limitation is not disclosed by Gerstenberger, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Gerstenberger, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 1 above.
7. The mobile device of claim 1 comprising an amplifier coupled to the power source to receive the power, wherein the amplifier is further coupled to the antenna.	Gerstenberger discloses or renders obvious "[t]he mobile device of claim 1 comprising an amplifier coupled to the power source to receive the power, wherein the amplifier is further coupled to the antenna." For example: Gerstenberger at Figure 5  Gerstenberger at Figure 6

Claim Element	Exemplary Citations to D.E. 102007019272 ("Gerstenberger")
	FIG 6  Gerstenberger at [0043] Fig. 6 shows schematically the actively transmitting transponder unit 120. The transponder unit has a power supply 102, the antenna 5 and the electronic circuit 100. The circuit 100 essentially consists of three functional blocks: a receiver 104, a controller 105 and a transmitter 106. A switch 107 is used to switch the antenna 5 between the receiver 104 and the transmitter 106. The energy supply 102 is normally provided by the battery of the mobile phone into which the data carrier to be coupled with the antenna adapter is inserted. But a simple battery can also serve this purpose. Gerstenberger at [0045] The transmitter 106 consists of an oscillator 108, a modulator 109 and a power amplifier 110. Furthermore, the transmitter 106 is extended by an electronic assembly 111 for generating and modulating a subcarrier signal in order to carry out the data transmission from the transponder unit 120 to the reading device by means of the subcarrier signal. Depending on the use of the transponder unit, the subcarrier signal may have different frequencies or may even be omitted entirely. Gerstenberger at [0050]

Claim Element	Exemplary Citations to D.E. 102007019272 ("Gerstenberger")
	An output signal is then available at the output of the ring modulator 109, which contains the two modulation sidebands and is combined with a signal generated by load modulation or The signal generated by the cross-section modulation matches (sufficiently accurately). The output signal generated by the ring modulator can then be amplified by means of an amplifier 110 if necessary and fed to the antenna 5 for sending the data to be sent via the switch 107, which is switched to transmission mode of the transponder unit 120 by a signal from the controller 105. Gerstenberger at [0051] The transponder unit 120 is operated in a first (active) operating mode as an actively transmitting transponder unit. In a second (passive) operating mode, the transponder unit works like a normal passive transponder, performing load modulation on the field of the reader. For example, the receiver 104 can additionally be designed as a conventional load modulator controlled by the controller 105. The controller then either switches the transmitter 106 on and the load modulator off or switches the transmitter 106 off and the load modulator on. The switch 107 is switched accordingly. The criteria for switching from a passive to an active operating state can be, for example, the received signal strength, the presence and/or sufficiency of an external power supply or the sufficiency of an internal power supply. It is thus possible, for example, to initially operate a transponder unit 120 passively and to switch to an active operating mode if, for example, the distance to the reader unintentionally increases. It can also be provided that the switching is carried out depending on the level of a voltage induced at the antenna 5, e.g. B. automatically when the induced voltage exceeds or falls below a certain value. Gerstenberger at [0055] Fig. 7 illustrates a further embodiment of the antenna adapter 1 . The antenna holder 3 and the data carrier holder 11 are integrally formed therein. The circuit 100 is again flat and arranged on the antenna holder 3. The receiving area 12 of the data carrier holder 11 is designed as a base for receiving a SIM card 30 in the size of a mini plug-in. It is also possible to design the receiving area 12 to accommodate card-shaped data carriers of other formats. A device connector 50, which is connected to the receiving area 12 of the data carrier holder 11 via flexible separate cables 14, is inserted into the mobile phone instead of the SIM card and has a corresponding SIM card format. The SIM card 30 receives the signals necessary for operation, such as, for example, the status, via the flexible cables 14. B. VCC, GND, I/O, RESET, CLK, from the device connector 50 . The circuit 100 is supplied with energy from the battery of the mobile phone via the device connection 50. *See also* Gerstenberger at [0042].

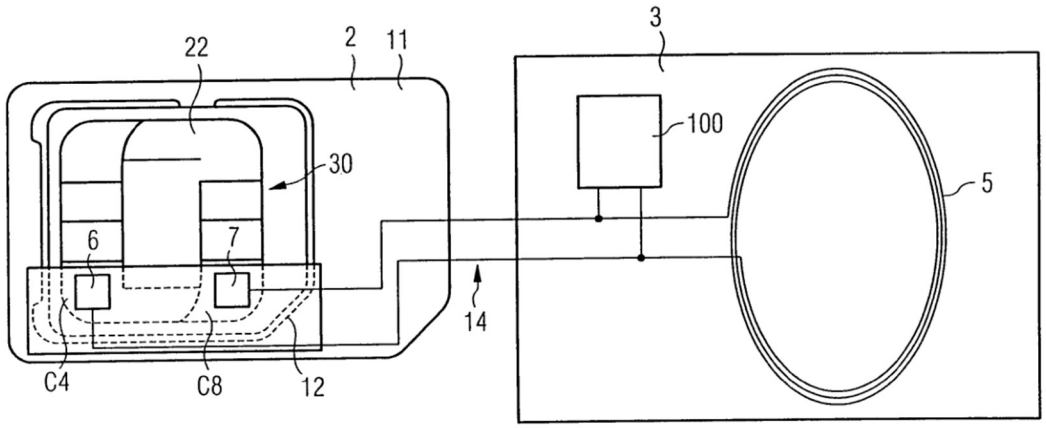
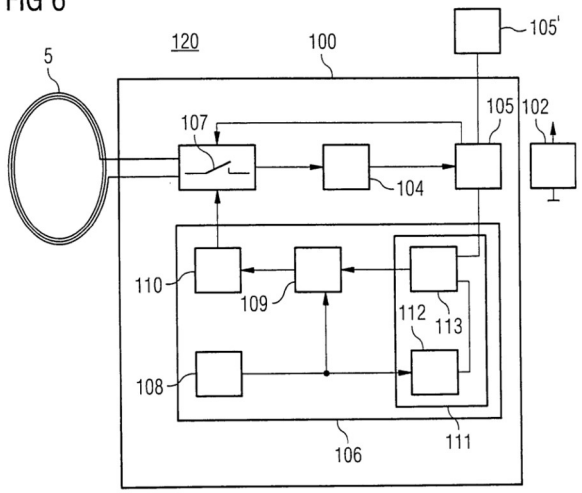
Claim Element	Exemplary Citations to D.E. 102007019272 ("Gerstenberger")
	To the extent this limitation is not disclosed by Gerstenberger, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Gerstenberger, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 1 above.
8. The mobile device of claim 7, wherein the amplifier amplifies a signal received at the antenna and generates an amplified signal, and provides the amplified signal to the smartcard controller.	To the extent this limitation is not disclosed by Gerstenberger, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Gerstenberger, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 7 above.
17[pre]. A method of near field communication between a mobile device and an NFC reader, the method comprising:	Gerstenberger discloses or renders obvious "[a] method of near field communication between a mobile device and an NFC reader, the method." For example: *See* [1d] above. Gerstenberger at Abstract The adapter (1) has a flexibly designed antenna holder (3) comprising an antenna (5) and an antenna connection connected with the antenna, where the antenna connection is arranged in an antenna connection holder (2). The connection holder is formed to cooperate with a flat side of a data carrier and formed as a foil. A data carrier holder is provided with an accommodation area for accommodating the data carrier, where the area is formed as a flat recess. An independent claim is also included for a system comprising a mobile phone and an antenna adapter. Gerstenberger at Figure 7

Claim Element	Exemplary Citations to D.E. 102007019272 ("Gerstenberger")
	 Gerstenberger at [0001] The invention relates to the technical field of card-shaped data carriers with integrated circuits, which are equipped with an antenna for contactless functionalities. The invention further relates to a system comprising a mobile phone, a SIM card and such an antenna. Gerstenberger at [0002] Card-shaped data carriers with an integrated circuit, in particular chip cards or smart cards, which have an antenna for contactless communication with the integrated circuit of the data carrier, are known in a large number of different embodiments, for example as smart cards with contactless functionality for contactless payment transactions, for ski passes, for access controls or for the use of local public transport. Such functionalities can in principle also be implemented on SIM cards (subscriber identity module). SIM cards are chip cards in a smaller format, usually in the ID-000 format according to GSM11.11 and TS102.221 and are used in mobile phones to authenticate the mobile phone when logging into a mobile network. Since the SIM card is already present in the mobile phone, it makes sense to use the integrated circuit of the SIM card to implement additional contactless functionalities on the mobile phone. Gerstenberger at [0003] In addition to appropriate hardware and software adaptations, an antenna is required for the contactless functionality. Due to their small format, SIM cards do not offer enough space for an integrated antenna with the appropriate range. The location intended for the SIM card in the mobile phone may also be unfavorable for the antenna, for example because of shielding by neighboring components, such as a battery. This

Claim Element	Exemplary Citations to D.E. 102007019272 ("Gerstenberger")
	problem can also occur in a similar way with electronic data storage devices of other types and forms that are used in other devices. Gerstenberger at [0004] In DE 10 2004 029 984 A1 it is proposed to design a portable data carrier, in particular a SIM card for mobile telephones, with an integrated antenna in such a way that the integrated circuit of the data carrier is arranged in a first flat-piece-like region and the antenna is arranged in a second flat-piece-like region, wherein the flat-piece-like antenna region is designed to be flexible. The first flat area has the usual dimensions of a standard SIM card and can be inserted into a mobile phone in the conventional way. The flat antenna area can be bent, for example around a cell phone battery, so that the antenna is not unnecessarily shielded by cell phone components. The surface of the flat-piece-like antenna region can accordingly be formed to be substantially larger than the first flat-piece-like region containing the integrated circuit. Gerstenberger at [0007] This object is achieved by an antenna adapter having the features of claim 1. A system comprising a mobile phone, a SIM card and such an antenna adapter is specified in claim 21. The dependent claims relate to advantageous developments and embodiments of the invention. Gerstenberger at [0008] With the aid of the antenna adapter according to the invention, conventional card-shaped data carriers with an integrated circuit, in particular SIM cards in the form of plug-ins or mini-plug-ins for mobile phones, can be equipped with an antenna for contactless data transfer over medium ranges (for example Near Field Communication NFC). The antenna adapter according to the invention comprises, in accordance with the prior art described above, an antenna which is arranged in a flat, flexible antenna holder, as well as an antenna connection connected to the antenna. Unlike in the prior art, however, the antenna connection is not designed as a plug connection, but is itself located in a flat antenna connection holder, which is connected to the antenna holder, for example, via a cable and which interacts with a flat side of the card-shaped data carrier in order to communicate with the integrated circuit of the data carrier. In this way, it is possible to use the interface device already present in the data carrier, via which the integrated circuit of the data carrier communicates with an external device, for communication with the antenna without any modification of the data carrier being necessary. Rather, conventional data storage devices can be upgraded for additional contactless functionality by appropriately placing the antenna adapter on one of its flat sides.

Claim Element	Exemplary Citations to D.E. 102007019272 ("Gerstenberger")
	Gerstenberger at [0018] The antenna holder carrying the antenna is significantly larger in area than the antenna connection holder and the data carrier holder. The antenna holder of an antenna adapter for a SIM card of a mobile phone is accordingly larger than the SIM card itself, but preferably smaller than the largest side surface of a battery of a mobile phone, so that the antenna holder can be placed on one side of the battery, while the SIM card is located, for example, under or next to the battery. Gerstenberger at [0035] Fig. 3 shows a second embodiment of an antenna adapter 1 according to the invention. Here, the antenna connection holder 2 is designed like a pocket so that the SIM card 20 can be inserted. The adhesive connection 9 can then be dispensed with. This also makes it easier to replace the SIM card 20. The antenna connection holder 2 is again formed by a film which is sufficiently thin that the SIM card 20 with the pocket-shaped antenna connection holder 2 can be inserted into a mobile phone without having to modify the device. It may be expedient to make the pocket open on two sides and, if necessary, to insert the SIM card 20 crosswise instead of lengthwise, as in Fig. 3. Gerstenberger at [0040] For shielding purposes, the antenna adapter 1 of the described embodiments can be designed in multiple layers at least in the area of the antenna holder 3 and, for example, can first have a copper foil and then a ferrite foil on a side facing an interference influence at the installation location. Such an antenna adapter is then particularly suitable for being folded around the battery of a mobile phone, for example. The SIM card 20 or the MiniPlugIn 30 are then located below the battery and the large antenna holder 3 is on the opposite side of the battery. If the battery and the SIM card 20 or the mini plug-in 30 are instead arranged next to one another within the mobile phone, depending on the situation as to whether the antenna holder 3 is to be located above or below the battery, it may be expedient to provide the aforementioned additional shielding layers on the other side of the antenna holder 3. Gerstenberger at [0042] For data transmission, the transponder unit sends a signal to a reader, which the reader can evaluate as a signal from a transponder that performs a load modulation of the reader's field. In contrast to conventional transponders, which modulate the reader field into a modulated reader field, the transponder unit generates and transmits its own modulated field as the data transmission signal. The transponder unit therefore uses its own energy for the purpose of data transmission.

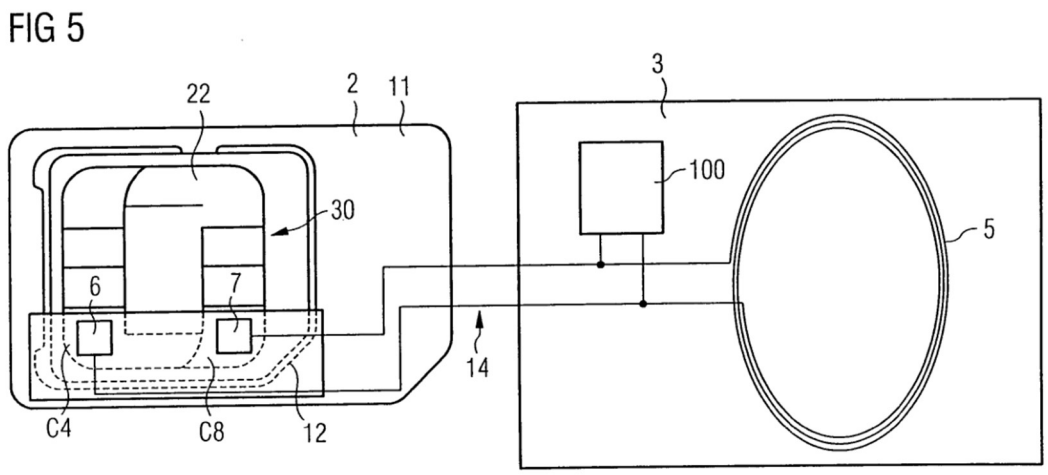
Claim Element	Exemplary Citations to D.E. 102007019272 ("Gerstenberger")
	Gerstenberger at [0043] Fig. 6 shows schematically the actively transmitting transponder unit 120. The transponder unit has a power supply 102, the antenna 5 and the electronic circuit 100. The circuit 100 essentially consists of three functional blocks: a receiver 104, a controller 105 and a transmitter 106. A switch 107 is used to switch the antenna 5 between the receiver 104 and the transmitter 106. The energy supply 102 is normally provided by the battery of the mobile phone into which the data carrier to be coupled with the antenna adapter is inserted. But a simple battery can also serve this purpose. Gerstenberger at [0055] Fig. 7 illustrates a further embodiment of the antenna adapter 1 . The antenna holder 3 and the data carrier holder 11 are integrally formed therein. The circuit 100 is again flat and arranged on the antenna holder 3. The receiving area 12 of the data carrier holder 11 is designed as a base for receiving a SIM card 30 in the size of a mini plug-in. It is also possible to design the receiving area 12 to accommodate card-shaped data carriers of other formats. A device connector 50, which is connected to the receiving area 12 of the data carrier holder 11 via flexible separate cables 14, is inserted into the mobile phone instead of the SIM card and has a corresponding SIM card format. The SIM card 30 receives the signals necessary for operation, such as, for example, the status, via the flexible cables 14. B. VCC, GND, I/O, RESET, CLK, from the device connector 50 . The circuit 100 is supplied with energy from the battery of the mobile phone via the device connection 50. To the extent this limitation is not disclosed by Gerstenberger, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Gerstenberger, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[17a] coupling a smartcard controller and an active transmit driver circuit to a power source of the mobile device;	Gerstenberger discloses or renders obvious "coupling a smartcard controller and an active transmit driver circuit to a power source of the mobile device." For example: Gerstenberger at Figure 5

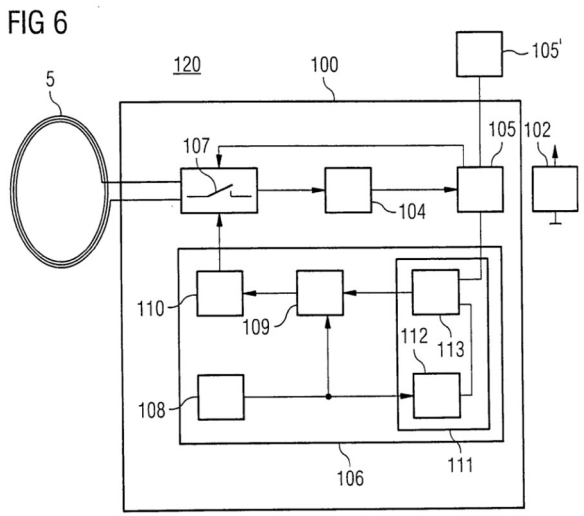
Claim Element	Exemplary Citations to D.E. 102007019272 ("Gerstenberger")
	FIG 5  Gerstenberger at Figure 6 FIG 6 

Claim Element	Exemplary Citations to D.E. 102007019272 ("Gerstenberger")
	Gerstenberger at [0003] In addition to appropriate hardware and software adaptations, an antenna is required for the contactless functionality. Due to their small format, SIM cards do not offer enough space for an integrated antenna with the appropriate range. The location intended for the SIM card in the mobile phone may also be unfavorable for the antenna, for example because of shielding by neighboring components, such as a battery. This problem can also occur in a similar way with electronic data storage devices of other types and forms that are used in other devices. Gerstenberger at [0004] In DE 10 2004 029 984 A1 it is proposed to design a portable data carrier, in particular a SIM card for mobile telephones, with an integrated antenna in such a way that the integrated circuit of the data carrier is arranged in a first flat-piece-like region and the antenna is arranged in a second flat-piece-like region, wherein the flat-piece-like antenna region is designed to be flexible. The first flat area has the usual dimensions of a standard SIM card and can be inserted into a mobile phone in the conventional way. The flat antenna area can be bent, for example around a cell phone battery, so that the antenna is not unnecessarily shielded by cell phone components. The surface of the flat-piece-like antenna region can accordingly be formed to be substantially larger than the first flat-piece-like region containing the integrated circuit. Gerstenberger at [0018] The antenna holder carrying the antenna is significantly larger in area than the antenna connection holder and the data carrier holder. The antenna holder of an antenna adapter for a SIM card of a mobile phone is accordingly larger than the SIM card itself, but preferably smaller than the largest side surface of a battery of a mobile phone, so that the antenna holder can be placed on one side of the battery, while the SIM card is located, for example, under or next to the battery. Gerstenberger at [0021] However, due to the location intended for installation of an antenna for a SIM card between the battery of the mobile phone and the battery cover, in some cases there is not enough space for such a shield with sufficient thickness. Furthermore, the shape and/or material of the shielding layer must be selected differently depending on the type of mobile phone into which the antenna is to be inserted, which prevents cost-effective, uniform

Claim Element	Exemplary Citations to D.E. 102007019272 (“Gerstenberger”)
	production. In order to take this circumstance into account, the antenna adapter can, according to a preferred embodiment of the invention, contain a circuit which, together with the antenna and the integrated circuit of the data carrier, forms an actively transmitting transponder unit in order to be usable even in cramped installation conditions. The circuit is coupled to the antenna and the antenna connector. In this way, as an alternative and/or in addition to the shielding layer, a limitation of the antenna's range caused by possible interference can be counteracted. In a preferred embodiment, the circuit is flat and arranged on the antenna holder of the antenna adapter. The circuit requires practically no additional space and can therefore be used advantageously. Gerstenberger at [0040] For shielding purposes, the antenna adapter 1 of the described embodiments can be designed in multiple layers at least in the area of the antenna holder 3 and, for example, can first have a copper foil and then a ferrite foil on a side facing an interference influence at the installation location. Such an antenna adapter is then particularly suitable for being folded around the battery of a mobile phone, for example. The SIM card 20 or the MiniPlugIn 30 are then located below the battery and the large antenna holder 3 is on the opposite side of the battery. If the battery and the SIM card 20 or the mini plug-in 30 are instead arranged next to one another within the mobile phone, depending on the situation as to whether the antenna holder 3 is to be located above or below the battery, it may be expedient to provide the aforementioned additional shielding layers on the other side of the antenna holder 3. Gerstenberger at [0042] For data transmission, the transponder unit sends a signal to a reader, which the reader can evaluate as a signal from a transponder that performs a load modulation of the reader's field. In contrast to conventional transponders, which modulate the reader field into a modulated reader field, the transponder unit generates and transmits its own modulated field as the data transmission signal. The transponder unit therefore uses its own energy for the purpose of data transmission. Gerstenberger at [0043] Fig. 6 shows schematically the actively transmitting transponder unit 120. The transponder unit has a power supply 102, the antenna 5 and the electronic circuit 100. The circuit 100 essentially consists of three functional blocks: a receiver 104, a controller 105 and a transmitter 106. A switch 107 is used to switch the antenna 5 between the receiver 104 and the transmitter 106. The energy supply 102 is normally provided by the battery of the mobile phone into which the data carrier to be coupled with the antenna adapter is inserted. But a simple battery can also serve this purpose.

Claim Element	Exemplary Citations to D.E. 102007019272 ("Gerstenberger")
	Gerstenberger at [0051] The transponder unit 120 is operated in a first (active) operating mode as an actively transmitting transponder unit. In a second (passive) operating mode, the transponder unit works like a normal passive transponder, performing load modulation on the field of the reader. For example, the receiver 104 can additionally be designed as a conventional load modulator controlled by the controller 105. The controller then either switches the transmitter 106 on and the load modulator off or switches the transmitter 106 off and the load modulator on. The switch 107 is switched accordingly. The criteria for switching from a passive to an active operating state can be, for example, the received signal strength, the presence and/or sufficiency of an external power supply or the sufficiency of an internal power supply. It is thus possible, for example, to initially operate a transponder unit 120 passively and to switch to an active operating mode if, for example, the distance to the reader unintentionally increases. It can also be provided that the switching is carried out depending on the level of a voltage induced at the antenna 5, e.g. B. automatically when the induced voltage exceeds or falls below a certain value. Gerstenberger at [0055] Fig. 7 illustrates a further embodiment of the antenna adapter 1 . The antenna holder 3 and the data carrier holder 11 are integrally formed therein. The circuit 100 is again flat and arranged on the antenna holder 3. The receiving area 12 of the data carrier holder 11 is designed as a base for receiving a SIM card 30 in the size of a mini plug-in. It is also possible to design the receiving area 12 to accommodate card-shaped data carriers of other formats. A device connector 50, which is connected to the receiving area 12 of the data carrier holder 11 via flexible separate cables 14, is inserted into the mobile phone instead of the SIM card and has a corresponding SIM card format. The SIM card 30 receives the signals necessary for operation, such as, for example, the status, via the flexible cables 14. B. VCC, GND, I/O, RESET, CLK, from the device connector 50 . The circuit 100 is supplied with energy from the battery of the mobile phone via the device connection 50. Gerstenberger at claim 25 25. Antenna adapter (1) according to one of claims 21 to 24, characterized in that the circuit (100) has a power supply (102) independent of an external reading device. To the extent this limitation is not disclosed by Gerstenberger, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Gerstenberger, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

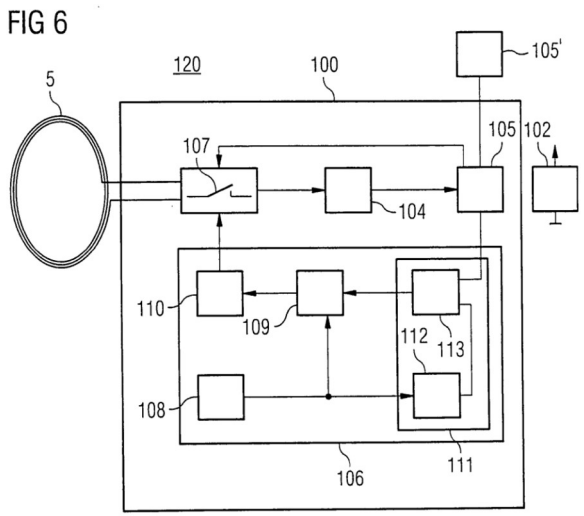
Claim Element	Exemplary Citations to D.E. 102007019272 ("Gerstenberger")
[17b] providing power to the smartcard controller and the active transmit driver circuit from the power source of the mobile device;	Gerstenberger discloses or renders obvious "providing power to the smartcard controller and the active transmit driver circuit from the power source of the mobile device." For example: *See* [17a] above. Gerstenberger at Figure 5  Gerstenberger at Figure 6

Claim Element	Exemplary Citations to D.E. 102007019272 ("Gerstenberger")
	 Gerstenberger at [0043] Fig. 6 shows schematically the actively transmitting transponder unit 120. The transponder unit has a power supply 102, the antenna 5 and the electronic circuit 100. The circuit 100 essentially consists of three functional blocks: a receiver 104, a controller 105 and a transmitter 106. A switch 107 is used to switch the antenna 5 between the receiver 104 and the transmitter 106. The energy supply 102 is normally provided by the battery of the mobile phone into which the data carrier to be coupled with the antenna adapter is inserted. But a simple battery can also serve this purpose. Gerstenberger at [0051] The transponder unit 120 is operated in a first (active) operating mode as an actively transmitting transponder unit. In a second (passive) operating mode, the transponder unit works like a normal passive transponder, performing load modulation on the field of the reader. For example, the receiver 104 can additionally be designed as a conventional load modulator controlled by the controller 105. The controller then either switches the transmitter 106 on and the load modulator off or switches the transmitter 106 off and the load modulator on. The switch 107 is switched accordingly. The criteria for switching from a passive to an active operating state can be, for example, the received signal strength, the presence and/or sufficiency of

Claim Element	Exemplary Citations to D.E. 102007019272 ("Gerstenberger")
	an external power supply or the sufficiency of an internal power supply. It is thus possible, for example, to initially operate a transponder unit 120 passively and to switch to an active operating mode if, for example, the distance to the reader unintentionally increases. It can also be provided that the switching is carried out depending on the level of a voltage induced at the antenna 5, e.g. B. automatically when the induced voltage exceeds or falls below a certain value. Gerstenberger at [0055] Fig. 7 illustrates a further embodiment of the antenna adapter 1 . The antenna holder 3 and the data carrier holder 11 are integrally formed therein. The circuit 100 is again flat and arranged on the antenna holder 3. The receiving area 12 of the data carrier holder 11 is designed as a base for receiving a SIM card 30 in the size of a mini plug-in. It is also possible to design the receiving area 12 to accommodate card-shaped data carriers of other formats. A device connector 50, which is connected to the receiving area 12 of the data carrier holder 11 via flexible separate cables 14, is inserted into the mobile phone instead of the SIM card and has a corresponding SIM card format. The SIM card 30 receives the signals necessary for operation, such as, for example, the status, via the flexible cables 14. B. VCC, GND, I/O, RESET, CLK, from the device connector 50 . The circuit 100 is supplied with energy from the battery of the mobile phone via the device connection 50. *See also* Gerstenberger at [0042]. To the extent this limitation is not disclosed by Gerstenberger, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Gerstenberger, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[17c] coupling the active transmit driver circuit to an antenna of the mobile device, wherein the antenna is tuned to operate at substantially 13.56 MHz; and	Gerstenberger discloses or renders obvious "coupling the active transmit driver circuit to an antenna of the mobile device, wherein the antenna is tuned to operate at substantially 13.56 MHz." For example: *See* [1c] above. Gerstenberger at [0008] With the aid of the antenna adapter according to the invention, conventional card-shaped data carriers with an integrated circuit, in particular SIM cards in the form of plug-ins or mini-plug-ins for mobile phones, can be equipped with an antenna for contactless data transfer over medium ranges (for example Near Field Communication NFC). The antenna adapter according to the invention comprises, in accordance with the prior art described above, an antenna which is arranged in a flat, flexible antenna holder, as well as an antenna connection

Claim Element	Exemplary Citations to D.E. 102007019272 ("Gerstenberger")
	connected to the antenna. Unlike in the prior art, however, the antenna connection is not designed as a plug connection, but is itself located in a flat antenna connection holder, which is connected to the antenna holder, for example, via a cable and which interacts with a flat side of the card-shaped data carrier in order to communicate with the integrated circuit of the data carrier. In this way, it is possible to use the interface device already present in the data carrier, via which the integrated circuit of the data carrier communicates with an external device, for communication with the antenna without any modification of the data carrier being necessary. Rather, conventional data storage devices can be upgraded for additional contactless functionality by appropriately placing the antenna adapter on one of its flat sides. Gerstenberger at [0009] As a rule, such data carriers have a contact field with six or eight contact surfaces for contact-based data transfer, which are standardized and designated C1 to C8 according to the ISO/IEC 7816-2 standard. Of these contact surfaces, contact surfaces C4 and C8, for example, can be used for antenna contacting. If the integrated circuit of the data carrier has an S2C interface (an interface for NFC devices defined by Philips), the SIGIN connections for the signal input and SIGOUT for the signal output can be addressed equally via the contact surfaces C4 and C8. In the same way, the antenna connections of a dual-interface chip equipped with a passive RFID (radio frequency identification) interface can be contacted via the contact surfaces C4 and C8. Accordingly, the antenna connection holder of the antenna adapter is placed above the contact field in such a way that a galvanic contact is established between the antenna connection and the contact surfaces C4 and C8. Gerstenberger at [0042] For data transmission, the transponder unit sends a signal to a reader, which the reader can evaluate as a signal from a transponder that performs a load modulation of the reader's field. In contrast to conventional transponders, which modulate the reader field into a modulated reader field, the transponder unit generates and transmits its own modulated field as the data transmission signal. The transponder unit therefore uses its own energy for the purpose of data transmission. Gerstenberger at [0045] The transmitter 106 consists of an oscillator 108, a modulator 109 and a power amplifier 110. Furthermore, the transmitter 106 is extended by an electronic assembly 111 for generating and modulating a subcarrier signal in order to carry out the data transmission from the transponder unit 120 to the reading device by means of the subcarrier signal. Depending on the use of the transponder unit, the subcarrier signal may have different frequencies or may even be omitted entirely.

Claim Element	Exemplary Citations to D.E. 102007019272 ("Gerstenberger")
	To the extent this limitation is not disclosed by Gerstenberger, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Gerstenberger, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[17d] driving transmission of data by the active transmit driver circuit from the antenna to the NFC reader.	Gerstenberger discloses or renders obvious "driving transmission of data by the active transmit driver circuit from the antenna to the NFC reader." For example: *See* [1d] above. Gerstenberger at [0042] For data transmission, the transponder unit sends a signal to a reader, which the reader can evaluate as a signal from a transponder that performs a load modulation of the reader's field. In contrast to conventional transponders, which modulate the reader field into a modulated reader field, the transponder unit generates and transmits its own modulated field as the data transmission signal. The transponder unit therefore uses its own energy for the purpose of data transmission. Gerstenberger at [0045] The transmitter 106 consists of an oscillator 108, a modulator 109 and a power amplifier 110. Furthermore, the transmitter 106 is extended by an electronic assembly 111 for generating and modulating a subcarrier signal in order to carry out the data transmission from the transponder unit 120 to the reading device by means of the subcarrier signal. Depending on the use of the transponder unit, the subcarrier signal may have different frequencies or may even be omitted entirely. To the extent this limitation is not disclosed by Gerstenberger, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Gerstenberger, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
18[pre]. The method of claim 17 further comprising:	Gerstenberger discloses or renders obvious "[t]he method of claim 17 further comprising." *See* claim 17 above.
[18a] amplifying a signal received from the antenna to generate an amplified signal; and	Gerstenberger discloses or renders obvious "amplifying a signal received from the antenna to generate an amplified signal." For example: Gerstenberger at Figure 6

Claim Element	Exemplary Citations to D.E. 102007019272 ("Gerstenberger")
	 Gerstenberger at [0045] The transmitter 106 consists of an oscillator 108, a modulator 109 and a power amplifier 110. Furthermore, the transmitter 106 is extended by an electronic assembly 111 for generating and modulating a subcarrier signal in order to carry out the data transmission from the transponder unit 120 to the reading device by means of the subcarrier signal. Depending on the use of the transponder unit, the subcarrier signal may have different frequencies or may even be omitted entirely. Gerstenberger at [0050] An output signal is then available at the output of the ring modulator 109, which contains the two modulation sidebands and is combined with a signal generated by load modulation or The signal generated by the cross-section modulation matches (sufficiently accurately). The output signal generated by the ring modulator can then be amplified by means of an amplifier 110 if necessary and fed to the antenna 5 for sending the data to be sent via the switch 107, which is switched to transmission mode of the transponder unit 120 by a signal from the controller 105. To the extent this limitation is not disclosed by Gerstenberger, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Gerstenberger, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

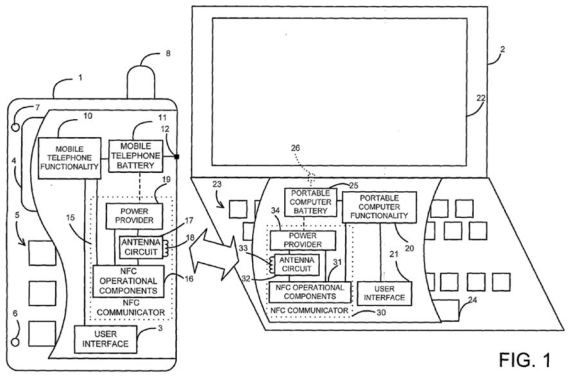
Claim Element	Exemplary Citations to D.E. 102007019272 ("Gerstenberger")
	See also claim 8 and claim 17 above.
[18b] providing the amplified signal to the smartcard controller.	To the extent this limitation is not disclosed by Gerstenberger, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Gerstenberger, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 8 and claim 17 above.
19. The method of claim 10 or 17, wherein the transmitted data includes ticketing information for a mass transit system.	Gerstenberger discloses or renders obvious "[t]he method of claim 10 or 17, wherein the transmitted data includes ticketing information for a mass transit system." *See* claim 2 above. *See also* claims 10 and 17 above.
20. The method of claim 10 or 17, wherein the transmitted data includes transaction information for a mobile payment.	Gerstenberger discloses or renders obvious "[t]he method of claim 10 or 17, wherein the transmitted data includes transaction information for a mobile payment." *See* claim 3 above. *See also* claims 10 and 17 above.

DEFENDANTS' INVALIDITY CONTENTIONS FOR U.S. PAT. 11,694,053

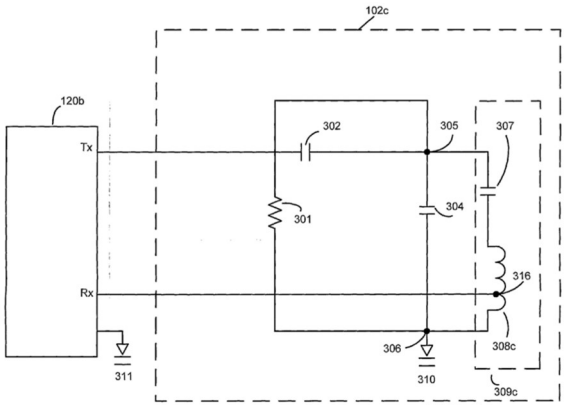
EXHIBIT C03 U.S. Patent Pub. No. 2010/0112941 ("Bangs")

As demonstrated in the claim charts below, the claims of U.S. Patent No. 11,694,053 ("the '053 patent") are invalid (a) under one or more sections of 35 U.S.C. § 102 as anticipated by Bangs and (b) under 35 U.S.C. § 103(a) as obvious over Bangs standing alone and as set forth herein, and/or combined with the knowledge of a person of ordinary skill in the art, Applicant's Admitted Prior Art, and/or the additional prior art references discussed in Exhibit C and Exhibits C01–C09, the contents of which are hereby incorporated by reference into this chart. One of ordinary skill in the art, as of the priority date of the '053 patent, would have known to combine the prior art elements disclosed by the foregoing references using known methods, and to use these elements according to their established functions in order to achieve a known and predictable result.

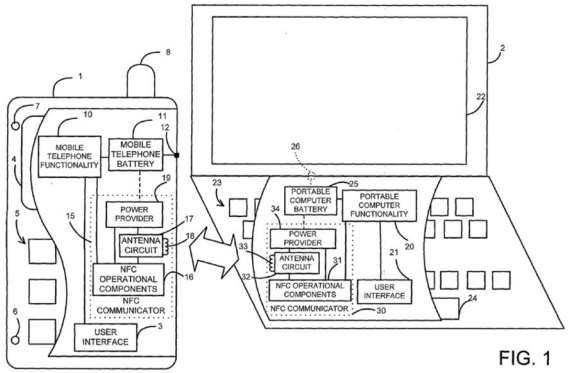
Defendants have conducted the invalidity analysis herein based at least in part and in some instance entirely upon Plaintiff's apparent application of the claims of the '053 patent. By charting the prior art against the claims and limitations herein, Defendants are not admitting or agreeing to Plaintiff's application of the claims at issue in this case, and these charts should not be interpreted as an admission or concession by Defendants that any particular construction or application of any claim limitation by Plaintiff is correct or proper. Additionally, these charts provide representative examples of portions of the charted references that disclose the indicated limitations of the claims; additional portions of these references other than the representative examples provided herein may also disclose the indicated limitation(s) and Defendants contend that the asserted claims are invalid in light of the charted reference(s) as a whole in its or their entirety. Where a particular figure is cited, the citation should be understood to encompass the caption and description of the figure as well as any text relating to or describing the figure. Conversely, where particular text referring to a figure is cited, the citation should be understood to include the figure as well.

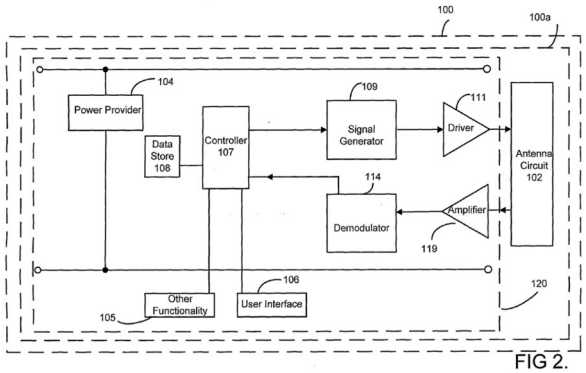
Claim Element	**Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")**
1[pre]. A mobile device comprising:	By providing this disclosure, Defendants do not take a position on whether the preamble is a claim limitation. Bangs discloses or renders obvious "[a] mobile device." For example: Bangs at Figure 1  FIG. 1

Patent Owner's Ex. 2018
Page 169

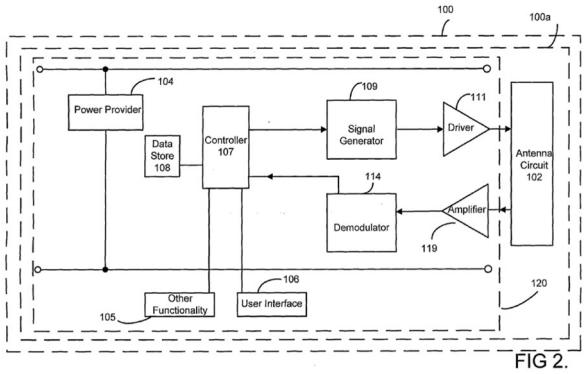
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	Bangs at Figure 6  FIG. 6 Bangs at [0006] Near field RF communicators may be provided as standalone or discrete devices or may be incorporated within or coupled to larger electrical devices or host devices (referred to below as near field RF communications enabled devices) to enable those devices to communicate by the near field with other near field RF communicators or devices incorporating or coupled to such near field RF communicators. When incorporated within a larger device or host, a near field RF communicator may be a discrete entity or may be provided by functionality within the larger device or host. Examples of such larger devices or host devices are, for example, mobile telephones, portable computing devices (such as personal digital assistants, notebooks, lap-tops), other computing devices such as personal or desk top computers, computer peripherals such as printers, or other electrical devices such as portable audio and/or video players such as MP3 players, IPODs®, CD players, DVD players. Other examples of such larger devices or host devices are other electrical or electronic products, for example consumer products such as domestic appliances or personal care products, and other electrical or electronic devices, apparatus or systems. Some areas of application are payment systems, ticketing systems, for example in tickets (for example parking tickets, bus tickets, train tickets or entrance permits or tickets) or in ticket checking systems, toys, games, posters, packaging, advertising material, product inventory checking systems and so on. Bangs at [0042]

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	It will be appreciated that FIG. 1 shows only examples of types of host devices. A host device may be another type of electrical device such as a personal digital assistant (PDA), other portable electrical device such as a portable audio and/or video player such as an MP3 player, an IPOD®, CD player, DVD player or other electrical device. Bangs at [0046] In this example, the NFC communications enabled device 100 comprises an NFC communicator 100a having NFC operational components including an antenna circuit 102 and NFC functionality 120 comprising power provider 104, controller 107, data store 108, receiver circuitry and transmitter circuitry. Bangs at [0054] In FIG. 2 control of the operation of the NFC communicator is through controller 107. As another possibility, where the NFC communicator is part of or associated with a host device, control of the operation of the NFC communicator may at least partly be directed by the host device, for example through the other functionality 105. In such circumstances all or part of the control may be provided by the other functionality 105 which may be part of the NFC functionality or a host. For example the NFC communicator controller 107 may control modulation and modulation protocols whereas the data to be transmitted may be provided by the other functionality 105. Bangs at [0064] Generally, the NFC functionality 120a will be formed as one or more integrated circuits (generally monocrystalline silicon integrated circuits) mounted on a Printed Circuit Board(s) (PCB(s)) or the like and the antenna circuit will be formed by external discrete components formed on or carried by (e.g. surface mounted on) a PCB, for example the antenna coil element may be defined by conductive tracks on a PCB while any capacitors and resistors of the antenna circuit may be provided by discrete components mounted to the PCB. Bangs at [0076] FIG. 4 shows a functional circuit diagram of an NFC communicator having an antenna circuit 102a that differs from that shown in FIG. 3 in that the antenna circuit has a single transmission input coupling Tx coupled to a single output driver 111b and a single receiver output coupling Rx coupled to a single input amplifier 119b so that the transmission signal is defined between transmission connection Tx and a signal ground coupling 311 and the receiver signal is defined between Rx and a coupling to ground 310 via capacitor 303. Both grounds (earths) may be provided by a local ground of the NFC communicator or a host.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	See also Bangs at [0033], [0035], [0036], [0038], [0039], [0040], [0041], [0043], claim 29, claim 30, claim 31, claim 32, claim 33, claim 34, claim 35, claim 36, claim 37, claim 38, claim 39, claim 40, claim 41, claim 42, claim 43, claim 44, and claim 45. To the extent this limitation is not disclosed by Bangs, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Bangs, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[1a] a power source;	Bangs discloses or renders obvious "a power source." For example: Bangs at Figure 1  FIG. 1 Bangs at Figure 2

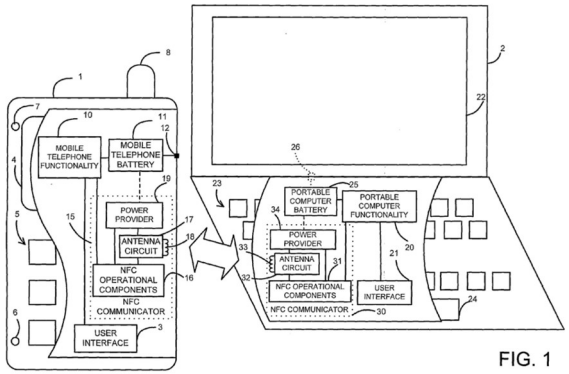
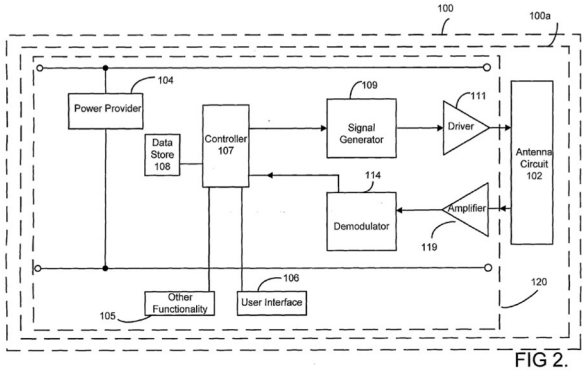
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	 FIG 2. Bangs at [0004] As will be understood from the above, an NFC communicator may operate in an "initiator" mode in which the NFC communicator seeks to initiate near field RF communication or in a "target" mode in which the NFC communicator is receptive to initiation of near field RF communication. NFC communicators may also operate in either a "passive communications mode" or an "active communications mode". When communication is by the "passive communications mode", an initiator NFC communicator will generate an RF field and a target NFC communicator will respond by modulation of the received H field, usually by load modulation. When communication is by the "active communications mode" the initiator NFC communicator and the target NFC communicator each use their own RF H field to enable communication. The terms "passive" and "active" in the context of NFC communicators do not have the same meaning as "passive" and "active" when used in the context of traditional RFID tags and readers where the terms are instead used to define whether the RFID tags and readers have their own power supply or whether a power supply is derived from the received RF HF field. Bangs at [0015] An NFC communicator may be battery powered and the desire to minimise power consumption, for example to prolong battery life, can limit the amount of current available to drive the antenna circuit. Also, as indicated above, size or environmental constraints may affect the antenna circuit design, limiting the size and/or topology of the antenna circuit, particularly the antenna coil. All of these factors will have an effect on the RF H field and therefore the voltage developed across an NFC communicator's antenna circuit during communication to the extent that the components of the NFC communicator need to be

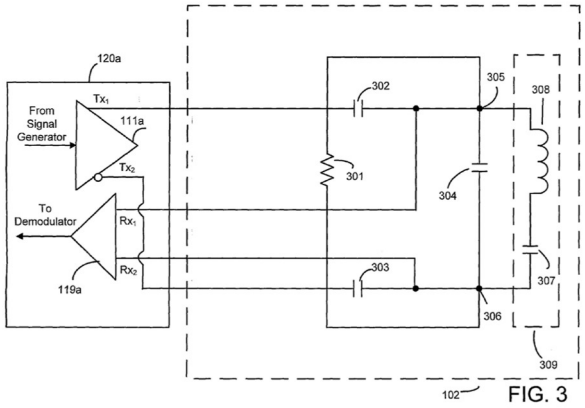
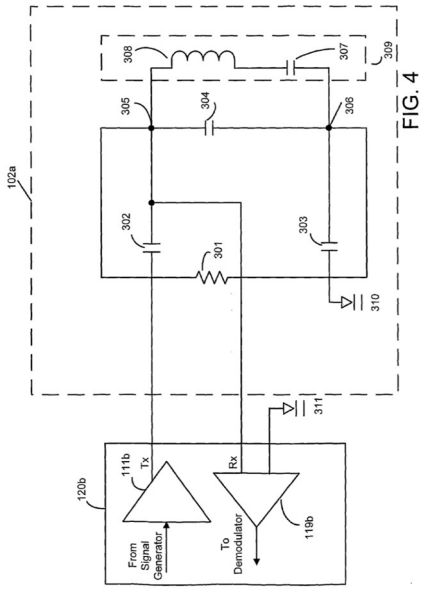
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	designed to operate at or need to be protected from voltages much higher than their intended operating voltages. Bangs at [0036] The mobile telephone 1 has the usual features of a mobile telephone including mobile telephone functionality 10 (in the form of, usually, a programmed controller, generally a processor or microprocessor with associated memory or data storage, for controlling operation of the mobile telephone in combination with a SIM card), an antenna 8 for enabling connection to a mobile telecommunications network, and a user interface 3 with a display 4, a keypad 5, a microphone 6 for receiving user voice input and a loudspeaker 7 for outputting received audio to the user. The mobile telephone also has a chargeable battery 11 coupled to a charging socket 12 via which a mains adapter (not shown) may be connected to enable charging of the battery 11. The mobile telephone 1 may have an alternative or additional power supply (not shown), for example a reserve battery or emergency battery. Although FIG. 1 shows a standalone mobile telephone (cellphone), the mobile telephone functionality may be incorporated in or associated with a host device such as a computer, for example a notebook, laptop or PDA. Bangs at [0041] Each NFC communicator 15 and 30 also comprises a power provider 19 and 34. The power providers 19 and 34 may be power supplies within the host device or specific to the NFC communicators 15 and 30, for example a button cell battery, or other small battery. As another possibility or additionally as shown by dashed lines in FIG. 1, one or both of the power providers 19 and 34 may simply comprise a coupling to derive power from the corresponding device battery 11 or 25. Bangs at [0046] In this example, the NFC communications enabled device 100 comprises an NFC communicator 100a having NFC operational components including an antenna circuit 102 and NFC functionality 120 comprising power provider 104, controller 107, data store 108, receiver circuitry and transmitter circuitry. Bangs at [0047] The power provider 104 may be any one or more of the types of power providers discussed above. In the interests of simplicity, power supply couplings from the power provider 104 to other components are not shown in FIG. 2. *See also* Bangs at [0033] and [0038].

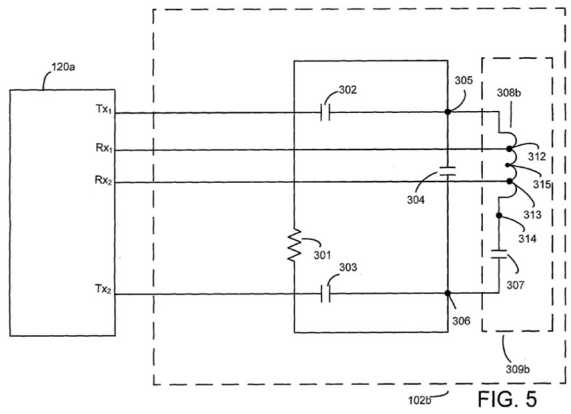
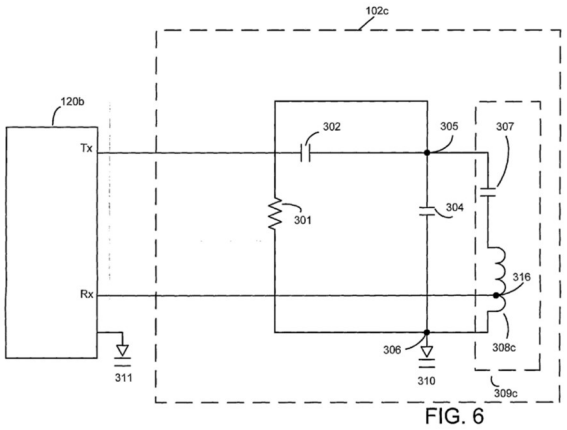
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	To the extent this limitation is not disclosed by Bangs, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Bangs, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[1b] a smartcard controller coupled to the power source to receive power;	Bangs discloses or renders obvious "a smartcard controller coupled to the power source to receive power." For example: Bangs at Figure 2  FIG 2. Bangs at [0004] As will be understood from the above, an NFC communicator may operate in an "initiator" mode in which the NFC communicator seeks to initiate near field RF communication or in a "target" mode in which the NFC communicator is receptive to initiation of near field RF communication. NFC communicators may also operate in either a "passive communications mode" or an "active communications mode". When communication is by the "passive communications mode", an initiator NFC communicator will generate an RF field and a target NFC communicator will respond by modulation of the received H field, usually by load modulation. When communication is by the "active communications mode" the initiator NFC communicator and the target NFC communicator each use their own RF H field to enable communication. The terms "passive" and "active" in the context of NFC communicators do not have the same meaning as "passive" and "active" when used in the context of traditional RFID tags and readers where the terms are instead used to define whether the RFID tags and readers have their own power supply or whether a power supply is derived from the received RF HF field.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	Bangs at [0015] An NFC communicator may be battery powered and the desire to minimise power consumption, for example to prolong battery life, can limit the amount of current available to drive the antenna circuit. Also, as indicated above, size or environmental constraints may affect the antenna circuit design, limiting the size and/or topology of the antenna circuit, particularly the antenna coil. All of these factors will have an effect on the RF H field and therefore the voltage developed across an NFC communicator's antenna circuit during communication to the extent that the components of the NFC communicator need to be designed to operate at or need to be protected from voltages much higher than their intended operating voltages. Bangs at [0036] The mobile telephone 1 has the usual features of a mobile telephone including mobile telephone functionality 10 (in the form of, usually, a programmed controller, generally a processor or microprocessor with associated memory or data storage, for controlling operation of the mobile telephone in combination with a SIM card), an antenna 8 for enabling connection to a mobile telecommunications network, and a user interface 3 with a display 4, a keypad 5, a microphone 6 for receiving user voice input and a loudspeaker 7 for outputting received audio to the user. The mobile telephone also has a chargeable battery 11 coupled to a charging socket 12 via which a mains adapter (not shown) may be connected to enable charging of the battery 11. The mobile telephone 1 may have an alternative or additional power supply (not shown), for example a reserve battery or emergency battery. Although FIG. 1 shows a standalone mobile telephone (cellphone), the mobile telephone functionality may be incorporated in or associated with a host device such as a computer, for example a notebook, laptop or PDA. Bangs at [0041] Each NFC communicator 15 and 30 also comprises a power provider 19 and 34. The power providers 19 and 34 may be power supplies within the host device or specific to the NFC communicators 15 and 30, for example a button cell battery, or other small battery. As another possibility or additionally as shown by dashed lines in FIG. 1, one or both of the power providers 19 and 34 may simply comprise a coupling to derive power from the corresponding device battery 11 or 25. Bangs at [0046] In this example, the NFC communications enabled device 100 comprises an NFC communicator 100a having NFC operational components including an antenna circuit 102 and NFC functionality 120 comprising power provider 104, controller 107, data store 108, receiver circuitry and transmitter circuitry.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	Bangs at [0047] The power provider 104 may be any one or more of the types of power providers discussed above. In the interests of simplicity, power supply couplings from the power provider 104 to other components are not shown in FIG. 2. *See also* Bangs at Figure 1 and [0038]. To the extent this limitation is not disclosed by Bangs, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Bangs, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[1c] an antenna tuned to operate at substantially 13.56 MHz, wherein the antenna interacts with a Near Field Communication (NFC) reader external to the mobile device; and	Bangs discloses or renders obvious "an antenna tuned to operate at substantially 13.56 MHz, wherein the antenna interacts with a Near Field Communication (NFC) reader external to the mobile device." For example: Bangs at Abstract An NFC communicator has an antenna circuit to enable inductive coupling, via an RF H field, of the NFC communicator and another near field RF communicator in near field range. The antenna circuit has an antenna element coupled in parallel with a first capacitor to form a parallel LC circuit. The antenna element has an antenna coil in series with a second capacitor to reduce the voltage to which circuitry of the NFC communicator is subjected by a received RF H field. Alternatively or additionally, receive circuitry of the NFC communicator may be coupled to only a proportion of the antenna coil to reduce the voltage to which circuitry of the NFC communicator is subjected by a received RF H field. Bangs at Figure 1

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	 FIG. 1 Bangs at Figure 2  FIG 2. Bangs at Figure 3

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	 FIG. 3 Bangs at Figure 4  FIG. 4 Bangs at Figure 5

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	 FIG. 5 Bangs at Figure 6  FIG. 6 Bangs at [0002] Near field RF (radio frequency) communication requires an antenna of one near field RF communicator to be present within the alternating magnetic field (H field) generated by the antenna of another near field RF communicator by transmission of an RF signal (for example a 13.56 Mega Hertz signal) to enable the magnetic field (H field) of the RF signal to be inductively coupled between the communicators. The RF signal may be modulated to enable communication of control and/or other data. Ranges of up to several centimetres (generally to a maximum of 1 metre) are common for near field RF communicators.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	Bangs at [0003] Near field RF communication may be referred to as near-field RFID (Radio Frequency Identification) or near-field communication. NFC communicators are a type of near field RF communicator that is capable of both initiating a near field RF communication (through transmission or generation of an alternating magnetic field) with another near field RF communicator and of responding to initiation of a near field RF communication by another near field RF communicator. The term "near field RE communicator" includes not only NFC communicators but also: initiating near field RF communicators such as RFID transceivers or readers (referred to below as RFID readers) that are capable of initiating a near field RF communication but not responding to initiation of a near field RF communication by another near field RF communicator; and responding near field RF communicators such as RFID transponders or tags (referred to below as RFID tags) that are capable of responding to initiation of a near field RF communication by another near field RF communicator but not of initiating a near field RF communication with another near field RF communicator. NFC communicators can act as both RFID transceivers and RFID transponders and are able to communicate with other NFC communicators, RFID transceivers and RFID transponders. Bangs at [0006] Near field RF communicators may be provided as standalone or discrete devices or may be incorporated within or coupled to larger electrical devices or host devices (referred to below as near field RF communications enabled devices) to enable those devices to communicate by the near field with other near field RF communicators or devices incorporating or coupled to such near field RF communicators. When incorporated within a larger device or host, a near field RF communicator may be a discrete entity or may be provided by functionality within the larger device or host. Examples of such larger devices or host devices are, for example, mobile telephones, portable computing devices (such as personal digital assistants, notebooks, lap-tops), other computing devices such as personal or desk top computers, computer peripherals such as printers, or other electrical devices such as portable audio and/or video players such as MP3 players, IPODs®, CD players, DVD players. Other examples of such larger devices or host devices are other electrical or electronic products, for example consumer products such as domestic appliances or personal care products, and other electrical or electronic devices, apparatus or systems. Some areas of application are payment systems, ticketing systems, for example in tickets (for example parking tickets, bus tickets, train tickets or entrance permits or tickets) or in ticket checking systems, toys, games, posters, packaging, advertising material, product inventory checking systems and so on.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	Bangs at [0008] With NFC communicators the position is different. Such NFC communicators need to be capable of both initiating an RF H field and of receiving an RF H field. Moreover a single design of NFC communicator may be used for many different applications and in some of those applications the NFC communicator may function like an RFID tag, in other applications the NFC communicator may function like an RFID reader and in other applications the NFC communicator may sometimes function like an RFID tag and sometimes function like an RFID reader. Also, NFC communicators tend to have small antennas as compared to traditional RFID readers. Bangs at [0016] An aspect of the present invention provides an NFC communicator that alleviates at least some of the aforementioned problems. An aspect of the invention provides an antenna circuit for an NFC communicator which enables operation of the NFC communicator in both active and passive communication modes. Bangs at [0017] An aspect of the invention provides an antenna circuit for an NFC communicator where certain capacitors of the antenna circuit are comprised wholly or partly within the silicon circuit of the NFC communicator. Such a design provides increased flexibility and enables optimisation of the antenna circuit. Bangs at [0021] According to an aspect of the present invention, there is provided a near field RF communicator, comprising: an antenna circuit to enable inductive coupling of the near field RF communicator and another near field RF communicator in near field range; a signal supplier coupled to the antenna circuit to supply a drive signal to cause the antenna circuit to generate an RF signal; and a receiver coupled to the antenna circuit to receive a signal inductively coupled to the antenna circuit from another near field RF communicator in near field range, wherein the antenna circuit comprises an antenna element coupled in parallel with a first capacitor, wherein the antenna element comprises an antenna coil in series with a second capacitor to affect a voltage resulting from inductive coupling to the antenna circuit. Bangs at [0023] According to an aspect of the present invention, there is provided a near field RF communicator, comprising: an antenna circuit to enable inductive coupling of the near field RF communicator and another near field RF communicator in near field range; a signal supplier coupled to the antenna circuit to

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	supply a drive signal to cause the antenna circuit to generate an RF signal; and a receiver coupled to the antenna circuit to receive a signal inductively coupled to the antenna circuit from another near field RF communicator in near field range, wherein the antenna circuit comprises an antenna element coupled in parallel with a capacitor, wherein the antenna element comprises an antenna coil having a tap and the receiver is coupled to the tap. Bangs at [0024] An embodiment of such a near field RF communicator enables, by tapping off only a part of the voltage developed across antenna for the receiver, the voltage to which the receiver of the NFC communicator is subjected to be limited or reduced below that to which the receiver would otherwise be subjected. Bangs at [0027] FIG. 1 shows a representational diagram illustrating communication between two NFC communications enabled devices; Bangs at [0029] FIG. 3 shows a functional circuit diagram of an NFC communicator to illustrate one example of an antenna circuit embodying the present invention; Bangs at [0030] FIG. 4 shows a functional circuit diagram of an NFC communicator to illustrate another example of an antenna circuit embodying the present invention; Bangs at [0031] FIG. 5 shows a functional circuit diagram of an NFC communicator to illustrate another example of an antenna circuit embodying the present invention; and Bangs at [0032] FIG. 6 shows a functional circuit diagram of an NFC communicator to illustrate another example of an antenna circuit embodying the present invention. Bangs at [0034] Referring now specifically to FIG. 1, there is shown a representational diagram illustrating communication between two NFC communications enabled devices. In FIG. 1 the representations of the NFC communications enabled devices have been shown partly cut-away and the functionality provided by

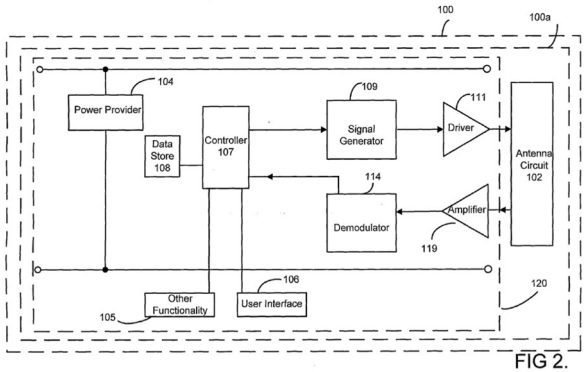
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	the NFC communications enabled devices illustrated by way of a functional block diagram within the NFC communications enabled device. Bangs at [0039] Each NFC communicator 15 and 30 comprises NFC operational components 16 and 31 for, as will be described below, enabling control of the NFC functionality and generation, modulation and demodulation of an RF signal. Each NFC communicator 15 and 30 also comprises an antenna circuit 17 and 32 comprising an inductor or coil in the form of an antenna 18 and 33. The antenna circuits 17 and 32 enable an alternating magnetic field (RF H field) generated by the antenna of one near field RF communicator 15 (or 30) by transmission of an RF signal (for example a 13.56 Mega Hertz signal) to be inductively coupled to the antenna of the other near field RF communicator 30 (or 15) when that antenna is within the near field of the RF signal generated by the one near field RF communicator 15 (or 30). Bangs at [0046] In this example, the NFC communications enabled device 100 comprises an NFC communicator 100a having NFC operational components including an antenna circuit 102 and NFC functionality 120 comprising power provider 104, controller 107, data store 108, receiver circuitry and transmitter circuitry. Bangs at [0052] The NFC communicator 100a may operate in an initiator mode (that is as an initiating near field RF communicator) or a target mode (that is as a responding near field RF communicator), dependent on the mode to which the NFC communicator is set. The mode may be determined by the controller 107 or may be determined in dependence on the nature of a received near field RF signal. When in initiator mode, an NFC communicator initiates communications with any compatible responding near field RF communicator capable of responding to the initiating NFC communicator (for example an NFC communicator in target mode or an RFID tag or transponder) that is in its near field range, while when in target mode an NFC communicator waits for a communication from a compatible initiating near field RF communicator (for example an NFC communicator in initiator mode or an RFID initiator or transceiver). As thus used, compatible means operable at the same frequency and in accordance with the same protocols, for example in accordance with the protocols set out in various standards such as ISO/IEC 18092, ISO/IEC 21481, ISO/IEC 14443 and ISO/IEC 15693. NFC communicators commonly operate at or around 13.56 MHz. Bangs at [0056]

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	FIG. 3 shows a functional circuit diagram of an NFC communicator embodying the invention to illustrate one example of an antenna circuit 102. In the interests of simplicity in FIG. 3, only some of the NFC functionality 120a is shown in FIG. 3. Bangs at [0057] As shown in FIG. 3, antenna circuit 102 comprises an antenna element 309 coupled in parallel with a first capacitor 304 to form a tank circuit (a parallel LC resonant circuit). Bangs at [0058] The antenna element 309 comprises an antenna coil element 308 in series with a second capacitor 307 which second capacitor 307 is anti-phase to the antenna coil element 308 and affects a voltage resulting from inductive coupling of an RF H field to the antenna circuit. As shown the antenna coil element 308 comprises a single antenna coil which may comprise one, two or more coils or loops. Bangs at [0061] The value of the capacitor 307 is chosen to "back-off" or reduce an induced voltage below that which might potentially have been induced by a received RF H field in the absence of the capacitor 307 while the resistor 301 acts as a shunt, limiting the voltage that can potentially be generated across the antenna circuit 102, and so protecting the NFC functionality from the potentially higher voltages that may otherwise occur across the antenna coil element 309. This enables the receiver circuitry to be connected directly to the antenna coil element 309. This enables protection of the receiver circuitry against received RF H fields whose strength is not only not known in advance but may because, for example, of the different nature of the near field RF communicator with which the NFC communicator is communicating, significantly exceed that of the NFC communicator's own transmitted RF H field, for example the other near field RF communicator may be designed to operate over a much larger range than the NFC communicator and/or any geometrical mismatch between the two antennas may expose one to a greater RF H field than antenna size/shape would otherwise dictate. The provision of capacitor 307 thus provides protection without reducing the antenna circuit's own RF H field strength. Bangs at [0063] As one possibility, the size of capacitor 307 to be employed to back off antenna coil 308 to effect a reduction in the apparent inductance of antenna coil 308 (that is the total inductance of antenna element 309) may be calculated using the following formula:

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	$$C_{307} = \frac{1}{(2\pi \times F_c)^2 L_{neg}}$$ where F_c is the carrier frequency (for example 13.56 MHz) and L_{neg} is the amount (in Henrys) that inductance 308 is to be reduced by. Bangs at [0068] When the NFC communicator antenna circuit 102 is within an RF H field (for example when the NFC communicator is in passive communication mode and within range of a second device transmitting an RF H field as discussed above or when the NFC communicator is in active communication mode with its RF H field switched off and within the RF H field generated by a target), the inherent inductive impedance of the coil 308 results in the current induced in the antenna coil 308 generating a voltage across the coil while the capacitive impedance of the capacitor 307 results in the current induced in the antenna coil 308 generating a voltage that is in anti-phase to that generated across the coil 308. The voltage seen by the rest of the antenna circuit and, as a result, the NFC communicator functionality 120a is a combination of the voltage generated across the antenna coil 308 and the anti-phase voltage generated across the capacitor 307. Accordingly, the presence of the capacitor 307 controls the voltage to which the rest of the antenna circuit (and as a result the NFC communicator functionality 120a) is subjected. In particular, the capacitor 307 acts to reduce the voltage to which the rest of the antenna circuit and the NFC functionality are subject below the voltage to which they would have been subject in response to inductive coupling with the same strength RF H field in the absence of the capacitor 307. Bangs at [0069] The presence of capacitor 307 thus reduces the potential difference (voltage) developed between junctions 306 and 305 for a given received H field, thereby reducing the voltage between receiver couplings Rx1 and Rx2 and between transmission couplings Tx1 and Tx2, so reducing the maximum potential voltage to which the receiver and transmitter circuitry may be subjected. Although antenna circuit designers generally aim to maximise the voltage induced by any given H field, the use of capacitor 307 enables control of the voltage that the capacitors 302, 303 and 304 and the NFC functionality 120a (for example the driver 111a and amplifier 119a) need to be able to withstand, thereby enabling the use of capacitors 302, 303 and 304 with lower voltage ratings and enabling coupling of the antenna circuit 102 directly to the NFC functionality 120a. Bangs at [0070]

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	When the NFC communicator is in the active communication mode, the controller 107 (FIG. 2) will cause the signal generator 109 (FIG. 2) and driver 111a to drive the antenna circuit 102 to initiate or generate an RF-H field. The antenna circuit 102 is tuned to the required RF transmission frequency which, for an NFC communicator operating in accordance with ISO 18092, is 13.56 MHz (Megahertz). The capacitors 302 and 303 add capacitance to bring the tuning closer to the required frequency. Bangs at [0073] Although not shown in FIG. 3, the resistor 301 may be coupled in series with a switch controlled by the controller 107 to enable the resistor to be switched out of the circuit whilst the NFC communicator is transmitting an RF H field, so as not to limit the RF current available to the antenna coil during transmission. The antenna-coil 308 and capacitances 304 and 307 act in a similar way as for passive communication (or receiving mode) and can also act as a current reservoir. Capacitance 304 forms a parallel resonant tank circuit with capacitor 307 and antenna coil 308 and thus may enable the amount of current seen at antenna coil 308 to be increased when device is generating an RF H field. The capacitors 302 and 303 change the high impedance of the tank circuit (which looks inductive) to allow efficient "top up" of the resonant current to compensate for losses due to resistance and/or other coils in the proximity. Bangs at [0076] FIG. 4 shows a functional circuit diagram of an NFC communicator having an antenna circuit 102a that differs from that shown in FIG. 3 in that the antenna circuit has a single transmission input coupling Tx coupled to a single output driver 111b and a single receiver output coupling Rx coupled to a single input amplifier 119b so that the transmission signal is defined between transmission connection Tx and a signal ground coupling 311 and the receiver signal is defined between Rx and a coupling to ground 310 via capacitor 303. Both grounds (earths) may be provided by a local ground of the NFC communicator or a host. Bangs at [0078] FIG. 5 shows a functional circuit diagram of an NFC communicator to illustrate another example of an antenna circuit 102 embodying the present invention. Bangs at [0079] The embodiment shown in FIG. 5 differs from that shown in FIG. 3 in that the receiver input couplings Rx1 and Rx2 are coupled across only a part of the antenna coil 308b, that is receiver input couplings Rx1 and Rx2 are coupled to taps 312 and 313 so that the antenna coil 308b forms an autotransformer and the voltage across the receiver input couplings Rx1 and Rx2 is stepped down from that across the entire

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	antenna coil 308b (i.e. from that between junctions 305 and 306) so that the voltage to which the receiver circuitry is subjected when an RF H field is coupled to or received by the antenna coil is less than the voltage to which the transmitter circuitry is subjected thereby reducing even further the maximum voltage that amplifier 119 needs to be able to withstand. This is advantageous because it enables the NFC communicator to protect the receiver circuitry against received RF H fields without reducing the strength of the NFC communicator's own RF H field. The transmitter circuitry should be isolated or otherwise protected during reception in this example. Bangs at [0081] FIG. 6 shows a functional circuit diagram of an NFC communicator having an antenna circuit 102c that differs from that shown in FIG. 5 in that, like the antenna circuit shown in FIG. 4, the antenna circuit 102c has a single transmission input coupling Tx coupled to a single output driver (not shown in FIG. 6) and a single receiver output coupling Rx coupled to a single input amplifier (not shown in FIG. 6) so that the transmission signal is defined between transmission connection Tx and a ground coupling 311 and the receiver signal is defined between Rx and a coupling to ground 310. Bangs at [0099] As used herein RF means any suitable frequency under which near field RF communicators may operate, for example 13.56 MHz for NFC communicators. Bangs at claim 44 The NFC communicator according to claim 29 arranged to communicate using any of: ISO/IEC 18092, ISO/IEC 21481, ISO/IEC 14443 and ISO/IEC 15693. *See also* Bangs at [0001], [0005], [0010], [0018], [0019], [0020], [0022], [0025], [0049], [0050], [0053], [0059], [0062], [0064], [0065], [0066], [0067], [0071], [0072], [0074], [0075], [0077], [0080], [0082], [0083], [0084], [0085], [0086], [0087], [0088], [0089], [0090], [0091], [0092], [0093], [0094], [0096], [0097], [0098], claim 29, claim 30, claim 31, claim 32, claim 33, claim 34, claim 35, claim 36, claim 37, claim 38, claim 39, claim 40, claim 41, claim 42, claim 43, claim 45, claim 46, claim 47, and claim 48. To the extent this limitation is not disclosed by Bangs, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Bangs, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
[1d] an active transmit driver circuit coupled to the power source to receive the power, wherein the active transmit driver circuit affects transmission of data between the antenna and the NFC reader.	Bangs discloses or renders obvious "an active transmit driver circuit coupled to the power source to receive the power, wherein the active transmit driver circuit affects transmission of data between the antenna and the NFC reader." For example: Bangs at Abstract An NFC communicator has an antenna circuit to enable inductive coupling, via an RF H field, of the NFC communicator and another near field RF communicator in near field range. The antenna circuit has an antenna element coupled in parallel with a first capacitor to form a parallel LC circuit. The antenna element has an antenna coil in series with a second capacitor to reduce the voltage to which circuitry of the NFC communicator is subjected by a received RF H field. Alternatively or additionally, receive circuitry of the NFC communicator may be coupled to only a proportion of the antenna coil to reduce the voltage to which circuitry of the NFC communicator is subjected by a received RF H field. Bangs at Figure 2  FIG 2. Bangs at [0004] As will be understood from the above, an NFC communicator may operate in an "initiator" mode in which the NFC communicator seeks to initiate near field RF communication or in a "target" mode in which the NFC communicator is receptive to initiation of near field RF communication. NFC communicators may also operate in either a "passive communications mode" or an "active communications mode". When communication is by the "passive communications mode", an initiator NFC communicator will generate an RF field and a target NFC communicator will respond by modulation of the received H field, usually by load modulation. When communication is by the "active

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	communications mode" the initiator NFC communicator and the target NFC communicator each use their own RF H field to enable communication. The terms "passive" and "active" in the context of NFC communicators do not have the same meaning as "passive" and "active" when used in the context of traditional RFID tags and readers where the terms are instead used to define whether the RFID tags and readers have their own power supply or whether a power supply is derived from the received RF HF field. Bangs at [0015] An NFC communicator may be battery powered and the desire to minimise power consumption, for example to prolong battery life, can limit the amount of current available to drive the antenna circuit. Also, as indicated above, size or environmental constraints may affect the antenna circuit design, limiting the size and/or topology of the antenna circuit, particularly the antenna coil. All of these factors will have an effect on the RF H field and therefore the voltage developed across an NFC communicator's antenna circuit during communication to the extent that the components of the NFC communicator need to be designed to operate at or need to be protected from voltages much higher than their intended operating voltages. Bangs at [0021] According to an aspect of the present invention, there is provided a near field RF communicator, comprising: an antenna circuit to enable inductive coupling of the near field RF communicator and another near field RF communicator in near field range; a signal supplier coupled to the antenna circuit to supply a drive signal to cause the antenna circuit to generate an RF signal; and a receiver coupled to the antenna circuit to receive a signal inductively coupled to the antenna circuit from another near field RF communicator in near field range, wherein the antenna circuit comprises an antenna element coupled in parallel with a first capacitor, wherein the antenna element comprises an antenna coil in series with a second capacitor to affect a voltage resulting from inductive coupling to the antenna circuit. Bangs at [0023] According to an aspect of the present invention, there is provided a near field RF communicator, comprising: an antenna circuit to enable inductive coupling of the near field RF communicator and another near field RF communicator in near field range; a signal supplier coupled to the antenna circuit to supply a drive signal to cause the antenna circuit to generate an RF signal; and a receiver coupled to the antenna circuit to receive a signal inductively coupled to the antenna circuit from another near field RF communicator in near field range, wherein the antenna circuit comprises an antenna element coupled in parallel with a capacitor, wherein the antenna element comprises an antenna coil having a tap and the receiver is coupled to the tap.

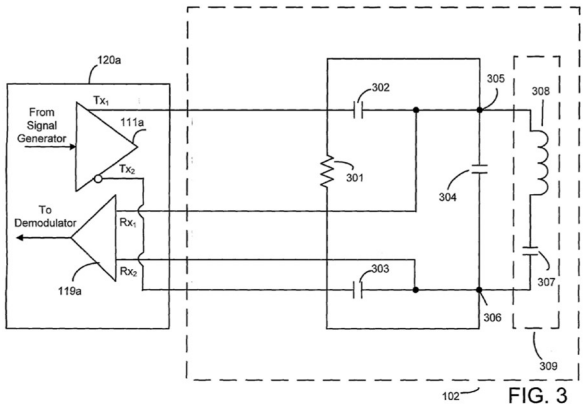
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	Bangs at [0027] FIG. 1 shows a representational diagram illustrating communication between two NFC communications enabled devices; Bangs at [0036] The mobile telephone 1 has the usual features of a mobile telephone including mobile telephone functionality 10 (in the form of, usually, a programmed controller, generally a processor or microprocessor with associated memory or data storage, for controlling operation of the mobile telephone in combination with a SIM card), an antenna 8 for enabling connection to a mobile telecommunications network, and a user interface 3 with a display 4, a keypad 5, a microphone 6 for receiving user voice input and a loudspeaker 7 for outputting received audio to the user. The mobile telephone also has a chargeable battery 11 coupled to a charging socket 12 via which a mains adapter (not shown) may be connected to enable charging of the battery 11. The mobile telephone 1 may have an alternative or additional power supply (not shown), for example a reserve battery or emergency battery. Although FIG. 1 shows a standalone mobile telephone (cellphone), the mobile telephone functionality may be incorporated in or associated with a host device such as a computer, for example a notebook, laptop or PDA. Bangs at [0041] Each NFC communicator 15 and 30 also comprises a power provider 19 and 34. The power providers 19 and 34 may be power supplies within the host device or specific to the NFC communicators 15 and 30, for example a button cell battery, or other small battery. As another possibility or additionally as shown by dashed lines in FIG. 1, one or both of the power providers 19 and 34 may simply comprise a coupling to derive power from the corresponding device battery 11 or 25. Bangs at [0046] In this example, the NFC communications enabled device 100 comprises an NFC communicator 100a having NFC operational components including an antenna circuit 102 and NFC functionality 120 comprising power provider 104, controller 107, data store 108, receiver circuitry and transmitter circuitry. Bangs at [0047] The power provider 104 may be any one or more of the types of power providers discussed above. In the interests of simplicity, power supply couplings from the power provider 104 to other components are not shown in FIG. 2.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	Bangs at [0050] In this example, the transmitter circuitry comprises components for driving the antenna circuit 102 to transmit an RF signal and for modulating an RF signal to enable communication of data between near field RF communicators in near field range. As shown in FIG. 2, the transmitter circuitry comprises a signal generator 109 coupled via a driver 111 to the antenna circuit 102. In this example, the signal generator 110 is configured to cause modulation by gating or switching on and off the RF signal in accordance with the data to be communicated. The NFC communicator may use any appropriate modulation scheme that is in accordance with the standards and/or protocols under which the NFC communicator operates. Alternatively a separate or further signal controller may be incorporated within the NFC operational components of functionality 120 to control modulation of the signal generated by the signal generator 109 in accordance with data or instructions received from the controller 107. Bangs at [0070] When the NFC communicator is in the active communication mode, the controller 107 (FIG. 2) will cause the signal generator 109 (FIG. 2) and driver 111a to drive the antenna circuit 102 to initiate or generate an RF-H field. The antenna circuit 102 is tuned to the required RF transmission frequency which, for an NFC communicator operating in accordance with ISO 18092, is 13.56 MHz (Megahertz). The capacitors 302 and 303 add capacitance to bring the tuning closer to the required frequency. Bangs at [0074] Any appropriate form of modulation may be used to enable data communication, for example modulation of the RF H field may be achieved through gating or switching of the generated signal in accordance with the relevant communication protocols. The form of modulation will depend on the type of drive functionality incorporated within the NFC communicator. For example, a current drive will control the current supplied to the antenna circuit 102 and may achieve modulation by changing the current. A voltage drive on the other hand will control the voltage supplied to the antenna circuit 102 and may achieve modulation by controlling pulses supplied the antenna circuit 102. Any suitable type of modulation technique may be used (e.g. amplitude and/or phase modulation) and any suitable modulation encoding scheme may be used Bangs at [0075] The antenna circuit 102 of FIG. 3 has a double-ended, balanced or differential transmission input, that is the drive signal supplied to the antenna circuit 102 is the difference between the signals at transmission couplings Tx1 and Tx2. Likewise, the receiver output of the antenna circuit is double-ended or

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	differential, that is the received signal is the difference between the signals at receiver couplings Rx1 and Rx2. Bangs at [0076] FIG. 4 shows a functional circuit diagram of an NFC communicator having an antenna circuit 102a that differs from that shown in FIG. 3 in that the antenna circuit has a single transmission input coupling Tx coupled to a single output driver 111b and a single receiver output coupling Rx coupled to a single input amplifier 119b so that the transmission signal is defined between transmission connection Tx and a signal ground coupling 311 and the receiver signal is defined between Rx and a coupling to ground 310 via capacitor 303. Both grounds (earths) may be provided by a local ground of the NFC communicator or a host. *See also* Bangs at Figure 1, [0002], [0003], [0033], and [0038]. To the extent this limitation is not disclosed by Bangs, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Bangs, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
2. The mobile device of claim 1, wherein the transmitted data includes ticketing information for a mass transit system.	Bangs discloses or renders obvious "[t]he mobile device of claim 1, wherein the transmitted data includes ticketing information for a mass transit system." For example: Bangs at [0006] Near field RF communicators may be provided as standalone or discrete devices or may be incorporated within or coupled to larger electrical devices or host devices (referred to below as near field RF communications enabled devices) to enable those devices to communicate by the near field with other near field RF communicators or devices incorporating or coupled to such near field RF communicators. When incorporated within a larger device or host, a near field RF communicator may be a discrete entity or may be provided by functionality within the larger device or host. Examples of such larger devices or host devices are, for example, mobile telephones, portable computing devices (such as personal digital assistants, notebooks, lap-tops), other computing devices such as personal or desk top computers, computer peripherals such as printers, or other electrical devices such as portable audio and/or video players such as MP3 players, IPODs®, CD players, DVD players. Other examples of such larger devices or host devices are other electrical or electronic products, for example consumer products such as domestic appliances or personal care products, and other electrical or electronic devices, apparatus or systems. Some areas of application are payment systems, ticketing systems, for example in tickets (for example parking tickets, bus tickets, train tickets or entrance permits or tickets) or in ticket checking

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	systems, toys, games, posters, packaging, advertising material, product inventory checking systems and so on. *See also* Bangs at [0008] and [0009]. To the extent this limitation is not disclosed by Bangs, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Bangs, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 1 above.
3. The mobile device of claim 1, wherein the transmitted data includes transaction information for a mobile payment.	Bangs discloses or renders obvious "[t]he mobile device of claim 1, wherein the transmitted data includes transaction information for a mobile payment." For example: Bangs at [0006] Near field RF communicators may be provided as standalone or discrete devices or may be incorporated within or coupled to larger electrical devices or host devices (referred to below as near field RF communications enabled devices) to enable those devices to communicate by the near field with other near field RF communicators or devices incorporating or coupled to such near field RF communicators. When incorporated within a larger device or host, a near field RF communicator may be a discrete entity or may be provided by functionality within the larger device or host. Examples of such larger devices or host devices are, for example, mobile telephones, portable computing devices (such as personal digital assistants, notebooks, lap-tops), other computing devices such as personal or desk top computers, computer peripherals such as printers, or other electrical devices such as portable audio and/or video players such as MP3 players, IPODs®, CD players, DVD players. Other examples of such larger devices or host devices are other electrical or electronic products, for example consumer products such as domestic appliances or personal care products, and other electrical or electronic devices, apparatus or systems. Some areas of application are payment systems, ticketing systems, for example in tickets (for example parking tickets, bus tickets, train tickets or entrance permits or tickets) or in ticket checking systems, toys, games, posters, packaging, advertising material, product inventory checking systems and so on. Bangs at [0008] With NFC communicators the position is different. Such NFC communicators need to be capable of both initiating an RF H field and of receiving an RF H field. Moreover a single design of NFC communicator may be used for many different applications and in some of those applications the NFC communicator

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	may function like an RFID tag, in other applications the NFC communicator may function like an RFID reader and in other applications the NFC communicator may sometimes function like an RFID tag and sometimes function like an RFID reader. Also, NFC communicators tend to have small antennas as compared to traditional RFID readers. To the extent this limitation is not disclosed by Bangs, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Bangs, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.\ *See also* claim 1 above.
4. The mobile device of claim 1, wherein the NFC reader is a point-of-sale NFC reader.	Bangs discloses or renders obvious "[t]he mobile device of claim 1, wherein the NFC reader is a point-of-sale NFC reader." For example: Bangs at [0006] Near field RF communicators may be provided as standalone or discrete devices or may be incorporated within or coupled to larger electrical devices or host devices (referred to below as near field RF communications enabled devices) to enable those devices to communicate by the near field with other near field RF communicators or devices incorporating or coupled to such near field RF communicators. When incorporated within a larger device or host, a near field RF communicator may be a discrete entity or may be provided by functionality within the larger device or host. Examples of such larger devices or host devices are, for example, mobile telephones, portable computing devices (such as personal digital assistants, notebooks, lap-tops), other computing devices such as personal or desk top computers, computer peripherals such as printers, or other electrical devices such as portable audio and/or video players such as MP3 players, IPODs®, CD players, DVD players. Other examples of such larger devices or host devices are other electrical or electronic products, for example consumer products such as domestic appliances or personal care products, and other electrical or electronic devices, apparatus or systems. Some areas of application are payment systems, ticketing systems, for example in tickets (for example parking tickets, bus tickets, train tickets or entrance permits or tickets) or in ticket checking systems, toys, games, posters, packaging, advertising material, product inventory checking systems and so on. To the extent this limitation is not disclosed by Bangs, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Bangs, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 1 above.

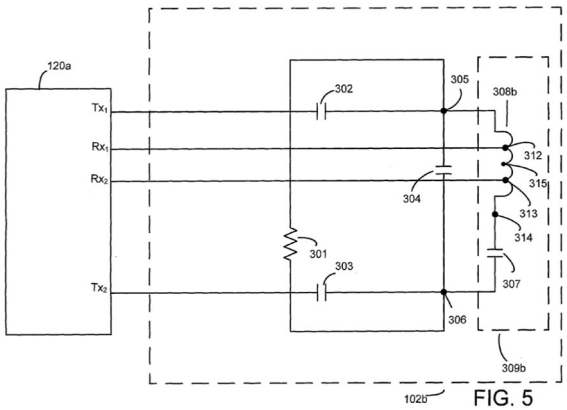
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
5. The mobile device of claim 1, wherein the antenna includes an inductive element.	Bangs discloses or renders obvious "[t]he mobile device of claim 1, wherein the antenna includes an inductive element." For example: Bangs at Abstract An NFC communicator has an antenna circuit to enable inductive coupling, via an RF H field, of the NFC communicator and another near field RF communicator in near field range. The antenna circuit has an antenna element coupled in parallel with a first capacitor to form a parallel LC circuit. The antenna element has an antenna coil in series with a second capacitor to reduce the voltage to which circuitry of the NFC communicator is subjected by a received RF H field. Alternatively or additionally, receive circuitry of the NFC communicator may be coupled to only a proportion of the antenna coil to reduce the voltage to which circuitry of the NFC communicator is subjected by a received RF H field. Bangs at Figure 3  FIG. 3 Bangs at [0008] With NFC communicators the position is different. Such NFC communicators need to be capable of both initiating an RF H field and of receiving an RF H field. Moreover a single design of NFC communicator may be used for many different applications and in some of those applications the NFC communicator may function like an RFID tag, in other applications the NFC communicator may function like an RFID reader and in other applications the NFC communicator may sometimes function like an RFID tag and sometimes function like an RFID reader. Also, NFC communicators tend to have small antennas as compared to traditional RFID readers.

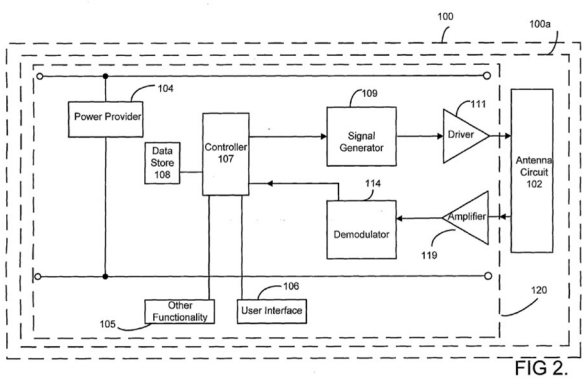
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	Bangs at [0010] In addition, where the NFC communicator is within a host device, then size limitations of the host and/or the local environment provided by the host may impact on the antenna circuit design and/or constrain the size of the antenna circuit or the antenna coil itself. Such impacts and constraints may seriously detrimentally affect the range over which inductive coupling may be achieved. Bangs at [0011] The use of existing antenna circuit designs for an NFC communicator thus requires compromise in the operating range or functionality of the NFC communicator. For example an existing antenna circuit might enable inductive coupling up to a range of 10 cm under certain environments, standards or protocols but only up to a range of 1 cm of under other environments, standards or protocols. Also an NFC communicator may be able to operate at a greater range when initiating an RF H field but may have a much reduced range when modulating a received RF H field. Bangs at [0012] Existing antenna circuit designs can result in large voltage fluctuations across the rest of the NFC communicator during inductive coupling and it can be difficult to protect the circuitry from those voltage fluctuations. In addition existing antenna designs tend to require the use high voltage capacitors, that is capacitors having a voltage rating which exceeds the operating voltage of the relevant circuit. For example if NFC communicator circuitry operates at 3.3 volts, a high voltage capacitor would be a capacitor having a voltage rating above 3.3 volts. Such high voltage capacitors are costly and generally have to be provided as discrete fixed capacitance components which is of itself costly and minimizes flexibility in design. Bangs at [0020] An aspect of the invention provides an antenna circuit operable to both inductively couple with a received RF H field and to transmit an RF H field, the antenna circuit comprising at least one antenna coil and at least one capacitance in anti-phase with the antenna coil. Bangs at [0021] According to an aspect of the present invention, there is provided a near field RF communicator, comprising: an antenna circuit to enable inductive coupling of the near field RF communicator and another near field RF communicator in near field range; a signal supplier coupled to the antenna circuit to supply a drive signal to cause the antenna circuit to generate an RF signal; and a receiver coupled to the

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	antenna circuit to receive a signal inductively coupled to the antenna circuit from another near field RF communicator in near field range, wherein the antenna circuit comprises an antenna element coupled in parallel with a first capacitor, wherein the antenna element comprises an antenna coil in series with a second capacitor to affect a voltage resulting from inductive coupling to the antenna circuit. Bangs at [0039] Each NFC communicator 15 and 30 comprises NFC operational components 16 and 31 for, as will be described below, enabling control of the NFC functionality and generation, modulation and demodulation of an RF signal. Each NFC communicator 15 and 30 also comprises an antenna circuit 17 and 32 comprising an inductor or coil in the form of an antenna 18 and 33. The antenna circuits 17 and 32 enable an alternating magnetic field (RF H field) generated by the antenna of one near field RF communicator 15 (or 30) by transmission of an RF signal (for example a 13.56 Mega Hertz signal) to be inductively coupled to the antenna of the other near field RF communicator 30 (or 15) when that antenna is within the near field of the RF signal generated by the one near field RF communicator 15 (or 30). Bangs at [0058] The antenna element 309 comprises an antenna coil element 308 in series with a second capacitor 307 which second capacitor 307 is anti-phase to the antenna coil element 308 and affects a voltage resulting from inductive coupling of an RF H field to the antenna circuit. As shown the antenna coil element 308 comprises a single antenna coil which may comprise one, two or more coils or loops. Bangs at [0061] The value of the capacitor 307 is chosen to "back-off" or reduce an induced voltage below that which might potentially have been induced by a received RF H field in the absence of the capacitor 307 while the resistor 301 acts as a shunt, limiting the voltage that can potentially be generated across the antenna circuit 102, and so protecting the NFC functionality from the potentially higher voltages that may otherwise occur across the antenna coil element 309. This enables the receiver circuitry to be connected directly to the antenna coil element 309. This enables protection of the receiver circuitry against received RF H fields whose strength is not only not known in advance but may because, for example, of the different nature of the near field RF communicator with which the NFC communicator is communicating, significantly exceed that of the NFC communicator's own transmitted RF H field, for example the other near field RF communicator may be designed to operate over a much larger range than the NFC communicator and/or any geometrical mismatch between the two antennas may expose one to a greater RF H field than antenna size/shape would otherwise dictate. The provision of capacitor 307 thus provides protection without reducing the antenna circuit's own RF H field strength.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	Bangs at [0063] As one possibility, the size of capacitor 307 to be employed to back off antenna coil 308 to effect a reduction in the apparent inductance of antenna coil 308 (that is the total inductance of antenna element 309) may be calculated using the following formula: $$C_{307} = \frac{1}{(2\pi \times F_c)^2 L_{neg}}$$ where F_c is the carrier frequency (for example 13.56 MHz) and L_{neg} is the amount (in Henrys) that inductance 308 is to be reduced by. Bangs at [0072] For any given RF voltage supplied by driver 111, the RF current that flows through antenna circuit 102 is inversely proportional to the total impedance of antenna circuit 102. Capacitors 302 and 303 act to transform the impedance of the tank circuit to reduce the total impedance of antenna circuit 102 and thus multiply the RF current produced for any given RF voltage. For example, if the impedance of the tank circuit is Xtank=A+Bj, and the impedance of each capacitor 302, 303 is Xc=−Cj, then the total impedance of antenna circuit 102 will be Xtotal=A+(B−2C)j. Accordingly, capacitors 302 and 303 reduce the total impedance of antenna circuit 102 thereby multiplying the current going to the tank circuit to top up the resonant current flowing through the antenna coil 308 and consequently the strength of the induced RF H field. Bangs at [0073] Although not shown in FIG. 3, the resistor 301 may be coupled in series with a switch controlled by the controller 107 to enable the resistor to be switched out of the circuit whilst the NFC communicator is transmitting an RF H field, so as not to limit the RF current available to the antenna coil during transmission. The antenna-coil 308 and capacitances 304 and 307 act in a similar way as for passive communication (or receiving mode) and can also act as a current reservoir. Capacitance 304 forms a parallel resonant tank circuit with capacitor 307 and antenna coil 308 and thus may enable the amount of current seen at antenna coil 308 to be increased when device is generating an RF H field. The capacitors 302 and 303 change the high impedance of the tank circuit (which looks inductive) to allow efficient "top up" of the resonant current to compensate for losses due to resistance and/or other coils in the proximity. Bangs at [0077]

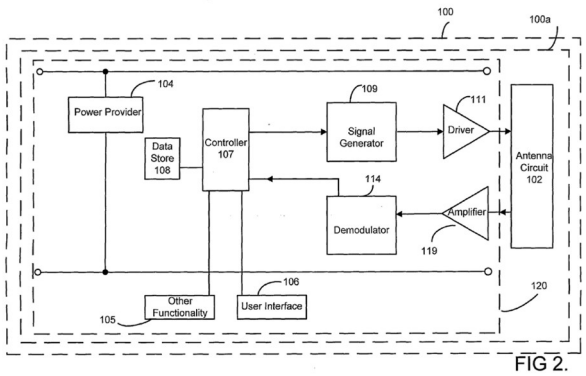
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	The above described embodiments enable protection of the receiver circuitry against received RF H fields whose strength is not only not known in advance but may because, for example, of the different nature of the near field RF communicator with which the NFC communicator is communicating, significantly exceed that of the NFC communicator's own transmitted RF H field, for example the other near field RF communicator may be designed to operate over a much larger range than the NFC communicator and/or any geometrical mismatch between the two antennas may expose one to a greater RF H field than antenna size/shape would otherwise dictate. Bangs at [0087] Providing an NFC communicator with an antenna circuit as described above avoids the performance of the NFC communicator being restricted by the physical size and shape of the coil antenna. Readers/initiators, for example, are generally larger than and have fewer coils than tags/targets. Capacitor 307 advantageously reduces the affects of the physical size and shape of the antenna coil on the performance of the antenna circuit. Thus, capacitor 307 may be described as a "negative inductance" which reduces the apparent inductive value of the antenna coil. This allows the apparent inductive value of the antenna coil to be divorced from its physical form thereby enabling greater ranges of antenna coil sizes and configurations to be employed. Bangs at [0088] Small NFC communicators, for example tag sized devices, can be poor initiators due to physical size constraints on their antenna coils. This may be ameliorated by increasing the number of antenna coil turns to increase the generated field strength. However, an increased number of antenna coil turns results in both the antenna coil having an increased inductance, and an increase in the voltage induced across the coil for a given amount of current. If this increase in voltage is too great it may exceed the operating voltage of other components of the NFC communicator thereby causing failure or reduced performance. Advantageously, by reducing the apparent inductive value of the antenna coil, capacitor 307 removes a proportion of the antenna coil voltage seen by other components of the NFC communicator thereby enabling their continued operation. Bangs at [0089] For a given supply voltage, reducing the apparent inductive value of the antenna coil advantageously facilitates the supply of current to the antenna coil. Furthermore, it allows lower voltage rated components to be used, and allows a shunt circuit (used in target mode and represented by resistor 301 above) to be connected across the combined inductance of the antenna coil plus the "negative inductance" of the capacitor 307.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	Bangs at [0094] Where this application refers to capacitors, this should be taken to encompass any suitable component having capacitance. Likewise where the text refers to an antenna, or an antenna coil, this should be taken to mean any inductive component suitable for use in coupling to an RF H field. Also, where this application refers to a resistor, this should be taken to encompass any suitable component having resistance. *See also* Bangs at Figure 4, Figure 5, Figure 6, [0001], [0007], [0009], [0017], [0018], [0019], [0022], [0023], [0024], [0025], [0056], [0057], [0062], [0064], [0067], [0068], [0079], [0080], [0084], [0085], [0086], [0090], [0091], [0092], [0093], [0095], [0096], [0097], claim 29, claim 32, claim 39, claim 46, claim 47, and claim 48. To the extent this limitation is not disclosed by Bangs, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Bangs, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 1 above.
6. The mobile device of claim 1, wherein the active transmit driver circuit includes one or more of an amplifier filter, oscillator, and/or modulator.	Bangs discloses or renders obvious "[t]he mobile device of claim 1, wherein the active transmit driver circuit includes one or more of an amplifier filter, oscillator, and/or modulator." For example: Bangs at Figure 5  FIG. 5

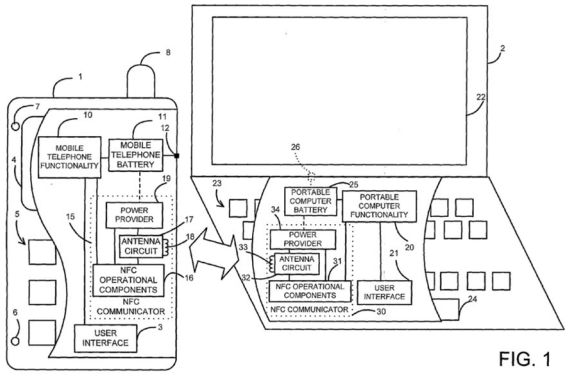
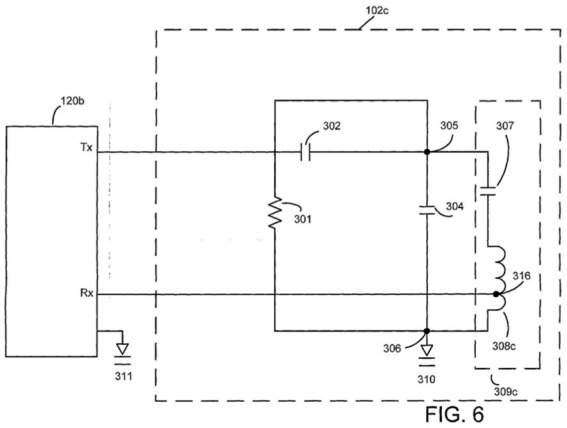
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	Bangs at [0050] In this example, the transmitter circuitry comprises components for driving the antenna circuit 102 to transmit an RF signal and for modulating an RF signal to enable communication of data between near field RF communicators in near field range. As shown in FIG. 2, the transmitter circuitry comprises a signal generator 109 coupled via a driver 111 to the antenna circuit 102. In this example, the signal generator 110 is configured to cause modulation by gating or switching on and off the RF signal in accordance with the data to be communicated. The NFC communicator may use any appropriate modulation scheme that is in accordance with the standards and/or protocols under which the NFC communicator operates. Alternatively a separate or further signal controller may be incorporated within the NFC operational components of functionality 120 to control modulation of the signal generated by the signal generator 109 in accordance with data or instructions received from the controller 107. To the extent this limitation is not disclosed by Bangs, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Bangs, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 1 above.
7. The mobile device of claim 1 comprising an amplifier coupled to the power source to receive the power, wherein the amplifier is further coupled to the antenna.	Bangs discloses or renders obvious "[t]he mobile device of claim 1 comprising an amplifier coupled to the power source to receive the power, wherein the amplifier is further coupled to the antenna." For example: Bangs at Figure 2  FIG 2.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	Bangs at [0004] As will be understood from the above, an NFC communicator may operate in an "initiator" mode in which the NFC communicator seeks to initiate near field RF communication or in a "target" mode in which the NFC communicator is receptive to initiation of near field RF communication. NFC communicators may also operate in either a "passive communications mode" or an "active communications mode". When communication is by the "passive communications mode", an initiator NFC communicator will generate an RF field and a target NFC communicator will respond by modulation of the received H field, usually by load modulation. When communication is by the "active communications mode" the initiator NFC communicator and the target NFC communicator each use their own RF H field to enable communication. The terms "passive" and "active" in the context of NFC communicators do not have the same meaning as "passive" and "active" when used in the context of traditional RFID tags and readers where the terms are instead used to define whether the RFID tags and readers have their own power supply or whether a power supply is derived from the received RF HF field. Bangs at [0015] An NFC communicator may be battery powered and the desire to minimise power consumption, for example to prolong battery life, can limit the amount of current available to drive the antenna circuit. Also, as indicated above, size or environmental constraints may affect the antenna circuit design, limiting the size and/or topology of the antenna circuit, particularly the antenna coil. All of these factors will have an effect on the RF H field and therefore the voltage developed across an NFC communicator's antenna circuit during communication to the extent that the components of the NFC communicator need to be designed to operate at or need to be protected from voltages much higher than their intended operating voltages. Bangs at [0036] The mobile telephone 1 has the usual features of a mobile telephone including mobile telephone functionality 10 (in the form of, usually, a programmed controller, generally a processor or microprocessor with associated memory or data storage, for controlling operation of the mobile telephone in combination with a SIM card), an antenna 8 for enabling connection to a mobile telecommunications network, and a user interface 3 with a display 4, a keypad 5, a microphone 6 for receiving user voice input and a loudspeaker 7 for outputting received audio to the user. The mobile telephone also has a chargeable battery 11 coupled to a charging socket 12 via which a mains adapter (not shown) may be connected to enable charging of the battery 11. The mobile telephone 1 may have an alternative or additional power supply (not shown), for example a reserve battery or emergency battery. Although FIG. 1 shows a

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	standalone mobile telephone (cellphone), the mobile telephone functionality may be incorporated in or associated with a host device such as a computer, for example a notebook, laptop or PDA. Bangs at [0041] Each NFC communicator 15 and 30 also comprises a power provider 19 and 34. The power providers 19 and 34 may be power supplies within the host device or specific to the NFC communicators 15 and 30, for example a button cell battery, or other small battery. As another possibility or additionally as shown by dashed lines in FIG. 1, one or both of the power providers 19 and 34 may simply comprise a coupling to derive power from the corresponding device battery 11 or 25. Bangs at [0046] In this example, the NFC communications enabled device 100 comprises an NFC communicator 100a having NFC operational components including an antenna circuit 102 and NFC functionality 120 comprising power provider 104, controller 107, data store 108, receiver circuitry and transmitter circuitry. Bangs at [0047] The power provider 104 may be any one or more of the types of power providers discussed above. In the interests of simplicity, power supply couplings from the power provider 104 to other components are not shown in FIG. 2. Bangs at [0049] In this example, the receiver circuitry comprises an amplifier 119 coupled to the antenna circuit 102 and a demodulator 114 coupled to the amplifier 119 and the controller 107 for amplifying and demodulating a modulated RF signal inductively coupled to the antenna circuit 102 from another near field RF communicator in near field range and for supplying the thus-extracted data to the controller 107 for processing. Bangs at [0059] The junction 305 between capacitor 304 and antenna element 309 is coupled to one input Rx1 of a differential amplifier 119a forming the amplifier 119 shown in FIG. 2 while the junction 306 between capacitor 304 and antenna element 309 is coupled to the other input Rx2 of the differential amplifier 119a. To enable the antenna circuit to be driven, respective outputs Tx1 and Tx2 of driver 111a are coupled to the junctions 305 and 306 via respective further capacitors 302 and 303. Thus, in this example, the antenna circuit 102 has double-ended or differential coupling (Rx1 and Rx2) to the receive circuitry and

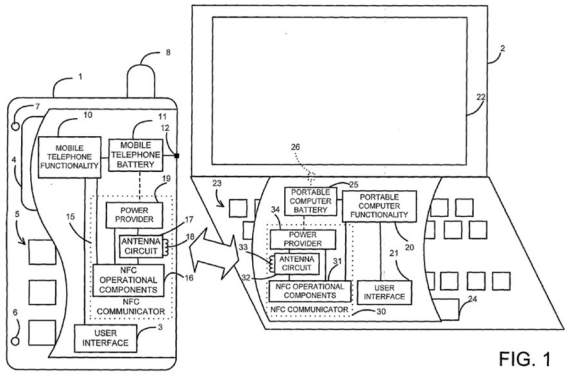
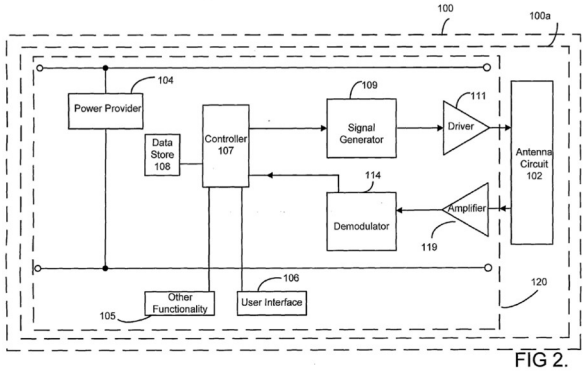
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	double-ended or differential coupling (Tx1 and Tx2) to the transmit circuitry of the NEC functionality 120a. *See also* Bangs at Figure 1 and [0038]. To the extent this limitation is not disclosed by Bangs, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Bangs, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 1 above.
8. The mobile device of claim 7, wherein the amplifier amplifies a signal received at the antenna and generates an amplified signal, and provides the amplified signal to the smartcard controller.	Bangs discloses or renders obvious "[t]he mobile device of claim 7, wherein the amplifier amplifies a signal received at the antenna and generates an amplified signal, and provides the amplified signal to the smartcard controller." For example: Bangs at Figure 2  FIG 2. Bangs at [0049] In this example, the receiver circuitry comprises an amplifier 119 coupled to the antenna circuit 102 and a demodulator 114 coupled to the amplifier 119 and the controller 107 for amplifying and demodulating a modulated RF signal inductively coupled to the antenna circuit 102 from another near field RF communicator in near field range and for supplying the thus-extracted data to the controller 107 for processing. Bangs at [0079]

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	The embodiment shown in FIG. 5 differs from that shown in FIG. 3 in that the receiver input couplings Rx1 and Rx2 are coupled across only a part of the antenna coil 308b, that is receiver input couplings Rx1 and Rx2 are coupled to taps 312 and 313 so that the antenna coil 308b forms an autotransformer and the voltage across the receiver input couplings Rx1 and Rx2 is stepped down from that across the entire antenna coil 308b (i.e. from that between junctions 305 and 306) so that the voltage to which the receiver circuitry is subjected when an RF H field is coupled to or received by the antenna coil is less than the voltage to which the transmitter circuitry is subjected thereby reducing even further the maximum voltage that amplifier 119 needs to be able to withstand. This is advantageous because it enables the NFC communicator to protect the receiver circuitry against received RF H fields without reducing the strength of the NFC communicator's own RF H field. The transmitter circuitry should be isolated or otherwise protected during reception in this example. *See also* Bangs at [0059]. To the extent this limitation is not disclosed by Bangs, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Bangs, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 7 above.
17[pre]. A method of near field communication between a mobile device and an NFC reader, the method comprising:	Bangs discloses or renders obvious "[a] method of near field communication between a mobile device and an NFC reader, the method." For example: *See* [1d] above. Bangs at Figure 1

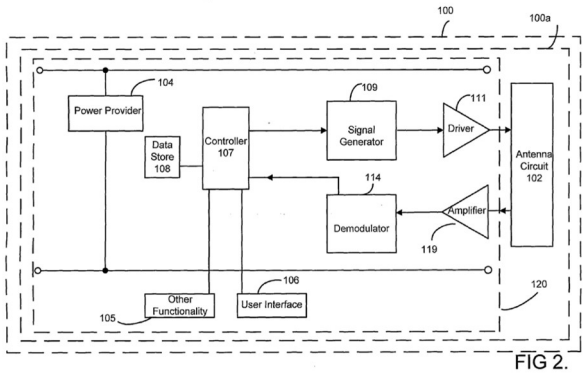
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	 FIG. 1 Bangs at Figure 6  FIG. 6 Bangs at [0006] Near field RF communicators may be provided as standalone or discrete devices or may be incorporated within or coupled to larger electrical devices or host devices (referred to below as near field RF communications enabled devices) to enable those devices to communicate by the near field with other near field RF communicators or devices incorporating or coupled to such near field RF communicators. When incorporated within a larger device or host, a near field RF communicator may be a discrete entity or may be provided by functionality within the larger device or host. Examples of such larger devices or

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	host devices are, for example, mobile telephones, portable computing devices (such as personal digital assistants, notebooks, lap-tops), other computing devices such as personal or desk top computers, computer peripherals such as printers, or other electrical devices such as portable audio and/or video players such as MP3 players, IPODs®, CD players, DVD players. Other examples of such larger devices or host devices are other electrical or electronic products, for example consumer products such as domestic appliances or personal care products, and other electrical or electronic devices, apparatus or systems. Some areas of application are payment systems, ticketing systems, for example in tickets (for example parking tickets, bus tickets, train tickets or entrance permits or tickets) or in ticket checking systems, toys, games, posters, packaging, advertising material, product inventory checking systems and so on. Bangs at [0008] With NFC communicators the position is different. Such NFC communicators need to be capable of both initiating an RF H field and of receiving an RF H field. Moreover a single design of NFC communicator may be used for many different applications and in some of those applications the NFC communicator may function like an RFID tag, in other applications the NFC communicator may function like an RFID reader and in other applications the NFC communicator may sometimes function like an RFID tag and sometimes function like an RFID reader. Also, NFC communicators tend to have small antennas as compared to traditional RFID readers. Bangs at [0042] It will be appreciated that FIG. 1 shows only examples of types of host devices. A host device may be another type of electrical device such as a personal digital assistant (PDA), other portable electrical device such as a portable audio and/or video player such as an MP3 player, an IPOD®, CD player, DVD player or other electrical device. Bangs at [0046] In this example, the NFC communications enabled device 100 comprises an NFC communicator 100a having NFC operational components including an antenna circuit 102 and NFC functionality 120 comprising power provider 104, controller 107, data store 108, receiver circuitry and transmitter circuitry. Bangs at [0054] In FIG. 2 control of the operation of the NFC communicator is through controller 107. As another possibility, where the NFC communicator is part of or associated with a host device, control of the operation of the NFC communicator may at least partly be directed by the host device, for example

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	through the other functionality 105. In such circumstances all or part of the control may be provided by the other functionality 105 which may be part of the NFC functionality or a host. For example the NFC communicator controller 107 may control modulation and modulation protocols whereas the data to be transmitted may be provided by the other functionality 105. Bangs at [0064] Generally, the NFC functionality 120a will be formed as one or more integrated circuits (generally monocrystalline silicon integrated circuits) mounted on a Printed Circuit Board(s) (PCB(s)) or the like and the antenna circuit will be formed by external discrete components formed on or carried by (e.g. surface mounted on) a PCB, for example the antenna coil element may be defined by conductive tracks on a PCB while any capacitors and resistors of the antenna circuit may be provided by discrete components mounted to the PCB. Bangs at [0076] FIG. 4 shows a functional circuit diagram of an NFC communicator having an antenna circuit 102a that differs from that shown in FIG. 3 in that the antenna circuit has a single transmission input coupling Tx coupled to a single output driver 111b and a single receiver output coupling Rx coupled to a single input amplifier 119b so that the transmission signal is defined between transmission connection Tx and a signal ground coupling 311 and the receiver signal is defined between Rx and a coupling to ground 310 via capacitor 303. Both grounds (earths) may be provided by a local ground of the NFC communicator or a host. *See also* Bangs at [0033], [0035], [0036], [0038], [0039], [0040], [0041], [0043], claim 29, claim 30, claim 31, claim 32, claim 33, claim 34, claim 35, claim 36, claim 37, claim 38, claim 39, claim 40, claim 41, claim 42, claim 43, claim 44, and claim 45. To the extent this limitation is not disclosed by Bangs, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Bangs, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[17a] coupling a smartcard controller and an active transmit driver circuit to a power source of the mobile device;	Bangs discloses or renders obvious "coupling a smartcard controller and an active transmit driver circuit to a power source of the mobile device." For example: Bangs at Figure 1

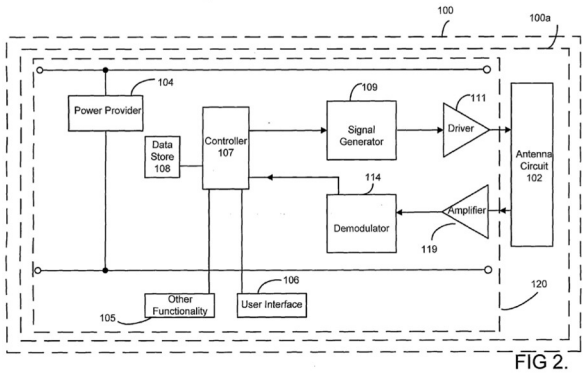
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	 FIG. 1 Bangs at Figure 2  FIG 2. Bangs at [0004] As will be understood from the above, an NFC communicator may operate in an "initiator" mode in which the NFC communicator seeks to initiate near field RF communication or in a "target" mode in which the NFC communicator is receptive to initiation of near field RF communication. NFC communicators may also operate in either a "passive communications mode" or an "active communications mode". When communication is by the "passive communications mode", an initiator NFC communicator will generate an RF field and a target NFC communicator will respond by modulation of the received H field, usually by load modulation. When communication is by the "active

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	communications mode" the initiator NFC communicator and the target NFC communicator each use their own RF H field to enable communication. The terms "passive" and "active" in the context of NFC communicators do not have the same meaning as "passive" and "active" when used in the context of traditional RFID tags and readers where the terms are instead used to define whether the RFID tags and readers have their own power supply or whether a power supply is derived from the received RF HF field. Bangs at [0015] An NFC communicator may be battery powered and the desire to minimise power consumption, for example to prolong battery life, can limit the amount of current available to drive the antenna circuit. Also, as indicated above, size or environmental constraints may affect the antenna circuit design, limiting the size and/or topology of the antenna circuit, particularly the antenna coil. All of these factors will have an effect on the RF H field and therefore the voltage developed across an NFC communicator's antenna circuit during communication to the extent that the components of the NFC communicator need to be designed to operate at or need to be protected from voltages much higher than their intended operating voltages. Bangs at [0036] The mobile telephone 1 has the usual features of a mobile telephone including mobile telephone functionality 10 (in the form of, usually, a programmed controller, generally a processor or microprocessor with associated memory or data storage, for controlling operation of the mobile telephone in combination with a SIM card), an antenna 8 for enabling connection to a mobile telecommunications network, and a user interface 3 with a display 4, a keypad 5, a microphone 6 for receiving user voice input and a loudspeaker 7 for outputting received audio to the user. The mobile telephone also has a chargeable battery 11 coupled to a charging socket 12 via which a mains adapter (not shown) may be connected to enable charging of the battery 11. The mobile telephone 1 may have an alternative or additional power supply (not shown), for example a reserve battery or emergency battery. Although FIG. 1 shows a standalone mobile telephone (cellphone), the mobile telephone functionality may be incorporated in or associated with a host device such as a computer, for example a notebook, laptop or PDA. Bangs at [0041] Each NFC communicator 15 and 30 also comprises a power provider 19 and 34. The power providers 19 and 34 may be power supplies within the host device or specific to the NFC communicators 15 and 30, for example a button cell battery, or other small battery. As another possibility or additionally as shown by dashed lines in FIG. 1, one or both of the power providers 19 and 34 may simply comprise a coupling to derive power from the corresponding device battery 11 or 25.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	Bangs at [0046] In this example, the NFC communications enabled device 100 comprises an NFC communicator 100a having NFC operational components including an antenna circuit 102 and NFC functionality 120 comprising power provider 104, controller 107, data store 108, receiver circuitry and transmitter circuitry. Bangs at [0047] The power provider 104 may be any one or more of the types of power providers discussed above. In the interests of simplicity, power supply couplings from the power provider 104 to other components are not shown in FIG. 2. *See also* Bangs at [0038]. To the extent this limitation is not disclosed by Bangs, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Bangs, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[17b] providing power to the smartcard controller and the active transmit driver circuit from the power source of the mobile device;	Bangs discloses or renders obvious "providing power to the smartcard controller and the active transmit driver circuit from the power source of the mobile device." For example: *See* [17a] above. Bangs at Figure 2  FIG 2. Bangs at [0004]

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	As will be understood from the above, an NFC communicator may operate in an "initiator" mode in which the NFC communicator seeks to initiate near field RF communication or in a "target" mode in which the NFC communicator is receptive to initiation of near field RF communication. NFC communicators may also operate in either a "passive communications mode" or an "active communications mode". When communication is by the "passive communications mode", an initiator NFC communicator will generate an RF field and a target NFC communicator will respond by modulation of the received H field, usually by load modulation. When communication is by the "active communications mode" the initiator NFC communicator and the target NFC communicator each use their own RF H field to enable communication. The terms "passive" and "active" in the context of NFC communicators do not have the same meaning as "passive" and "active" when used in the context of traditional RFID tags and readers where the terms are instead used to define whether the RFID tags and readers have their own power supply or whether a power supply is derived from the received RF HF field. Bangs at [0015] An NFC communicator may be battery powered and the desire to minimise power consumption, for example to prolong battery life, can limit the amount of current available to drive the antenna circuit. Also, as indicated above, size or environmental constraints may affect the antenna circuit design, limiting the size and/or topology of the antenna circuit, particularly the antenna coil. All of these factors will have an effect on the RF H field and therefore the voltage developed across an NFC communicator's antenna circuit during communication to the extent that the components of the NFC communicator need to be designed to operate at or need to be protected from voltages much higher than their intended operating voltages. Bangs at [0036] The mobile telephone 1 has the usual features of a mobile telephone including mobile telephone functionality 10 (in the form of, usually, a programmed controller, generally a processor or microprocessor with associated memory or data storage, for controlling operation of the mobile telephone in combination with a SIM card), an antenna 8 for enabling connection to a mobile telecommunications network, and a user interface 3 with a display 4, a keypad 5, a microphone 6 for receiving user voice input and a loudspeaker 7 for outputting received audio to the user. The mobile telephone also has a chargeable battery 11 coupled to a charging socket 12 via which a mains adapter (not shown) may be connected to enable charging of the battery 11. The mobile telephone 1 may have an alternative or additional power supply (not shown), for example a reserve battery or emergency battery. Although FIG. 1 shows a

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	standalone mobile telephone (cellphone), the mobile telephone functionality may be incorporated in or associated with a host device such as a computer, for example a notebook, laptop or PDA. Bangs at [0041] Each NFC communicator 15 and 30 also comprises a power provider 19 and 34. The power providers 19 and 34 may be power supplies within the host device or specific to the NFC communicators 15 and 30, for example a button cell battery, or other small battery. As another possibility or additionally as shown by dashed lines in FIG. 1, one or both of the power providers 19 and 34 may simply comprise a coupling to derive power from the corresponding device battery 11 or 25. Bangs at [0046] In this example, the NFC communications enabled device 100 comprises an NFC communicator 100a having NFC operational components including an antenna circuit 102 and NFC functionality 120 comprising power provider 104, controller 107, data store 108, receiver circuitry and transmitter circuitry. Bangs at [0047] The power provider 104 may be any one or more of the types of power providers discussed above. In the interests of simplicity, power supply couplings from the power provider 104 to other components are not shown in FIG. 2. *See also* Bangs at Figure 1 and [0038]. To the extent this limitation is not disclosed by Bangs, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Bangs, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[17c] coupling the active transmit driver circuit to an antenna of the mobile device, wherein the antenna is tuned to operate at substantially 13.56 MHz; and	Bangs discloses or renders obvious "coupling the active transmit driver circuit to an antenna of the mobile device, wherein the antenna is tuned to operate at substantially 13.56 MHz." For example: *See* [1c] above. Bangs at Abstract An NFC communicator has an antenna circuit to enable inductive coupling, via an RF H field, of the NFC communicator and another near field RF communicator in near field range. The antenna circuit has an antenna element coupled in parallel with a first capacitor to form a parallel LC circuit. The antenna element has an antenna coil in series with a second capacitor to reduce the voltage to which circuitry of the NFC communicator is subjected by a received RF H field. Alternatively or additionally, receive

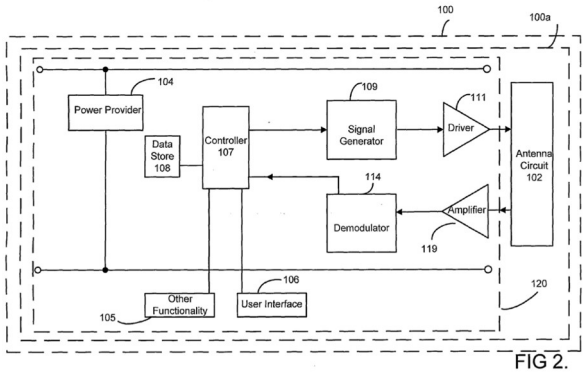
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	circuitry of the NFC communicator may be coupled to only a proportion of the antenna coil to reduce the voltage to which circuitry of the NFC communicator is subjected by a received RF H field. Bangs at Figure 2  FIG 2. Bangs at [0002] Near field RF (radio frequency) communication requires an antenna of one near field RF communicator to be present within the alternating magnetic field (H field) generated by the antenna of another near field RF communicator by transmission of an RF signal (for example a 13.56 Mega Hertz signal) to enable the magnetic field (H field) of the RF signal to be inductively coupled between the communicators. The RF signal may be modulated to enable communication of control and/or other data. Ranges of up to several centimetres (generally to a maximum of 1 metre) are common for near field RF communicators. Bangs at [0021] According to an aspect of the present invention, there is provided a near field RF communicator, comprising: an antenna circuit to enable inductive coupling of the near field RF communicator and another near field RF communicator in near field range; a signal supplier coupled to the antenna circuit to supply a drive signal to cause the antenna circuit to generate an RF signal; and a receiver coupled to the antenna circuit to receive a signal inductively coupled to the antenna circuit from another near field RF communicator in near field range, wherein the antenna circuit comprises an antenna element coupled in parallel with a first capacitor, wherein the antenna element comprises an antenna coil in series with a second capacitor to affect a voltage resulting from inductive coupling to the antenna circuit.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	Bangs at [0023] According to an aspect of the present invention, there is provided a near field RF communicator, comprising: an antenna circuit to enable inductive coupling of the near field RF communicator and another near field RF communicator in near field range; a signal supplier coupled to the antenna circuit to supply a drive signal to cause the antenna circuit to generate an RF signal; and a receiver coupled to the antenna circuit to receive a signal inductively coupled to the antenna circuit from another near field RF communicator in near field range, wherein the antenna circuit comprises an antenna element coupled in parallel with a capacitor, wherein the antenna element comprises an antenna coil having a tap and the receiver is coupled to the tap. Bangs at [0027] FIG. 1 shows a representational diagram illustrating communication between two NFC communications enabled devices; Bangs at [0039] Each NFC communicator 15 and 30 comprises NFC operational components 16 and 31 for, as will be described below, enabling control of the NFC functionality and generation, modulation and demodulation of an RF signal. Each NFC communicator 15 and 30 also comprises an antenna circuit 17 and 32 comprising an inductor or coil in the form of an antenna 18 and 33. The antenna circuits 17 and 32 enable an alternating magnetic field (RF H field) generated by the antenna of one near field RF communicator 15 (or 30) by transmission of an RF signal (for example a 13.56 Mega Hertz signal) to be inductively coupled to the antenna of the other near field RF communicator 30 (or 15) when that antenna is within the near field of the RF signal generated by the one near field RF communicator 15 (or 30). Bangs at [0050] In this example, the transmitter circuitry comprises components for driving the antenna circuit 102 to transmit an RF signal and for modulating an RF signal to enable communication of data between near field RF communicators in near field range. As shown in FIG. 2, the transmitter circuitry comprises a signal generator 109 coupled via a driver 111 to the antenna circuit 102. In this example, the signal generator 110 is configured to cause modulation by gating or switching on and off the RF signal in accordance with the data to be communicated. The NFC communicator may use any appropriate modulation scheme that is in accordance with the standards and/or protocols under which the NFC communicator operates. Alternatively a separate or further signal controller may be incorporated within

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	the NFC operational components of functionality 120 to control modulation of the signal generated by the signal generator 109 in accordance with data or instructions received from the controller 107. Bangs at [0052] The NFC communicator 100a may operate in an initiator mode (that is as an initiating near field RF communicator) or a target mode (that is as a responding near field RF communicator), dependent on the mode to which the NFC communicator is set. The mode may be determined by the controller 107 or may be determined in dependence on the nature of a received near field RF signal. When in initiator mode, an NFC communicator initiates communications with any compatible responding near field RF communicator capable of responding to the initiating NFC communicator (for example an NFC communicator in target mode or an RFID tag or transponder) that is in its near field range, while when in target mode an NFC communicator waits for a communication from a compatible initiating near field RF communicator (for example an NFC communicator in initiator mode or an RFID initiator or transceiver). As thus used, compatible means operable at the same frequency and in accordance with the same protocols, for example in accordance with the protocols set out in various standards such as ISO/IEC 18092, ISO/IEC 21481, ISO/IEC 14443 and ISO/IEC 15693. NFC communicators commonly operate at or around 13.56 MHz. Bangs at [0063] As one possibility, the size of capacitor 307 to be employed to back off antenna coil 308 to effect a reduction in the apparent inductance of antenna coil 308 (that is the total inductance of antenna element 309) may be calculated using the following formula: $$C_{307} = \frac{1}{(2\pi \times F_c)^2 L_{neg}}$$ where F_c is the carrier frequency (for example 13.56 MHz) and L_{neg} is the amount (in Henrys) that inductance 308 is to be reduced by. Bangs at [0070] When the NFC communicator is in the active communication mode, the controller 107 (FIG. 2) will cause the signal generator 109 (FIG. 2) and driver 111a to drive the antenna circuit 102 to initiate or generate an RF-H field. The antenna circuit 102 is tuned to the required RF transmission frequency which, for an NFC communicator operating in accordance with ISO 18092, is 13.56 MHz (Megahertz). The capacitors 302 and 303 add capacitance to bring the tuning closer to the required frequency.

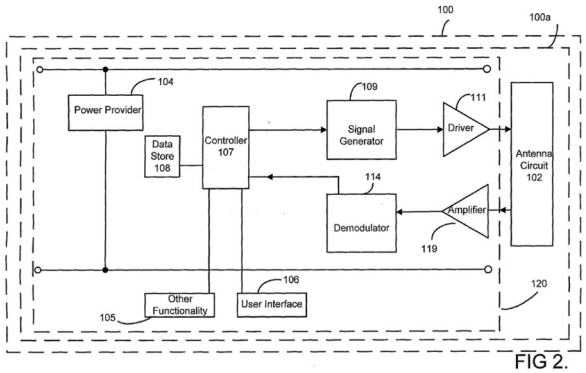
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	Bangs at [0074] Any appropriate form of modulation may be used to enable data communication, for example modulation of the RF H field may be achieved through gating or switching of the generated signal in accordance with the relevant communication protocols. The form of modulation will depend on the type of drive functionality incorporated within the NFC communicator. For example, a current drive will control the current supplied to the antenna circuit 102 and may achieve modulation by changing the current. A voltage drive on the other hand will control the voltage supplied to the antenna circuit 102 and may achieve modulation by controlling pulses supplied the antenna circuit 102. Any suitable type of modulation technique may be used (e.g. amplitude and/or phase modulation) and any suitable modulation encoding scheme may be used Bangs at [0075] The antenna circuit 102 of FIG. 3 has a double-ended, balanced or differential transmission input, that is the drive signal supplied to the antenna circuit 102 is the difference between the signals at transmission couplings Tx1 and Tx2. Likewise, the receiver output of the antenna circuit is double-ended or differential, that is the received signal is the difference between the signals at receiver couplings Rx1 and Rx2. Bangs at [0076] FIG. 4 shows a functional circuit diagram of an NFC communicator having an antenna circuit 102a that differs from that shown in FIG. 3 in that the antenna circuit has a single transmission input coupling Tx coupled to a single output driver 111b and a single receiver output coupling Rx coupled to a single input amplifier 119b so that the transmission signal is defined between transmission connection Tx and a signal ground coupling 311 and the receiver signal is defined between Rx and a coupling to ground 310 via capacitor 303. Both grounds (earths) may be provided by a local ground of the NFC communicator or a host. Bangs at [0099] As used herein RF means any suitable frequency under which near field RF communicators may operate, for example 13.56 MHz for NFC communicators. Bangs at claim 44 The NFC communicator according to claim 29 arranged to communicate using any of: ISO/IEC 18092, ISO/IEC 21481, ISO/IEC 14443 and ISO/IEC 15693.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	See also Bangs at Figure 1, [0003], [0005], [0016], [0017], [0018], [0019], [0020], [0022], [0024], [0025], [0029], [0030], [0031], [0032], [0046], [0049], [0053], [0056], [0061], [0064], [0065], [0066], [0067], [0068], [0069], [0071], [0072], [0073], [0077], [0078], [0079], [0081], [0086], [0087], [0088], [0090], [0097], [0098], claim 29, claim 30, claim 31, claim 32, claim 33, claim 34, claim 35, claim 36, claim 37, claim 38, claim 39, claim 40, claim 41, claim 42, claim 43, and claim 45. To the extent this limitation is not disclosed by Bangs, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Bangs, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[17d] driving transmission of data by the active transmit driver circuit from the antenna to the NFC reader.	Bangs discloses or renders obvious "driving transmission of data by the active transmit driver circuit from the antenna to the NFC reader." For example: *See* [1d] above. Bangs at Abstract > An NFC communicator has an antenna circuit to enable inductive coupling, via an RF H field, of the NFC communicator and another near field RF communicator in near field range. The antenna circuit has an antenna element coupled in parallel with a first capacitor to form a parallel LC circuit. The antenna element has an antenna coil in series with a second capacitor to reduce the voltage to which circuitry of the NFC communicator is subjected by a received RF H field. Alternatively or additionally, receive circuitry of the NFC communicator may be coupled to only a proportion of the antenna coil to reduce the voltage to which circuitry of the NFC communicator is subjected by a received RF H field. Bangs at Figure 2

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	 FIG 2. Bangs at [0021] According to an aspect of the present invention, there is provided a near field RF communicator, comprising: an antenna circuit to enable inductive coupling of the near field RF communicator and another near field RF communicator in near field range; a signal supplier coupled to the antenna circuit to supply a drive signal to cause the antenna circuit to generate an RF signal; and a receiver coupled to the antenna circuit to receive a signal inductively coupled to the antenna circuit from another near field RF communicator in near field range, wherein the antenna circuit comprises an antenna element coupled in parallel with a first capacitor, wherein the antenna element comprises an antenna coil in series with a second capacitor to affect a voltage resulting from inductive coupling to the antenna circuit. Bangs at [0023] According to an aspect of the present invention, there is provided a near field RF communicator, comprising: an antenna circuit to enable inductive coupling of the near field RF communicator and another near field RF communicator in near field range; a signal supplier coupled to the antenna circuit to supply a drive signal to cause the antenna circuit to generate an RF signal; and a receiver coupled to the antenna circuit to receive a signal inductively coupled to the antenna circuit from another near field RF communicator in near field range, wherein the antenna circuit comprises an antenna element coupled in parallel with a capacitor, wherein the antenna element comprises an antenna coil having a tap and the receiver is coupled to the tap. Bangs at [0027]

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	FIG. 1 shows a representational diagram illustrating communication between two NFC communications enabled devices; Bangs at [0050] In this example, the transmitter circuitry comprises components for driving the antenna circuit 102 to transmit an RF signal and for modulating an RF signal to enable communication of data between near field RF communicators in near field range. As shown in FIG. 2, the transmitter circuitry comprises a signal generator 109 coupled via a driver 111 to the antenna circuit 102. In this example, the signal generator 110 is configured to cause modulation by gating or switching on and off the RF signal in accordance with the data to be communicated. The NFC communicator may use any appropriate modulation scheme that is in accordance with the standards and/or protocols under which the NFC communicator operates. Alternatively a separate or further signal controller may be incorporated within the NFC operational components of functionality 120 to control modulation of the signal generated by the signal generator 109 in accordance with data or instructions received from the controller 107. Bangs at [0070] When the NFC communicator is in the active communication mode, the controller 107 (FIG. 2) will cause the signal generator 109 (FIG. 2) and driver 111a to drive the antenna circuit 102 to initiate or generate an RF-H field. The antenna circuit 102 is tuned to the required RF transmission frequency which, for an NFC communicator operating in accordance with ISO 18092, is 13.56 MHz (Megahertz). The capacitors 302 and 303 add capacitance to bring the tuning closer to the required frequency. Bangs at [0074] Any appropriate form of modulation may be used to enable data communication, for example modulation of the RF H field may be achieved through gating or switching of the generated signal in accordance with the relevant communication protocols. The form of modulation will depend on the type of drive functionality incorporated within the NFC communicator. For example, a current drive will control the current supplied to the antenna circuit 102 and may achieve modulation by changing the current. A voltage drive on the other hand will control the voltage supplied to the antenna circuit 102 and may achieve modulation by controlling pulses supplied the antenna circuit 102. Any suitable type of modulation technique may be used (e.g. amplitude and/or phase modulation) and any suitable modulation encoding scheme may be used Bangs at [0075]

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	The antenna circuit 102 of FIG. 3 has a double-ended, balanced or differential transmission input, that is the drive signal supplied to the antenna circuit 102 is the difference between the signals at transmission couplings Tx1 and Tx2. Likewise, the receiver output of the antenna circuit is double-ended or differential, that is the received signal is the difference between the signals at receiver couplings Rx1 and Rx2. Bangs at [0076] FIG. 4 shows a functional circuit diagram of an NFC communicator having an antenna circuit 102a that differs from that shown in FIG. 3 in that the antenna circuit has a single transmission input coupling Tx coupled to a single output driver 111b and a single receiver output coupling Rx coupled to a single input amplifier 119b so that the transmission signal is defined between transmission connection Tx and a signal ground coupling 311 and the receiver signal is defined between Rx and a coupling to ground 310 via capacitor 303. Both grounds (earths) may be provided by a local ground of the NFC communicator or a host. *See also* Bangs at [0002] and [0003]. To the extent this limitation is not disclosed by Bangs, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Bangs, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
18[pre]. The method of claim 17 further comprising:	Bangs discloses or renders obvious "[t]he method of claim 17 further comprising." *See* claim 17 above.
[18a] amplifying a signal received from the antenna to generate an amplified signal; and	Bangs discloses or renders obvious "amplifying a signal received from the antenna to generate an amplified signal." For example: *See* claim 8 above. Bangs at Figure 2

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	 FIG 2. Bangs at [0049] In this example, the receiver circuitry comprises an amplifier 119 coupled to the antenna circuit 102 and a demodulator 114 coupled to the amplifier 119 and the controller 107 for amplifying and demodulating a modulated RF signal inductively coupled to the antenna circuit 102 from another near field RF communicator in near field range and for supplying the thus-extracted data to the controller 107 for processing. Bangs at [0059] The junction 305 between capacitor 304 and antenna element 309 is coupled to one input Rx1 of a differential amplifier 119a forming the amplifier 119 shown in FIG. 2 while the junction 306 between capacitor 304 and antenna element 309 is coupled to the other input Rx2 of the differential amplifier 119a. To enable the antenna circuit to be driven, respective outputs Tx1 and Tx2 of driver 111a are coupled to the junctions 305 and 306 via respective further capacitors 302 and 303. Thus, in this example, the antenna circuit 102 has double-ended or differential coupling (Rx1 and Rx2) to the receive circuitry and double-ended or differential coupling (Tx1 and Tx2) to the transmit circuitry of the NEC functionality 120a. Bangs at [0069] The presence of capacitor 307 thus reduces the potential difference (voltage) developed between junctions 306 and 305 for a given received H field, thereby reducing the voltage between receiver couplings Rx1 and Rx2 and between transmission couplings Tx1 and Tx2, so reducing the maximum potential voltage to which the receiver and transmitter circuitry may be subjected. Although antenna circuit designers

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
	generally aim to maximise the voltage induced by any given H field, the use of capacitor 307 enables control of the voltage that the capacitors 302, 303 and 304 and the NFC functionality 120a (for example the driver 111a and amplifier 119a) need to be able to withstand, thereby enabling the use of capacitors 302, 303 and 304 with lower voltage ratings and enabling coupling of the antenna circuit 102 directly to the NFC functionality 120a. Bangs at [0076] FIG. 4 shows a functional circuit diagram of an NFC communicator having an antenna circuit 102a that differs from that shown in FIG. 3 in that the antenna circuit has a single transmission input coupling Tx coupled to a single output driver 111b and a single receiver output coupling Rx coupled to a single input amplifier 119b so that the transmission signal is defined between transmission connection Tx and a signal ground coupling 311 and the receiver signal is defined between Rx and a coupling to ground 310 via capacitor 303. Both grounds (earths) may be provided by a local ground of the NFC communicator or a host. Bangs at [0079] The embodiment shown in FIG. 5 differs from that shown in FIG. 3 in that the receiver input couplings Rx1 and Rx2 are coupled across only a part of the antenna coil 308b, that is receiver input couplings Rx1 and Rx2 are coupled to taps 312 and 313 so that the antenna coil 308b forms an autotransformer and the voltage across the receiver input couplings Rx1 and Rx2 is stepped down from that across the entire antenna coil 308b (i.e. from that between junctions 305 and 306) so that the voltage to which the receiver circuitry is subjected when an RF H field is coupled to or received by the antenna coil is less than the voltage to which the transmitter circuitry is subjected thereby reducing even further the maximum voltage that amplifier 119 needs to be able to withstand. This is advantageous because it enables the NFC communicator to protect the receiver circuitry against received RF H fields without reducing the strength of the NFC communicator's own RF H field. The transmitter circuitry should be isolated or otherwise protected during reception in this example. *See also* Bangs at [0081]. To the extent this limitation is not disclosed by Bangs, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Bangs, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 17 above.

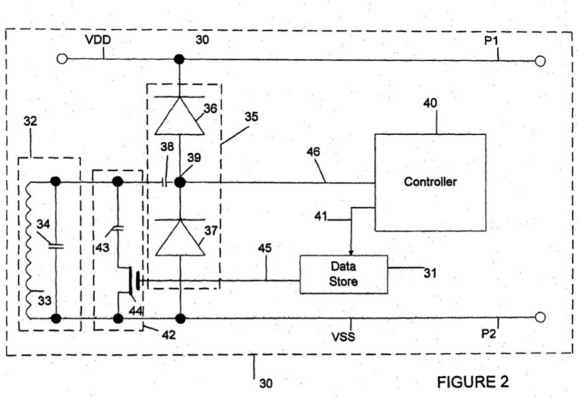
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0112941 ("Bangs")
[18b] providing the amplified signal to the smartcard controller.	Bangs discloses or renders obvious "providing the amplified signal to the smartcard controller." *See* [18a] and claim 8 above. To the extent this limitation is not disclosed by Bangs, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Bangs, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 17 above.
19. The method of claim 10 or 17, wherein the transmitted data includes ticketing information for a mass transit system.	Bangs discloses or renders obvious "[t]he method of claim 10 or 17, wherein the transmitted data includes ticketing information for a mass transit system." *See* claim 2 above. *See also* claims 10 and 17 above.
20. The method of claim 10 or 17, wherein the transmitted data includes transaction information for a mobile payment.	Bangs discloses or renders obvious "[t]he method of claim 10 or 17, wherein the transmitted data includes transaction information for a mobile payment." *See* claim 3 above. *See also* claims 10 and 17 above.

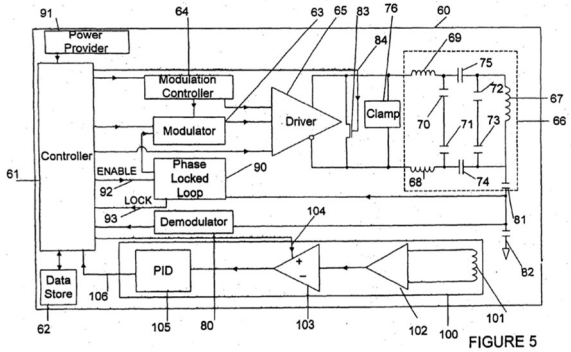
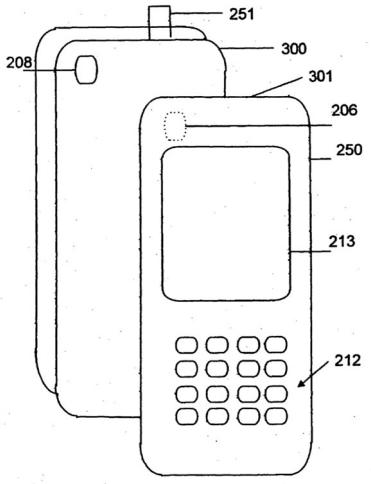
DEFENDANTS' INVALIDITY CONTENTIONS FOR U.S. PAT. 11,694,053

EXHIBIT C04: U.S. Patent Pub. No. 2008/0194200 ("Keen")

As demonstrated in the claim charts below, the claims of U.S. Patent No. 11,694,053 ("the '053 patent") are invalid (a) under one or more sections of 35 U.S.C. § 102 as anticipated by Keen and (b) under 35 U.S.C. § 103(a) as obvious over Keen standing alone and as set forth herein, and/or combined with the knowledge of a person of ordinary skill in the art, Applicant's Admitted Prior Art, and/or the additional prior art references discussed in Exhibit C and Exhibits C01–C09 the contents of which are hereby incorporated by reference into this chart. One of ordinary skill in the art, as of the priority date of the '053 patent, would have known to combine the prior art elements disclosed by the foregoing references using known methods, and to use these elements according to their established functions in order to achieve a known and predictable result.

Defendants have conducted the invalidity analysis herein based at least in part and in some instance entirely upon Plaintiff's apparent application of the claims of the '053 patent. By charting the prior art against the claims and limitations herein, Defendants are not admitting or agreeing to Plaintiff's application of the claims at issue in this case, and these charts should not be interpreted as an admission or concession by Defendants that any particular construction or application of any claim limitation by Plaintiff is correct or proper. Additionally, these charts provide representative examples of portions of the charted references that disclose the indicated limitations of the claims; additional portions of these references other than the representative examples provided herein may also disclose the indicated limitation(s) and Defendants contend that the asserted claims are invalid in light of the charted reference(s) as a whole in its or their entirety. Where a particular figure is cited, the citation should be understood to encompass the caption and description of the figure as well as any text relating to or describing the figure. Conversely, where particular text referring to a figure is cited, the citation should be understood to include the figure as well.

Claim Element	**Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")**
1[pre]. A mobile device comprising:	By providing this disclosure, Defendants do not take a position on whether the preamble is a claim limitation. Keen discloses or renders obvious "[a] mobile device." For example: Keen at Figure 2  FIGURE 2

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	Keen at Figure 5  FIGURE 5 Keen at Figure 7 FIGURE 7  Keen at [0003]

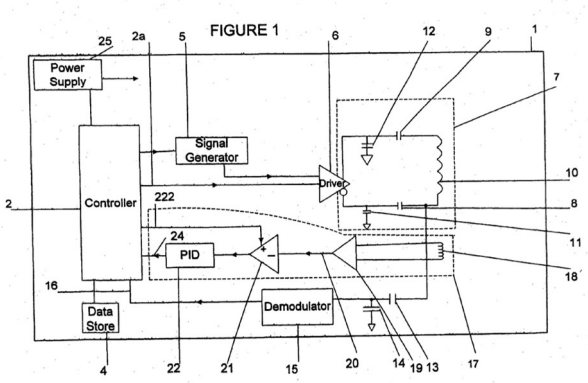
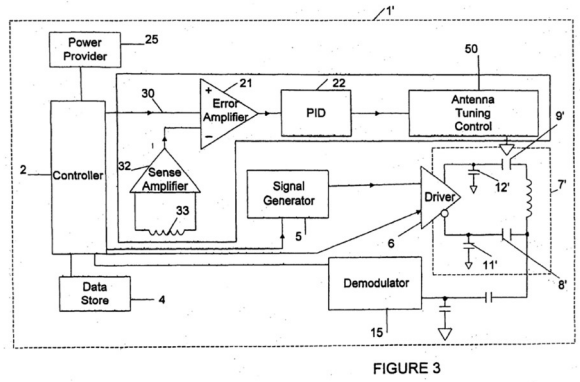
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	Examples of near field communicators are RFID (Radio Frequency Identification) transceivers ("readers") or transponders ("tags") that operate under the RFID ISO/IEC 14443A protocol or ISO/IEC 15693 protocol or NFC (Near Field Communication) communicators operating under the NFCIP-1 (ISO/IEC 18092) or NFCIP-2 (ISO/IEC 21481) protocol. The phrase "near field communicator" will be used herein for any communicator that communicates using radio frequency in the near field (that is the H-field). The phrase "RFID tag" will be used herein for any near field communicator which is operable to respond to a received RF signal by transmission of its own RF signal or through modulation of or interference with the received RF signal. The phrase "RFID reader" will be used herein for any near field communicator which initiates the transmission of an RF signal and which is operable to wait for a response from any near field communicators within the near field of the RF signal. The phrase "NFC communicator" will be reserved for communicators operable to both initiate transmission of an RF signal and to respond to a received RF signal initiated by a second near field communicator. NFC communicators are therefore able to communicate with other NFC communicators, RFID readers and RFID tags. Keen at [0004] Such near field communicators may be discrete standalone devices, systems or apparatus or may be incorporated into or provided as part of the functionality of larger host devices, systems or apparatus, for example a consumer product such as a portable communications device having telecommunications capability (for example a mobile telephone (cellphone) or a telecommunications-enabled personal digital assistant or other computing device). Keen at [0007] Generally, the functionality of such a near field communicator is provided as a semiconductor integrated circuit to which a number of passive components and the antenna are added. The internal metal components of any host device, system or apparatus will as far as possible be located as far away as possible from the near field communicator's antenna. Compensation for the effects of any such metallic components or elements is normally effected by adjusting the capacitance value of a discrete "trimming" capacitor or by selecting a "select-on-test" type fixed capacitor or number of capacitor values during production testing of the host device, system or apparatus. However, this increases unit costs because of the cost of additional component(s), the impact on the printed circuit board costs and the costs involved in the testing and trimming or selecting operations. Further, the addition of such components may adversely affect the life and reliability of the communicator. Also, there may be circumstances in which it is not possible for the antenna circuitry to be adapted to the host device, system or apparatus or the configuration of the host device, system or apparatus may change (for example parts may be removed and

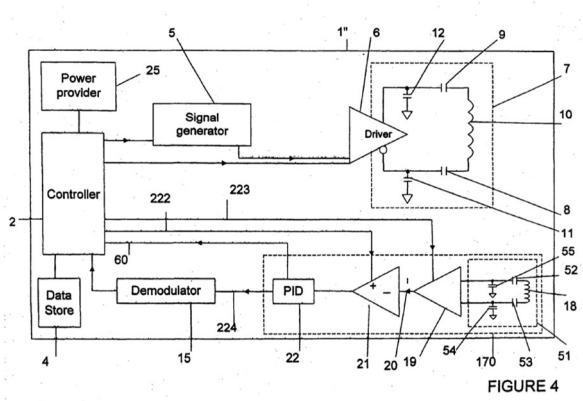
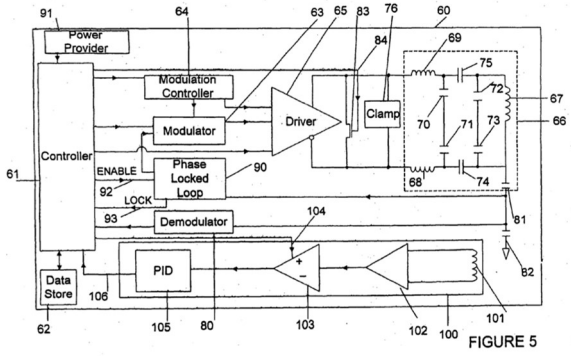
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	new sections added) throughout its life. Furthermore, if a common near field communicator circuit design is produced for a number of different host applications, those host applications will almost certainly have different antenna spatial envelopes, different dimensions, shapes, footprints or sizes (form factors) and differently located or distributed metallic material components or elements, so requiring different compensation component values for each different host application in order to achieve and maintain optimum performance. This results in a large overhead (both in terms of costs and resources) for a company supplying or using near field communicators in a range of host devices, systems or apparatus. Keen at [0010] In addition during normal operation of near field communicators, such communicators will communicate with all kinds of different near field communicators each of which has different antenna sizes and form factors and each of which will operate at differing distances from the antenna of the transmitting communicator. All of these factors will have an effect on the H-field and therefore the signal strength of the RF signal produced by the near field communicator. Keen at [0013] In one aspect, the present invention provides a near field communicator comprising a driver operable to drive an antenna or coil to produce a magnetic field; a magnetic field sensor operable to sense the magnetic field produced by the antenna or coil; a comparator operable to compare, directly or indirectly, the sensed magnetic field strength with a desired parameter, and a controller operable to control the driver to compensate for a difference between the sensed magnetic field strength and the desired parameter. Keen at [0026] FIG. 7 shows a simplified view of a mobile telephone incorporating a near field communicator embodying the invention. Keen at [0048] To assist the explanation of the operation of the RFID reader 1, FIG. 2 shows a functional block diagram of an RFID data storage tag 30 that may be read by the reader 1 when the tag 30 is in the read range (H field) of the reader 1. In this example, the RFID tag or transponder is a passive device, where "passive" in this context means that the RFID tag derives power from the RF signal supplied by the reader (it is not self-powered). As another possibility, the RFID tag may be an active device having a power provider (similar to that shown for an RFID reader in FIG. 1 as 25) for example at least one of a battery or a coupling to a power source of host device, system or apparatus containing or associated with the RFID tag.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	Keen at [0067] FIG. 3 may also be implemented as an active RFID tag rather than an RFID reader if the controller 2 is configured not to initiate but to respond, that is if the controller 2 is configured to allow RF signal generation and any modulation only in response to an RF signal (H field) from an RFID reader or an NFC communicator in initiator mode. Keen at [0083] FIG. 5 shows a functional block diagram of an embodiment of an NFC communicator 60 in accordance with the invention. Unlike the RFID readers described with reference to FIGS. 1, 3 and 4, an NFC communicator is capable of communicating with transponders or tags, RFID transceivers or readers and other NFC communicators. Examples of such NFC communicators are described in ISO/IEC 18092 and ISO/IEC 21481. Thus, an NFC communicator can operate: 1) in an initiator mode in which the NFC communicator functions in a similar fashion to an RFID reader and will transmit an RF signal; and 2) in a target mode in which the NFC communicator waits for receipt of an RF signal from another NFC communicator operating in initiator mode or an RFID reader, that is it functions like a tag or transponder. NFC communicators may communicate with each other using an active or passive protocol. When using the active protocol, an initiator mode NFC communicator transmits an RF signal and then ceases RF signal transmission and a target mode NFC communicator responds by transmitting its own RF signal and then ceasing RF signal transmission. When using the passive protocol, an initiator mode NFC communicator transmits its RF signal and maintains that RF signal throughout the duration of the communication cycle and a target mode NFC communicator responds by causing modulation of the transmitted RF signal. Keen at [0084] As shown in FIG. 5, the NFC communicator 60 includes a controller 61 for controlling overall operation of the NFC communicator in accordance with control data and/or instructions and other data stored by an internal memory of the controller 61 and/or a data store 62 coupled to the controller. The controller 61 may comprise a microcontroller, RISC computer or state machine, for example. Keen at [0088] The NFC communicator 60 shown in FIG. 5 has two mechanisms for enabling communication of data when the NFC communicator is in the target mode. One mechanism is a load modulation mechanism as described above with reference to FIG. 2 and the other is an interference mechanism which simulates load modulation.

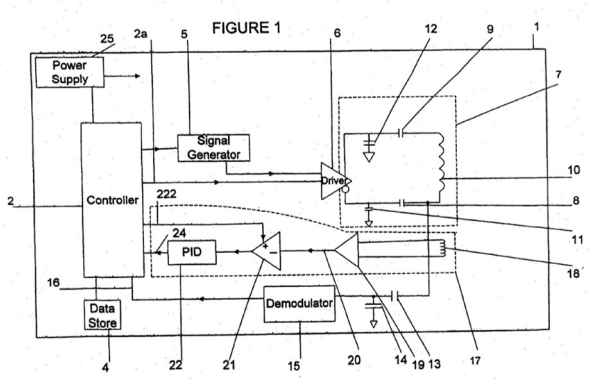
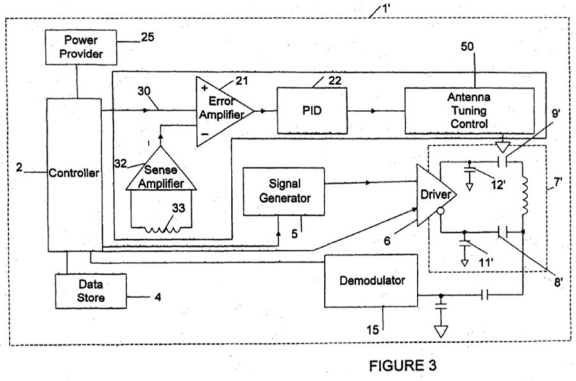
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	Keen at [0091] The NFC communicator 60 of course also has a power provider 91. For convenience the connections of the power provider to the remainder of the NFC communicator 91 are not shown. The power provider 91 may comprise at least one of a power supply such as a battery provided within the NFC communicator 60 and or a connection to a power supply of a host device, apparatus or system. The power provider could also comprise a power deriver for deriving a power supply from an RF signal inductively coupled to the antenna circuit 66 when the NFC communicator is in target mode. Keen at [0093] The NFC communicator 60 may use a combination of load modulation or carrier interference or may alternatively use only one or the other form of communication. As another possibility, the NFC communicator 60 may comprise multiple antennas, one being used for response to a received RF signal and the other being used for transmission of an RF signal with the antennas being switched on according to need, under the control of the controller of the NFC communicator. Thus, where the NFC communicator is acting in initiator mode, the antenna selected for transmission of an RF signal will be used while where the NFC communicator is, for example, acting as a passive target (i.e. similar to an RFID transponder) the controller 61 will switch the antennas, thereby utilising an antenna more suited to load modulation of an incoming RF signal. Keen at [0101] The near field communicator may be a stand-alone device or may be comprised within a host device, apparatus or system such as a consumer product, for example a mobile telephone, personal digital assistant, digital camera, or a laptop, notebook, or other computer. Also near field communicators in accordance with the invention may be used in other electrical or electronic products, for example consumer products such as domestic appliance or personal care products, and other electrical or electronic devices, apparatus or systems. Other areas of application are ticketing systems, for example in tickets (for example parking tickets, bus tickets, train tickets or entrance permits or tickets) or in ticket checking systems, toys, games, posters, packaging, advertising material, product inventory checking systems and so on. Keen at [0102] Where comprised within a host device, apparatus or system, the functionality or at least some of the functionality of the near field communicator may be provided by the host device, apparatus or system and an interface provided between the host system controller and the other components of the near field

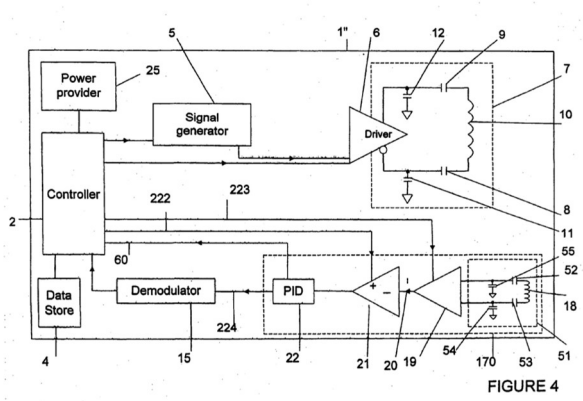
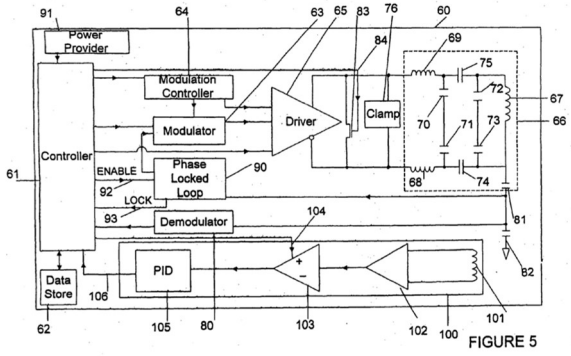
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	communicator. FIG. 6 shows a functional block diagram of a host device, apparatus or system 200 comprising a near field communicator 201 in which the near field communicator controller 202 is coupled via an interface 203 to a host controller 204 which controls operations of the host device, apparatus or system which may be, for example, a mobile telephone. As shown, the near field communicator 201 has the functional elements discussed above discretely located within the host device, apparatus or system, namely antenna circuitry 205 having an antenna coil 206, control circuitry 207 for controlling operation of the near field communicator in accordance with the magnetic field strength sensed by a sense coil 208, signal providing circuitry 209 for providing the RF signal modulated in accordance with control data and/or other data from the near field communicator controller 202, a demodulator 210 for extracting modulation from an RF signal coupled to the near field communicator 201, and a data store 211. The functionality of the near field communicator 201 may, however, be dispersed throughout the host device, apparatus or system 200. In addition the data storage or at least part of the data storage may be provided by the host device, apparatus or system and at least some instructions, control data and/or other data may be provided by the host device, apparatus or system or input by a user via a user interface 212 of the host device, apparatus or system which may comprise a display 213 and a keyboard 214, for example. Keen at [0103] FIG. 7 shows a simplified view of a mobile telephone 250 forming such a host device with the main body 300 of the mobile telephone 250 shown separated from its fascia 301 to show that, as one possibility, the main and sense antennas or coils 206 and 208 of the near field communicator may be located opposite one another within each part of the mobile phone so that their coil axes are coincident. *See also* Keen at Abstract, [0025], [0028], [0046], [0050], [0051], [0053], [0054], [0055], [0056], [0058], [0087], [0090], [0092], [0095], and [0098]. To the extent this limitation is not disclosed by Keen, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Keen, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[1a] a power source;	Keen discloses or renders obvious "a power source." For example: Keen at Figure 1

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	 Keen at Figure 3  FIGURE 3 Keen at Figure 4

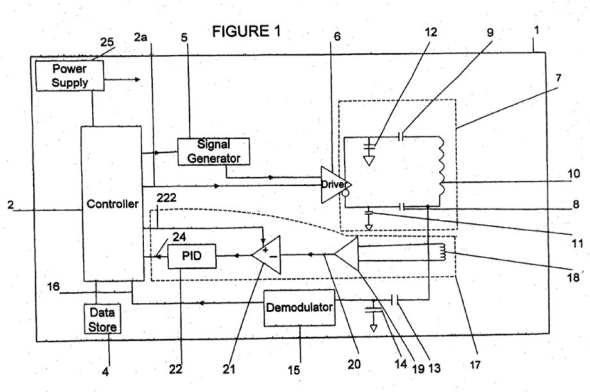
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	 FIGURE 4 Keen at Figure 5  FIGURE 5 Keen at [0046] The RFID reader 1 will of course have or be associated with a power provider 25 for providing a power supply for the various components of the RFID reader 1. In the interests of simplicity, the couplings of most of the various components of the RFID reader 1 to the power provider 25 are omitted in FIG. 1. The power provider 25 may be, for example, an internal battery or may be a coupling to a power supply provided by any host apparatus, system or device of the RFID reader 1. Keen at [0048]

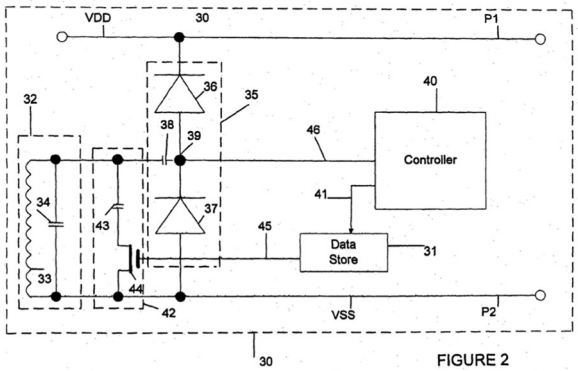
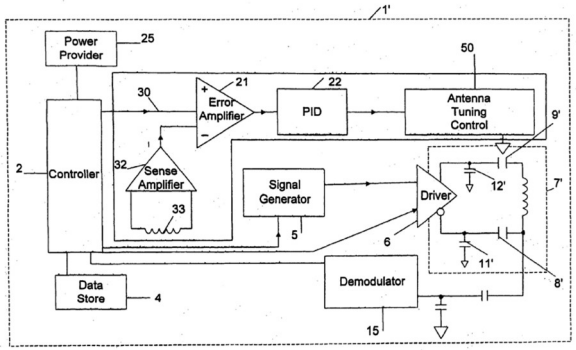
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	To assist the explanation of the operation of the RFID reader 1, FIG. 2 shows a functional block diagram of an RFID data storage tag 30 that may be read by the reader 1 when the tag 30 is in the read range (H field) of the reader 1. In this example, the RFID tag or transponder is a passive device, where "passive" in this context means that the RFID tag derives power from the RF signal supplied by the reader (it is not self-powered). As another possibility, the RFID tag may be an active device having a power provider (similar to that shown for an RFID reader in FIG. 1 as 25) for example at least one of a battery or a coupling to a power source of host device, system or apparatus containing or associated with the RFID tag. Keen at [0091] The NFC communicator 60 of course also has a power provider 91. For convenience the connections of the power provider to the remainder of the NFC communicator 91 are not shown. The power provider 91 may comprise at least one of a power supply such as a battery provided within the NFC communicator 60 and or a connection to a power supply of a host device, apparatus or system. The power provider could also comprise a power deriver for deriving a power supply from an RF signal inductively coupled to the antenna circuit 66 when the NFC communicator is in target mode. Keen at [0092] The controller 61 controls RF signal generation, modulation characteristics of any transmitted RF signal, response to any received RF signal, interpretation of any received demodulated signal, mode of operation (for example initiator or target or active or passive mode) and the communication protocol under which the NFC communicator 60 operates. In responding to a received signal when in target mode, the NFC communicator will respond in a manner dependent upon whether the NFC communicator 60 is operating under the active or passive protocol. Where the NFC communicator is operating under the active protocol, the controller 61 will cause the NFC communicator to respond by generation of a phase-locked modulated signal using the phase-locked loop mechanism whereas in the event the NFC communicator is operating under the passive protocol, the controller 61 may cause the received RF signal to be directly modulated by switching the transistor 83 in accordance with the data to be communicated or may use the phase-locked loop 90 mechanism to effect modulation by interference with the received RF signal (simulated load modulation). To the extent this limitation is not disclosed by Keen, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Keen, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

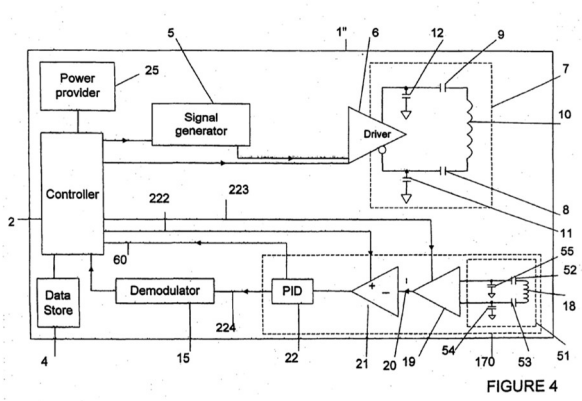
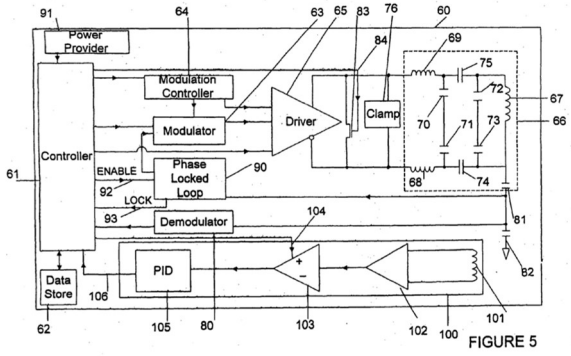
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
[1b] a smartcard controller coupled to the power source to receive power;	Keen discloses or renders obvious "a smartcard controller coupled to the power source to receive power." For example: Keen at Figure 1  Keen at Figure 3  Keen at Figure 4

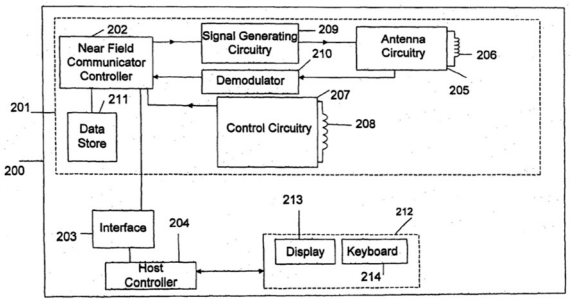
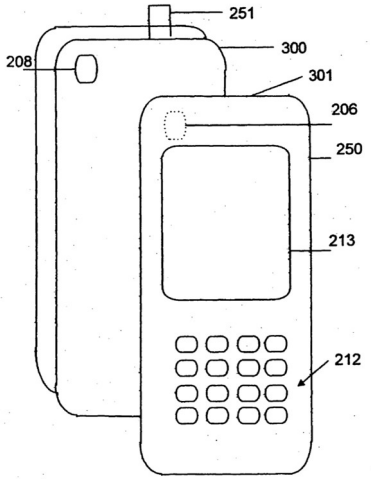
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	 FIGURE 4 Keen at Figure 5  FIGURE 5 Keen at [0046] The RFID reader 1 will of course have or be associated with a power provider 25 for providing a power supply for the various components of the RFID reader 1. In the interests of simplicity, the couplings of most of the various components of the RFID reader 1 to the power provider 25 are omitted in FIG. 1. The power provider 25 may be, for example, an internal battery or may be a coupling to a power supply provided by any host apparatus, system or device of the RFID reader 1. Keen at [0048]

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	To assist the explanation of the operation of the RFID reader 1, FIG. 2 shows a functional block diagram of an RFID data storage tag 30 that may be read by the reader 1 when the tag 30 is in the read range (H field) of the reader 1. In this example, the RFID tag or transponder is a passive device, where "passive" in this context means that the RFID tag derives power from the RF signal supplied by the reader (it is not self-powered). As another possibility, the RFID tag may be an active device having a power provider (similar to that shown for an RFID reader in FIG. 1 as 25) for example at least one of a battery or a coupling to a power source of host device, system or apparatus containing or associated with the RFID tag. Keen at [0091] The NFC communicator 60 of course also has a power provider 91. For convenience the connections of the power provider to the remainder of the NFC communicator 91 are not shown. The power provider 91 may comprise at least one of a power supply such as a battery provided within the NFC communicator 60 and or a connection to a power supply of a host device, apparatus or system. The power provider could also comprise a power deriver for deriving a power supply from an RF signal inductively coupled to the antenna circuit 66 when the NFC communicator is in target mode. Keen at [0092] The controller 61 controls RF signal generation, modulation characteristics of any transmitted RF signal, response to any received RF signal, interpretation of any received demodulated signal, mode of operation (for example initiator or target or active or passive mode) and the communication protocol under which the NFC communicator 60 operates. In responding to a received signal when in target mode, the NFC communicator will respond in a manner dependent upon whether the NFC communicator 60 is operating under the active or passive protocol. Where the NFC communicator is operating under the active protocol, the controller 61 will cause the NFC communicator to respond by generation of a phase-locked modulated signal using the phase-locked loop mechanism whereas in the event the NFC communicator is operating under the passive protocol, the controller 61 may cause the received RF signal to be directly modulated by switching the transistor 83 in accordance with the data to be communicated or may use the phase-locked loop 90 mechanism to effect modulation by interference with the received RF signal (simulated load modulation). To the extent this limitation is not disclosed by Keen, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Keen, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
[1c] an antenna tuned to operate at substantially 13.56 MHz, wherein the antenna interacts with a Near Field Communication (NFC) reader external to the mobile device; and	Keen discloses or renders obvious "an antenna tuned to operate at substantially 13.56 MHz, wherein the antenna interacts with a Near Field Communication (NFC) reader external to the mobile device." For example: Keen at Abstract A near field communicator has a driver (6) to supply a drive signal to drive an antenna (10) to generate a magnetic field. A magnetic field sensor (18) is located so as to be within a magnetic field generated by the antenna (6) to sense a magnetic field characteristic. A controller (17) provides a control signal to control the operation of the driver (6) to compensate for any difference between the magnetic field characteristic sensed by the magnetic field sensor (18) and a predetermined parameter. Keen at Figure 1  Keen at Figure 2

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	 FIGURE 2 Keen at Figure 3  FIGURE 3 Keen at Figure 4

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	 FIGURE 4 Keen at Figure 5  FIGURE 5 Keen at Figure 6

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	 FIGURE 6 Keen at Figure 7 FIGURE 7  Keen at [0001] This invention relates to wireless communicators, in particular near field wireless communicators and devices, systems or apparatus having near field wireless communicator functionality. Keen at [0002]

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	Near field communication requires the antenna of one near field communicator to be present within the alternating magnetic field (the H field) generated by the antenna of another near field communicator by transmission of an RF signal, for example a 13.56 Mega Hertz signal. The RF signal is thus inductively coupled between the communicators. The RF signal may be modulated to enable communication of control instructions and/or data and/or may be used by the receiving communicator to derive a power supply. Keen at [0003] Examples of near field communicators are RFID (Radio Frequency Identification) transceivers ("readers") or transponders ("tags") that operate under the RFID ISO/IEC 14443A protocol or ISO/IEC 15693 protocol or NFC (Near Field Communication) communicators operating under the NFCIP-1 (ISO/IEC 18092) or NFCIP-2 (ISO/IEC 21481) protocol. The phrase "near field communicator" will be used herein for any communicator that communicates using radio frequency in the near field (that is the H-field). The phrase "RFID tag" will be used herein for any near field communicator which is operable to respond to a received RF signal by transmission of its own RF signal or through modulation of or interference with the received RF signal. The phrase "RFID reader" will be used herein for any near field communicator which initiates the transmission of an RF signal and which is operable to wait for a response from any near field communicators within the near field of the RF signal. The phrase "NFC communicator" will be reserved for communicators operable to both initiate transmission of an RF signal and to respond to a received RF signal initiated by a second near field communicator. NFC communicators are therefore able to communicate with other NFC communicators, RFID readers and RFID tags. Keen at [0007] Generally, the functionality of such a near field communicator is provided as a semiconductor integrated circuit to which a number of passive components and the antenna are added. The internal metal components of any host device, system or apparatus will as far as possible be located as far away as possible from the near field communicator's antenna. Compensation for the effects of any such metallic components or elements is normally effected by adjusting the capacitance value of a discrete "trimming" capacitor or by selecting a "select-on-test" type fixed capacitor or number of capacitor values during production testing of the host device, system or apparatus. However, this increases unit costs because of the cost of additional component(s), the impact on the printed circuit board costs and the costs involved in the testing and trimming or selecting operations. Further, the addition of such components may adversely affect the life and reliability of the communicator. Also, there may be circumstances in which it is not possible for the antenna circuitry to be adapted to the host device, system or apparatus or the

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	configuration of the host device, system or apparatus may change (for example parts may be removed and new sections added) throughout its life. Furthermore, if a common near field communicator circuit design is produced for a number of different host applications, those host applications will almost certainly have different antenna spatial envelopes, different dimensions, shapes, footprints or sizes (form factors) and differently located or distributed metallic material components or elements, so requiring different compensation component values for each different host application in order to achieve and maintain optimum performance. This results in a large overhead (both in terms of costs and resources) for a company supplying or using near field communicators in a range of host devices, systems or apparatus. Keen at [0009] A further issue is that, in order to create the strongest magnetic field for the lowest drive power, near field communicators generally use an antenna circuit tuned to have a resonant frequency coinciding with or very close to the operating carrier frequency of the near field communicator. One of the most influential parameters of a resonant circuit is its "Q" factor and to achieve optimum read range performance, especially when using small size (small form factor) antennas, relatively high Q factors are used. Although this achieves maximum read range it also makes the communicator very sensitive to the de-tuning effects of nearby metallic and/or magnetic materials. Indeed, the inventors have realised that these de-tuning effects can be more dominant than the unavoidable eddy current loses. Keen at [0010] In addition during normal operation of near field communicators, such communicators will communicate with all kinds of different near field communicators each of which has different antenna sizes and form factors and each of which will operate at differing distances from the antenna of the transmitting communicator. All of these factors will have an effect on the H-field and therefore the signal strength of the RF signal produced by the near field communicator. Keen at [0011] In one aspect, the present invention provides a near field communicator having a magnetic field strength determiner and an antenna drive adjuster operable to adjust the drive to an antenna of the communicator in accordance with the determined magnetic field strength to provide the communicator with the required read range performance. Keen at [0013] In one aspect, the present invention provides a near field communicator comprising a driver operable to drive an antenna or coil to produce a magnetic field; a magnetic field sensor operable to sense the

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	magnetic field produced by the antenna or coil; a comparator operable to compare, directly or indirectly, the sensed magnetic field strength with a desired parameter, and a controller operable to control the driver to compensate for a difference between the sensed magnetic field strength and the desired parameter. Keen at [0016] In an embodiment, the near field communicator comprises an RFID reader, an NFC device and/or an RFID tag. Keen at [0025] FIG. 6 shows a simplified diagram of a host apparatus, system or device comprising a near field communicator embodying the invention; and Keen at [0028] FIG. 1 shows a functional block diagram of an embodiment of an RFID reader 1 in accordance with the invention which is operable to transmit a radio frequency signal and to detect and demodulate modulation of the transmitted radio frequency signal. The RFID reader 1 may be compatible with a variety of standards or communications protocols, for example ISO/IEC 14443 or ISO/IEC 15693. Keen at [0029] The RFID reader 1 comprises a controller 2 for controlling operation of the RFID reader 1 including controlling the communication protocol under which the RFID reader operates, the data supplied to any receiving near field communicator and the modulation of any generated magnetic field. The controller 2 may be, for example, a microprocessor, a microcontroller (for example a reduced instruction set computer) or state machine. The choice will depend on the design of the reader and operational requirements. The controller 2 is coupled to a data store 4 which may be of, for example EEPROM, ROM, RAM or other memory format. Keen at [0030] The controller 2 is also coupled to a signal generator 5 for generating a radio frequency signal (for example a 13.56 Mega Hertz RF signal). The generated RF signal may be unmodulated or modulated with control or other data supplied by the controller 2. The signal generator 5 may generate the RF signal in a variety of ways. For example the RF signal may be a digital signal generated by sine synthesis in which case any required modulation will generally be effected by pulse-width modulation (PWM), pulse code modulation or pulse-density modulation (PDM) techniques. As another possibility, the RF signal may be a digital signal generated by use of a pre-configured algorithm or direct digital synthesis. Where sine

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	synthesis is not used additional filtering circuitry may be required (not shown) to meet electromagnetic energy emissions regulations. Other possible modulation schemes that may be used include amplitude shift key (ASK) modulation and load modulation. Keen at [0032] The differential driver 6 is coupled to supply the RF signal to an antenna circuit 7. In this example, the antenna circuit 7 is a tuned circuit comprising respective capacitors 8 and 9 in series with an antenna coil 10 and further capacitors 11 and 12 each coupled between a respective one of the capacitors 8 and 9 and ground (earth). The presence of all four capacitors serves to reduce unwanted carrier harmonics but it may be possible to omit some of the capacitors, for example capacitors 11 and 12, where the signal generated by the differential driver 6 does not exceed electromagnetic energy emissions regulations. Keen at [0033] One end of the antenna coil 10 is coupled to ground via a filter arrangement comprising a series connection of capacitors 13 and 14 for filtering out extraneous signals. The junction between the capacitors 13 and 14 is coupled to a demodulator 15 (which may be, for example, a simple diode demodulator or synchronous demodulator). The output of the demodulator 15 is coupled to a data input 16 of the controller 2. Keen at [0046] The RFID reader 1 will of course have or be associated with a power provider 25 for providing a power supply for the various components of the RFID reader 1. In the interests of simplicity, the couplings of most of the various components of the RFID reader 1 to the power provider 25 are omitted in FIG. 1. The power provider 25 may be, for example, an internal battery or may be a coupling to a power supply provided by any host apparatus, system or device of the RFID reader 1. Keen at [0047] The components of the RFID reader 1 apart from the power provider 25, and the antenna coil 10 and sense coil 18 may be provided by a single semiconductor integrated circuit chip or by several separate chips or discrete devices mounted on a printed circuit board. Whether particular functions are implemented by analogue or digital circuitry will depend on the design route chosen. For example, the error detection and feedback circuitry may be implemented in either the analogue or digital domain. Keen at [0048]

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	To assist the explanation of the operation of the RFID reader 1, FIG. 2 shows a functional block diagram of an RFID data storage tag 30 that may be read by the reader 1 when the tag 30 is in the read range (H field) of the reader 1. In this example, the RFID tag or transponder is a passive device, where "passive" in this context means that the RFID tag derives power from the RF signal supplied by the reader (it is not self-powered). As another possibility, the RFID tag may be an active device having a power provider (similar to that shown for an RFID reader in FIG. 1 as 25) for example at least one of a battery or a coupling to a power source of host device, system or apparatus containing or associated with the RFID tag. Keen at [0050] The tag 30 has an antenna circuit 32 comprising, in this example, an antenna coil 33 in parallel with a capacitor 34. The tag 30 also has a power deriver 35 for deriving a power supply for the tag 30 from an RF signal coupled to the antenna circuit 32. As shown in FIG. 2, the power deriver 35 comprises series-connected diodes 36 and 37 and a capacitor 38 coupled between the antenna circuit 32 and a junction 39 between the anode of the diode 36 and the cathode of the diode 37. The cathode of the first diode 36 is connected to a first power supply rail P1 (Vdd) while the anode of the second diode 37 is connected to a second power supply rail P2 (Vss). The capacitor 38 and the diodes 36 and 37 act effectively as a voltage doubler enabling the peak to peak voltage of a received RF signal inductively coupled to the tag 30 to be used to derive a power supply for the tag 30. It will, of course, be appreciated that, in the interests of simplicity, the power supply connections to the remaining components of the tag are not shown. Keen at [0052] The tag 30 may be a synchronous tag in which case the tag controller 40 will have a clock deriver input 46 coupled to receive an RF signal coupled to the antenna circuit 32 so that the tag controller 40 can derive a clock signal directly from the received RF signal or from periodic interruption by the reader controller 2 (FIG. 1) of the RF signal. Alternatively, the tag 30 may be an asynchronous tag in which the tag controller 40 will have its own clock. Keen at [0053] The tag controller 40 may simply control reading of data from the data store 31 when the tag is powered or may be more sophisticated and may allow data and/or control instructions to be retrieved from a modulated RF signal supplied by a reader 1. An example of the former simple type of tag is shown in FIG. 6 of WO02/093881 while an example of a tag that can receive and store data and/or instructions is shown in FIG. 7 of WO02/093881, the whole contents of which are hereby incorporated by reference. The tag controller 40 may be, for example, a microprocessor, a microcontroller, a controller (for example a

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	reduced instruction set computer) or state machine. The choice will depend on the design of tag used and operational requirements. Keen at [0054] As will be appreciated from the above, the controller 2 of the reader 1 shown in FIG. 1 is configured to control communication with a tag. The actual nature of this control will depend upon the reader and tag configuration or type. Thus, the reader control 2 will control the generation of an RF signal by the signal generator 5, the interruption, where required, of that signal to enable a tag to generate a clock signal, the protocols under which the RFID communicator 1 operates, any modulation of the RF signal and any response to any received modulation of the generated RF signal. As will be appreciated, the pattern of any modulation will represent a series of digital ones and zeros determined by the binary data being transmitted. Keen at [0056] In the case of a simple tag, the tag controller 40 may cause data to be read from the tag data store 31 upon powering up of the tag, that is once the power deriver 35 of the tag 30 derives a power supply for the tag 30 from the inductively coupled RF signal. Where the tag 30 is more sophisticated, then the communications protocol under which the tag and the reader operate may require some form of communication or handshaking to occur before the tag controller 40 causes data to be read from the tag data store. The reading of data from the data store 31 causes the modulator 42 to modulate the load on the antenna circuit 32 (and thus on the antenna circuit 7 inductively coupled thereto) in accordance with the data read from the data store 31. The modulation by the tag 30 of the RF signal is extracted by the reader demodulator 15 and supplied to the controller 2. The capacitors 13 and 14 limit the amplitude of the signal input to the demodulator 15 and so avoid over-voltage damage to the demodulator 15. Keen at [0058] When the controller 2 causes the signal generator 5 to generate an RF signal, the digital signal generated by the signal generator 5 is fed into the differential driver 6 which outputs complementary pulses to the antenna circuit 7. The resulting oscillating magnetic H field produced by the antenna circuit 7 is inductively coupled to the antenna circuit of any tag 30 (FIG. 2) within the H field, that is within the read range of the reader 1. The designed read range (that is the distance over which the tag antenna coil 33 is intended to be able to couple inductively to the magnetic field (H field) of the reader 1 antenna coil 10) will depend upon the actual reader and tag antenna circuit design and constraints, in particular upon the size and configuration of the antenna coils and the strength of the RF signal supplied by the reader 1. For example, the H field or read range may be designed to lie in a range up to 1 metre.

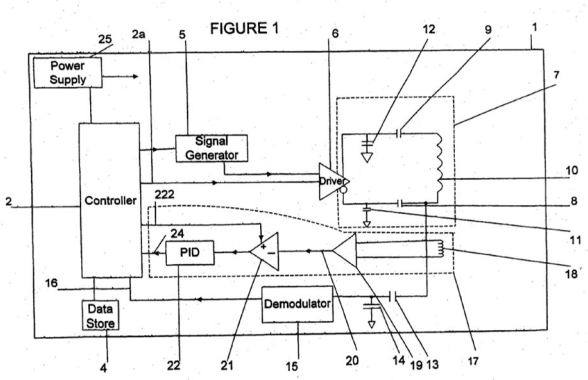
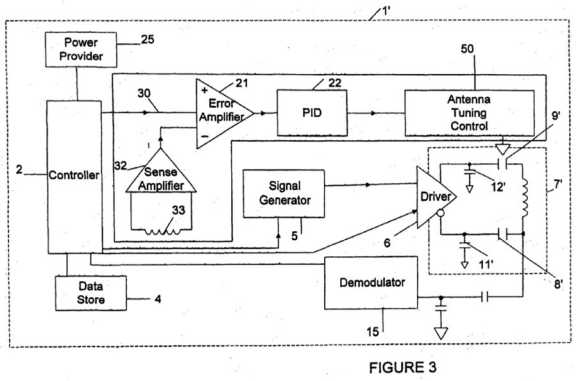
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	Keen at [0065] FIG. 3 shows a functional block diagram of another embodiment of an RFID reader 1′ in accordance with the invention. As can be seen by comparing FIGS. 1 and 3, the RFID reader 1′ shown in FIG. 3 differs from that described above in the way in which the RF signal is controlled in accordance with the sensed magnetic field. In this embodiment, the operation of the differential driver 6′ is not controlled in accordance with the sensed magnetic field. Rather, the output of the control loop stabiliser 22 provides a control signal for an antenna tuning control circuit 50. The antenna tuning control circuit 50 directly controls or affects the capacitance of at least of the capacitors 8′, 9′, 11′ and 12′ of the antenna circuit 7′ so as to alter the resonant frequency of the antenna circuit 7′. For example, one or more of these capacitors may comprise a switched capacitor network controllable by the antenna tuning control circuit 50 or the antenna tuning circuit may comprise additional capacitor elements and may couple or decouple these into the antenna circuit 7′, depending upon the control signal provided by the control loop stabiliser 22. Keen at [0067] FIG. 3 may also be implemented as an active RFID tag rather than an RFID reader if the controller 2 is configured not to initiate but to respond, that is if the controller 2 is configured to allow RF signal generation and any modulation only in response to an RF signal (H field) from an RFID reader or an NFC communicator in initiator mode. Keen at [0069] The controller 2, signal generator 5, differential driver 6 and main antenna circuit 7 (comprising the main antenna coil 10 and associated capacitors 8, 911 and 12), and data store 4 correspond to the same components described above with reference to FIG. 1 and operate in the same way as described for the equivalent components in FIG. 1 Likewise the control loop stabiliser 220 operates in the same way as the control loop stabiliser 22 in FIG. 1 as regards the strength of the magnetic field generated by the RFID reader 1″. In this embodiment, however, the control loop stabiliser 220 is also used by the RFID reader 1″ to detect modulation of the magnetic field by an external near field communicator. Keen at [0074] During operation of the RFID reader 1″ shown in FIG. 4, when the controller 2 causes the signal generator 5 to generate an RF signal, the digital signal generated by the signal generator 5 is fed into the differential driver 6 which outputs complementary pulses to the antenna circuit 7. The resulting oscillating magnetic H field produced by the antenna circuit 7 is inductively coupled to the antenna circuit of any tag (for example the tag 30 shown in FIG. 2) within the H field, that is within the read range of the reader 1″.

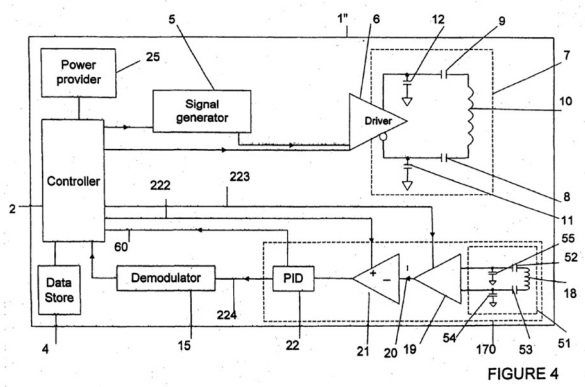
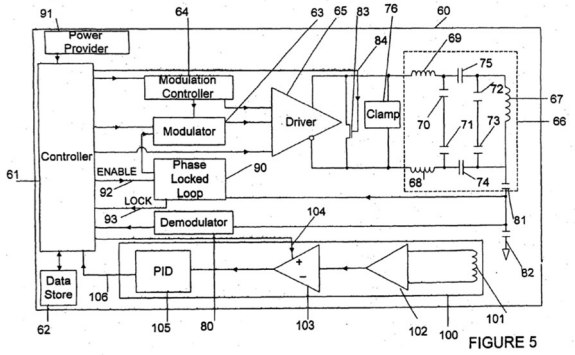
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	Keen at [0081] As described above the sense amplifier 19 filters out modulation in accordance with instructions from the controller 2. The modulation filtering may be carried out anywhere in the control circuit 170 before the control loop stabiliser. For example a separate filter may be provided or the error amplifier 21 may incorporate an initial filtering stage. As another possibility, there may be no filtering out of the modulation. In this latter case, the control loop stabiliser 220 (or controller 2 where the signal processing functionality is provided by the controller) will be configured to track any modulation, and to ignore any modulation where the controller 2 indicates that the modulation was effected by the RFID reader 1″ but to detect and process any modulation where the controller 2 indicates that the RFID reader 1″ is waiting for a response. Keen at [0083] FIG. 5 shows a functional block diagram of an embodiment of an NFC communicator 60 in accordance with the invention. Unlike the RFID readers described with reference to FIGS. 1, 3 and 4, an NFC communicator is capable of communicating with transponders or tags, RFID transceivers or readers and other NFC communicators. Examples of such NFC communicators are described in ISO/IEC 18092 and ISO/IEC 21481. Thus, an NFC communicator can operate: 1) in an initiator mode in which the NFC communicator functions in a similar fashion to an RFID reader and will transmit an RF signal; and 2) in a target mode in which the NFC communicator waits for receipt of an RF signal from another NFC communicator operating in initiator mode or an RFID reader, that is it functions like a tag or transponder. NFC communicators may communicate with each other using an active or passive protocol. When using the active protocol, an initiator mode NFC communicator transmits an RF signal and then ceases RF signal transmission and a target mode NFC communicator responds by transmitting its own RF signal and then ceasing RF signal transmission. When using the passive protocol, an initiator mode NFC communicator transmits its RF signal and maintains that RF signal throughout the duration of the communication cycle and a target mode NFC communicator responds by causing modulation of the transmitted RF signal. Keen at [0084] As shown in FIG. 5, the NFC communicator 60 includes a controller 61 for controlling overall operation of the NFC communicator in accordance with control data and/or instructions and other data stored by an internal memory of the controller 61 and/or a data store 62 coupled to the controller. The controller 61 may comprise a microcontroller, RISC computer or state machine, for example.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	Keen at [0086] The differential driver 65 is coupled to supply an RF signal modulated under the control of the controller 61 to an antenna circuit 66 comprising an antenna coil 67. In this example the RF signal fed to the antenna circuit 66 is of a digital square-wave form and so filtering components (as shown inductors 68 and 69 and capacitors 70 to 75) may be required to reduce harmonics of the carrier so that electromagnetic energy emissions regulations are met. A clamp 76 is provided across the antenna circuit 66 to divert current in the event of a high voltage occurring to reduce the risk of high voltages destroying chip functionality. Keen at [0087] The NFC communicator 60 also has a demodulator 80 coupled (as shown via capacitor 81 which is itself coupled to ground or earth via another capacitor 82) to the antenna circuit 66 for extracting the modulation from a received modulated RF signal. Keen at [0089] The load modulation mechanism is provided by a transistor 83 (as shown a FET) coupled across the antenna coil 67. The controller 61 has a data output 84 coupled to the gate or control electrode of the transistor 83 and, when this mechanism is operational, the transistor 83 is switched on and off in accordance with the data supplied by the controller 61, thereby modulating the load on the antenna circuit 66 and thus an RF signal supplied by the initiator NFC communicator or RFID reader. Keen at [0090] The interference or simulated load modulation mechanism is provided by a phase-locked loop 90 comprising, in this example, a voltage controlled oscillator (VCO), a phase detector, a loop filter and preferably a sample and hold circuit). The phase-locked loop 90 is coupled, as shown via capacitor 81, to the antenna circuit 66. The phase-locked loop 90 generates an internal RF signal which is supplied to the modulator 63 when the NFC communicator 60 is in initiator mode. When, however, the NFC communicator 60 is in target mode, the phase-locked loop 90 is controlled by an enable signal output 92 of the controller 61 to bring the internally generated RF signal into phase ("lock") with an external RF signal coupled to the antenna circuit 66 (that is an RF signal from an initiator mode NFC communicator or RFID reader) so that the internally generated RF signal has a fixed phase relationship to the external RF signal. The phase-locked loop 90 provides a signal to an input 93 of the controller 61 when phase lock has been achieved. This ensures that the target mode NFC communicator can communicate with the initiator mode NFC communicator or RFID reader by modulating its internally generated RF signal.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	Keen at [0091] The NFC communicator 60 of course also has a power provider 91. For convenience the connections of the power provider to the remainder of the NFC communicator 91 are not shown. The power provider 91 may comprise at least one of a power supply such as a battery provided within the NFC communicator 60 and or a connection to a power supply of a host device, apparatus or system. The power provider could also comprise a power deriver for deriving a power supply from an RF signal inductively coupled to the antenna circuit 66 when the NFC communicator is in target mode. Keen at [0095] As with the RFID reader 1 shown in FIG. 1, the NFC communicator 60 has a control circuit 100 for controlling operation of the NFC communicator 60 in accordance with the strength of the magnetic field generated by the antenna circuit coil 66. As shown in FIG. 5, the control circuit 100 comprises a sense coil 101 positioned so as to be able to sense or detect at least part of the magnetic field (H field) produced by the antenna circuit coil 67, that is so that the sense coil 101 lies within the H field of the antenna circuit coil 67. The sense coil 101 is coupled to a sense amplifier 102 having its output coupled to one input (as shown the negative input) of a differential or error amplifier 103. The other input of the error amplifier 103 is coupled to a required magnetic field strength output 104 of the controller 61 which provides a signal indicating the magnetic field strength required to be produced by the antenna circuit 66. Keen at [0098] In operation of the NFC communicator shown in FIG. 5, the sense coil 101 detects the magnetic field at the antenna circuit coil 67. The detected signal is amplified and filtered by the sense amplifier 102 and fed to the error amplifier 103 which compares the received signal against a pre-set desired signal level or threshold level output 104 representing the required magnetic field strength provided by the controller 61 and produces an error or difference signal. This error or difference signal is processed by the control loop stabiliser 105 using PID techniques to provide instruction data utilisable by the controller 61 to control the modulation controller 64 and differential driver 65 to adjust or modify the RF signal fed to the antenna circuit 66 by the driver 65 to compensate for the difference between the sensed magnetic field strength and the required magnetic field strength. Keen at [0101] The near field communicator may be a stand-alone device or may be comprised within a host device, apparatus or system such as a consumer product, for example a mobile telephone, personal digital assistant, digital camera, or a laptop, notebook, or other computer. Also near field communicators in

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	accordance with the invention may be used in other electrical or electronic products, for example consumer products such as domestic appliance or personal care products, and other electrical or electronic devices, apparatus or systems. Other areas of application are ticketing systems, for example in tickets (for example parking tickets, bus tickets, train tickets or entrance permits or tickets) or in ticket checking systems, toys, games, posters, packaging, advertising material, product inventory checking systems and so on. Keen at [0102] Where comprised within a host device, apparatus or system, the functionality or at least some of the functionality of the near field communicator may be provided by the host device, apparatus or system and an interface provided between the host system controller and the other components of the near field communicator. FIG. 6 shows a functional block diagram of a host device, apparatus or system 200 comprising a near field communicator 201 in which the near field communicator controller 202 is coupled via an interface 203 to a host controller 204 which controls operations of the host device, apparatus or system which may be, for example, a mobile telephone. As shown, the near field communicator 201 has the functional elements discussed above discretely located within the host device, apparatus or system, namely antenna circuitry 205 having an antenna coil 206, control circuitry 207 for controlling operation of the near field communicator in accordance with the magnetic field strength sensed by a sense coil 208, signal providing circuitry 209 for providing the RF signal modulated in accordance with control data and/or other data from the near field communicator controller 202, a demodulator 210 for extracting modulation from an RF signal coupled to the near field communicator 201, and a data store 211. The functionality of the near field communicator 201 may, however, be dispersed throughout the host device, apparatus or system 200. In addition the data storage or at least part of the data storage may be provided by the host device, apparatus or system and at least some instructions, control data and/or other data may be provided by the host device, apparatus or system or input by a user via a user interface 212 of the host device, apparatus or system which may comprise a display 213 and a keyboard 214, for example. Keen at [0103] FIG. 7 shows a simplified view of a mobile telephone 250 forming such a host device with the main body 300 of the mobile telephone 250 shown separated from its fascia 301 to show that, as one possibility, the main and sense antennas or coils 206 and 208 of the near field communicator may be located opposite one another within each part of the mobile phone so that their coil axes are coincident. *See also* Keen at [0015], [0051], [0093], claim 8, and claim 14.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	To the extent this limitation is not disclosed by Keen, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Keen, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[1d] an active transmit driver circuit coupled to the power source to receive the power, wherein the active transmit driver circuit affects transmission of data between the antenna and the NFC reader.	Keen discloses or renders obvious "an active transmit driver circuit coupled to the power source to receive the power, wherein the active transmit driver circuit affects transmission of data between the antenna and the NFC reader." For example: Keen at Figure 1  Keen at Figure 3  FIGURE 3

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	Keen at Figure 4  Keen at Figure 5  Keen at [0009] A further issue is that, in order to create the strongest magnetic field for the lowest drive power, near field communicators generally use an antenna circuit tuned to have a resonant frequency coinciding with or very close to the operating carrier frequency of the near field communicator. One of the most influential parameters of a resonant circuit is its "Q" factor and to achieve optimum read range performance, especially when using small size (small form factor) antennas, relatively high Q factors are used. Although this achieves maximum read range it also makes the communicator very sensitive to the de-

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	tuning effects of nearby metallic and/or magnetic materials. Indeed, the inventors have realised that these de-tuning effects can be more dominant than the unavoidable eddy current loses. Keen at [0028] FIG. 1 shows a functional block diagram of an embodiment of an RFID reader 1 in accordance with the invention which is operable to transmit a radio frequency signal and to detect and demodulate modulation of the transmitted radio frequency signal. The RFID reader 1 may be compatible with a variety of standards or communications protocols, for example ISO/IEC 14443 or ISO/IEC 15693. Keen at [0046] The RFID reader 1 will of course have or be associated with a power provider 25 for providing a power supply for the various components of the RFID reader 1. In the interests of simplicity, the couplings of most of the various components of the RFID reader 1 to the power provider 25 are omitted in FIG. 1. The power provider 25 may be, for example, an internal battery or may be a coupling to a power supply provided by any host apparatus, system or device of the RFID reader 1. Keen at [0048] To assist the explanation of the operation of the RFID reader 1, FIG. 2 shows a functional block diagram of an RFID data storage tag 30 that may be read by the reader 1 when the tag 30 is in the read range (H field) of the reader 1. In this example, the RFID tag or transponder is a passive device, where "passive" in this context means that the RFID tag derives power from the RF signal supplied by the reader (it is not self-powered). As another possibility, the RFID tag may be an active device having a power provider (similar to that shown for an RFID reader in FIG. 1 as 25) for example at least one of a battery or a coupling to a power source of host device, system or apparatus containing or associated with the RFID tag. Keen at [0051] The tag 30 also has a controller 40 for controlling (via control line 41) reading of data from the data store 31 and supply of that data to a modulator 42 coupled to the antenna circuit 32. In the example shown, the modulator 42 comprises a series-connection of a capacitor 43 and an FET 44 coupled across the capacitor 34 of the antenna circuit 32 with the gate electrode of the FET 44 coupled to an output 45 of the data store 31 so that output of data from the data store 31 modulates the load on the antenna circuit 32 and thus on any antenna circuit 7 (FIG. 1) inductively coupled to the antenna circuit 32. Keen at [0053]

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	The tag controller 40 may simply control reading of data from the data store 31 when the tag is powered or may be more sophisticated and may allow data and/or control instructions to be retrieved from a modulated RF signal supplied by a reader 1. An example of the former simple type of tag is shown in FIG. 6 of WO02/093881 while an example of a tag that can receive and store data and/or instructions is shown in FIG. 7 of WO02/093881, the whole contents of which are hereby incorporated by reference. The tag controller 40 may be, for example, a microprocessor, a microcontroller, a controller (for example a reduced instruction set computer) or state machine. The choice will depend on the design of tag used and operational requirements. Keen at [0054] As will be appreciated from the above, the controller 2 of the reader 1 shown in FIG. 1 is configured to control communication with a tag. The actual nature of this control will depend upon the reader and tag configuration or type. Thus, the reader control 2 will control the generation of an RF signal by the signal generator 5, the interruption, where required, of that signal to enable a tag to generate a clock signal, the protocols under which the RFID communicator 1 operates, any modulation of the RF signal and any response to any received modulation of the generated RF signal. As will be appreciated, the pattern of any modulation will represent a series of digital ones and zeros determined by the binary data being transmitted. Keen at [0074] During operation of the RFID reader 1″ shown in FIG. 4, when the controller 2 causes the signal generator 5 to generate an RF signal, the digital signal generated by the signal generator 5 is fed into the differential driver 6 which outputs complementary pulses to the antenna circuit 7. The resulting oscillating magnetic H field produced by the antenna circuit 7 is inductively coupled to the antenna circuit of any tag (for example the tag 30 shown in FIG. 2) within the H field, that is within the read range of the reader 1″. Keen at [0083] FIG. 5 shows a functional block diagram of an embodiment of an NFC communicator 60 in accordance with the invention. Unlike the RFID readers described with reference to FIGS. 1, 3 and 4, an NFC communicator is capable of communicating with transponders or tags, RFID transceivers or readers and other NFC communicators. Examples of such NFC communicators are described in ISO/IEC 18092 and ISO/IEC 21481. Thus, an NFC communicator can operate: 1) in an initiator mode in which the NFC communicator functions in a similar fashion to an RFID reader and will transmit an RF signal; and 2) in a target mode in which the NFC communicator waits for receipt of an RF signal from another NFC communicator operating in initiator mode or an RFID reader, that is it functions like a tag or transponder.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	NFC communicators may communicate with each other using an active or passive protocol. When using the active protocol, an initiator mode NFC communicator transmits an RF signal and then ceases RF signal transmission and a target mode NFC communicator responds by transmitting its own RF signal and then ceasing RF signal transmission. When using the passive protocol, an initiator mode NFC communicator transmits its RF signal and maintains that RF signal throughout the duration of the communication cycle and a target mode NFC communicator responds by causing modulation of the transmitted RF signal. Keen at [0085] The controller 61 is coupled to a signal modulator 63 for modulating an RF signal in accordance with data provided by the controller 61, to a modulation controller 64 and to a differential driver 65 which is also coupled to the outputs of the signal modulator 63 and the modulation controller 64. The modulation controller 64 may control the amplitude of the signal supplied by the modulator 63. As shown, the modulation controller 64 is separate from the controller 61. The functionality of the modulation controller may however be provided by the controller 61. Keen at [0088] The NFC communicator 60 shown in FIG. 5 has two mechanisms for enabling communication of data when the NFC communicator is in the target mode. One mechanism is a load modulation mechanism as described above with reference to FIG. 2 and the other is an interference mechanism which simulates load modulation. Keen at [0089] The load modulation mechanism is provided by a transistor 83 (as shown a FET) coupled across the antenna coil 67. The controller 61 has a data output 84 coupled to the gate or control electrode of the transistor 83 and, when this mechanism is operational, the transistor 83 is switched on and off in accordance with the data supplied by the controller 61, thereby modulating the load on the antenna circuit 66 and thus an RF signal supplied by the initiator NFC communicator or RFID reader. Keen at [0090] The interference or simulated load modulation mechanism is provided by a phase-locked loop 90 comprising, in this example, a voltage controlled oscillator (VCO), a phase detector, a loop filter and preferably a sample and hold circuit). The phase-locked loop 90 is coupled, as shown via capacitor 81, to the antenna circuit 66. The phase-locked loop 90 generates an internal RF signal which is supplied to the modulator 63 when the NFC communicator 60 is in initiator mode. When, however, the NFC

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	communicator 60 is in target mode, the phase-locked loop 90 is controlled by an enable signal output 92 of the controller 61 to bring the internally generated RF signal into phase ("lock") with an external RF signal coupled to the antenna circuit 66 (that is an RF signal from an initiator mode NFC communicator or RFID reader) so that the internally generated RF signal has a fixed phase relationship to the external RF signal. The phase-locked loop 90 provides a signal to an input 93 of the controller 61 when phase lock has been achieved. This ensures that the target mode NFC communicator can communicate with the initiator mode NFC communicator or RFID reader by modulating its internally generated RF signal. Keen at [0091] The NFC communicator 60 of course also has a power provider 91. For convenience the connections of the power provider to the remainder of the NFC communicator 91 are not shown. The power provider 91 may comprise at least one of a power supply such as a battery provided within the NFC communicator 60 and or a connection to a power supply of a host device, apparatus or system. The power provider could also comprise a power deriver for deriving a power supply from an RF signal inductively coupled to the antenna circuit 66 when the NFC communicator is in target mode. Keen at [0092] The controller 61 controls RF signal generation, modulation characteristics of any transmitted RF signal, response to any received RF signal, interpretation of any received demodulated signal, mode of operation (for example initiator or target or active or passive mode) and the communication protocol under which the NFC communicator 60 operates. In responding to a received signal when in target mode, the NFC communicator will respond in a manner dependent upon whether the NFC communicator 60 is operating under the active or passive protocol. Where the NFC communicator is operating under the active protocol, the controller 61 will cause the NFC communicator to respond by generation of a phase-locked modulated signal using the phase-locked loop mechanism whereas in the event the NFC communicator is operating under the passive protocol, the controller 61 may cause the received RF signal to be directly modulated by switching the transistor 83 in accordance with the data to be communicated or may use the phase-locked loop 90 mechanism to effect modulation by interference with the received RF signal (simulated load modulation). Keen at [0093] The NFC communicator 60 may use a combination of load modulation or carrier interference or may alternatively use only one or the other form of communication. As another possibility, the NFC communicator 60 may comprise multiple antennas, one being used for response to a received RF signal and the other being used for transmission of an RF signal with the antennas being switched on according

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	to need, under the control of the controller of the NFC communicator. Thus, where the NFC communicator is acting in initiator mode, the antenna selected for transmission of an RF signal will be used while where the NFC communicator is, for example, acting as a passive target (i.e. similar to an RFID transponder) the controller 61 will switch the antennas, thereby utilising an antenna more suited to load modulation of an incoming RF signal. Keen at [0098] In operation of the NFC communicator shown in FIG. 5, the sense coil 101 detects the magnetic field at the antenna circuit coil 67. The detected signal is amplified and filtered by the sense amplifier 102 and fed to the error amplifier 103 which compares the received signal against a pre-set desired signal level or threshold level output 104 representing the required magnetic field strength provided by the controller 61 and produces an error or difference signal. This error or difference signal is processed by the control loop stabiliser 105 using PID techniques to provide instruction data utilisable by the controller 61 to control the modulation controller 64 and differential driver 65 to adjust or modify the RF signal fed to the antenna circuit 66 by the driver 65 to compensate for the difference between the sensed magnetic field strength and the required magnetic field strength. To the extent this limitation is not disclosed by Keen, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Keen, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
2. The mobile device of claim 1, wherein the transmitted data includes ticketing information for a mass transit system.	Keen discloses or renders obvious "[t]he mobile device of claim 1, wherein the transmitted data includes ticketing information for a mass transit system." For example: Keen at [0101] The near field communicator may be a stand-alone device or may be comprised within a host device, apparatus or system such as a consumer product, for example a mobile telephone, personal digital assistant, digital camera, or a laptop, notebook, or other computer. Also near field communicators in accordance with the invention may be used in other electrical or electronic products, for example consumer products such as domestic appliance or personal care products, and other electrical or electronic devices, apparatus or systems. Other areas of application are ticketing systems, for example in tickets (for example parking tickets, bus tickets, train tickets or entrance permits or tickets) or in ticket checking systems, toys, games, posters, packaging, advertising material, product inventory checking systems and so on.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	To the extent this limitation is not disclosed by Keen, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Keen, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 1 above.
3. The mobile device of claim 1, wherein the transmitted data includes transaction information for a mobile payment.	Keen discloses or renders obvious "[t]he mobile device of claim 1, wherein the transmitted data includes transaction information for a mobile payment." For example: To the extent this limitation is not disclosed by Keen, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Keen, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.\ *See also* claim 1 above.
4. The mobile device of claim 1, wherein the NFC reader is a point-of-sale NFC reader.	Keen discloses or renders obvious "[t]he mobile device of claim 1, wherein the NFC reader is a point-of-sale NFC reader." For example: To the extent this limitation is not disclosed by Keen, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Keen, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 1 above.
5. The mobile device of claim 1, wherein the antenna includes an inductive element.	Keen discloses or renders obvious "[t]he mobile device of claim 1, wherein the antenna includes an inductive element." For example: Keen at [0002] Near field communication requires the antenna of one near field communicator to be present within the alternating magnetic field (the H field) generated by the antenna of another near field communicator by transmission of an RF signal, for example a 13.56 Mega Hertz signal. The RF signal is thus inductively coupled between the communicators. The RF signal may be modulated to enable communication of control instructions and/or data and/or may be used by the receiving communicator to derive a power supply. Keen at [0004]–[0005] The presence of metallic and/or magnetic materials, especially ferro-magnetic materials, and conductive loop paths in the vicinity of the antenna of a near field communicator can have a profound effect on the

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	range over which the antenna's signal can be read (the "read range") because of the induction of eddy currents and the consequential eddy current loses. Keen at [0007] Generally, the functionality of such a near field communicator is provided as a semiconductor integrated circuit to which a number of passive components and the antenna are added. The internal metal components of any host device, system or apparatus will as far as possible be located as far away as possible from the near field communicator's antenna. Compensation for the effects of any such metallic components or elements is normally effected by adjusting the capacitance value of a discrete "trimming" capacitor or by selecting a "select-on-test" type fixed capacitor or number of capacitor values during production testing of the host device, system or apparatus. However, this increases unit costs because of the cost of additional component(s), the impact on the printed circuit board costs and the costs involved in the testing and trimming or selecting operations. Further, the addition of such components may adversely affect the life and reliability of the communicator. Also, there may be circumstances in which it is not possible for the antenna circuitry to be adapted to the host device, system or apparatus or the configuration of the host device, system or apparatus may change (for example parts may be removed and new sections added) throughout its life. Furthermore, if a common near field communicator circuit design is produced for a number of different host applications, those host applications will almost certainly have different antenna spatial envelopes, different dimensions, shapes, footprints or sizes (form factors) and differently located or distributed metallic material components or elements, so requiring different compensation component values for each different host application in order to achieve and maintain optimum performance. This results in a large overhead (both in terms of costs and resources) for a company supplying or using near field communicators in a range of host devices, systems or apparatus. Keen at [0009] A further issue is that, in order to create the strongest magnetic field for the lowest drive power, near field communicators generally use an antenna circuit tuned to have a resonant frequency coinciding with or very close to the operating carrier frequency of the near field communicator. One of the most influential parameters of a resonant circuit is its "Q" factor and to achieve optimum read range performance, especially when using small size (small form factor) antennas, relatively high Q factors are used. Although this achieves maximum read range it also makes the communicator very sensitive to the de-tuning effects of nearby metallic and/or magnetic materials. Indeed, the inventors have realised that these de-tuning effects can be more dominant than the unavoidable eddy current loses. Keen at [0010]

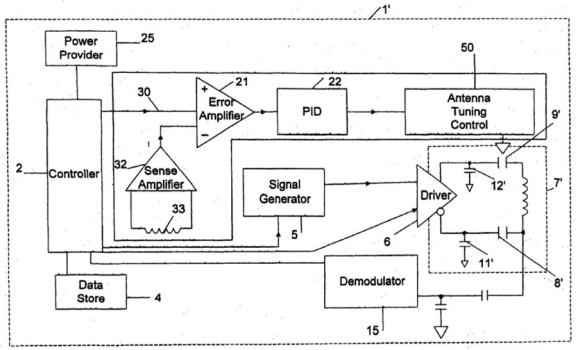
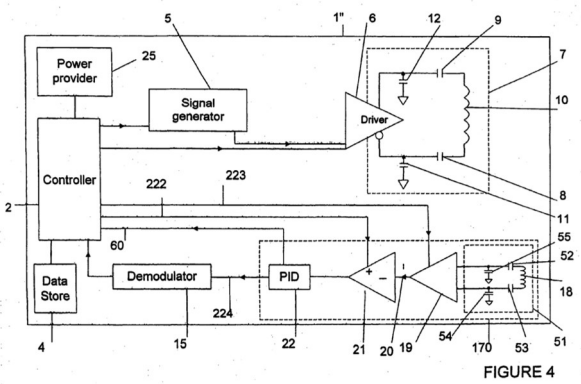
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	In addition during normal operation of near field communicators, such communicators will communicate with all kinds of different near field communicators each of which has different antenna sizes and form factors and each of which will operate at differing distances from the antenna of the transmitting communicator. All of these factors will have an effect on the H-field and therefore the signal strength of the RF signal produced by the near field communicator. Keen at [0011] In one aspect, the present invention provides a near field communicator having a magnetic field strength determiner and an antenna drive adjuster operable to adjust the drive to an antenna of the communicator in accordance with the determined magnetic field strength to provide the communicator with the required read range performance. Keen at [0013] In one aspect, the present invention provides a near field communicator comprising a driver operable to drive an antenna or coil to produce a magnetic field; a magnetic field sensor operable to sense the magnetic field produced by the antenna or coil; a comparator operable to compare, directly or indirectly, the sensed magnetic field strength with a desired parameter, and a controller operable to control the driver to compensate for a difference between the sensed magnetic field strength and the desired parameter. Keen at [0015] In an embodiment, the controller is operable to control the driver to control the magnetic signal strength produced by the antenna. Keen at [0032] The differential driver 6 is coupled to supply the RF signal to an antenna circuit 7. In this example, the antenna circuit 7 is a tuned circuit comprising respective capacitors 8 and 9 in series with an antenna coil 10 and further capacitors 11 and 12 each coupled between a respective one of the capacitors 8 and 9 and ground (earth). The presence of all four capacitors serves to reduce unwanted carrier harmonics but it may be possible to omit some of the capacitors, for example capacitors 11 and 12, where the signal generated by the differential driver 6 does not exceed electromagnetic energy emissions regulations. Keen at [0050] The tag 30 has an antenna circuit 32 comprising, in this example, an antenna coil 33 in parallel with a capacitor 34. The tag 30 also has a power deriver 35 for deriving a power supply for the tag 30 from an RF signal coupled to the antenna circuit 32. As shown in FIG. 2, the power deriver 35 comprises series-

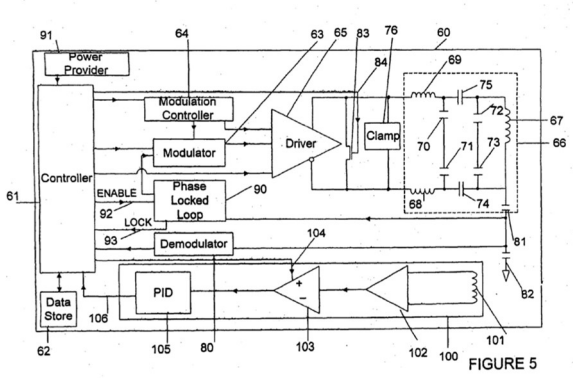
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	connected diodes 36 and 37 and a capacitor 38 coupled between the antenna circuit 32 and a junction 39 between the anode of the diode 36 and the cathode of the diode 37. The cathode of the first diode 36 is connected to a first power supply rail P1 (Vdd) while the anode of the second diode 37 is connected to a second power supply rail P2 (Vss). The capacitor 38 and the diodes 36 and 37 act effectively as a voltage doubler enabling the peak to peak voltage of a received RF signal inductively coupled to the tag 30 to be used to derive a power supply for the tag 30. It will, of course, be appreciated that, in the interests of simplicity, the power supply connections to the remaining components of the tag are not shown. Keen at [0056] In the case of a simple tag, the tag controller 40 may cause data to be read from the tag data store 31 upon powering up of the tag, that is once the power deriver 35 of the tag 30 derives a power supply for the tag 30 from the inductively coupled RF signal. Where the tag 30 is more sophisticated, then the communications protocol under which the tag and the reader operate may require some form of communication or handshaking to occur before the tag controller 40 causes data to be read from the tag data store. The reading of data from the data store 31 causes the modulator 42 to modulate the load on the antenna circuit 32 (and thus on the antenna circuit 7 inductively coupled thereto) in accordance with the data read from the data store 31. The modulation by the tag 30 of the RF signal is extracted by the reader demodulator 15 and supplied to the controller 2. The capacitors 13 and 14 limit the amplitude of the signal input to the demodulator 15 and so avoid over-voltage damage to the demodulator 15. Keen at [0058] When the controller 2 causes the signal generator 5 to generate an RF signal, the digital signal generated by the signal generator 5 is fed into the differential driver 6 which outputs complementary pulses to the antenna circuit 7. The resulting oscillating magnetic H field produced by the antenna circuit 7 is inductively coupled to the antenna circuit of any tag 30 (FIG. 2) within the H field, that is within the read range of the reader 1. The designed read range (that is the distance over which the tag antenna coil 33 is intended to be able to couple inductively to the magnetic field (H field) of the reader 1 antenna coil 10) will depend upon the actual reader and tag antenna circuit design and constraints, in particular upon the size and configuration of the antenna coils and the strength of the RF signal supplied by the reader 1. For example, the H field or read range may be designed to lie in a range up to 1 metre. Keen at [0091] The NFC communicator 60 of course also has a power provider 91. For convenience the connections of the power provider to the remainder of the NFC communicator 91 are not shown. The power provider 91 may comprise at least one of a power supply such as a battery provided within the NFC communicator 60

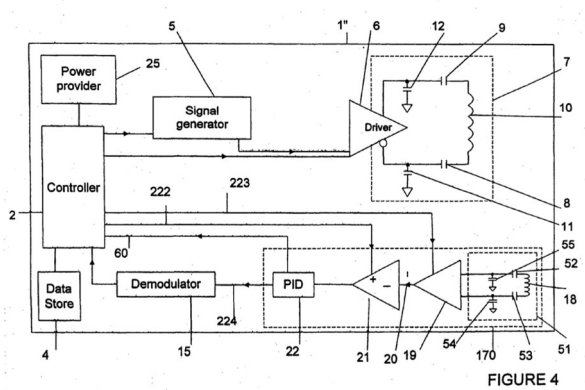
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	and or a connection to a power supply of a host device, apparatus or system. The power provider could also comprise a power deriver for deriving a power supply from an RF signal inductively coupled to the antenna circuit 66 when the NFC communicator is in target mode. *See also* Keen at [0051], [0069], [0074], and [0086]. To the extent this limitation is not disclosed by Keen, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Keen, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 1 above.
6. The mobile device of claim 1, wherein the active transmit driver circuit includes one or more of an amplifier filter, oscillator, and/or modulator.	Keen discloses or renders obvious "[t]he mobile device of claim 1, wherein the active transmit driver circuit includes one or more of an amplifier filter, oscillator, and/or modulator." For example: Keen at [0024] FIG. 5 shows a functional block diagram of an embodiment of an NFC communicator in accordance with the invention; Keen at [0051] The tag 30 also has a controller 40 for controlling (via control line 41) reading of data from the data store 31 and supply of that data to a modulator 42 coupled to the antenna circuit 32. In the example shown, the modulator 42 comprises a series-connection of a capacitor 43 and an FET 44 coupled across the capacitor 34 of the antenna circuit 32 with the gate electrode of the FET 44 coupled to an output 45 of the data store 31 so that output of data from the data store 31 modulates the load on the antenna circuit 32 and thus on any antenna circuit 7 (FIG. 1) inductively coupled to the antenna circuit 32. Keen at [0056] In the case of a simple tag, the tag controller 40 may cause data to be read from the tag data store 31 upon powering up of the tag, that is once the power deriver 35 of the tag 30 derives a power supply for the tag 30 from the inductively coupled RF signal. Where the tag 30 is more sophisticated, then the communications protocol under which the tag and the reader operate may require some form of communication or handshaking to occur before the tag controller 40 causes data to be read from the tag data store. The reading of data from the data store 31 causes the modulator 42 to modulate the load on the antenna circuit 32 (and thus on the antenna circuit 7 inductively coupled thereto) in accordance with the data read from the data store 31. The modulation by the tag 30 of the RF signal is extracted by the reader

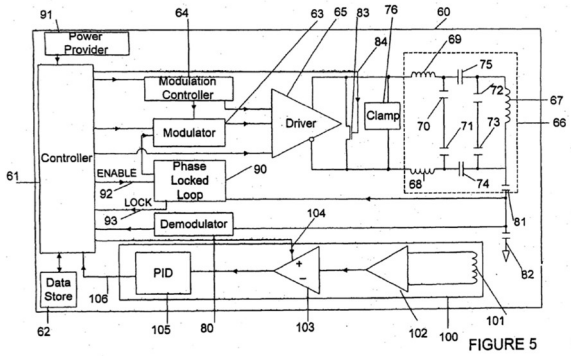
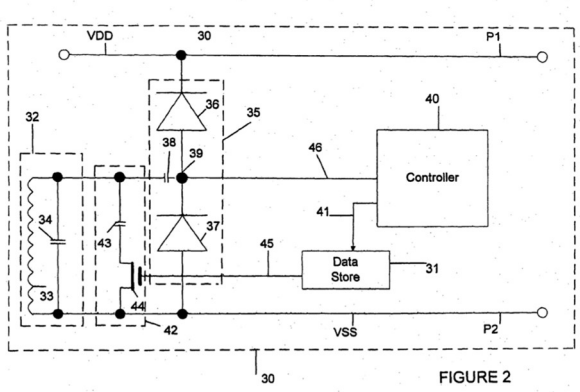
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	demodulator 15 and supplied to the controller 2. The capacitors 13 and 14 limit the amplitude of the signal input to the demodulator 15 and so avoid over-voltage damage to the demodulator 15. Keen at [0081] As described above the sense amplifier 19 filters out modulation in accordance with instructions from the controller 2. The modulation filtering may be carried out anywhere in the control circuit 170 before the control loop stabiliser. For example a separate filter may be provided or the error amplifier 21 may incorporate an initial filtering stage. As another possibility, there may be no filtering out of the modulation. In this latter case, the control loop stabiliser 220 (or controller 2 where the signal processing functionality is provided by the controller) will be configured to track any modulation, and to ignore any modulation where the controller 2 indicates that the modulation was effected by the RFID reader 1″ but to detect and process any modulation where the controller 2 indicates that the RFID reader 1″ is waiting for a response. Keen at [0085] The controller 61 is coupled to a signal modulator 63 for modulating an RF signal in accordance with data provided by the controller 61, to a modulation controller 64 and to a differential driver 65 which is also coupled to the outputs of the signal modulator 63 and the modulation controller 64. The modulation controller 64 may control the amplitude of the signal supplied by the modulator 63. As shown, the modulation controller 64 is separate from the controller 61. The functionality of the modulation controller may however be provided by the controller 61. Keen at [0086] The differential driver 65 is coupled to supply an RF signal modulated under the control of the controller 61 to an antenna circuit 66 comprising an antenna coil 67. In this example the RF signal fed to the antenna circuit 66 is of a digital square-wave form and so filtering components (as shown inductors 68 and 69 and capacitors 70 to 75) may be required to reduce harmonics of the carrier so that electromagnetic energy emissions regulations are met. A clamp 76 is provided across the antenna circuit 66 to divert current in the event of a high voltage occurring to reduce the risk of high voltages destroying chip functionality. Keen at [0090] The interference or simulated load modulation mechanism is provided by a phase-locked loop 90 comprising, in this example, a voltage controlled oscillator (VCO), a phase detector, a loop filter and preferably a sample and hold circuit). The phase-locked loop 90 is coupled, as shown via capacitor 81, to the antenna circuit 66. The phase-locked loop 90 generates an internal RF signal which is supplied to the

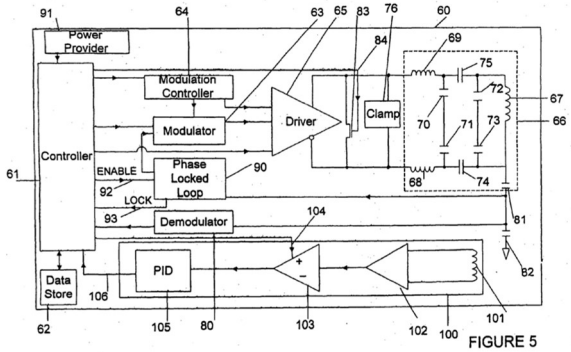
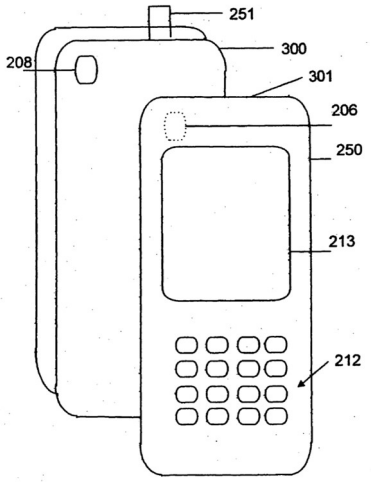
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	modulator 63 when the NFC communicator 60 is in initiator mode. When, however, the NFC communicator 60 is in target mode, the phase-locked loop 90 is controlled by an enable signal output 92 of the controller 61 to bring the internally generated RF signal into phase ("lock") with an external RF signal coupled to the antenna circuit 66 (that is an RF signal from an initiator mode NFC communicator or RFID reader) so that the internally generated RF signal has a fixed phase relationship to the external RF signal. The phase-locked loop 90 provides a signal to an input 93 of the controller 61 when phase lock has been achieved. This ensures that the target mode NFC communicator can communicate with the initiator mode NFC communicator or RFID reader by modulating its internally generated RF signal. Keen at [0092] The controller 61 controls RF signal generation, modulation characteristics of any transmitted RF signal, response to any received RF signal, interpretation of any received demodulated signal, mode of operation (for example initiator or target or active or passive mode) and the communication protocol under which the NFC communicator 60 operates. In responding to a received signal when in target mode, the NFC communicator will respond in a manner dependent upon whether the NFC communicator 60 is operating under the active or passive protocol. Where the NFC communicator is operating under the active protocol, the controller 61 will cause the NFC communicator to respond by generation of a phase-locked modulated signal using the phase-locked loop mechanism whereas in the event the NFC communicator is operating under the passive protocol, the controller 61 may cause the received RF signal to be directly modulated by switching the transistor 83 in accordance with the data to be communicated or may use the phase-locked loop 90 mechanism to effect modulation by interference with the received RF signal (simulated load modulation). Keen at claim 8 8. A near field communicator according to claim 1, wherein the driver is operable to supply an oscillating, for example RF, drive signal to drive the antenna. Keen at claim 17 17. A near field communicator according to claim 1, further comprising a modulator operable to modulate the magnetic field generated by the antenna. Keen at claim 18 18. A near field communicator according to claim 17, wherein the modulator is operable to modulate the magnetic field generated by the antenna in accordance with data to be communicated to another near field communicator.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	To the extent this limitation is not disclosed by Keen, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Keen, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 1 above.
7. The mobile device of claim 1 comprising an amplifier coupled to the power source to receive the power, wherein the amplifier is further coupled to the antenna.	Keen discloses or renders obvious "[t]he mobile device of claim 1 comprising an amplifier coupled to the power source to receive the power, wherein the amplifier is further coupled to the antenna." For example: Keen at Figure 3  FIGURE 3 Keen at Figure 4  FIGURE 4

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	Keen at Figure 5  FIGURE 5 Keen at [0046] The RFID reader 1 will of course have or be associated with a power provider 25 for providing a power supply for the various components of the RFID reader 1. In the interests of simplicity, the couplings of most of the various components of the RFID reader 1 to the power provider 25 are omitted in FIG. 1. The power provider 25 may be, for example, an internal battery or may be a coupling to a power supply provided by any host apparatus, system or device of the RFID reader 1. Keen at [0091] The NFC communicator 60 of course also has a power provider 91. For convenience the connections of the power provider to the remainder of the NFC communicator 91 are not shown. The power provider 91 may comprise at least one of a power supply such as a battery provided within the NFC communicator 60 and or a connection to a power supply of a host device, apparatus or system. The power provider could also comprise a power deriver for deriving a power supply from an RF signal inductively coupled to the antenna circuit 66 when the NFC communicator is in target mode. Keen at [0098] In operation of the NFC communicator shown in FIG. 5, the sense coil 101 detects the magnetic field at the antenna circuit coil 67. The detected signal is amplified and filtered by the sense amplifier 102 and fed to the error amplifier 103 which compares the received signal against a pre-set desired signal level or threshold level output 104 representing the required magnetic field strength provided by the controller 61 and produces an error or difference signal. This error or difference signal is processed by the control loop

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	stabiliser 105 using PID techniques to provide instruction data utilisable by the controller 61 to control the modulation controller 64 and differential driver 65 to adjust or modify the RF signal fed to the antenna circuit 66 by the driver 65 to compensate for the difference between the sensed magnetic field strength and the required magnetic field strength. *See also* Keen at [0048]. To the extent this limitation is not disclosed by Keen, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Keen, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 1 above.
8. The mobile device of claim 7, wherein the amplifier amplifies a signal received at the antenna and generates an amplified signal, and provides the amplified signal to the smartcard controller.	Keen discloses or renders obvious "[t]he mobile device of claim 7, wherein the amplifier amplifies a signal received at the antenna and generates an amplified signal, and provides the amplified signal to the smartcard controller." For example: Keen at Figure 4  Keen at Figure 5

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	 FIGURE 5 *See also* Keen at Figure 3. To the extent this limitation is not disclosed by Keen, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Keen, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 7 above.
17[pre]. A method of near field communication between a mobile device and an NFC reader, the method comprising:	Keen discloses or renders obvious "[a] method of near field communication between a mobile device and an NFC reader, the method." For example: *See* [1d] above. Keen at Figure 2  FIGURE 2

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	Keen at Figure 5  FIGURE 5 Keen at Figure 7 FIGURE 7  Keen at [0003]

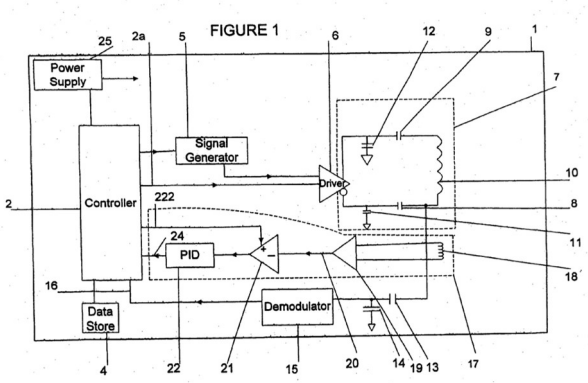
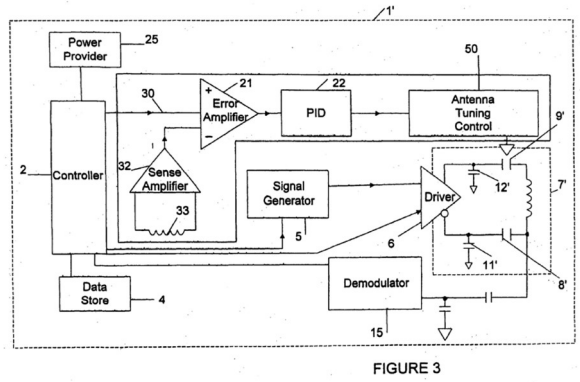
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	Examples of near field communicators are RFID (Radio Frequency Identification) transceivers ("readers") or transponders ("tags") that operate under the RFID ISO/IEC 14443A protocol or ISO/IEC 15693 protocol or NFC (Near Field Communication) communicators operating under the NFCIP-1 (ISO/IEC 18092) or NFCIP-2 (ISO/IEC 21481) protocol. The phrase "near field communicator" will be used herein for any communicator that communicates using radio frequency in the near field (that is the H-field). The phrase "RFID tag" will be used herein for any near field communicator which is operable to respond to a received RF signal by transmission of its own RF signal or through modulation of or interference with the received RF signal. The phrase "RFID reader" will be used herein for any near field communicator which initiates the transmission of an RF signal and which is operable to wait for a response from any near field communicators within the near field of the RF signal. The phrase "NFC communicator" will be reserved for communicators operable to both initiate transmission of an RF signal and to respond to a received RF signal initiated by a second near field communicator. NFC communicators are therefore able to communicate with other NFC communicators, RFID readers and RFID tags. Keen at [0004] Such near field communicators may be discrete standalone devices, systems or apparatus or may be incorporated into or provided as part of the functionality of larger host devices, systems or apparatus, for example a consumer product such as a portable communications device having telecommunications capability (for example a mobile telephone (cellphone) or a telecommunications-enabled personal digital assistant or other computing device). Keen at [0007] Generally, the functionality of such a near field communicator is provided as a semiconductor integrated circuit to which a number of passive components and the antenna are added. The internal metal components of any host device, system or apparatus will as far as possible be located as far away as possible from the near field communicator's antenna. Compensation for the effects of any such metallic components or elements is normally effected by adjusting the capacitance value of a discrete "trimming" capacitor or by selecting a "select-on-test" type fixed capacitor or number of capacitor values during production testing of the host device, system or apparatus. However, this increases unit costs because of the cost of additional component(s), the impact on the printed circuit board costs and the costs involved in the testing and trimming or selecting operations. Further, the addition of such components may adversely affect the life and reliability of the communicator. Also, there may be circumstances in which it is not possible for the antenna circuitry to be adapted to the host device, system or apparatus or the configuration of the host device, system or apparatus may change (for example parts may be removed and

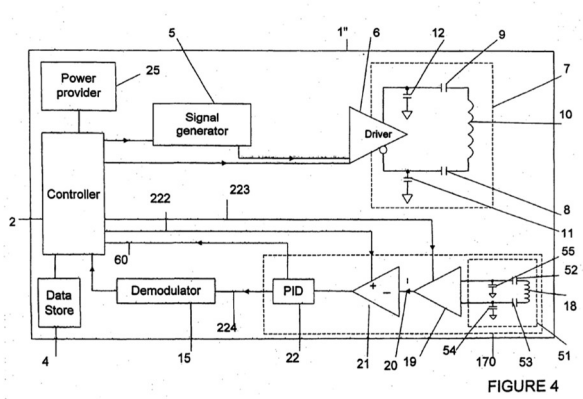
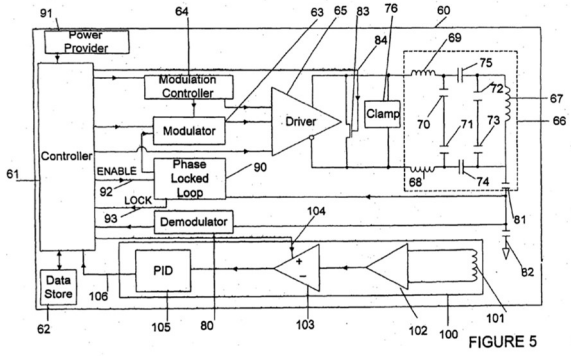
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	new sections added) throughout its life. Furthermore, if a common near field communicator circuit design is produced for a number of different host applications, those host applications will almost certainly have different antenna spatial envelopes, different dimensions, shapes, footprints or sizes (form factors) and differently located or distributed metallic material components or elements, so requiring different compensation component values for each different host application in order to achieve and maintain optimum performance. This results in a large overhead (both in terms of costs and resources) for a company supplying or using near field communicators in a range of host devices, systems or apparatus. Keen at [0010] In addition during normal operation of near field communicators, such communicators will communicate with all kinds of different near field communicators each of which has different antenna sizes and form factors and each of which will operate at differing distances from the antenna of the transmitting communicator. All of these factors will have an effect on the H-field and therefore the signal strength of the RF signal produced by the near field communicator. Keen at [0013] In one aspect, the present invention provides a near field communicator comprising a driver operable to drive an antenna or coil to produce a magnetic field; a magnetic field sensor operable to sense the magnetic field produced by the antenna or coil; a comparator operable to compare, directly or indirectly, the sensed magnetic field strength with a desired parameter, and a controller operable to control the driver to compensate for a difference between the sensed magnetic field strength and the desired parameter. Keen at [0026] FIG. 7 shows a simplified view of a mobile telephone incorporating a near field communicator embodying the invention. Keen at [0048] To assist the explanation of the operation of the RFID reader 1, FIG. 2 shows a functional block diagram of an RFID data storage tag 30 that may be read by the reader 1 when the tag 30 is in the read range (H field) of the reader 1. In this example, the RFID tag or transponder is a passive device, where "passive" in this context means that the RFID tag derives power from the RF signal supplied by the reader (it is not self-powered). As another possibility, the RFID tag may be an active device having a power provider (similar to that shown for an RFID reader in FIG. 1 as 25) for example at least one of a battery or a coupling to a power source of host device, system or apparatus containing or associated with the RFID tag.

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	Keen at [0067] FIG. 3 may also be implemented as an active RFID tag rather than an RFID reader if the controller 2 is configured not to initiate but to respond, that is if the controller 2 is configured to allow RF signal generation and any modulation only in response to an RF signal (H field) from an RFID reader or an NFC communicator in initiator mode. Keen at [0083] FIG. 5 shows a functional block diagram of an embodiment of an NFC communicator 60 in accordance with the invention. Unlike the RFID readers described with reference to FIGS. 1, 3 and 4, an NFC communicator is capable of communicating with transponders or tags, RFID transceivers or readers and other NFC communicators. Examples of such NFC communicators are described in ISO/IEC 18092 and ISO/IEC 21481. Thus, an NFC communicator can operate: 1) in an initiator mode in which the NFC communicator functions in a similar fashion to an RFID reader and will transmit an RF signal; and 2) in a target mode in which the NFC communicator waits for receipt of an RF signal from another NFC communicator operating in initiator mode or an RFID reader, that is it functions like a tag or transponder. NFC communicators may communicate with each other using an active or passive protocol. When using the active protocol, an initiator mode NFC communicator transmits an RF signal and then ceases RF signal transmission and a target mode NFC communicator responds by transmitting its own RF signal and then ceasing RF signal transmission. When using the passive protocol, an initiator mode NFC communicator transmits its RF signal and maintains that RF signal throughout the duration of the communication cycle and a target mode NFC communicator responds by causing modulation of the transmitted RF signal. Keen at [0084] As shown in FIG. 5, the NFC communicator 60 includes a controller 61 for controlling overall operation of the NFC communicator in accordance with control data and/or instructions and other data stored by an internal memory of the controller 61 and/or a data store 62 coupled to the controller. The controller 61 may comprise a microcontroller, RISC computer or state machine, for example. Keen at [0088] The NFC communicator 60 shown in FIG. 5 has two mechanisms for enabling communication of data when the NFC communicator is in the target mode. One mechanism is a load modulation mechanism as described above with reference to FIG. 2 and the other is an interference mechanism which simulates load modulation.

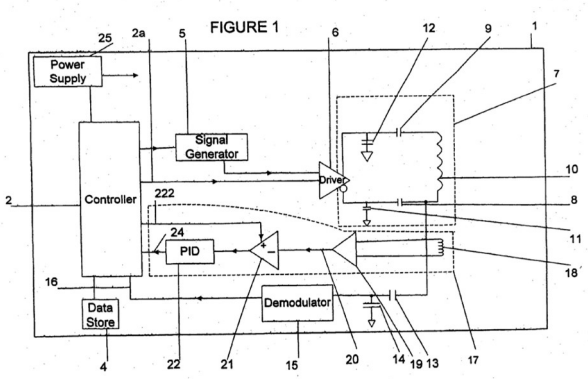
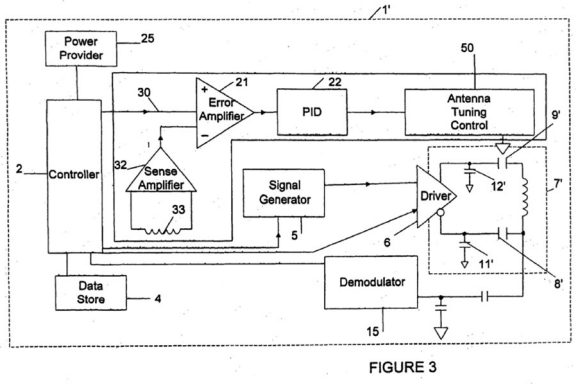
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	Keen at [0091] The NFC communicator 60 of course also has a power provider 91. For convenience the connections of the power provider to the remainder of the NFC communicator 91 are not shown. The power provider 91 may comprise at least one of a power supply such as a battery provided within the NFC communicator 60 and or a connection to a power supply of a host device, apparatus or system. The power provider could also comprise a power deriver for deriving a power supply from an RF signal inductively coupled to the antenna circuit 66 when the NFC communicator is in target mode. Keen at [0093] The NFC communicator 60 may use a combination of load modulation or carrier interference or may alternatively use only one or the other form of communication. As another possibility, the NFC communicator 60 may comprise multiple antennas, one being used for response to a received RF signal and the other being used for transmission of an RF signal with the antennas being switched on according to need, under the control of the controller of the NFC communicator. Thus, where the NFC communicator is acting in initiator mode, the antenna selected for transmission of an RF signal will be used while where the NFC communicator is, for example, acting as a passive target (i.e. similar to an RFID transponder) the controller 61 will switch the antennas, thereby utilising an antenna more suited to load modulation of an incoming RF signal. Keen at [0101] The near field communicator may be a stand-alone device or may be comprised within a host device, apparatus or system such as a consumer product, for example a mobile telephone, personal digital assistant, digital camera, or a laptop, notebook, or other computer. Also near field communicators in accordance with the invention may be used in other electrical or electronic products, for example consumer products such as domestic appliance or personal care products, and other electrical or electronic devices, apparatus or systems. Other areas of application are ticketing systems, for example in tickets (for example parking tickets, bus tickets, train tickets or entrance permits or tickets) or in ticket checking systems, toys, games, posters, packaging, advertising material, product inventory checking systems and so on. Keen at [0102] Where comprised within a host device, apparatus or system, the functionality or at least some of the functionality of the near field communicator may be provided by the host device, apparatus or system and an interface provided between the host system controller and the other components of the near field

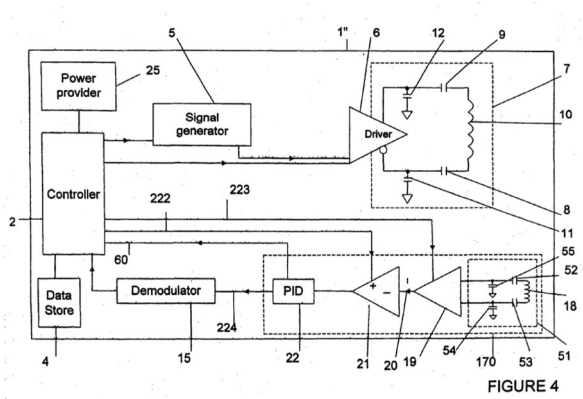
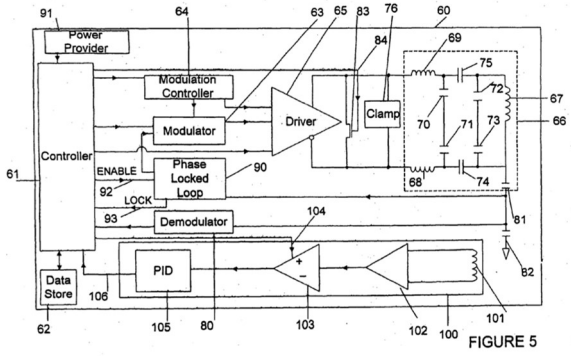
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	communicator. FIG. 6 shows a functional block diagram of a host device, apparatus or system 200 comprising a near field communicator 201 in which the near field communicator controller 202 is coupled via an interface 203 to a host controller 204 which controls operations of the host device, apparatus or system which may be, for example, a mobile telephone. As shown, the near field communicator 201 has the functional elements discussed above discretely located within the host device, apparatus or system, namely antenna circuitry 205 having an antenna coil 206, control circuitry 207 for controlling operation of the near field communicator in accordance with the magnetic field strength sensed by a sense coil 208, signal providing circuitry 209 for providing the RF signal modulated in accordance with control data and/or other data from the near field communicator controller 202, a demodulator 210 for extracting modulation from an RF signal coupled to the near field communicator 201, and a data store 211. The functionality of the near field communicator 201 may, however, be dispersed throughout the host device, apparatus or system 200. In addition the data storage or at least part of the data storage may be provided by the host device, apparatus or system and at least some instructions, control data and/or other data may be provided by the host device, apparatus or system or input by a user via a user interface 212 of the host device, apparatus or system which may comprise a display 213 and a keyboard 214, for example. Keen at [0103] FIG. 7 shows a simplified view of a mobile telephone 250 forming such a host device with the main body 300 of the mobile telephone 250 shown separated from its fascia 301 to show that, as one possibility, the main and sense antennas or coils 206 and 208 of the near field communicator may be located opposite one another within each part of the mobile phone so that their coil axes are coincident. *See also* Keen at Abstract, [0025], [0028], [0046], [0050], [0051], [0053], [0054], [0055], [0056], [0058], [0087], [0090], [0092], [0095], and [0098]. To the extent this limitation is not disclosed by Keen, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Keen, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[17a] coupling a smartcard controller and an active transmit driver circuit to a power source of the mobile device;	Keen discloses or renders obvious "coupling a smartcard controller and an active transmit driver circuit to a power source of the mobile device." For example: Keen at Figure 1

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	 Keen at Figure 3  FIGURE 3 Keen at Figure 4

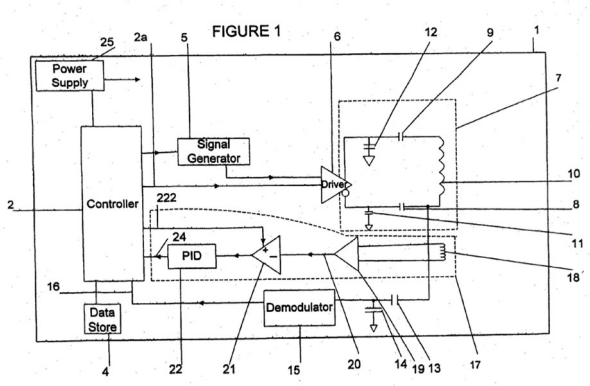
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	 FIGURE 4 Keen at Figure 5  FIGURE 5 Keen at [0046] The RFID reader 1 will of course have or be associated with a power provider 25 for providing a power supply for the various components of the RFID reader 1. In the interests of simplicity, the couplings of most of the various components of the RFID reader 1 to the power provider 25 are omitted in FIG. 1. The power provider 25 may be, for example, an internal battery or may be a coupling to a power supply provided by any host apparatus, system or device of the RFID reader 1. Keen at [0048]

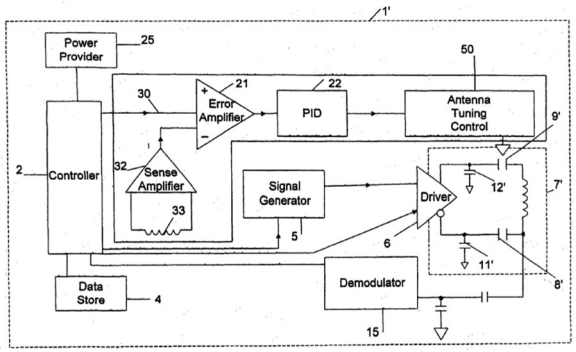
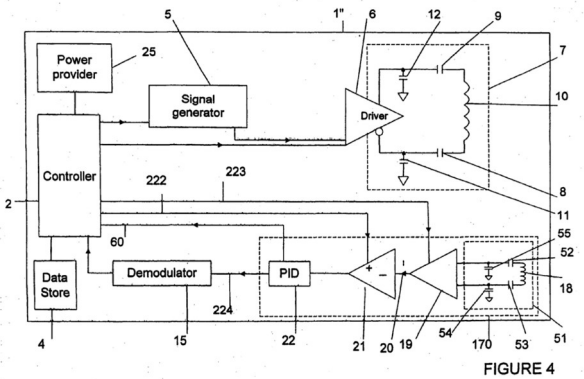
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	To assist the explanation of the operation of the RFID reader 1, FIG. 2 shows a functional block diagram of an RFID data storage tag 30 that may be read by the reader 1 when the tag 30 is in the read range (H field) of the reader 1. In this example, the RFID tag or transponder is a passive device, where "passive" in this context means that the RFID tag derives power from the RF signal supplied by the reader (it is not self-powered). As another possibility, the RFID tag may be an active device having a power provider (similar to that shown for an RFID reader in FIG. 1 as 25) for example at least one of a battery or a coupling to a power source of host device, system or apparatus containing or associated with the RFID tag. Keen at [0091] The NFC communicator 60 of course also has a power provider 91. For convenience the connections of the power provider to the remainder of the NFC communicator 91 are not shown. The power provider 91 may comprise at least one of a power supply such as a battery provided within the NFC communicator 60 and or a connection to a power supply of a host device, apparatus or system. The power provider could also comprise a power deriver for deriving a power supply from an RF signal inductively coupled to the antenna circuit 66 when the NFC communicator is in target mode. Keen at [0092] The controller 61 controls RF signal generation, modulation characteristics of any transmitted RF signal, response to any received RF signal, interpretation of any received demodulated signal, mode of operation (for example initiator or target or active or passive mode) and the communication protocol under which the NFC communicator 60 operates. In responding to a received signal when in target mode, the NFC communicator will respond in a manner dependent upon whether the NFC communicator 60 is operating under the active or passive protocol. Where the NFC communicator is operating under the active protocol, the controller 61 will cause the NFC communicator to respond by generation of a phase-locked modulated signal using the phase-locked loop mechanism whereas in the event the NFC communicator is operating under the passive protocol, the controller 61 may cause the received RF signal to be directly modulated by switching the transistor 83 in accordance with the data to be communicated or may use the phase-locked loop 90 mechanism to effect modulation by interference with the received RF signal (simulated load modulation). To the extent this limitation is not disclosed by Keen, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Keen, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

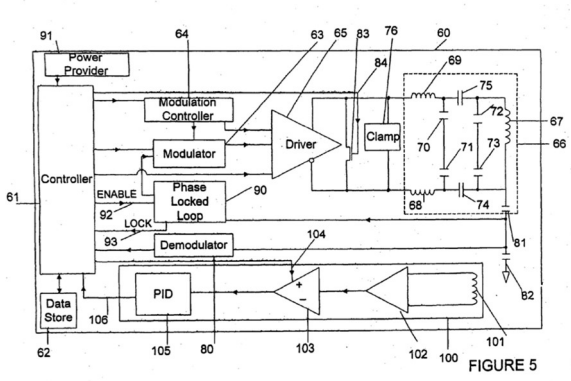
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
[17b] providing power to the smartcard controller and the active transmit driver circuit from the power source of the mobile device;	Keen discloses or renders obvious "providing power to the smartcard controller and the active transmit driver circuit from the power source of the mobile device." For example: *See* [17a] above. Keen at Figure 1  Keen at Figure 3  Keen at Figure 4

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	 FIGURE 4 Keen at Figure 5  FIGURE 5 Keen at [0046] The RFID reader 1 will of course have or be associated with a power provider 25 for providing a power supply for the various components of the RFID reader 1. In the interests of simplicity, the couplings of most of the various components of the RFID reader 1 to the power provider 25 are omitted in FIG. 1. The power provider 25 may be, for example, an internal battery or may be a coupling to a power supply provided by any host apparatus, system or device of the RFID reader 1. Keen at [0048]

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	To assist the explanation of the operation of the RFID reader 1, FIG. 2 shows a functional block diagram of an RFID data storage tag 30 that may be read by the reader 1 when the tag 30 is in the read range (H field) of the reader 1. In this example, the RFID tag or transponder is a passive device, where "passive" in this context means that the RFID tag derives power from the RF signal supplied by the reader (it is not self-powered). As another possibility, the RFID tag may be an active device having a power provider (similar to that shown for an RFID reader in FIG. 1 as 25) for example at least one of a battery or a coupling to a power source of host device, system or apparatus containing or associated with the RFID tag. Keen at [0091] The NFC communicator 60 of course also has a power provider 91. For convenience the connections of the power provider to the remainder of the NFC communicator 91 are not shown. The power provider 91 may comprise at least one of a power supply such as a battery provided within the NFC communicator 60 and or a connection to a power supply of a host device, apparatus or system. The power provider could also comprise a power deriver for deriving a power supply from an RF signal inductively coupled to the antenna circuit 66 when the NFC communicator is in target mode. Keen at [0092] The controller 61 controls RF signal generation, modulation characteristics of any transmitted RF signal, response to any received RF signal, interpretation of any received demodulated signal, mode of operation (for example initiator or target or active or passive mode) and the communication protocol under which the NFC communicator 60 operates. In responding to a received signal when in target mode, the NFC communicator will respond in a manner dependent upon whether the NFC communicator 60 is operating under the active or passive protocol. Where the NFC communicator is operating under the active protocol, the controller 61 will cause the NFC communicator to respond by generation of a phase-locked modulated signal using the phase-locked loop mechanism whereas in the event the NFC communicator is operating under the passive protocol, the controller 61 may cause the received RF signal to be directly modulated by switching the transistor 83 in accordance with the data to be communicated or may use the phase-locked loop 90 mechanism to effect modulation by interference with the received RF signal (simulated load modulation). To the extent this limitation is not disclosed by Keen, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Keen, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
[17c] coupling the active transmit driver circuit to an antenna of the mobile device, wherein the antenna is tuned to operate at substantially 13.56 MHz; and	Keen discloses or renders obvious "coupling the active transmit driver circuit to an antenna of the mobile device, wherein the antenna is tuned to operate at substantially 13.56 MHz." For example: *See* [1c] above. Keen at Abstract A near field communicator has a driver (6) to supply a drive signal to drive an antenna (10) to generate a magnetic field. A magnetic field sensor (18) is located so as to be within a magnetic field generated by the antenna (6) to sense a magnetic field characteristic. A controller (17) provides a control signal to control the operation of the driver (6) to compensate for any difference between the magnetic field characteristic sensed by the magnetic field sensor (18) and a predetermined parameter. Keen at Figure 1  Keen at Figure 3

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	 FIGURE 3 Keen at Figure 4  FIGURE 4 Keen at Figure 5

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	 FIGURE 5 Keen at [0002] Near field communication requires the antenna of one near field communicator to be present within the alternating magnetic field (the H field) generated by the antenna of another near field communicator by transmission of an RF signal, for example a 13.56 Mega Hertz signal. The RF signal is thus inductively coupled between the communicators. The RF signal may be modulated to enable communication of control instructions and/or data and/or may be used by the receiving communicator to derive a power supply. Keen at [0003] Examples of near field communicators are RFID (Radio Frequency Identification) transceivers ("readers") or transponders ("tags") that operate under the RFID ISO/IEC 14443A protocol or ISO/IEC 15693 protocol or NFC (Near Field Communication) communicators operating under the NFCIP-1 (ISO/IEC 18092) or NFCIP-2 (ISO/IEC 21481) protocol. The phrase "near field communicator" will be used herein for any communicator that communicates using radio frequency in the near field (that is the H-field). The phrase "RFID tag" will be used herein for any near field communicator which is operable to respond to a received RF signal by transmission of its own RF signal or through modulation of or interference with the received RF signal. The phrase "RFID reader" will be used herein for any near field communicator which initiates the transmission of an RF signal and which is operable to wait for a response from any near field communicators within the near field of the RF signal. The phrase "NFC communicator" will be reserved for communicators operable to both initiate transmission of an RF signal and to respond to a received RF signal initiated by a second near field communicator. NFC communicators are therefore able to communicate with other NFC communicators, RFID readers and RFID tags.

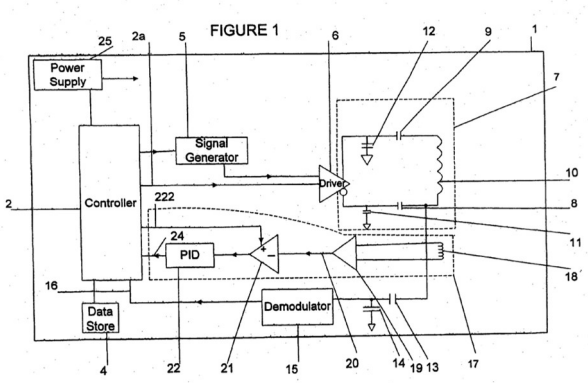
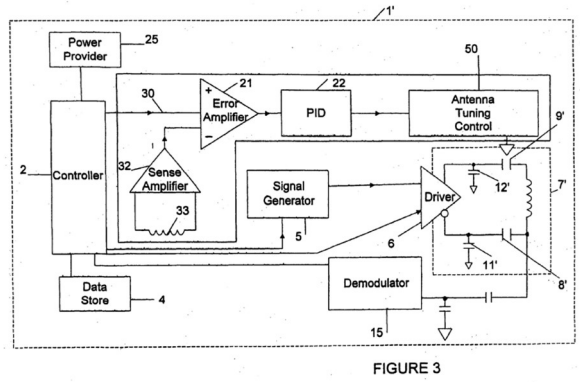
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	Keen at [0009] A further issue is that, in order to create the strongest magnetic field for the lowest drive power, near field communicators generally use an antenna circuit tuned to have a resonant frequency coinciding with or very close to the operating carrier frequency of the near field communicator. One of the most influential parameters of a resonant circuit is its "Q" factor and to achieve optimum read range performance, especially when using small size (small form factor) antennas, relatively high Q factors are used. Although this achieves maximum read range it also makes the communicator very sensitive to the de-tuning effects of nearby metallic and/or magnetic materials. Indeed, the inventors have realised that these de-tuning effects can be more dominant than the unavoidable eddy current loses. Keen at [0028] FIG. 1 shows a functional block diagram of an embodiment of an RFID reader 1 in accordance with the invention which is operable to transmit a radio frequency signal and to detect and demodulate modulation of the transmitted radio frequency signal. The RFID reader 1 may be compatible with a variety of standards or communications protocols, for example ISO/IEC 14443 or ISO/IEC 15693. Keen at [0030] The controller 2 is also coupled to a signal generator 5 for generating a radio frequency signal (for example a 13.56 Mega Hertz RF signal). The generated RF signal may be unmodulated or modulated with control or other data supplied by the controller 2. The signal generator 5 may generate the RF signal in a variety of ways. For example the RF signal may be a digital signal generated by sine synthesis in which case any required modulation will generally be effected by pulse-width modulation (PWM), pulse code modulation or pulse-density modulation (PDM) techniques. As another possibility, the RF signal may be a digital signal generated by use of a pre-configured algorithm or direct digital synthesis. Where sine synthesis is not used additional filtering circuitry may be required (not shown) to meet electromagnetic energy emissions regulations. Other possible modulation schemes that may be used include amplitude shift key (ASK) modulation and load modulation. Keen at [0051] The tag 30 also has a controller 40 for controlling (via control line 41) reading of data from the data store 31 and supply of that data to a modulator 42 coupled to the antenna circuit 32. In the example shown, the modulator 42 comprises a series-connection of a capacitor 43 and an FET 44 coupled across the capacitor 34 of the antenna circuit 32 with the gate electrode of the FET 44 coupled to an output 45 of the data store

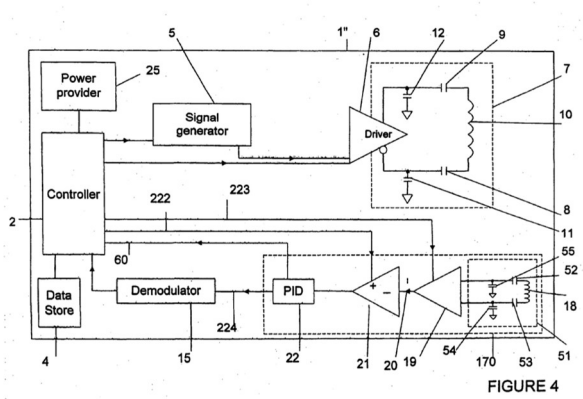
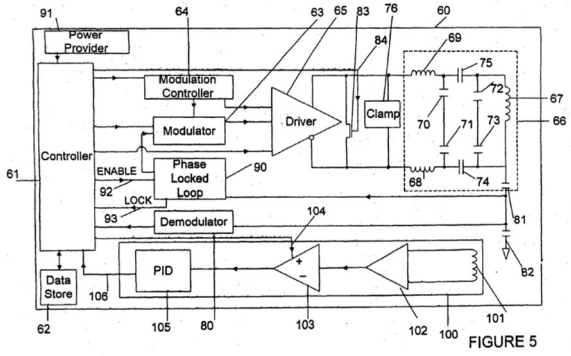
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	31 so that output of data from the data store 31 modulates the load on the antenna circuit 32 and thus on any antenna circuit 7 (FIG. 1) inductively coupled to the antenna circuit 32. Keen at [0053] The tag controller 40 may simply control reading of data from the data store 31 when the tag is powered or may be more sophisticated and may allow data and/or control instructions to be retrieved from a modulated RF signal supplied by a reader 1. An example of the former simple type of tag is shown in FIG. 6 of WO02/093881 while an example of a tag that can receive and store data and/or instructions is shown in FIG. 7 of WO02/093881, the whole contents of which are hereby incorporated by reference. The tag controller 40 may be, for example, a microprocessor, a microcontroller, a controller (for example a reduced instruction set computer) or state machine. The choice will depend on the design of tag used and operational requirements. Keen at [0054] As will be appreciated from the above, the controller 2 of the reader 1 shown in FIG. 1 is configured to control communication with a tag. The actual nature of this control will depend upon the reader and tag configuration or type. Thus, the reader control 2 will control the generation of an RF signal by the signal generator 5, the interruption, where required, of that signal to enable a tag to generate a clock signal, the protocols under which the RFID communicator 1 operates, any modulation of the RF signal and any response to any received modulation of the generated RF signal. As will be appreciated, the pattern of any modulation will represent a series of digital ones and zeros determined by the binary data being transmitted. Keen at [0074] During operation of the RFID reader 1″ shown in FIG. 4, when the controller 2 causes the signal generator 5 to generate an RF signal, the digital signal generated by the signal generator 5 is fed into the differential driver 6 which outputs complementary pulses to the antenna circuit 7. The resulting oscillating magnetic H field produced by the antenna circuit 7 is inductively coupled to the antenna circuit of any tag (for example the tag 30 shown in FIG. 2) within the H field, that is within the read range of the reader 1″. Keen at [0083] FIG. 5 shows a functional block diagram of an embodiment of an NFC communicator 60 in accordance with the invention. Unlike the RFID readers described with reference to FIGS. 1, 3 and 4, an NFC communicator is capable of communicating with transponders or tags, RFID transceivers or readers and other NFC communicators. Examples of such NFC communicators are described in ISO/IEC 18092 and

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	ISO/IEC 21481. Thus, an NFC communicator can operate: 1) in an initiator mode in which the NFC communicator functions in a similar fashion to an RFID reader and will transmit an RF signal; and 2) in a target mode in which the NFC communicator waits for receipt of an RF signal from another NFC communicator operating in initiator mode or an RFID reader, that is it functions like a tag or transponder. NFC communicators may communicate with each other using an active or passive protocol. When using the active protocol, an initiator mode NFC communicator transmits an RF signal and then ceases RF signal transmission and a target mode NFC communicator responds by transmitting its own RF signal and then ceasing RF signal transmission. When using the passive protocol, an initiator mode NFC communicator transmits its RF signal and maintains that RF signal throughout the duration of the communication cycle and a target mode NFC communicator responds by causing modulation of the transmitted RF signal. Keen at [0085] The controller 61 is coupled to a signal modulator 63 for modulating an RF signal in accordance with data provided by the controller 61, to a modulation controller 64 and to a differential driver 65 which is also coupled to the outputs of the signal modulator 63 and the modulation controller 64. The modulation controller 64 may control the amplitude of the signal supplied by the modulator 63. As shown, the modulation controller 64 is separate from the controller 61. The functionality of the modulation controller may however be provided by the controller 61. Keen at [0088] The NFC communicator 60 shown in FIG. 5 has two mechanisms for enabling communication of data when the NFC communicator is in the target mode. One mechanism is a load modulation mechanism as described above with reference to FIG. 2 and the other is an interference mechanism which simulates load modulation. Keen at [0089] The load modulation mechanism is provided by a transistor 83 (as shown a FET) coupled across the antenna coil 67. The controller 61 has a data output 84 coupled to the gate or control electrode of the transistor 83 and, when this mechanism is operational, the transistor 83 is switched on and off in accordance with the data supplied by the controller 61, thereby modulating the load on the antenna circuit 66 and thus an RF signal supplied by the initiator NFC communicator or RFID reader. Keen at [0090]

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	The interference or simulated load modulation mechanism is provided by a phase-locked loop 90 comprising, in this example, a voltage controlled oscillator (VCO), a phase detector, a loop filter and preferably a sample and hold circuit). The phase-locked loop 90 is coupled, as shown via capacitor 81, to the antenna circuit 66. The phase-locked loop 90 generates an internal RF signal which is supplied to the modulator 63 when the NFC communicator 60 is in initiator mode. When, however, the NFC communicator 60 is in target mode, the phase-locked loop 90 is controlled by an enable signal output 92 of the controller 61 to bring the internally generated RF signal into phase ("lock") with an external RF signal coupled to the antenna circuit 66 (that is an RF signal from an initiator mode NFC communicator or RFID reader) so that the internally generated RF signal has a fixed phase relationship to the external RF signal. The phase-locked loop 90 provides a signal to an input 93 of the controller 61 when phase lock has been achieved. This ensures that the target mode NFC communicator can communicate with the initiator mode NFC communicator or RFID reader by modulating its internally generated RF signal. Keen at [0092] The controller 61 controls RF signal generation, modulation characteristics of any transmitted RF signal, response to any received RF signal, interpretation of any received demodulated signal, mode of operation (for example initiator or target or active or passive mode) and the communication protocol under which the NFC communicator 60 operates. In responding to a received signal when in target mode, the NFC communicator will respond in a manner dependent upon whether the NFC communicator 60 is operating under the active or passive protocol. Where the NFC communicator is operating under the active protocol, the controller 61 will cause the NFC communicator to respond by generation of a phase-locked modulated signal using the phase-locked loop mechanism whereas in the event the NFC communicator is operating under the passive protocol, the controller 61 may cause the received RF signal to be directly modulated by switching the transistor 83 in accordance with the data to be communicated or may use the phase-locked loop 90 mechanism to effect modulation by interference with the received RF signal (simulated load modulation). Keen at [0093] The NFC communicator 60 may use a combination of load modulation or carrier interference or may alternatively use only one or the other form of communication. As another possibility, the NFC communicator 60 may comprise multiple antennas, one being used for response to a received RF signal and the other being used for transmission of an RF signal with the antennas being switched on according to need, under the control of the controller of the NFC communicator. Thus, where the NFC communicator is acting in initiator mode, the antenna selected for transmission of an RF signal will be

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	used while where the NFC communicator is, for example, acting as a passive target (i.e. similar to an RFID transponder) the controller 61 will switch the antennas, thereby utilising an antenna more suited to load modulation of an incoming RF signal. Keen at [0098] In operation of the NFC communicator shown in FIG. 5, the sense coil 101 detects the magnetic field at the antenna circuit coil 67. The detected signal is amplified and filtered by the sense amplifier 102 and fed to the error amplifier 103 which compares the received signal against a pre-set desired signal level or threshold level output 104 representing the required magnetic field strength provided by the controller 61 and produces an error or difference signal. This error or difference signal is processed by the control loop stabiliser 105 using PID techniques to provide instruction data utilisable by the controller 61 to control the modulation controller 64 and differential driver 65 to adjust or modify the RF signal fed to the antenna circuit 66 by the driver 65 to compensate for the difference between the sensed magnetic field strength and the required magnetic field strength. *See also* Keen at [0067], [0084], and [0091]. To the extent this limitation is not disclosed by Keen, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Keen, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[17d] driving transmission of data by the active transmit driver circuit from the antenna to the NFC reader.	Keen discloses or renders obvious "driving transmission of data by the active transmit driver circuit from the antenna to the NFC reader." For example: *See* [1d] above. Keen at Figure 1

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	 Keen at Figure 3  FIGURE 3 Keen at Figure 4

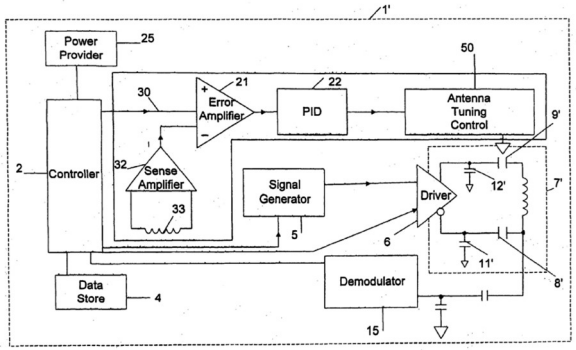
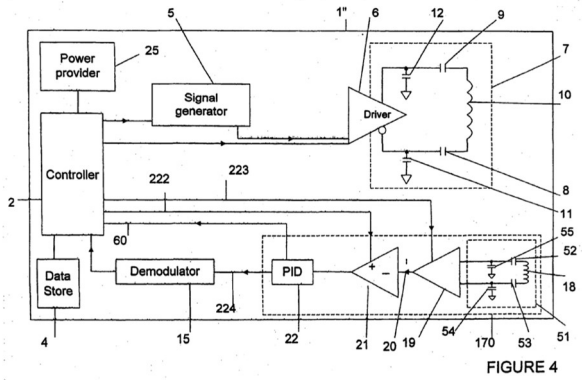
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	 FIGURE 4 Keen at Figure 5  FIGURE 5 Keen at [0009] A further issue is that, in order to create the strongest magnetic field for the lowest drive power, near field communicators generally use an antenna circuit tuned to have a resonant frequency coinciding with or very close to the operating carrier frequency of the near field communicator. One of the most influential parameters of a resonant circuit is its "Q" factor and to achieve optimum read range performance, especially when using small size (small form factor) antennas, relatively high Q factors are used. Although this achieves maximum read range it also makes the communicator very sensitive to the de-tuning effects of nearby metallic and/or magnetic materials. Indeed, the inventors have realised that these de-tuning effects can be more dominant than the unavoidable eddy current loses.

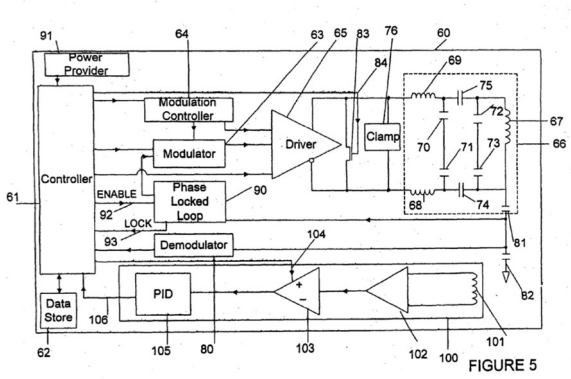
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	Keen at [0028] FIG. 1 shows a functional block diagram of an embodiment of an RFID reader 1 in accordance with the invention which is operable to transmit a radio frequency signal and to detect and demodulate modulation of the transmitted radio frequency signal. The RFID reader 1 may be compatible with a variety of standards or communications protocols, for example ISO/IEC 14443 or ISO/IEC 15693. Keen at [0051] The tag 30 also has a controller 40 for controlling (via control line 41) reading of data from the data store 31 and supply of that data to a modulator 42 coupled to the antenna circuit 32. In the example shown, the modulator 42 comprises a series-connection of a capacitor 43 and an FET 44 coupled across the capacitor 34 of the antenna circuit 32 with the gate electrode of the FET 44 coupled to an output 45 of the data store 31 so that output of data from the data store 31 modulates the load on the antenna circuit 32 and thus on any antenna circuit 7 (FIG. 1) inductively coupled to the antenna circuit 32. Keen at [0053] The tag controller 40 may simply control reading of data from the data store 31 when the tag is powered or may be more sophisticated and may allow data and/or control instructions to be retrieved from a modulated RF signal supplied by a reader 1. An example of the former simple type of tag is shown in FIG. 6 of WO02/093881 while an example of a tag that can receive and store data and/or instructions is shown in FIG. 7 of WO02/093881, the whole contents of which are hereby incorporated by reference. The tag controller 40 may be, for example, a microprocessor, a microcontroller, a controller (for example a reduced instruction set computer) or state machine. The choice will depend on the design of tag used and operational requirements. Keen at [0054] As will be appreciated from the above, the controller 2 of the reader 1 shown in FIG. 1 is configured to control communication with a tag. The actual nature of this control will depend upon the reader and tag configuration or type. Thus, the reader control 2 will control the generation of an RF signal by the signal generator 5, the interruption, where required, of that signal to enable a tag to generate a clock signal, the protocols under which the RFID communicator 1 operates, any modulation of the RF signal and any response to any received modulation of the generated RF signal. As will be appreciated, the pattern of any modulation will represent a series of digital ones and zeros determined by the binary data being transmitted.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	Keen at [0074] During operation of the RFID reader 1″ shown in FIG. 4, when the controller 2 causes the signal generator 5 to generate an RF signal, the digital signal generated by the signal generator 5 is fed into the differential driver 6 which outputs complementary pulses to the antenna circuit 7. The resulting oscillating magnetic H field produced by the antenna circuit 7 is inductively coupled to the antenna circuit of any tag (for example the tag 30 shown in FIG. 2) within the H field, that is within the read range of the reader 1″. Keen at [0083] FIG. 5 shows a functional block diagram of an embodiment of an NFC communicator 60 in accordance with the invention. Unlike the RFID readers described with reference to FIGS. 1, 3 and 4, an NFC communicator is capable of communicating with transponders or tags, RFID transceivers or readers and other NFC communicators. Examples of such NFC communicators are described in ISO/IEC 18092 and ISO/IEC 21481. Thus, an NFC communicator can operate: 1) in an initiator mode in which the NFC communicator functions in a similar fashion to an RFID reader and will transmit an RF signal; and 2) in a target mode in which the NFC communicator waits for receipt of an RF signal from another NFC communicator operating in initiator mode or an RFID reader, that is it functions like a tag or transponder. NFC communicators may communicate with each other using an active or passive protocol. When using the active protocol, an initiator mode NFC communicator transmits an RF signal and then ceases RF signal transmission and a target mode NFC communicator responds by transmitting its own RF signal and then ceasing RF signal transmission. When using the passive protocol, an initiator mode NFC communicator transmits its RF signal and maintains that RF signal throughout the duration of the communication cycle and a target mode NFC communicator responds by causing modulation of the transmitted RF signal. Keen at [0085] The controller 61 is coupled to a signal modulator 63 for modulating an RF signal in accordance with data provided by the controller 61, to a modulation controller 64 and to a differential driver 65 which is also coupled to the outputs of the signal modulator 63 and the modulation controller 64. The modulation controller 64 may control the amplitude of the signal supplied by the modulator 63. As shown, the modulation controller 64 is separate from the controller 61. The functionality of the modulation controller may however be provided by the controller 61. Keen at [0088]

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	The NFC communicator 60 shown in FIG. 5 has two mechanisms for enabling communication of data when the NFC communicator is in the target mode. One mechanism is a load modulation mechanism as described above with reference to FIG. 2 and the other is an interference mechanism which simulates load modulation. Keen at [0089] The load modulation mechanism is provided by a transistor 83 (as shown a FET) coupled across the antenna coil 67. The controller 61 has a data output 84 coupled to the gate or control electrode of the transistor 83 and, when this mechanism is operational, the transistor 83 is switched on and off in accordance with the data supplied by the controller 61, thereby modulating the load on the antenna circuit 66 and thus an RF signal supplied by the initiator NFC communicator or RFID reader. Keen at [0090] The interference or simulated load modulation mechanism is provided by a phase-locked loop 90 comprising, in this example, a voltage controlled oscillator (VCO), a phase detector, a loop filter and preferably a sample and hold circuit). The phase-locked loop 90 is coupled, as shown via capacitor 81, to the antenna circuit 66. The phase-locked loop 90 generates an internal RF signal which is supplied to the modulator 63 when the NFC communicator 60 is in initiator mode. When, however, the NFC communicator 60 is in target mode, the phase-locked loop 90 is controlled by an enable signal output 92 of the controller 61 to bring the internally generated RF signal into phase ("lock") with an external RF signal coupled to the antenna circuit 66 (that is an RF signal from an initiator mode NFC communicator or RFID reader) so that the internally generated RF signal has a fixed phase relationship to the external RF signal. The phase-locked loop 90 provides a signal to an input 93 of the controller 61 when phase lock has been achieved. This ensures that the target mode NFC communicator can communicate with the initiator mode NFC communicator or RFID reader by modulating its internally generated RF signal. Keen at [0092] The controller 61 controls RF signal generation, modulation characteristics of any transmitted RF signal, response to any received RF signal, interpretation of any received demodulated signal, mode of operation (for example initiator or target or active or passive mode) and the communication protocol under which the NFC communicator 60 operates. In responding to a received signal when in target mode, the NFC communicator will respond in a manner dependent upon whether the NFC communicator 60 is operating under the active or passive protocol. Where the NFC communicator is operating under the active protocol, the controller 61 will cause the NFC communicator to respond by generation of a phase-locked modulated signal using the phase-locked loop mechanism whereas in the event the NFC communicator is operating

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	under the passive protocol, the controller 61 may cause the received RF signal to be directly modulated by switching the transistor 83 in accordance with the data to be communicated or may use the phase-locked loop 90 mechanism to effect modulation by interference with the received RF signal (simulated load modulation). Keen at [0093] The NFC communicator 60 may use a combination of load modulation or carrier interference or may alternatively use only one or the other form of communication. As another possibility, the NFC communicator 60 may comprise multiple antennas, one being used for response to a received RF signal and the other being used for transmission of an RF signal with the antennas being switched on according to need, under the control of the controller of the NFC communicator. Thus, where the NFC communicator is acting in initiator mode, the antenna selected for transmission of an RF signal will be used while where the NFC communicator is, for example, acting as a passive target (i.e. similar to an RFID transponder) the controller 61 will switch the antennas, thereby utilising an antenna more suited to load modulation of an incoming RF signal. Keen at [0098] In operation of the NFC communicator shown in FIG. 5, the sense coil 101 detects the magnetic field at the antenna circuit coil 67. The detected signal is amplified and filtered by the sense amplifier 102 and fed to the error amplifier 103 which compares the received signal against a pre-set desired signal level or threshold level output 104 representing the required magnetic field strength provided by the controller 61 and produces an error or difference signal. This error or difference signal is processed by the control loop stabiliser 105 using PID techniques to provide instruction data utilisable by the controller 61 to control the modulation controller 64 and differential driver 65 to adjust or modify the RF signal fed to the antenna circuit 66 by the driver 65 to compensate for the difference between the sensed magnetic field strength and the required magnetic field strength. To the extent this limitation is not disclosed by Keen, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Keen, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
18[pre]. The method of claim 17 further comprising:	Keen discloses or renders obvious "[t]he method of claim 17 further comprising." *See* claim 17 above.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
[18a] amplifying a signal received from the antenna to generate an amplified signal; and	Keen discloses or renders obvious "amplifying a signal received from the antenna to generate an amplified signal." For example: Keen at Figure 3  FIGURE 3 Keen at Figure 4  FIGURE 4 Keen at Figure 5

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
	 FIGURE 5 Keen at [0098] In operation of the NFC communicator shown in FIG. 5, the sense coil 101 detects the magnetic field at the antenna circuit coil 67. The detected signal is amplified and filtered by the sense amplifier 102 and fed to the error amplifier 103 which compares the received signal against a pre-set desired signal level or threshold level output 104 representing the required magnetic field strength provided by the controller 61 and produces an error or difference signal. This error or difference signal is processed by the control loop stabiliser 105 using PID techniques to provide instruction data utilisable by the controller 61 to control the modulation controller 64 and differential driver 65 to adjust or modify the RF signal fed to the antenna circuit 66 by the driver 65 to compensate for the difference between the sensed magnetic field strength and the required magnetic field strength. To the extent this limitation is not disclosed by Keen, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Keen, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 8 and claim 17 above.
[18b] providing the amplified signal to the smartcard controller.	Keen discloses or renders obvious "providing the amplified signal to the smartcard controller." *See* [18a] above. To the extent this limitation is not disclosed by Keen, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Keen, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 8 and claim 17 above.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2008/0194200 ("Keen")
19. The method of claim 10 or 17, wherein the transmitted data includes ticketing information for a mass transit system.	Keen discloses or renders obvious "[t]he method of claim 10 or 17, wherein the transmitted data includes ticketing information for a mass transit system." *See* claim 2 above. *See also* claims 10 and 17 above.
20. The method of claim 10 or 17, wherein the transmitted data includes transaction information for a mobile payment.	Keen discloses or renders obvious "[t]he method of claim 10 or 17, wherein the transmitted data includes transaction information for a mobile payment." *See* claim 3 above. *See also* claims 10 and 17 above.

DEFENDANTS' INVALIDITY CONTENTIONS FOR U.S. PAT. 11,694,053

EXHIBIT C05: Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")

As demonstrated in the claim charts below, the claims of U.S. Patent No. 11,694,053 ("the '053 patent") are invalid (a) under one or more sections of 35 U.S.C. § 102 as anticipated by Philips Specification and (b) under 35 U.S.C. § 103(a) as obvious over Philips Specification standing alone and as set forth herein, and/or combined with the knowledge of a person of ordinary skill in the art, Applicant's Admitted Prior Art, and/or the additional prior art references discussed in Exhibit C and Exhibits C01–C09, the contents of which are hereby incorporated by reference into this chart. One of ordinary skill in the art, as of the priority date of the '053 patent, would have known to combine the prior art elements disclosed by the foregoing references using known methods, and to use these elements according to their established functions in order to achieve a known and predictable result.

Defendants have conducted the invalidity analysis herein based at least in part and in some instance entirely upon Plaintiff's apparent application of the claims of the '053 patent. By charting the prior art against the claims and limitations herein, Defendants are not admitting or agreeing to Plaintiff's application of the claims at issue in this case, and these charts should not be interpreted as an admission or concession by Defendants that any particular construction or application of any claim limitation by Plaintiff is correct or proper. Additionally, these charts provide representative examples of portions of the charted references that disclose the indicated limitations of the claims; additional portions of these references other than the representative examples provided herein may also disclose the indicated limitation(s) and Defendants contend that the asserted claims are invalid in light of the charted reference(s) as a whole in its or their entirety. Where a particular figure is cited, the citation should be understood to encompass the caption and description of the figure as well as any text relating to or describing the figure. Conversely, where particular text referring to a figure is cited, the citation should be understood to include the figure as well.

Claim Element	**Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")**
1[pre]. A mobile device comprising:	By providing this disclosure, Defendants do not take a position on whether the preamble is a claim limitation. Philips Specification discloses or renders obvious "[a] mobile device." For example: Philips Specification at 5 Typical devices to integrate the PN531 are • Mobile phones • PDAs • PCs • Intelligent remote controls • PC peripherals e.g. printers and mice • Consumer electronic devices like digital cameras

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")
	To the extent this limitation is not disclosed by Philips Specification, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Philips Specification, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[1a] a power source;	Philips Specification discloses or renders obvious "a power source." For example: Philips Specification at 4 • 80C51 microcontroller core with 32 kbyte ROM and 1 kbyte RAM • Highly integrated analog circuitry for transmission and reception • Output drivers to connect an antenna with minimum number of external components • Integrated RF Level detector • Integrated mode detector • Hardware and embedded Firmware support for • ISO 14443A reader/writer mode • MIFARE®Classic encryption and MIFARE® higher baudrate communication up to 424 kbit/s • Contactless communication according to the FeliCa™ scheme at 212 kbit/s and 424 kbit/s • NFC standard ECMA 340 and ISO 18092: NFC IP-1 interface and protocol • Host protocol on following interfaces • USB 2.0 full speed compliant device • SPI • I2C • High speed serial UART • Optional interrupt line to the host • Hard reset with low power function • Flexible Power down mode or power reduction mode per software • Internal oscillator to connect a 27.12 MHz quartz • Internal oscillator to connect a 4 MHz quartz for the USB interface • 2.5 - 3.6 V power supply • USB bus powered (In USB mode) • Specific IO ports and interrupt sources for external devices control Philips Specification at 7

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")

The device operates with six individual power supplies for best performance in terms of EMC behaviour and signal de-coupling. This gives outstanding RF performance and maximum flexibility to adapt to different operating voltages of digital and analog parts.

Philips Specification at Figure 3.2

3.2 Pin Description

Pin	Symbol	Type	Pad Ref Voltage	Description
1	DVSS	PWR		Digital Ground
2	LOADMOD	O	DVDD	Load Modulation output provides digital signal for FeliCa and MIFARE® card operating mode
3	TVSS1	PWR		Transmitter Ground: supplies the output stage of TX1 and TX2
4	TX1	O	TVDD	Transmitter 1: delivers the modulated 13.56 MHz energy carrier
5	TVDD	PWR		Transmitter power supply: supplies the output stage of TX1 and TX2
6	TX2	O	TVDD	Transmitter 2: delivers the modulated 13.56 MHz energy carrier
7	TVSS2	PWR		Transmitter Ground: supplies the output stage of TX1 and TX2
8	AVDD	PWR		Analog Power Supply
9	VMID	PWR	AVDD	Internal Reference Voltage: This pin delivers the internal reference voltage.
10	RX	I	AVDD	Receiver Input: Input pin for the reception signal, which is the load modulated 13.56 MHz energy carrier from the antenna circuit.
11	AVSS	PWR		Analog Ground
12	AUX1	O	DVDD	Auxiliary Output: This pin delivers analog and digital test signals.
13	AUX2	O	DVDD	Auxiliary Output: This pin delivers analog and digital test signals.
14	OSCIN	I	AVDD	Crystal Oscillator Input: input to the inverting amplifier of the oscillator. This pin is also the input for an externally generated clock (fosc = 27.12 MHz).
15	OSCOUT	O	AVDD	Crystal Oscillator output: Output of the inverting amplifier of the oscillator.
16	I0	I	DVDD	Interface mode lines: selects the used host interface. In test mode I0 is used as test signals.
17	I1	I	DVDD	Interface mode lines: selects the used host interface. In test mode I0 is used as test signals.
18	TESTEN	I	DVDD	Test enable pin: When set to 1 enable the test mode. When set to 0 reset the TCB and disable the access to the test mode.
19	OSC2OUT	O	DVDD	Crystal Oscillator output: Output of the inverting amplifier of the oscillator for the USB clock.
20	OSC2IN	I	DVDD	Crystal Oscillator Input: input to the inverting amplifier of the oscillator for the USB clock generation. This pin is also the input for an externally generated clock (f_{osc} =4 MHz). In test mode this signal is used as test clock input
21	P35	IO	DVDD	General purpose IO signal
22	P34	IO	SVDD	General purpose IO signal or clk signal for the SAM
23	SIGOUT	O	SVDD	Contactless communication interface output: delivers a serial data stream according to NFCIP-1 and output signal for the SAM. In test mode this signal is used as test signal output.
24	SIGIN	I	SVDD	Contactless communication interface input: accepts a digital, serial data stream according to NFCIP-1 and input signal from the SAM. In test mode

Philips Specification at Figure 3

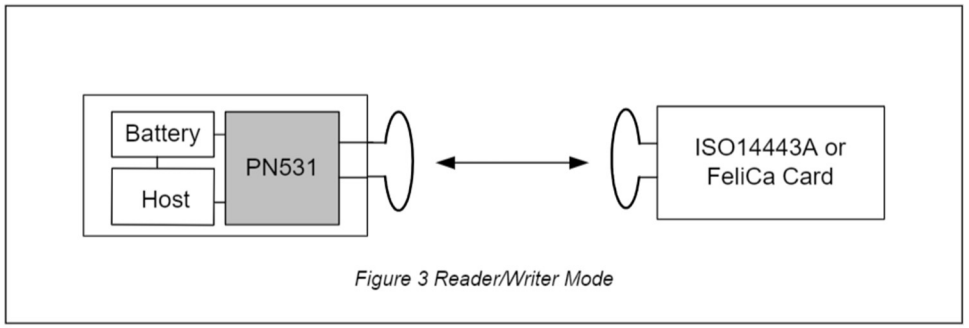
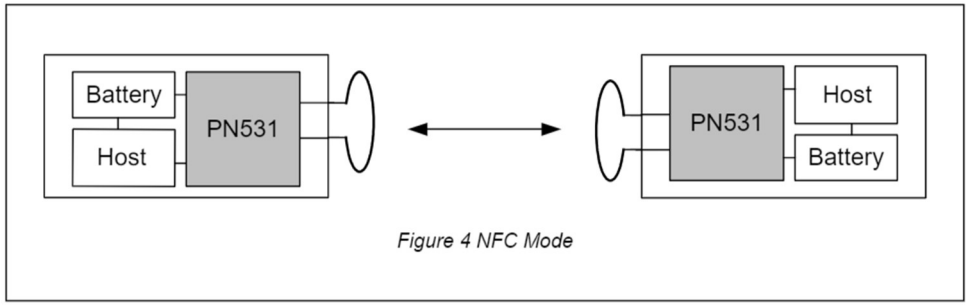


Figure 3 Reader/Writer Mode

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")
	Philips Specification at Figure 4  *Figure 4 NFC Mode* Philips Specification at 11 • Initiator: generates RF field @ 13.56 MHz and starts the NFC communication • Target: responds to initiator commands either using load modulation scheme (RF field continuously generated by Initiator) or using modulation of self generated RF field (no RF field generated by initiator) Philips Specification at Figure 5

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")

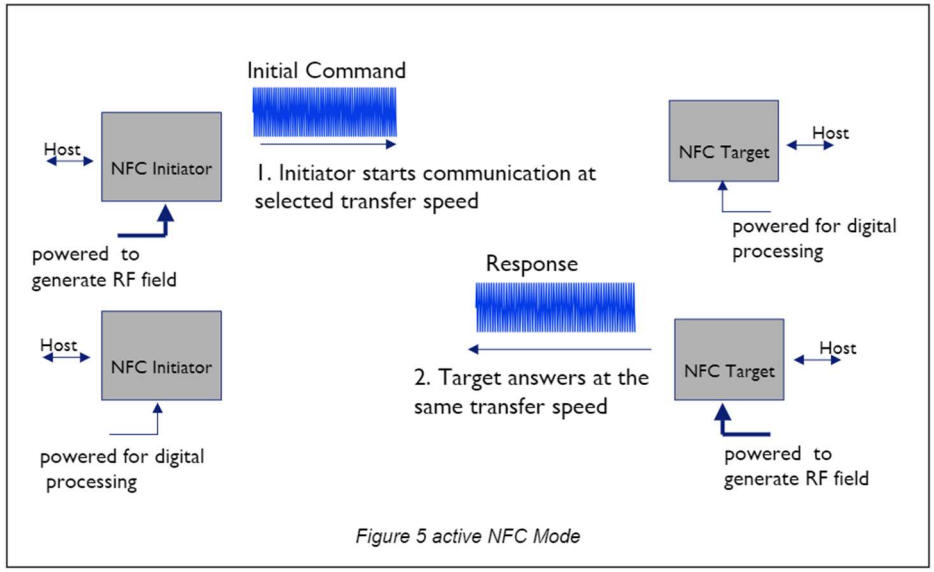


Figure 5 active NFC Mode

Philips Specification at Figure 7

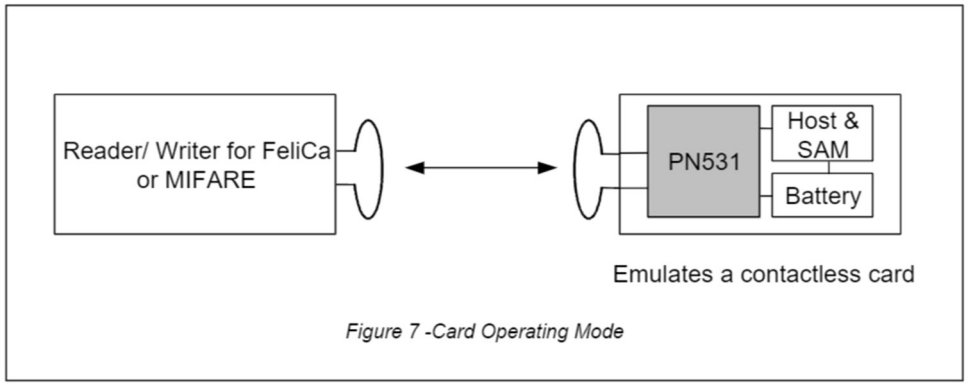


Figure 7 -Card Operating Mode

Philips Specification at Table 6–1

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")
	6.1 Absolute Maximum Continuous Ratings SYMBOL / PARAMETER / MIN / MAX / UNIT AVDD, DVDD, PVDD, SVDD, TVDD — Supply Voltages — -0.5 — 4.0 — V VBUS — USB Supply Voltage — -0.5 — 5.5 — V *Table 6-1: Absolute Maximum Continuous Ratings* To the extent this limitation is not disclosed by Philips Specification, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Philips Specification, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[1b] a smartcard controller coupled to the power source to receive power;	Philips Specification discloses or renders obvious "a smartcard controller coupled to the power source to receive power." For example: Philips Specification at 4 • 80C51 microcontroller core with 32 kbyte ROM and 1 kbyte RAM • Highly integrated analog circuitry for transmission and reception • Output drivers to connect an antenna with minimum number of external components • Integrated RF Level detector • Integrated mode detector • Hardware and embedded Firmware support for • ISO 14443A reader/writer mode • MIFARE®Classic encryption and MIFARE® higher baudrate communication up to 424 kbit/s • Contactless communication according to the FeliCa™ scheme at 212 kbit/s and 424 kbit/s • NFC standard ECMA 340 and ISO 18092: NFC IP-1 interface and protocol • Host protocol on following interfaces • USB 2.0 full speed compliant device • SPI • I2C • High speed serial UART • Optional interrupt line to the host

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")

- Hard reset with low power function
- Flexible Power down mode or power reduction mode per software
- Internal oscillator to connect a 27.12 MHz quartz
- Internal oscillator to connect a 4 MHz quartz for the USB interface
- 2.5 - 3.6 V power supply
- USB bus powered (In USB mode)
- Specific IO ports and interrupt sources for external devices control

Philips Specification at 7

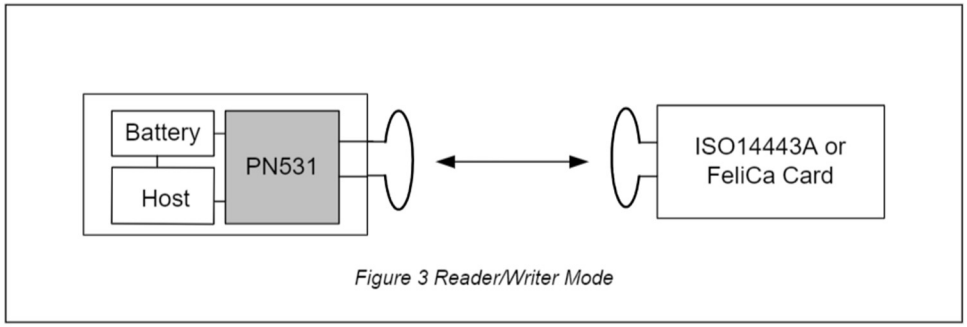
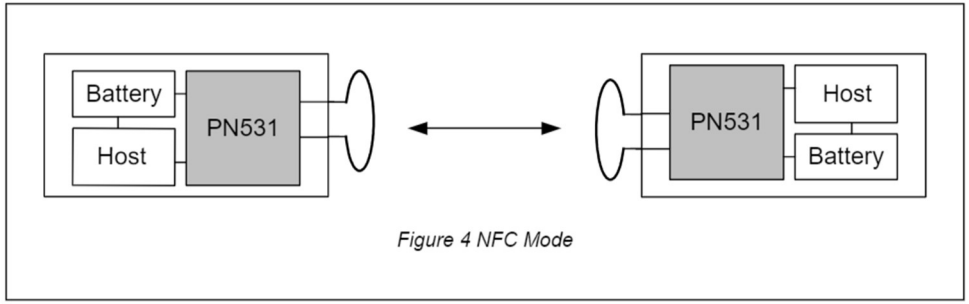
> The device operates with six individual power supplies for best performance in terms of EMC behaviour and signal de-coupling. This gives outstanding RF performance and maximum flexibility to adapt to different operating voltages of digital and analog parts.

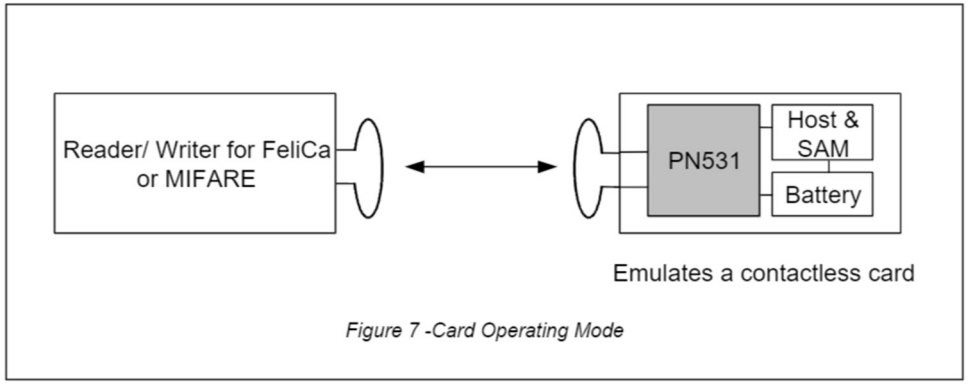
Philips Specification at Figure 3.2

3.2 Pin Description

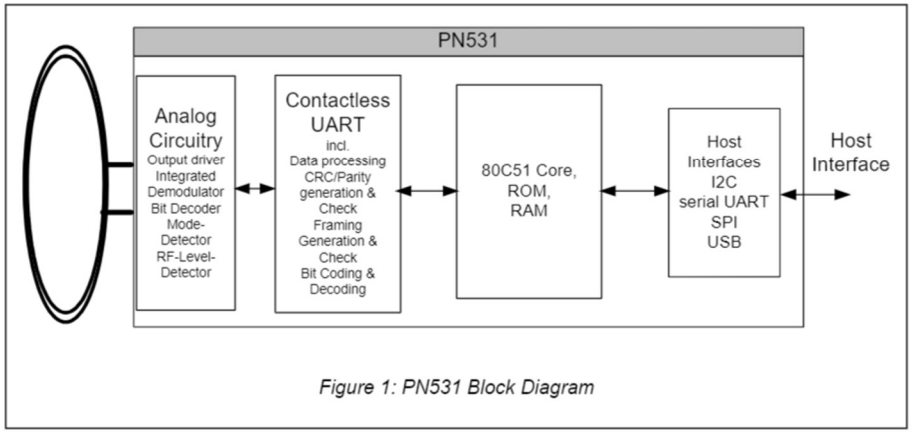
Pin	Symbol	Type	Pad Ref Voltage	Description
1	DVSS	PWR		Digital Ground
2	LOADMOD	O	DVDD	Load Modulation output provides digital signal for FeliCa and MIFARE® card operating mode
3	TVSS1	PWR		Transmitter Ground: supplies the output stage of TX1 and TX2
4	TX1	O	TVDD	Transmitter 1: delivers the modulated 13.56 MHz energy carrier
5	TVDD	PWR		Transmitter power supply: supplies the output stage of TX1 and TX2
6	TX2	O	TVDD	Transmitter 2: delivers the modulated 13.56 MHz energy carrier
7	TVSS2	PWR		Transmitter Ground: supplies the output stage of TX1 and TX2
8	AVDD	PWR		Analog Power Supply
9	VMID	PWR	AVDD	Internal Reference Voltage: This pin delivers the internal reference voltage.
10	RX	I	AVDD	Receiver Input: Input pin for the reception signal, which is the load modulated 13.56 MHz energy carrier from the antenna circuit.
11	AVSS	PWR		Analog Ground
12	AUX1	O	DVDD	Auxiliary Output: This pin delivers analog and digital test signals.
13	AUX2	O	DVDD	Auxiliary Output: This pin delivers analog and digital test signals.
14	OSCIN	I	AVDD	Crystal Oscillator Input: input to the inverting amplifier of the oscillator. This pin is also the input for an externally generated clock (fosc = 27.12 MHz).
15	OSCOUT	O	AVDD	Crystal Oscillator output: Output of the inverting amplifier of the oscillator.
16	I0	I	DVDD	Interface mode lines: selects the used host interface. In test mode I0 is used as test signals.
17	I1	I	DVDD	Interface mode lines: selects the used host interface. In test mode I0 is used as test signals.
18	TESTEN	I	DVDD	Test enable pin: When set to 1 enable the test mode. When set to 0 reset the TCB and disable the access to the test mode.
19	OSC2OUT	O	DVDD	Crystal Oscillator output: Output of the inverting amplifier of the oscillator for the USB clock.
20	OSC2IN	I	DVDD	Crystal Oscillator Input: input to the inverting amplifier of the oscillator for the USB clock generation. This pin is also the input for an externally generated clock (f_{osc} =4 MHz). In test mode this signal is used as test clock input
21	P35	IO	DVDD	General purpose IO signal
22	P34	IO	SVDD	General purpose IO signal or clk signal for the SAM
23	SIGOUT	O	SVDD	Contactless communication interface output: delivers a serial data stream according to NFCIP-1 and output signal for the SAM. In test mode this signal is used as test signal output.
24	SIGIN	I	SVDD	Contactless communication interface input: accepts a digital, serial data stream according to NFCIP-1 and input signal from the SAM. In test mode

Philips Specification at Figure 3

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")
	 *Figure 3 Reader/Writer Mode* Philips Specification at Figure 4  *Figure 4 NFC Mode* Philips Specification at 11 • Initiator: generates RF field @ 13.56 MHz and starts the NFC communication • Target: responds to initiator commands either using load modulation scheme (RF field continuously generated by Initiator) or using modulation of self generated RF field (no RF field generated by initiator) Philips Specification at Figure 7

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")
	 *Figure 7 -Card Operating Mode* Philips Specification at Table 6–1 **6.1 Absolute Maximum Continuous Ratings** SYMBOL / PARAMETER / MIN / MAX / UNIT AVDD, DVDD, PVDD, SVDD, TVDD — Supply Voltages — -0.5 — 4.0 — V VBUS — USB Supply Voltage — -0.5 — 5.5 — V *Table 6-1: Absolute Maximum Continuous Ratings* To the extent this limitation is not disclosed by Philips Specification, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Philips Specification, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[1c] an antenna tuned to operate at substantially 13.56 MHz, wherein the antenna interacts with a Near Field Communication (NFC) reader external to the mobile device; and	Philips Specification discloses or renders obvious "an antenna tuned to operate at substantially 13.56 MHz, wherein the antenna interacts with a Near Field Communication (NFC) reader external to the mobile device." For example: Philips Specification at 3 The PN531 is a highly integrated transmission module for contactless communication at 13.56 MHz including µ-controller functionality based on an 80C51 core with 32 kbyte of ROM and 1 kbyte of RAM. This µc-based transmission module combines an outstanding modulation and demodulation concept

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")
	completely integrated for different kinds of contactless communication methods and protocols at 13.56 MHz with an easy to use firmware for the different supported modes and the required host interfaces. Philips Specification at 3 In reader/ writer mode the PN531's internal transmitter part is able to drive a reader/writer antenna designed to communicate with ISO14443A /MIFARE® or FeliCa™ cards and transponders without additional active circuitry. The receiver part provides a robust and efficient implementation of a demodulation and decoding circuitry for signals from ISO14443A compatible cards and transponders. The digital part handles the complete ISO14443A framing and error detection (Parity & CRC). Philips Specification at 3 In card mode the PN531 is able to answer a reader/writer command either in FeliCa™ or ISO14443A/MIFARE® card mode. The PN531 generates the proper digital load modulated signals and with an external circuit, can respond to commands sent by the reader/writer. Philips Specification at 4 • 80C51 microcontroller core with 32 kbyte ROM and 1 kbyte RAM • Highly integrated analog circuitry for transmission and reception • Output drivers to connect an antenna with minimum number of external components • Integrated RF Level detector • Integrated mode detector • Hardware and embedded Firmware support for • ISO 14443A reader/writer mode • MIFARE®Classic encryption and MIFARE® higher baudrate communication up to 424 kbit/s • Contactless communication according to the FeliCa™ scheme at 212 kbit/s and 424 kbit/s • NFC standard ECMA 340 and ISO 18092: NFC IP-1 interface and protocol • Host protocol on following interfaces • USB 2.0 full speed compliant device • SPI • I2C • High speed serial UART • Optional interrupt line to the host • Hard reset with low power function

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")
	• Flexible Power down mode or power reduction mode per software • Internal oscillator to connect a 27.12 MHz quartz • Internal oscillator to connect a 4 MHz quartz for the USB interface • 2.5 - 3.6 V power supply • USB bus powered (In USB mode) • Specific IO ports and interrupt sources for external devices control Philips Specification at 5 The PN531 is tailored to fulfil the requirements of various applications using contactless communication based on the ECMA340 (NFC IP-1) Interface and protocol standard, the ISO14443A reader and FeliCa reader protocol. NFC IP-1 is also standardised in ISO/IEC 18092. Philips Specification at Figure 1 **2 BLOCK DIAGRAM** **2.1 Simplified PN531 Block Diagram**  *Figure 1: PN531 Block Diagram* Philips Specification at 6 The RF level detector detects the presence of an external RF field at 13.56 MHz.

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")
	Philips Specification at Figure 3.2

3.2 Pin Description

Pin	Symbol	Type	Pad Ref Voltage	Description
1	DVSS	PWR		Digital Ground
2	LOADMOD	O	DVDD	Load Modulation output provides digital signal for FeliCa and MIFARE® card operating mode
3	TVSS1	PWR		Transmitter Ground: supplies the output stage of TX1 and TX2
4	TX1	O	TVDD	Transmitter 1: delivers the modulated 13.56 MHz energy carrier
5	TVDD	PWR		Transmitter power supply: supplies the output stage of TX1 and TX2
6	TX2	O	TVDD	Transmitter 2: delivers the modulated 13.56 MHz energy carrier
7	TVSS2	PWR		Transmitter Ground: supplies the output stage of TX1 and TX2
8	AVDD	PWR		Analog Power Supply
9	VMID	PWR	AVDD	Internal Reference Voltage: This pin delivers the internal reference voltage.
10	RX	I	AVDD	Receiver Input: Input pin for the reception signal, which is the load modulated 13.56 MHz energy carrier from the antenna circuit.
11	AVSS	PWR		Analog Ground
12	AUX1	O	DVDD	Auxiliary Output: This pin delivers analog and digital test signals.
13	AUX2	O	DVDD	Auxiliary Output: This pin delivers analog and digital test signals.
14	OSCIN	I	AVDD	Crystal Oscillator Input: input to the inverting amplifier of the oscillator. This pin is also the input for an externally generated clock (fosc = 27.12 MHz).
15	OSCOUT	O	AVDD	Crystal Oscillator output: Output of the inverting amplifier of the oscillator.
16	I0	I	DVDD	Interface mode lines: selects the used host interface. In test mode I0 is used as test signals.
17	I1	I	DVDD	Interface mode lines: selects the used host interface. In test mode I0 is used as test signals.
18	TESTEN	I	DVDD	Test enable pin: When set to 1 enable the test mode. When set to 0 reset the TCB and disable the access to the test mode.
19	OSC2OUT	O	DVDD	Crystal Oscillator output: Output of the inverting amplifier of the oscillator for the USB clock.
20	OSC2IN	I	DVDD	Crystal Oscillator Input: input to the inverting amplifier of the oscillator for the USB clock generation. This pin is also the input for an externally generated clock (f_{osc} =4 MHz). In test mode this signal is used as test clock input
21	P35	IO	DVDD	General purpose IO signal
22	P34	IO	SVDD	General purpose IO signal or clk signal for the SAM
23	SIGOUT	O	SVDD	Contactless communication interface output: delivers a serial data stream according to NFCIP-1 and output signal for the SAM. In test mode this signal is used as test signal output.
24	SIGIN	I	SVDD	Contactless communication interface input: accepts a digital, serial data stream according to NFCIP-1 and input signal from the SAM. In test mode

Philips Specification at Figure 3

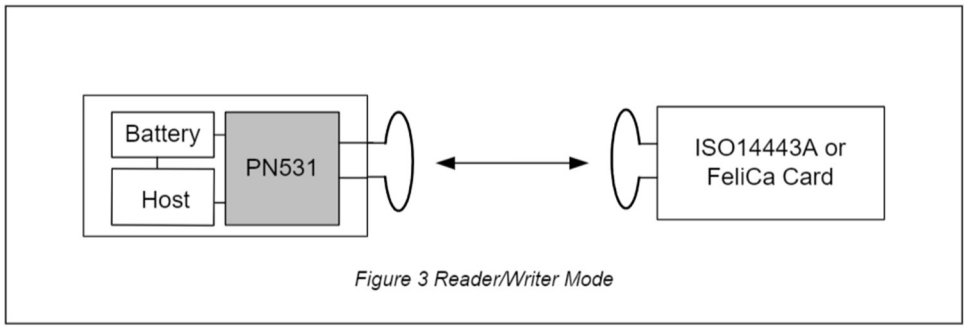


Figure 3 Reader/Writer Mode

Philips Specification at Figure 4

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")

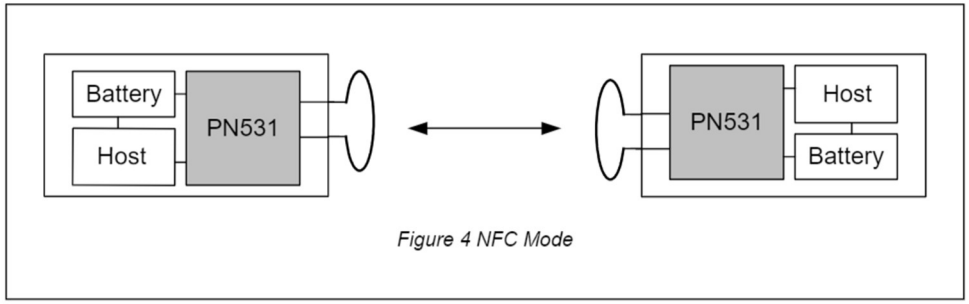


Figure 4 NFC Mode

Philips Specification at 11

- Initiator: generates RF field @ 13.56 MHz and starts the NFC communication
- Target: responds to initiator commands either using load modulation scheme (RF field continuously generated by Initiator) or using modulation of self generated RF field (no RF field generated by initiator)

Philips Specification at Figure 5

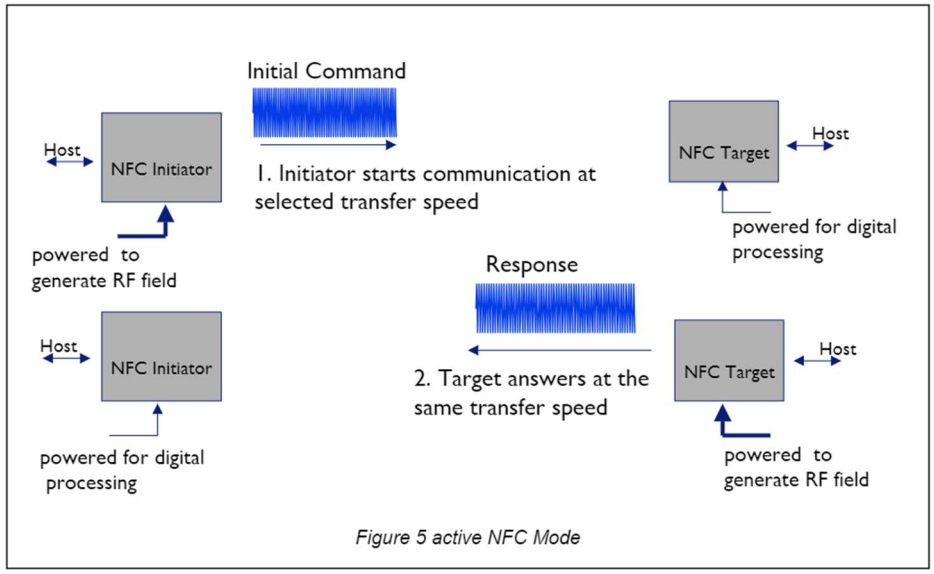
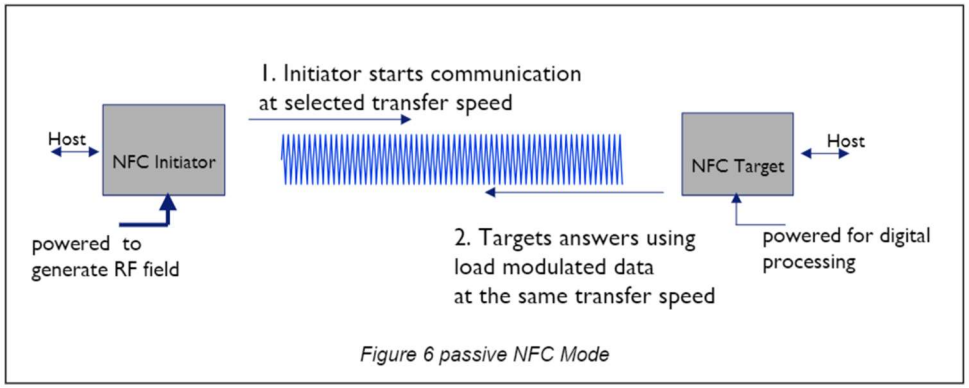
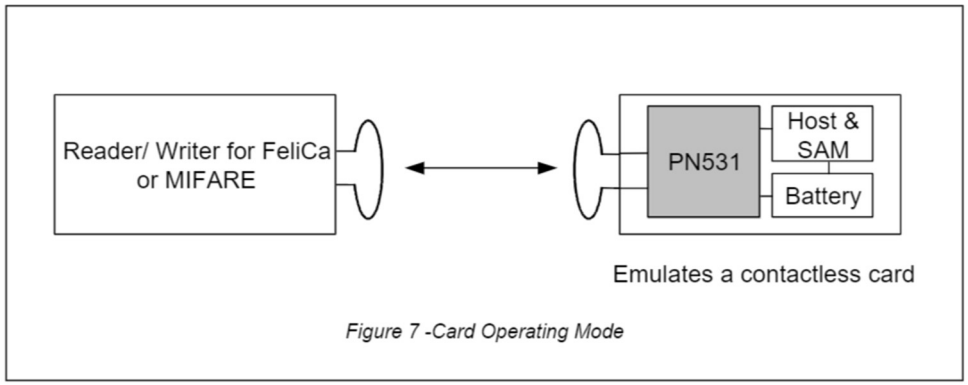
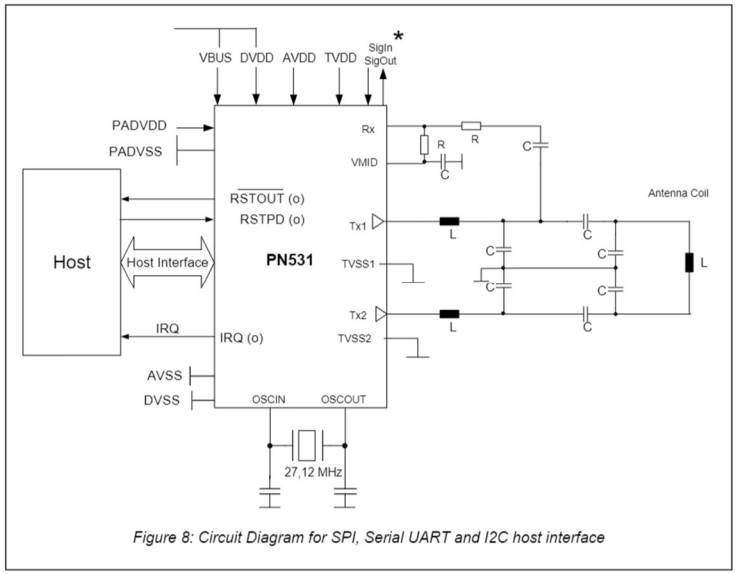
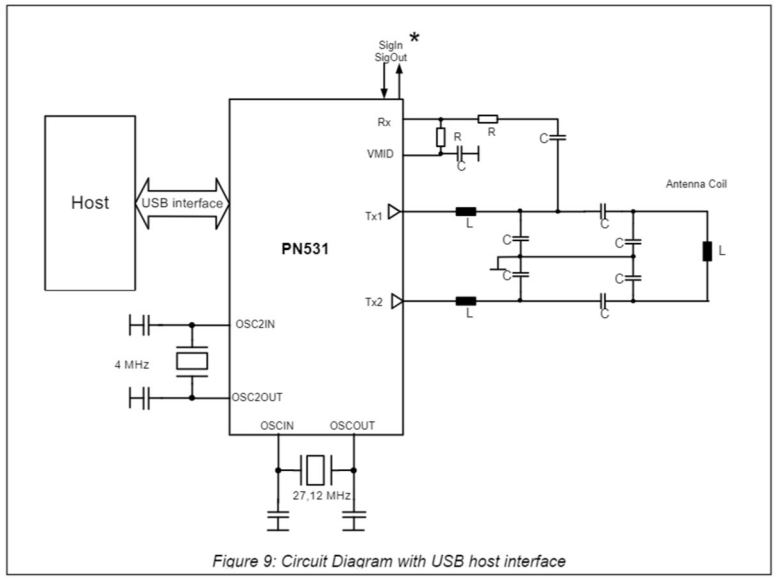


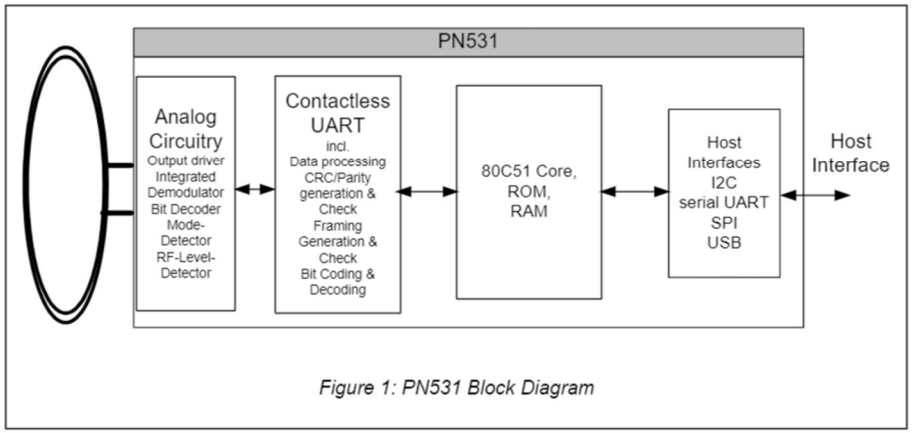
Figure 5 active NFC Mode

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")
	Philips Specification at Figure 6  *Figure 6 passive NFC Mode* Philips Specification at Figure 7  *Figure 7 -Card Operating Mode* Philips Specification at Figure 8

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")
	 *Figure 8: Circuit Diagram for SPI, Serial UART and I2C host interface* Philips Specification at 14 The figure below shows a typical application, where the antenna is directly connected to the PN531. The used host interface is SPI, Serial UART or I2C. Philips Specification at Figure 9

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")
	 *Figure 9: Circuit Diagram with USB host interface* Philips Specification at 15 The figure below shows a typical application where the antenna is directly connected to the PN531. The host interface is USB. *See also* Philips Specification at 3, 6, and 11. To the extent this limitation is not disclosed by Philips Specification, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Philips Specification, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[1d] an active transmit driver circuit coupled to the power source to receive the power, wherein the active transmit driver circuit affects transmission of data between the antenna and the NFC reader.	Philips Specification discloses or renders obvious "an active transmit driver circuit coupled to the power source to receive the power, wherein the active transmit driver circuit affects transmission of data between the antenna and the NFC reader." For example: Philips Specification at 3 In reader/ writer mode the PN531's internal transmitter part is able to drive a reader/writer antenna designed to communicate with ISO14443A /MIFARE® or FeliCa™ cards and transponders without

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")
	additional active circuitry. The receiver part provides a robust and efficient implementation of a demodulation and decoding circuitry for signals from ISO14443A compatible cards and transponders. The digital part handles the complete ISO14443A framing and error detection (Parity & CRC). Philips Specification at 3 In card mode the PN531 is able to answer a reader/writer command either in FeliCa™ or ISO14443A/MIFARE® card mode. The PN531 generates the proper digital load modulated signals and with an external circuit, can respond to commands sent by the reader/writer. Philips Specification at 4 • 80C51 microcontroller core with 32 kbyte ROM and 1 kbyte RAM • Highly integrated analog circuitry for transmission and reception • Output drivers to connect an antenna with minimum number of external components • Integrated RF Level detector • Integrated mode detector • Hardware and embedded Firmware support for • ISO 14443A reader/writer mode • MIFARE®Classic encryption and MIFARE® higher baudrate communication up to 424 kbit/s • Contactless communication according to the FeliCa™ scheme at 212 kbit/s and 424 kbit/s • NFC standard ECMA 340 and ISO 18092: NFC IP-1 interface and protocol • Host protocol on following interfaces • USB 2.0 full speed compliant device • SPI • I2C • High speed serial UART • Optional interrupt line to the host • Hard reset with low power function • Flexible Power down mode or power reduction mode per software • Internal oscillator to connect a 27.12 MHz quartz • Internal oscillator to connect a 4 MHz quartz for the USB interface • 2.5 - 3.6 V power supply • USB bus powered (In USB mode)

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")
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Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")

3.2 Pin Description

Pin	Symbol	Type	Pad Ref Voltage	Description
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3	TVSS1	PWR		Transmitter Ground: supplies the output stage of TX1 and TX2
4	TX1	O	TVDD	Transmitter 1: delivers the modulated 13.56 MHz energy carrier
5	TVDD	PWR		Transmitter power supply: supplies the output stage of TX1 and TX2
6	TX2	O	TVDD	Transmitter 2: delivers the modulated 13.56 MHz energy carrier
7	TVSS2	PWR		Transmitter Ground: supplies the output stage of TX1 and TX2
8	AVDD	PWR		Analog Power Supply
9	VMID	PWR	AVDD	Internal Reference Voltage: This pin delivers the internal reference voltage.
10	RX	I	AVDD	Receiver Input: Input pin for the reception signal, which is the load modulated 13.56 MHz energy carrier from the antenna circuit.
11	AVSS	PWR		Analog Ground
12	AUX1	O	DVDD	Auxiliary Output: This pin delivers analog and digital test signals.
13	AUX2	O	DVDD	Auxiliary Output: This pin delivers analog and digital test signals.
14	OSCIN	I	AVDD	Crystal Oscillator Input: input to the inverting amplifier of the oscillator. This pin is also the input for an externally generated clock (fosc = 27.12 MHz).
15	OSCOUT	O	AVDD	Crystal Oscillator output: Output of the inverting amplifier of the oscillator.
16	I0	I	DVDD	Interface mode lines: selects the used host interface. In test mode I0 is used as test signals.
17	I1	I	DVDD	Interface mode lines: selects the used host interface. In test mode I0 is used as test signals.
18	TESTEN	I	DVDD	Test enable pin: When set to 1 enable the test mode. When set to 0 reset the TCB and disable the access to the test mode.
19	OSC2OUT	O	DVDD	Crystal Oscillator output: Output of the inverting amplifier of the oscillator for the USB clock.
20	OSC2IN	I	DVDD	Crystal Oscillator Input: input to the inverting amplifier of the oscillator for the USB clock generation. This pin is also the input for an externally generated clock (f_{osc} =4 MHz). In test mode this signal is used as test clock input
21	P35	IO	DVDD	General purpose IO signal
22	P34	IO	SVDD	General purpose IO signal or clk signal for the SAM
23	SIGOUT	O	SVDD	Contactless communication interface output: delivers a serial data stream according to NFCIP-1 and output signal for the SAM. In test mode this signal is used as test signal output.
24	SIGIN	I	SVDD	Contactless communication interface input: accepts a digital, serial data stream according to NFCIP-1 and input signal from the SAM. In test mode

Philips Specification at Figure 3

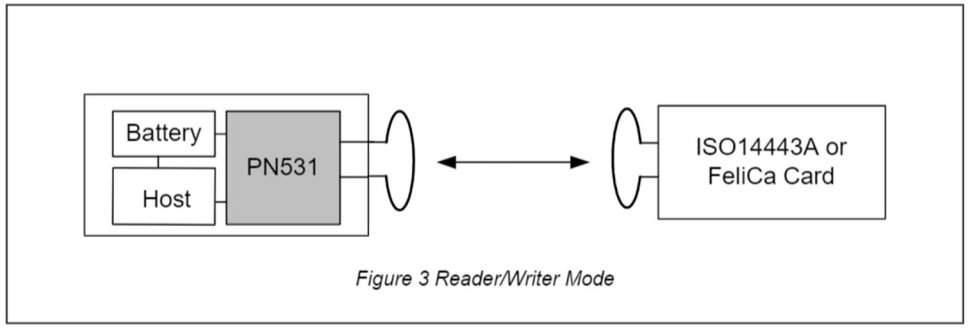
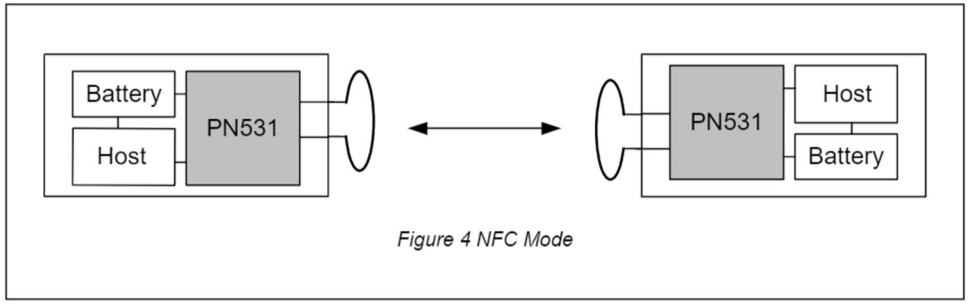
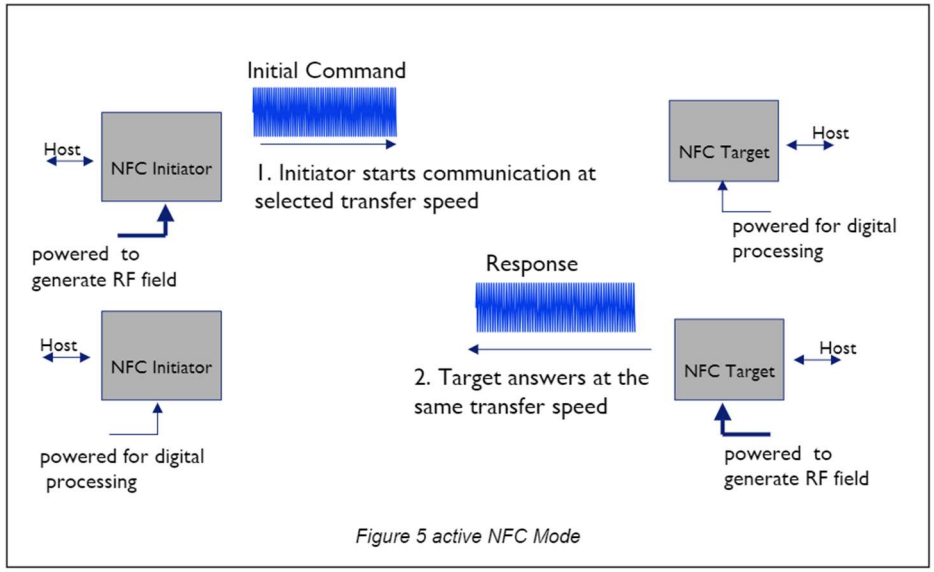
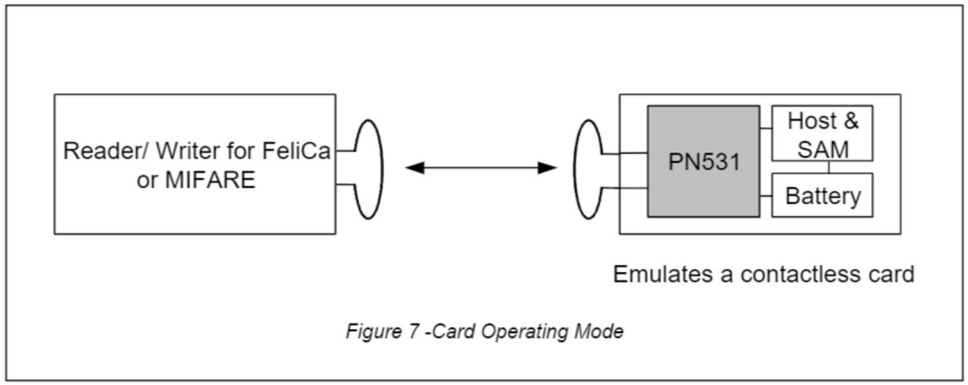
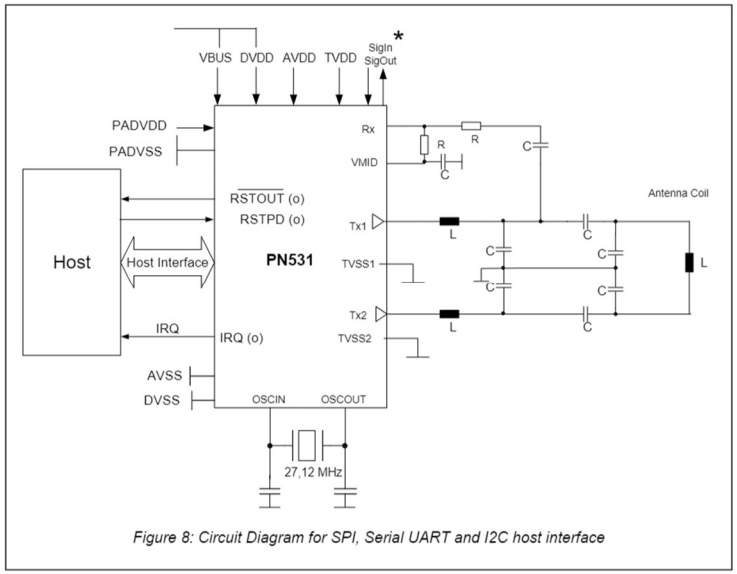


Figure 3 Reader/Writer Mode

Philips Specification at Figure 4

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")
	 *Figure 4 NFC Mode* Philips Specification at 11 NFC communication differentiates between an active and a passive communication. • Active NFC Mode means both the initiator and the target are using their own RF field for the communication. • Passive NFC Mode means that the target answers to an initiator command in a load modulation scheme. The initiator is active i.e. generating the RF field. Philips Specification at 11 • Initiator: generates RF field @ 13.56 MHz and starts the NFC communication • Target: responds to initiator commands either using load modulation scheme (RF field continuously generated by Initiator) or using modulation of self generated RF field (no RF field generated by initiator) Philips Specification at Figure 5

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")
	 *Figure 5 active NFC Mode* Philips Specification at Figure 7  *Figure 7 -Card Operating Mode* Philips Specification at Figure 8

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")
	 *Figure 8: Circuit Diagram for SPI, Serial UART and I2C host interface* Philips Specification at Figure 9

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")

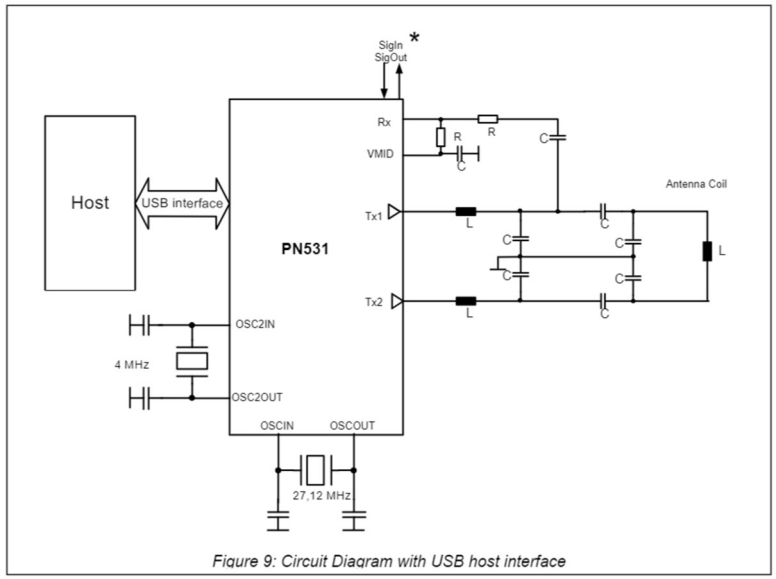


Figure 9: Circuit Diagram with USB host interface

Philips Specification at Table 6–1

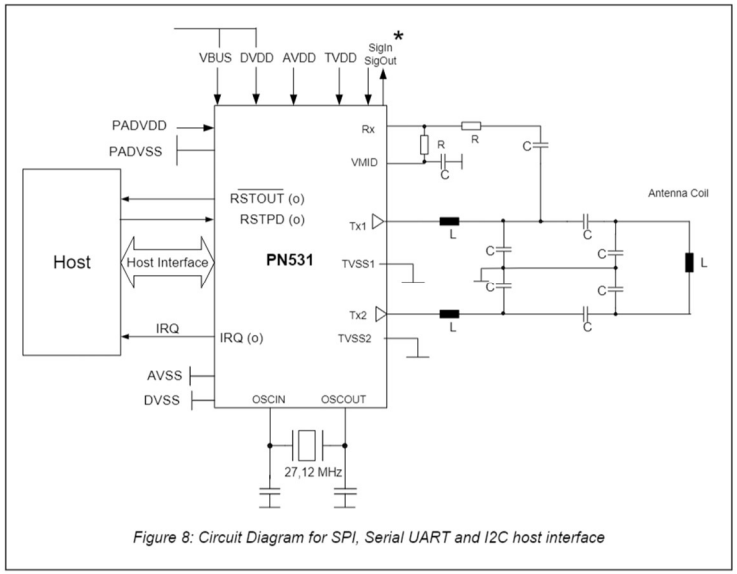
6.1 Absolute Maximum Continuous Ratings

SYMBOL	PARAMETER	MIN	MAX	UNIT
AVDD DVDD PVDD SVDD TVDD	Supply Voltages	-0.5	4.0	V
VBUS	USB Supply Voltage	-0.5	5.5	V

Table 6-1: Absolute Maximum Continuous Ratings

To the extent this limitation is not disclosed by Philips Specification, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Philips Specification, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

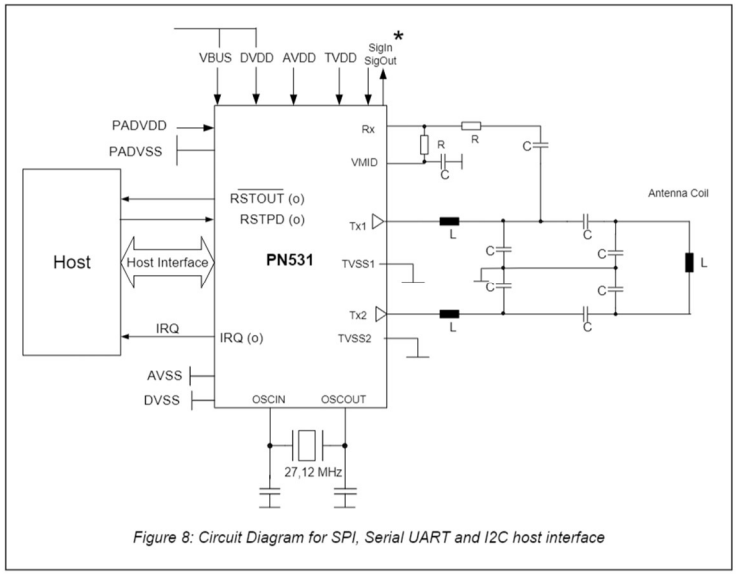
Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")
2. The mobile device of claim 1, wherein the transmitted data includes ticketing information for a mass transit system.	To the extent this limitation is not disclosed by Philips Specification, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Philips Specification, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 1 above.
3. The mobile device of claim 1, wherein the transmitted data includes transaction information for a mobile payment.	To the extent this limitation is not disclosed by Philips Specification, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Philips Specification, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.\ *See also* claim 1 above.
4. The mobile device of claim 1, wherein the NFC reader is a point-of-sale NFC reader.	To the extent this limitation is not disclosed by Philips Specification, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Philips Specification, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 1 above.
5. The mobile device of claim 1, wherein the antenna includes an inductive element.	Philips Specification discloses or renders obvious "[t]he mobile device of claim 1, wherein the antenna includes an inductive element." For example: Philips Specification at Figure 8

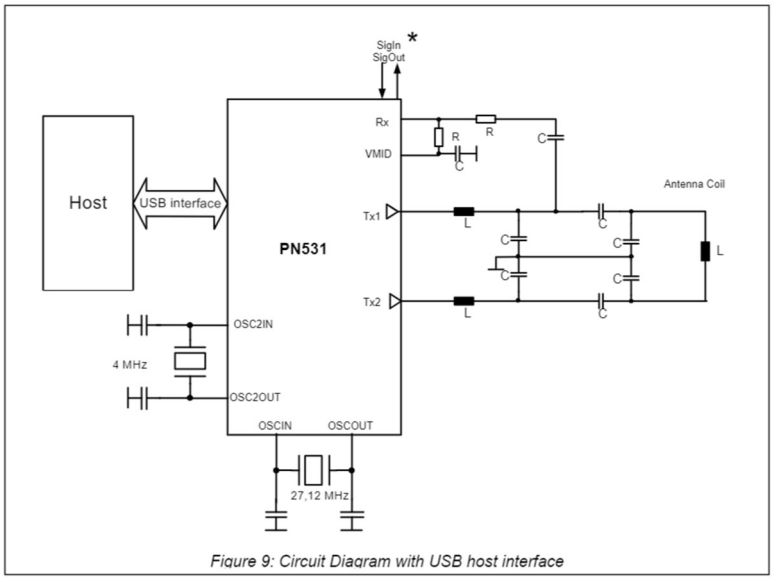
Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")
	 *Figure 8: Circuit Diagram for SPI, Serial UART and I2C host interface* To the extent this limitation is not disclosed by Philips Specification, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Philips Specification, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 1 above.
6. The mobile device of claim 1, wherein the active transmit driver circuit includes one or more of an amplifier filter, oscillator, and/or modulator.	Philips Specification discloses or renders obvious "[t]he mobile device of claim 1, wherein the active transmit driver circuit includes one or more of an amplifier filter, oscillator, and/or modulator." For example: Philips Specification at 4 • 80C51 microcontroller core with 32 kbyte ROM and 1 kbyte RAM • Highly integrated analog circuitry for transmission and reception • Output drivers to connect an antenna with minimum number of external components • Integrated RF Level detector • Integrated mode detector • Hardware and embedded Firmware support for • ISO 14443A reader/writer mode

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")
	• MIFARE®Classic encryption and MIFARE® higher baudrate communication up to 424 kbit/s • Contactless communication according to the FeliCa™ scheme at 212 kbit/s and 424 kbit/s • NFC standard ECMA 340 and ISO 18092: NFC IP-1 interface and protocol • Host protocol on following interfaces • USB 2.0 full speed compliant device • SPI • I2C • High speed serial UART • Optional interrupt line to the host • Hard reset with low power function • Flexible Power down mode or power reduction mode per software • Internal oscillator to connect a 27.12 MHz quartz • Internal oscillator to connect a 4 MHz quartz for the USB interface • 2.5 - 3.6 V power supply • USB bus powered (In USB mode) • Specific IO ports and interrupt sources for external devices control Philips Specification at Figure 3.2

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")
	3.2 Pin Description Philips Specification at Figure 8

Pin	Symbol	Type	Pad Ref Voltage	Description
1	DVSS	PWR		Digital Ground
2	LOADMOD	O	DVDD	Load Modulation output provides digital signal for FeliCa and MIFARE® card operating mode
3	TVSS1	PWR		Transmitter Ground: supplies the output stage of TX1 and TX2
4	TX1	O	TVDD	Transmitter 1: delivers the modulated 13.56 MHz energy carrier
5	TVDD	PWR		Transmitter power supply: supplies the output stage of TX1 and TX2
6	TX2	O	TVDD	Transmitter 2: delivers the modulated 13.56 MHz energy carrier
7	TVSS2	PWR		Transmitter Ground: supplies the output stage of TX1 and TX2
8	AVDD	PWR		Analog Power Supply
9	VMID	PWR	AVDD	Internal Reference Voltage: This pin delivers the internal reference voltage.
10	RX	I	AVDD	Receiver Input: Input pin for the reception signal, which is the load modulated 13.56 MHz energy carrier from the antenna circuit.
11	AVSS	PWR		Analog Ground
12	AUX1	O	DVDD	Auxiliary Output: This pin delivers analog and digital test signals.
13	AUX2	O	DVDD	Auxiliary Output: This pin delivers analog and digital test signals.
14	OSCIN	I	AVDD	Crystal Oscillator Input: input to the inverting amplifier of the oscillator. This pin is also the input for an externally generated clock (fosc = 27.12 MHz).
15	OSCOUT	O	AVDD	Crystal Oscillator output: Output of the inverting amplifier of the oscillator.
16	I0	I	DVDD	Interface mode lines: selects the used host interface. In test mode I0 is used as test signals.
17	I1	I	DVDD	Interface mode lines: selects the used host interface. In test mode I0 is used as test signals.
18	TESTEN	I	DVDD	Test enable pin: When set to 1 enable the test mode. When set to 0 reset the TCB and disable the access to the test mode.
19	OSC2OUT	O	DVDD	Crystal Oscillator output: Output of the inverting amplifier of the oscillator for the USB clock.
20	OSC2IN	I	DVDD	Crystal Oscillator Input: input to the inverting amplifier of the oscillator for the USB clock generation. This pin is also the input for an externally generated clock (f_{osc} =4 MHz). In test mode this signal is used as test clock input
21	P35	IO	DVDD	General purpose IO signal
22	P34	IO	SVDD	General purpose IO signal or clk signal for the SAM
23	SIGOUT	O	SVDD	Contactless communication interface output: delivers a serial data stream according to NFCIP-1 and output signal for the SAM. In test mode this signal is used as test signal output.
24	SIGIN	I	SVDD	Contactless communication interface input: accepts a digital, serial data stream according to NFCIP-1 and input signal from the SAM. In test mode

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")
	 *Figure 8: Circuit Diagram for SPI, Serial UART and I2C host interface* Philips Specification at Figure 9

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")
	 *Figure 9: Circuit Diagram with USB host interface* To the extent this limitation is not disclosed by Philips Specification, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Philips Specification, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 1 above.
7. The mobile device of claim 1 comprising an amplifier coupled to the power source to receive the power, wherein the amplifier is further coupled to the antenna.	Philips Specification discloses or renders obvious "[t]he mobile device of claim 1 comprising an amplifier coupled to the power source to receive the power, wherein the amplifier is further coupled to the antenna." For example: Philips Specification at 4 • 80C51 microcontroller core with 32 kbyte ROM and 1 kbyte RAM • Highly integrated analog circuitry for transmission and reception • Output drivers to connect an antenna with minimum number of external components • Integrated RF Level detector • Integrated mode detector • Hardware and embedded Firmware support for

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")
	• ISO 14443A reader/writer mode • MIFARE®Classic encryption and MIFARE® higher baudrate communication up to 424 kbit/s • Contactless communication according to the FeliCa™ scheme at 212 kbit/s and 424 kbit/s • NFC standard ECMA 340 and ISO 18092: NFC IP-1 interface and protocol • Host protocol on following interfaces • USB 2.0 full speed compliant device • SPI • I2C • High speed serial UART • Optional interrupt line to the host • Hard reset with low power function • Flexible Power down mode or power reduction mode per software • Internal oscillator to connect a 27.12 MHz quartz • Internal oscillator to connect a 4 MHz quartz for the USB interface • 2.5 - 3.6 V power supply • USB bus powered (In USB mode) • Specific IO ports and interrupt sources for external devices control Philips Specification at 7 The device operates with six individual power supplies for best performance in terms of EMC behaviour and signal de-coupling. This gives outstanding RF performance and maximum flexibility to adapt to different operating voltages of digital and analog parts. Philips Specification at Figure 3.2

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")

3.2 Pin Description

Pin	Symbol	Type	Pad Ref Voltage	Description
1	DVSS	PWR		Digital Ground
2	LOADMOD	O	DVDD	Load Modulation output provides digital signal for FeliCa and MIFARE® card operating mode
3	TVSS1	PWR		Transmitter Ground: supplies the output stage of TX1 and TX2
4	TX1	O	TVDD	Transmitter 1: delivers the modulated 13.56 MHz energy carrier
5	TVDD	PWR		Transmitter power supply: supplies the output stage of TX1 and TX2
6	TX2	O	TVDD	Transmitter 2: delivers the modulated 13.56 MHz energy carrier
7	TVSS2	PWR		Transmitter Ground: supplies the output stage of TX1 and TX2
8	AVDD	PWR		Analog Power Supply
9	VMID	PWR	AVDD	Internal Reference Voltage: This pin delivers the internal reference voltage.
10	RX	I	AVDD	Receiver Input: Input pin for the reception signal, which is the load modulated 13.56 MHz energy carrier from the antenna circuit.
11	AVSS	PWR		Analog Ground
12	AUX1	O	DVDD	Auxiliary Output: This pin delivers analog and digital test signals.
13	AUX2	O	DVDD	Auxiliary Output: This pin delivers analog and digital test signals.
14	OSCIN	I	AVDD	Crystal Oscillator Input: input to the inverting amplifier of the oscillator. This pin is also the input for an externally generated clock (fosc = 27.12 MHz).
15	OSCOUT	O	AVDD	Crystal Oscillator output: Output of the inverting amplifier of the oscillator.
16	I0	I	DVDD	Interface mode lines: selects the used host interface. In test mode I0 is used as test signals.
17	I1	I	DVDD	Interface mode lines: selects the used host interface. In test mode I0 is used as test signals.
18	TESTEN	I	DVDD	Test enable pin: When set to 1 enable the test mode. When set to 0 reset the TCB and disable the access to the test mode.
19	OSC2OUT	O	DVDD	Crystal Oscillator output: Output of the inverting amplifier of the oscillator for the USB clock.
20	OSC2IN	I	DVDD	Crystal Oscillator Input: input to the inverting amplifier of the oscillator for the USB clock generation. This pin is also the input for an externally generated clock (f_{osc} =4 MHz). In test mode this signal is used as test clock input
21	P35	IO	DVDD	General purpose IO signal
22	P34	IO	SVDD	General purpose IO signal or clk signal for the SAM
23	SIGOUT	O	SVDD	Contactless communication interface output: delivers a serial data stream according to NFCIP-1 and output signal for the SAM. In test mode this signal is used as test signal output.
24	SIGIN	I	SVDD	Contactless communication interface input: accepts a digital, serial data stream according to NFCIP-1 and input signal from the SAM. In test mode

Philips Specification at Figure 3

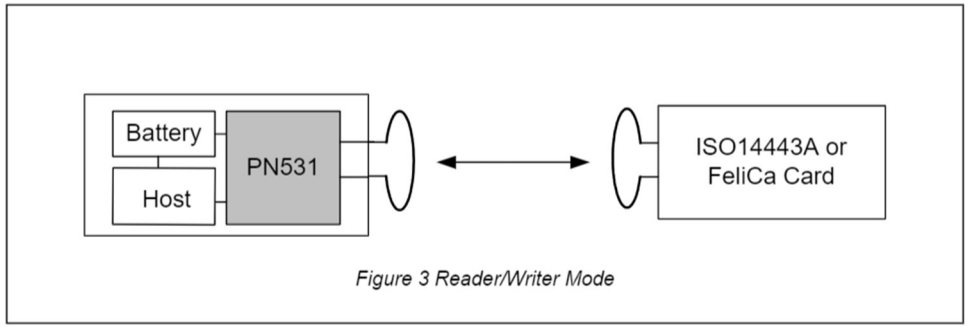


Figure 3 Reader/Writer Mode

Philips Specification at Figure 4

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")

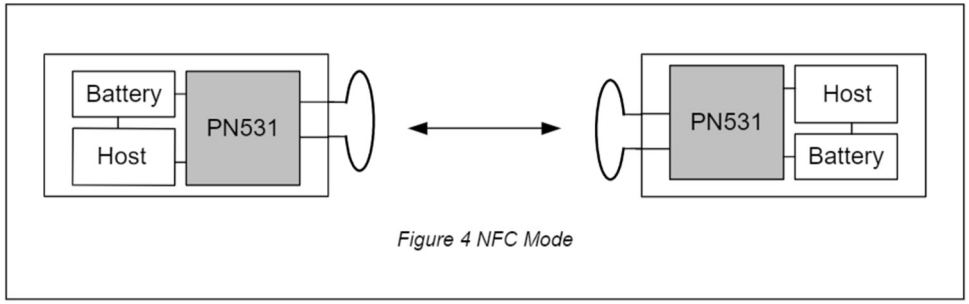


Figure 4 NFC Mode

Philips Specification at Figure 7

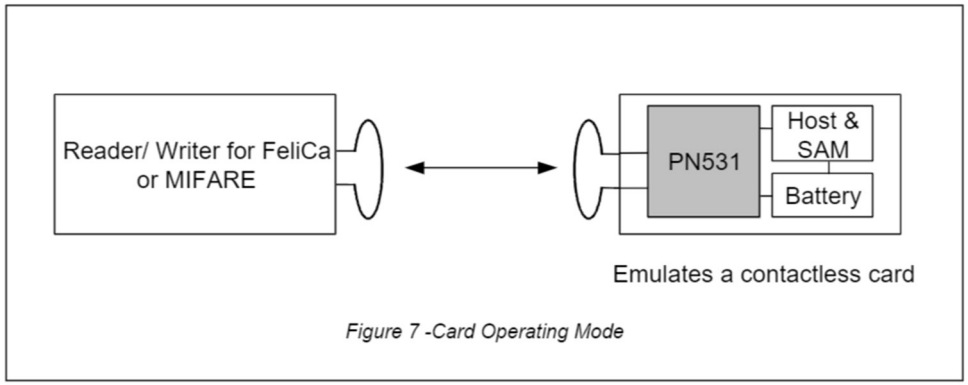


Figure 7 -Card Operating Mode

Philips Specification at Table 6–1

6.1 Absolute Maximum Continuous Ratings

SYMBOL	PARAMETER	MIN	MAX	UNIT
AVDD DVDD PVDD SVDD TVDD	Supply Voltages	-0.5	4.0	V
VBUS	USB Supply Voltage	-0.5	5.5	V

Table 6-1: Absolute Maximum Continuous Ratings

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")
	To the extent this limitation is not disclosed by Philips Specification, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Philips Specification, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 1 above.
8. The mobile device of claim 7, wherein the amplifier amplifies a signal received at the antenna and generates an amplified signal, and provides the amplified signal to the smartcard controller.	Philips Specification discloses or renders obvious "[t]he mobile device of claim 7, wherein the amplifier amplifies a signal received at the antenna and generates an amplified signal, and provides the amplified signal to the smartcard controller." For example: *See* claim 7 above. To the extent this limitation is not disclosed by Philips Specification, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Philips Specification, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 7 above.
17[pre]. A method of near field communication between a mobile device and an NFC reader, the method comprising:	By providing this disclosure, Defendants do not take a position on whether the preamble is a claim limitation. Philips Specification discloses or renders obvious "[a] method of near field communication between a mobile device and an NFC reader, the method." For example: *See* [1d] above. Philips Specification at 5 Typical devices to integrate the PN531 are • Mobile phones • PDAs • PCs • Intelligent remote controls • PC peripherals e.g. printers and mice • Consumer electronic devices like digital cameras To the extent this limitation is not disclosed by Philips Specification, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Philips Specification, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")
[17a] coupling a smartcard controller and an active transmit driver circuit to a power source of the mobile device;	Philips Specification discloses or renders obvious "coupling a smartcard controller and an active transmit driver circuit to a power source of the mobile device." For example: Philips Specification at 4 • 80C51 microcontroller core with 32 kbyte ROM and 1 kbyte RAM • Highly integrated analog circuitry for transmission and reception • Output drivers to connect an antenna with minimum number of external components • Integrated RF Level detector • Integrated mode detector • Hardware and embedded Firmware support for • ISO 14443A reader/writer mode • MIFARE®Classic encryption and MIFARE® higher baudrate communication up to 424 kbit/s • Contactless communication according to the FeliCa™ scheme at 212 kbit/s and 424 kbit/s • NFC standard ECMA 340 and ISO 18092: NFC IP-1 interface and protocol • Host protocol on following interfaces • USB 2.0 full speed compliant device • SPI • I2C • High speed serial UART • Optional interrupt line to the host • Hard reset with low power function • Flexible Power down mode or power reduction mode per software • Internal oscillator to connect a 27.12 MHz quartz • Internal oscillator to connect a 4 MHz quartz for the USB interface • 2.5 - 3.6 V power supply • USB bus powered (In USB mode) • Specific IO ports and interrupt sources for external devices control Philips Specification at 7 The device operates with six individual power supplies for best performance in terms of EMC behaviour and signal de-coupling. This gives outstanding RF performance and maximum flexibility to adapt to different operating voltages of digital and analog parts.

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")
	Philips Specification at Figure 3.2

3.2 Pin Description

Pin	Symbol	Type	Pad Ref Voltage	Description
1	DVSS	PWR		Digital Ground
2	LOADMOD	O	DVDD	Load Modulation output provides digital signal for FeliCa and MIFARE® card operating mode
3	TVSS1	PWR		Transmitter Ground: supplies the output stage of TX1 and TX2
4	TX1	O	TVDD	Transmitter 1: delivers the modulated 13.56 MHz energy carrier
5	TVDD	PWR		Transmitter power supply: supplies the output stage of TX1 and TX2
6	TX2	O	TVDD	Transmitter 2: delivers the modulated 13.56 MHz energy carrier
7	TVSS2	PWR		Transmitter Ground: supplies the output stage of TX1 and TX2
8	AVDD	PWR		Analog Power Supply
9	VMID	PWR	AVDD	Internal Reference Voltage: This pin delivers the internal reference voltage.
10	RX	I	AVDD	Receiver Input: Input pin for the reception signal, which is the load modulated 13.56 MHz energy carrier from the antenna circuit.
11	AVSS	PWR		Analog Ground
12	AUX1	O	DVDD	Auxiliary Output: This pin delivers analog and digital test signals.
13	AUX2	O	DVDD	Auxiliary Output: This pin delivers analog and digital test signals.
14	OSCIN	I	AVDD	Crystal Oscillator Input: input to the inverting amplifier of the oscillator. This pin is also the input for an externally generated clock (fosc = 27.12 MHz).
15	OSCOUT	O	AVDD	Crystal Oscillator output: Output of the inverting amplifier of the oscillator.
16	I0	I	DVDD	Interface mode lines: selects the used host interface. In test mode I0 is used as test signals.
17	I1	I	DVDD	Interface mode lines: selects the used host interface. In test mode I0 is used as test signals.
18	TESTEN	I	DVDD	Test enable pin: When set to 1 enable the test mode. When set to 0 reset the TCB and disable the access to the test mode.
19	OSC2OUT	O	DVDD	Crystal Oscillator output: Output of the inverting amplifier of the oscillator for the USB clock.
20	OSC2IN	I	DVDD	Crystal Oscillator Input: input to the inverting amplifier of the oscillator for the USB clock generation. This pin is also the input for an externally generated clock (f_{osc} =4 MHz). In test mode this signal is used as test clock input
21	P35	IO	DVDD	General purpose IO signal
22	P34	IO	SVDD	General purpose IO signal or clk signal for the SAM
23	SIGOUT	O	SVDD	Contactless communication interface output: delivers a serial data stream according to NFCIP-1 and output signal for the SAM. In test mode this signal is used as test signal output.
24	SIGIN	I	SVDD	Contactless communication interface input: accepts a digital, serial data stream according to NFCIP-1 and input signal from the SAM. In test mode

Philips Specification at Figure 3

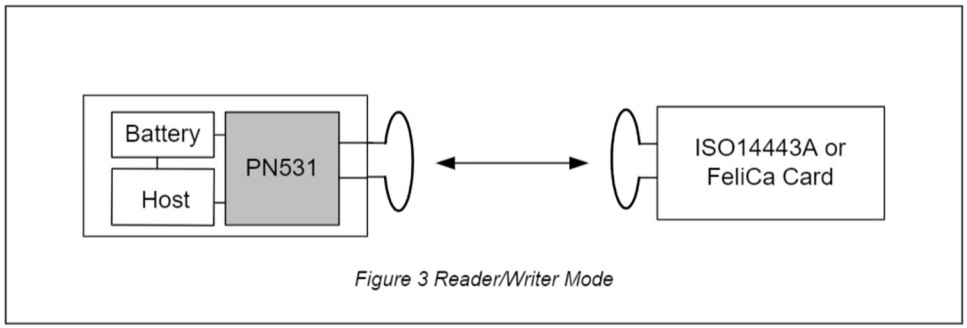


Figure 3 Reader/Writer Mode

Philips Specification at Figure 4

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")

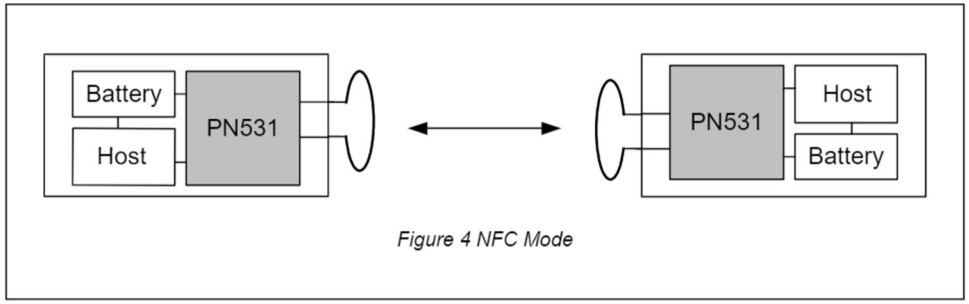


Figure 4 NFC Mode

Philips Specification at 11

- Initiator: generates RF field @ 13.56 MHz and starts the NFC communication
- Target: responds to initiator commands either using load modulation scheme (RF field continuously generated by Initiator) or using modulation of self generated RF field (no RF field generated by initiator)

Philips Specification at Figure 5

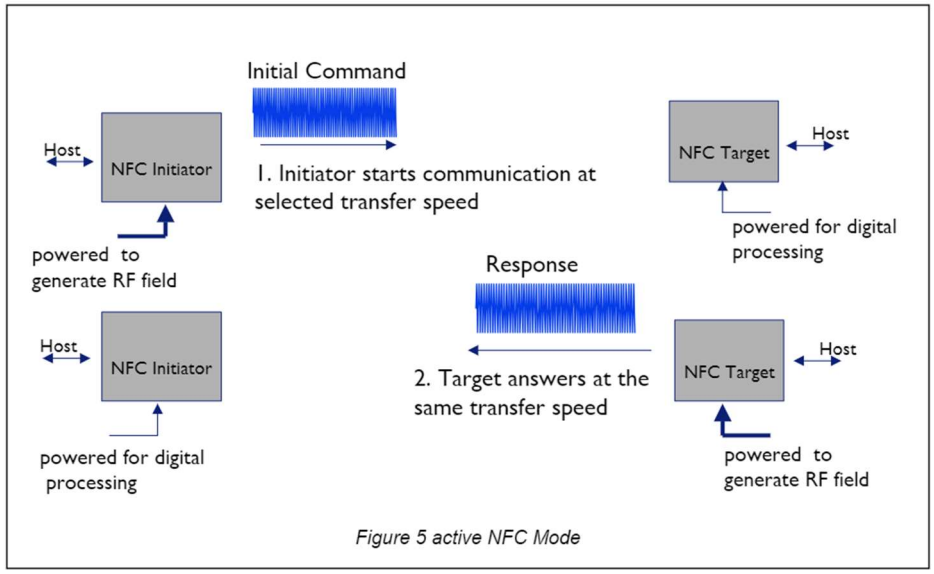
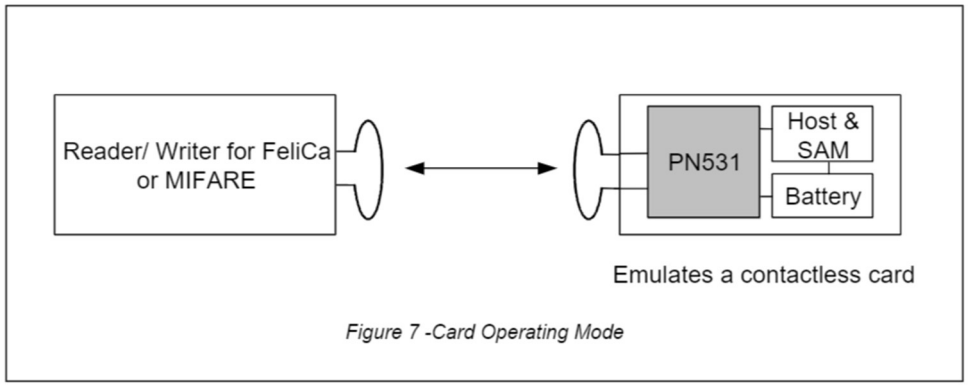


Figure 5 active NFC Mode

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")
	Philips Specification at Figure 7  *Figure 7 -Card Operating Mode* Philips Specification at Table 6–1 **6.1 Absolute Maximum Continuous Ratings** SYMBOL / PARAMETER / MIN / MAX / UNIT AVDD, DVDD, PVDD, SVDD, TVDD — Supply Voltages — -0.5 — 4.0 — V VBUS — USB Supply Voltage — -0.5 — 5.5 — V *Table 6-1: Absolute Maximum Continuous Ratings* To the extent this limitation is not disclosed by Philips Specification, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Philips Specification, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[17b] providing power to the smartcard controller and the active transmit driver circuit from the power source of the mobile device;	Philips Specification discloses or renders obvious "providing power to the smartcard controller and the active transmit driver circuit from the power source of the mobile device." For example: *See* [17a] above. Philips Specification at 4

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")
	• 80C51 microcontroller core with 32 kbyte ROM and 1 kbyte RAM • Highly integrated analog circuitry for transmission and reception • Output drivers to connect an antenna with minimum number of external components • Integrated RF Level detector • Integrated mode detector • Hardware and embedded Firmware support for • ISO 14443A reader/writer mode • MIFARE®Classic encryption and MIFARE® higher baudrate communication up to 424 kbit/s • Contactless communication according to the FeliCa™ scheme at 212 kbit/s and 424 kbit/s • NFC standard ECMA 340 and ISO 18092: NFC IP-1 interface and protocol • Host protocol on following interfaces • USB 2.0 full speed compliant device • SPI • I2C • High speed serial UART • Optional interrupt line to the host • Hard reset with low power function • Flexible Power down mode or power reduction mode per software • Internal oscillator to connect a 27.12 MHz quartz • Internal oscillator to connect a 4 MHz quartz for the USB interface • 2.5 - 3.6 V power supply • USB bus powered (In USB mode) • Specific IO ports and interrupt sources for external devices control Philips Specification at 7 The device operates with six individual power supplies for best performance in terms of EMC behaviour and signal de-coupling. This gives outstanding RF performance and maximum flexibility to adapt to different operating voltages of digital and analog parts. Philips Specification at Figure 3.2

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")

3.2 Pin Description

Pin	Symbol	Type	Pad Ref Voltage	Description
1	DVSS	PWR		Digital Ground
2	LOADMOD	O	DVDD	Load Modulation output provides digital signal for FeliCa and MIFARE® card operating mode
3	TVSS1	PWR		Transmitter Ground: supplies the output stage of TX1 and TX2
4	TX1	O	TVDD	Transmitter 1: delivers the modulated 13.56 MHz energy carrier
5	TVDD	PWR		Transmitter power supply: supplies the output stage of TX1 and TX2
6	TX2	O	TVDD	Transmitter 2: delivers the modulated 13.56 MHz energy carrier
7	TVSS2	PWR		Transmitter Ground: supplies the output stage of TX1 and TX2
8	AVDD	PWR		Analog Power Supply
9	VMID	PWR	AVDD	Internal Reference Voltage: This pin delivers the internal reference voltage.
10	RX	I	AVDD	Receiver Input: Input pin for the reception signal, which is the load modulated 13.56 MHz energy carrier from the antenna circuit.
11	AVSS	PWR		Analog Ground
12	AUX1	O	DVDD	Auxiliary Output: This pin delivers analog and digital test signals.
13	AUX2	O	DVDD	Auxiliary Output: This pin delivers analog and digital test signals.
14	OSCIN	I	AVDD	Crystal Oscillator Input: input to the inverting amplifier of the oscillator. This pin is also the input for an externally generated clock (fosc = 27.12 MHz).
15	OSCOUT	O	AVDD	Crystal Oscillator output: Output of the inverting amplifier of the oscillator.
16	I0	I	DVDD	Interface mode lines: selects the used host interface. In test mode I0 is used as test signals.
17	I1	I	DVDD	Interface mode lines: selects the used host interface. In test mode I0 is used as test signals.
18	TESTEN	I	DVDD	Test enable pin: When set to 1 enable the test mode. When set to 0 reset the TCB and disable the access to the test mode.
19	OSC2OUT	O	DVDD	Crystal Oscillator output: Output of the inverting amplifier of the oscillator for the USB clock.
20	OSC2IN	I	DVDD	Crystal Oscillator Input: input to the inverting amplifier of the oscillator for the USB clock generation. This pin is also the input for an externally generated clock (f_{osc} =4 MHz). In test mode this signal is used as test clock input
21	P35	IO	DVDD	General purpose IO signal
22	P34	IO	SVDD	General purpose IO signal or clk signal for the SAM
23	SIGOUT	O	SVDD	Contactless communication interface output: delivers a serial data stream according to NFCIP-1 and output signal for the SAM. In test mode this signal is used as test signal output.
24	SIGIN	I	SVDD	Contactless communication interface input: accepts a digital, serial data stream according to NFCIP-1 and input signal from the SAM. In test mode

Philips Specification at Figure 3

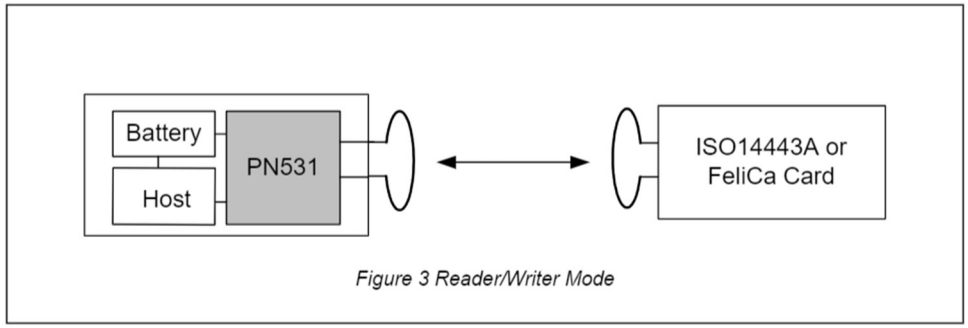
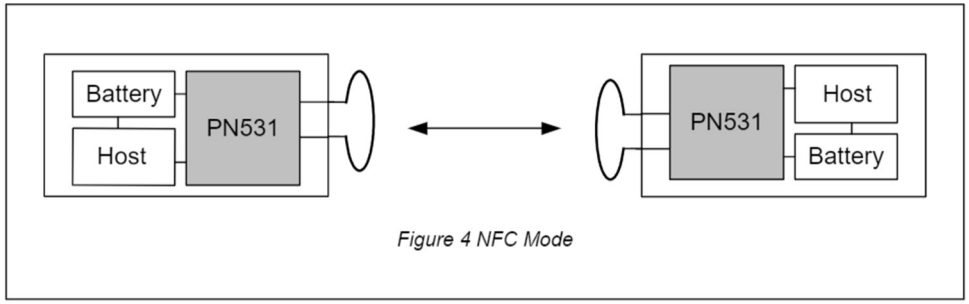
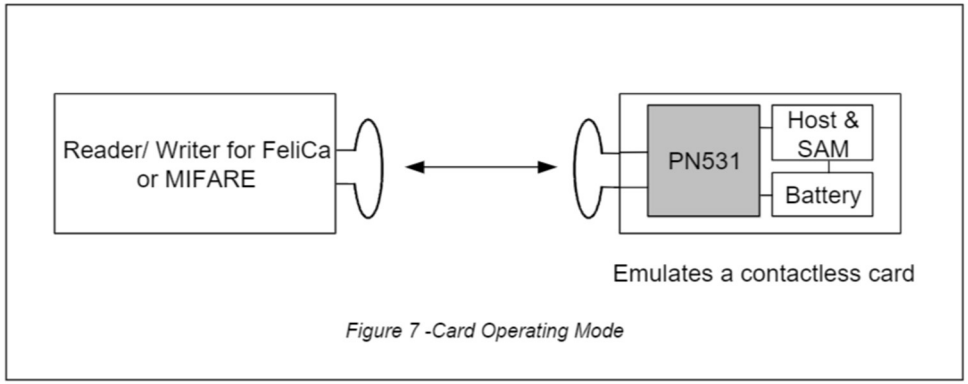


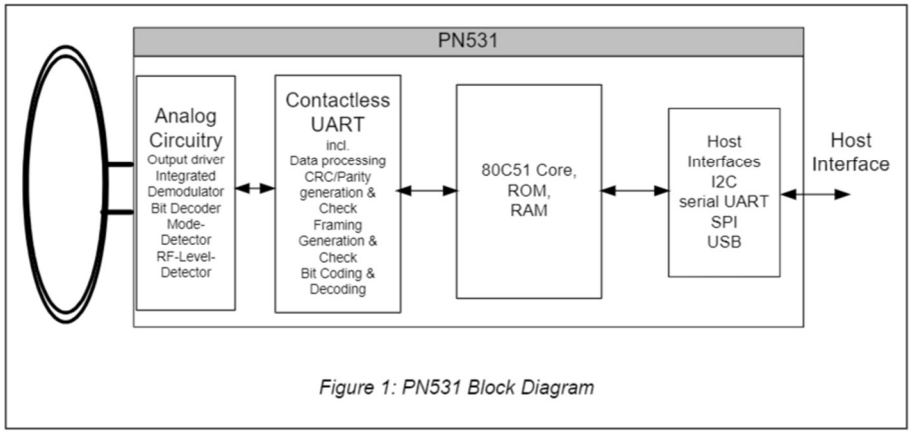
Figure 3 Reader/Writer Mode

Philips Specification at Figure 4

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")
	 *Figure 4 NFC Mode* Philips Specification at 11 • Initiator: generates RF field @ 13.56 MHz and starts the NFC communication • Target: responds to initiator commands either using load modulation scheme (RF field continuously generated by Initiator) or using modulation of self generated RF field (no RF field generated by initiator) Philips Specification at Figure 7  *Figure 7 -Card Operating Mode* Philips Specification at Table 6–1

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")
	6.1 Absolute Maximum Continuous Ratings SYMBOL / PARAMETER / MIN / MAX / UNIT AVDD, DVDD, PVDD, SVDD, TVDD — Supply Voltages — -0.5 — 4.0 — V VBUS — USB Supply Voltage — -0.5 — 5.5 — V *Table 6-1: Absolute Maximum Continuous Ratings* To the extent this limitation is not disclosed by Philips Specification, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Philips Specification, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[17c] coupling the active transmit driver circuit to an antenna of the mobile device, wherein the antenna is tuned to operate at substantially 13.56 MHz; and	Philips Specification discloses or renders obvious "coupling the active transmit driver circuit to an antenna of the mobile device, wherein the antenna is tuned to operate at substantially 13.56 MHz." For example: *See* [1c] above. Philips Specification at 3 The PN531 is a highly integrated transmission module for contactless communication at 13.56 MHz including µ-controller functionality based on an 80C51 core with 32 kbyte of ROM and 1 kbyte of RAM. This µc-based transmission module combines an outstanding modulation and demodulation concept completely integrated for different kinds of contactless communication methods and protocols at 13.56 MHz with an easy to use firmware for the different supported modes and the required host interfaces. Philips Specification at 3 In reader/ writer mode the PN531's internal transmitter part is able to drive a reader/writer antenna designed to communicate with ISO14443A /MIFARE® or FeliCa™ cards and transponders without additional active circuitry. The receiver part provides a robust and efficient implementation of a demodulation and decoding circuitry for signals from ISO14443A compatible cards and transponders. The digital part handles the complete ISO14443A framing and error detection (Parity & CRC). Philips Specification at 3

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")
	In card mode the PN531 is able to answer a reader/writer command either in FeliCa™ or ISO14443A/MIFARE® card mode. The PN531 generates the proper digital load modulated signals and with an external circuit, can respond to commands sent by the reader/writer. Philips Specification at 4 • 80C51 microcontroller core with 32 kbyte ROM and 1 kbyte RAM • Highly integrated analog circuitry for transmission and reception • Output drivers to connect an antenna with minimum number of external components • Integrated RF Level detector • Integrated mode detector • Hardware and embedded Firmware support for • ISO 14443A reader/writer mode • MIFARE®Classic encryption and MIFARE® higher baudrate communication up to 424 kbit/s • Contactless communication according to the FeliCa™ scheme at 212 kbit/s and 424 kbit/s • NFC standard ECMA 340 and ISO 18092: NFC IP-1 interface and protocol • Host protocol on following interfaces • USB 2.0 full speed compliant device • SPI • I2C • High speed serial UART • Optional interrupt line to the host • Hard reset with low power function • Flexible Power down mode or power reduction mode per software • Internal oscillator to connect a 27.12 MHz quartz • Internal oscillator to connect a 4 MHz quartz for the USB interface • 2.5 - 3.6 V power supply • USB bus powered (In USB mode) • Specific IO ports and interrupt sources for external devices control Philips Specification at 5

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")
	The PN531 is tailored to fulfil the requirements of various applications using contactless communication based on the ECMA340 (NFC IP-1) Interface and protocol standard, the ISO14443A reader and FeliCa reader protocol. NFC IP-1 is also standardised in ISO/IEC 18092. Philips Specification at Figure 1 **2 BLOCK DIAGRAM** **2.1 Simplified PN531 Block Diagram**  *Figure 1: PN531 Block Diagram* Philips Specification at 6 The RF level detector detects the presence of an external RF field at 13.56 MHz. Philips Specification at Figure 3.2

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")

3.2 Pin Description

Pin	Symbol	Type	Pad Ref Voltage	Description
1	DVSS	PWR		Digital Ground
2	LOADMOD	O	DVDD	Load Modulation output provides digital signal for FeliCa and MIFARE® card operating mode
3	TVSS1	PWR		Transmitter Ground: supplies the output stage of TX1 and TX2
4	TX1	O	TVDD	Transmitter 1: delivers the modulated 13.56 MHz energy carrier
5	TVDD	PWR		Transmitter power supply: supplies the output stage of TX1 and TX2
6	TX2	O	TVDD	Transmitter 2: delivers the modulated 13.56 MHz energy carrier
7	TVSS2	PWR		Transmitter Ground: supplies the output stage of TX1 and TX2
8	AVDD	PWR		Analog Power Supply
9	VMID	PWR	AVDD	Internal Reference Voltage: This pin delivers the internal reference voltage.
10	RX	I	AVDD	Receiver Input: Input pin for the reception signal, which is the load modulated 13.56 MHz energy carrier from the antenna circuit.
11	AVSS	PWR		Analog Ground
12	AUX1	O	DVDD	Auxiliary Output: This pin delivers analog and digital test signals.
13	AUX2	O	DVDD	Auxiliary Output: This pin delivers analog and digital test signals.
14	OSCIN	I	AVDD	Crystal Oscillator Input: input to the inverting amplifier of the oscillator. This pin is also the input for an externally generated clock (fosc = 27.12 MHz).
15	OSCOUT	O	AVDD	Crystal Oscillator output: Output of the inverting amplifier of the oscillator.
16	I0	I	DVDD	Interface mode lines: selects the used host interface. In test mode I0 is used as test signals.
17	I1	I	DVDD	Interface mode lines: selects the used host interface. In test mode I0 is used as test signals.
18	TESTEN	I	DVDD	Test enable pin: When set to 1 enable the test mode. When set to 0 reset the TCB and disable the access to the test mode.
19	OSC2OUT	O	DVDD	Crystal Oscillator output: Output of the inverting amplifier of the oscillator for the USB clock.
20	OSC2IN	I	DVDD	Crystal Oscillator Input: input to the inverting amplifier of the oscillator for the USB clock generation. This pin is also the input for an externally generated clock (f_{osc} =4 MHz). In test mode this signal is used as test clock input
21	P35	IO	DVDD	General purpose IO signal
22	P34	IO	SVDD	General purpose IO signal or clk signal for the SAM
23	SIGOUT	O	SVDD	Contactless communication interface output: delivers a serial data stream according to NFCIP-1 and output signal for the SAM. In test mode this signal is used as test signal output.
24	SIGIN	I	SVDD	Contactless communication interface input: accepts a digital, serial data stream according to NFCIP-1 and input signal from the SAM. In test mode

Philips Specification at 11

NFC communication differentiates between an active and a passive communication.

• Active NFC Mode means both the initiator and the target are using their own RF field for the communication.

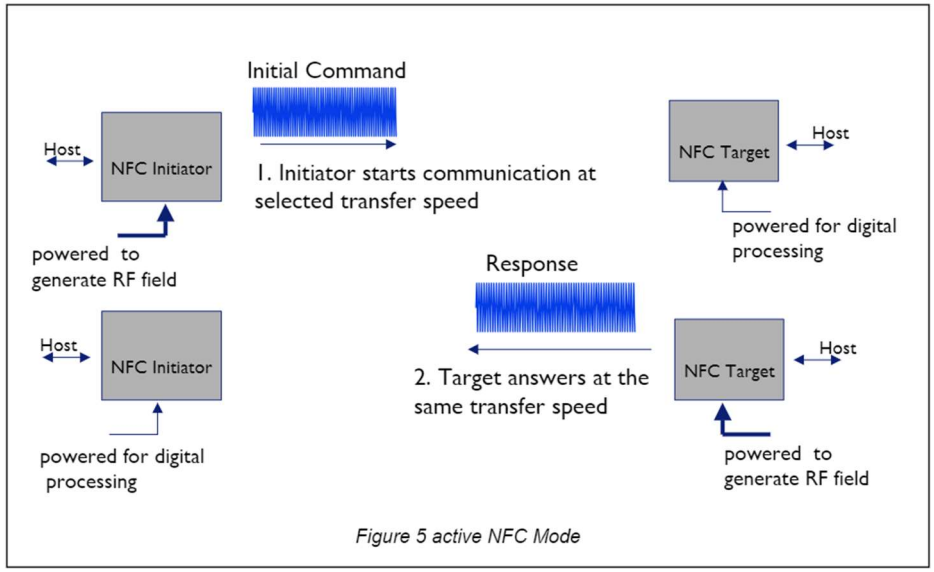
• Passive NFC Mode means that the target answers to an initiator command in a load modulation scheme. The initiator is active i.e. generating the RF field.

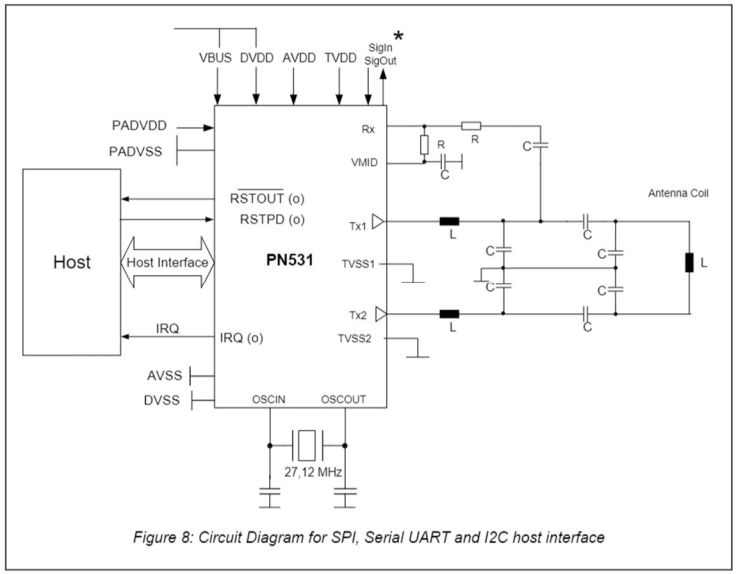
Philips Specification at 11

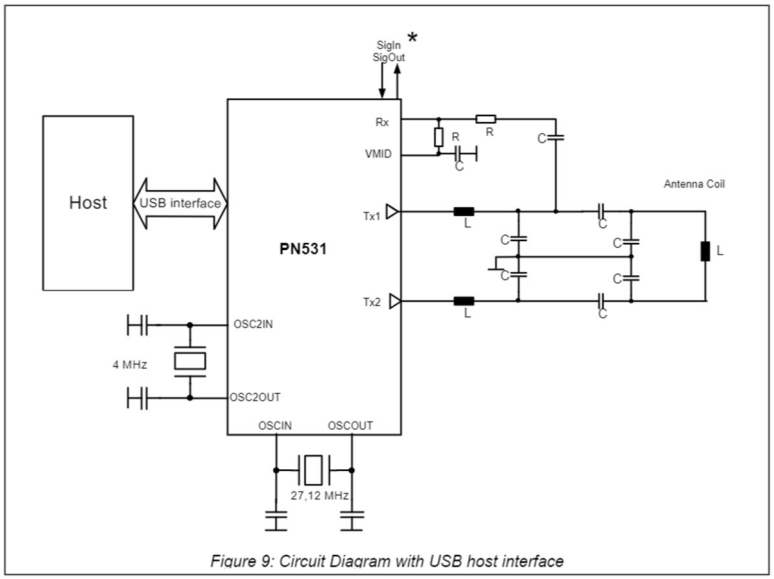
• Initiator: generates RF field @ 13.56 MHz and starts the NFC communication

• Target: responds to initiator commands either using load modulation scheme (RF field continuously generated by Initiator) or using modulation of self generated RF field (no RF field generated by initiator)

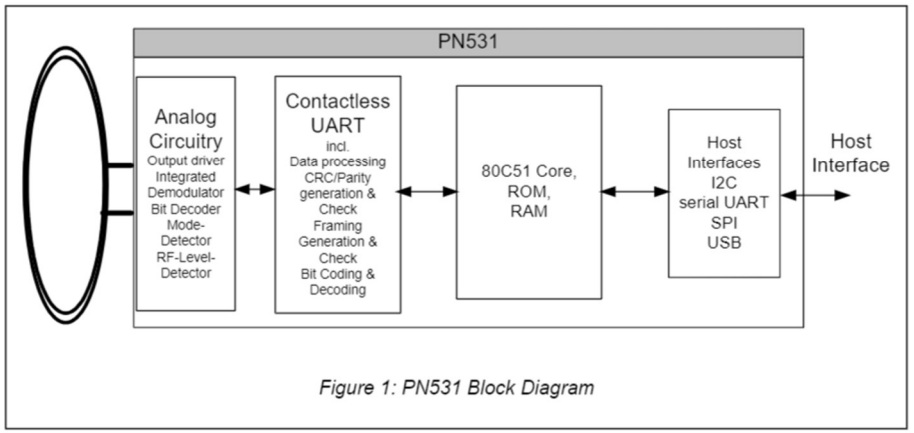
Philips Specification at Figure 5

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")
	 *Figure 5 active NFC Mode* Philips Specification at Figure 8

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")
	 *Figure 8: Circuit Diagram for SPI, Serial UART and I2C host interface* Philips Specification at Figure 9

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")
	 *Figure 9: Circuit Diagram with USB host interface* *See also* Philips Specification at 3, 6, Figure 4, and Figure 6. To the extent this limitation is not disclosed by Philips Specification, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Philips Specification, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[17d] driving transmission of data by the active transmit driver circuit from the antenna to the NFC reader.	Philips Specification discloses or renders obvious "driving transmission of data by the active transmit driver circuit from the antenna to the NFC reader." For example: *See* [1d] above. Philips Specification at 3 > In reader/ writer mode the PN531's internal transmitter part is able to drive a reader/writer antenna designed to communicate with ISO14443A /MIFARE® or FeliCa™ cards and transponders without additional active circuitry. The receiver part provides a robust and efficient implementation of a demodulation and decoding circuitry for signals from ISO14443A compatible cards and transponders. The digital part handles the complete ISO14443A framing and error detection (Parity & CRC).

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")
	Philips Specification at 3 In card mode the PN531 is able to answer a reader/writer command either in FeliCa™ or ISO14443A/MIFARE® card mode. The PN531 generates the proper digital load modulated signals and with an external circuit, can respond to commands sent by the reader/writer. Philips Specification at 4 • 80C51 microcontroller core with 32 kbyte ROM and 1 kbyte RAM • Highly integrated analog circuitry for transmission and reception • Output drivers to connect an antenna with minimum number of external components • Integrated RF Level detector • Integrated mode detector • Hardware and embedded Firmware support for • ISO 14443A reader/writer mode • MIFARE®Classic encryption and MIFARE® higher baudrate communication up to 424 kbit/s • Contactless communication according to the FeliCa™ scheme at 212 kbit/s and 424 kbit/s • NFC standard ECMA 340 and ISO 18092: NFC IP-1 interface and protocol • Host protocol on following interfaces • USB 2.0 full speed compliant device • SPI • I2C • High speed serial UART • Optional interrupt line to the host • Hard reset with low power function • Flexible Power down mode or power reduction mode per software • Internal oscillator to connect a 27.12 MHz quartz • Internal oscillator to connect a 4 MHz quartz for the USB interface • 2.5 - 3.6 V power supply • USB bus powered (In USB mode) • Specific IO ports and interrupt sources for external devices control Philips Specification at Figure 1

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")
	2 BLOCK DIAGRAM **2.1 Simplified PN531 Block Diagram**  *Figure 1: PN531 Block Diagram* Philips Specification at Figure 3.2

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")

3.2 Pin Description

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5	TVDD	PWR		Transmitter power supply: supplies the output stage of TX1 and TX2
6	TX2	O	TVDD	Transmitter 2: delivers the modulated 13.56 MHz energy carrier
7	TVSS2	PWR		Transmitter Ground: supplies the output stage of TX1 and TX2
8	AVDD	PWR		Analog Power Supply
9	VMID	PWR	AVDD	Internal Reference Voltage: This pin delivers the internal reference voltage.
10	RX	I	AVDD	Receiver Input: Input pin for the reception signal, which is the load modulated 13.56 MHz energy carrier from the antenna circuit.
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15	OSCOUT	O	AVDD	Crystal Oscillator output: Output of the inverting amplifier of the oscillator.
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17	I1	I	DVDD	Interface mode lines: selects the used host interface. In test mode I0 is used as test signals.
18	TESTEN	I	DVDD	Test enable pin: When set to 1 enable the test mode. When set to 0 reset the TCB and disable the access to the test mode.
19	OSC2OUT	O	DVDD	Crystal Oscillator output: Output of the inverting amplifier of the oscillator for the USB clock.
20	OSC2IN	I	DVDD	Crystal Oscillator Input: input to the inverting amplifier of the oscillator for the USB clock generation. This pin is also the input for an externally generated clock (f_{osc} =4 MHz). In test mode this signal is used as test clock input
21	P35	IO	DVDD	General purpose IO signal
22	P34	IO	SVDD	General purpose IO signal or clk signal for the SAM
23	SIGOUT	O	SVDD	Contactless communication interface output: delivers a serial data stream according to NFCIP-1 and output signal for the SAM. In test mode this signal is used as test signal output.
24	SIGIN	I	SVDD	Contactless communication interface input: accepts a digital, serial data stream according to NFCIP-1 and input signal from the SAM. In test mode

Philips Specification at 11

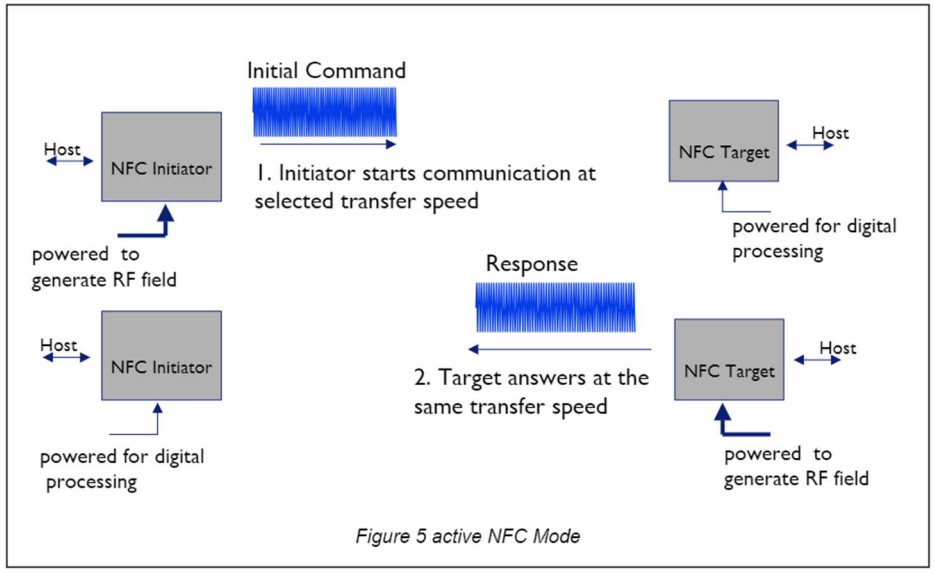
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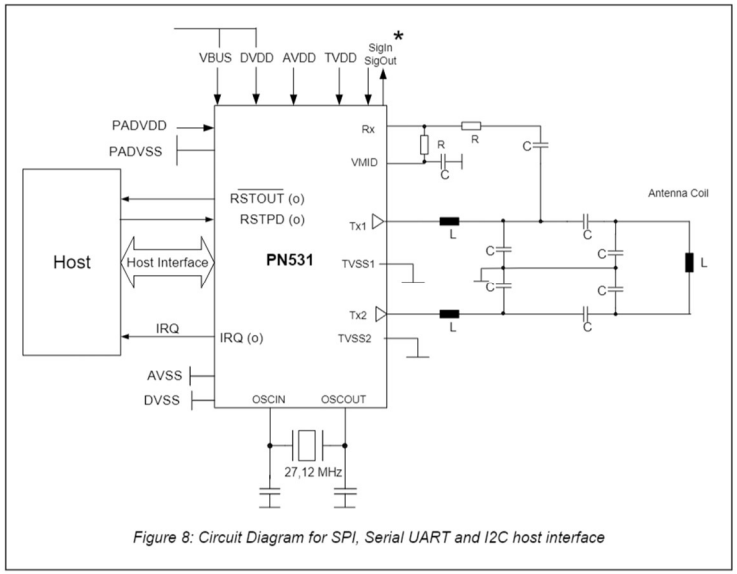
- Active NFC Mode means both the initiator and the target are using their own RF field for the communication.
- Passive NFC Mode means that the target answers to an initiator command in a load modulation scheme. The initiator is active i.e. generating the RF field.

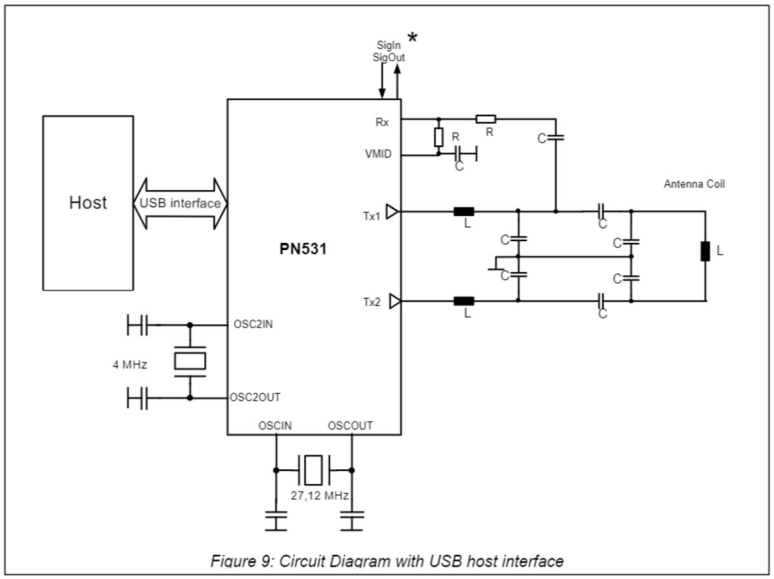
Philips Specification at 11

- Initiator: generates RF field @ 13.56 MHz and starts the NFC communication
- Target: responds to initiator commands either using load modulation scheme (RF field continuously generated by Initiator) or using modulation of self generated RF field (no RF field generated by initiator)

Philips Specification at Figure 5

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")
	 *Figure 5 active NFC Mode* Philips Specification at Figure 8

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")
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Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")
	 *Figure 9: Circuit Diagram with USB host interface* To the extent this limitation is not disclosed by Philips Specification, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Philips Specification, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
18[pre]. The method of claim 17 further comprising:	By providing this disclosure, Defendants do not take a position on whether the preamble is a claim limitation. Philips Specification discloses or renders obvious "[t]he method of claim 17 further comprising." *See* claim 17 above.
[18a] amplifying a signal received from the antenna to generate an amplified signal; and	Philips Specification discloses or renders obvious "amplifying a signal received from the antenna to generate an amplified signal." For example: *See* above at claims 7, 8.
[18b] providing the amplified signal to the smartcard controller.	Philips Specification discloses or renders obvious "providing the amplified signal to the smartcard controller." For example: *See* above at claims 7, 8.

Claim Element	Exemplary Citations to Philips Semiconductors, "Short Form Specification: Near Field Communication PN531–µC based Transmission module" (2004) ("Philips Specification")
19. The method of claim 10 or 17, wherein the transmitted data includes ticketing information for a mass transit system.	Philips Specification discloses or renders obvious "[t]he method of claim 10 or 17, wherein the transmitted data includes ticketing information for a mass transit system." *See* claim 2 above. *See also* claims 10 and 17 above.
20. The method of claim 10 or 17, wherein the transmitted data includes transaction information for a mobile payment.	Philips Specification discloses or renders obvious "[t]he method of claim 10 or 17, wherein the transmitted data includes transaction information for a mobile payment." *See* claim 3 above. *See also* claims 10 and 17 above.

DEFENDANTS' INVALIDITY CONTENTIONS FOR U.S. PAT. 11,694,053

EXHIBIT C06: U.S. Pat. No. 6,282,407 ("Vega")

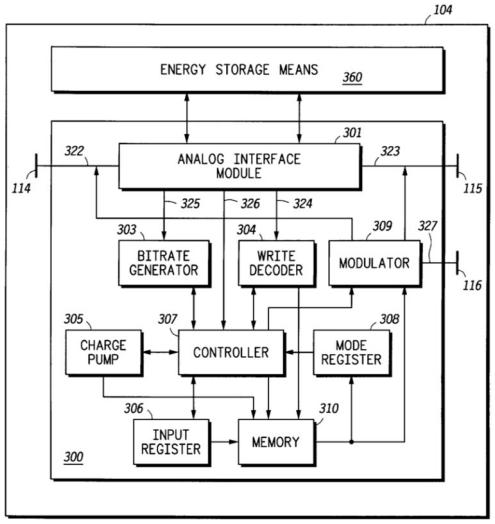
As demonstrated in the claim charts below, the claims of U.S. Patent No. 11,694,053 ("the '053 patent") are invalid (a) under one or more sections of 35 U.S.C. § 102 as anticipated by Vega and (b) under 35 U.S.C. § 103(a) as obvious over Vega standing alone and as set forth herein, and/or combined with the knowledge of a person of ordinary skill in the art, Applicant's Admitted Prior Art, and/or the additional prior art references discussed in Exhibit C and Exhibits C01–C09, the contents of which are hereby incorporated by reference into this chart. One of ordinary skill in the art, as of the priority date of the '053 patent, would have known to combine the prior art elements disclosed by the foregoing references using known methods, and to use these elements according to their established functions in order to achieve a known and predictable result.

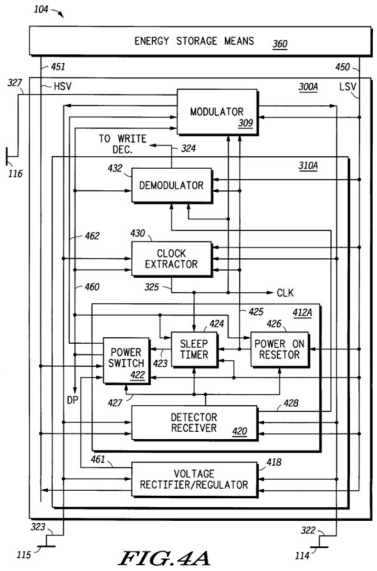
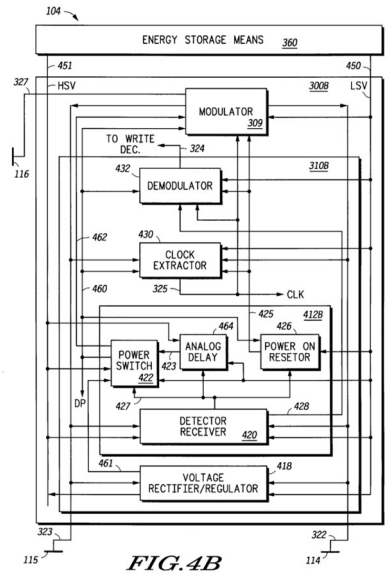
Defendants have conducted the invalidity analysis herein based at least in part and in some instance entirely upon Plaintiff's apparent application of the claims of the '053 patent. By charting the prior art against the claims and limitations herein, Defendants are not admitting or agreeing to Plaintiff's application of the claims at issue in this case, and these charts should not be interpreted as an admission or concession by Defendants that any particular construction or application of any claim limitation by Plaintiff is correct or proper. Additionally, these charts provide representative examples of portions of the charted references that disclose the indicated limitations of the claims; additional portions of these references other than the representative examples provided herein may also disclose the indicated limitation(s) and Defendants contend that the asserted claims are invalid in light of the charted reference(s) as a whole in its or their entirety. Where a particular figure is cited, the citation should be understood to encompass the caption and description of the figure as well as any text relating to or describing the figure. Conversely, where particular text referring to a figure is cited, the citation should be understood to include the figure as well.

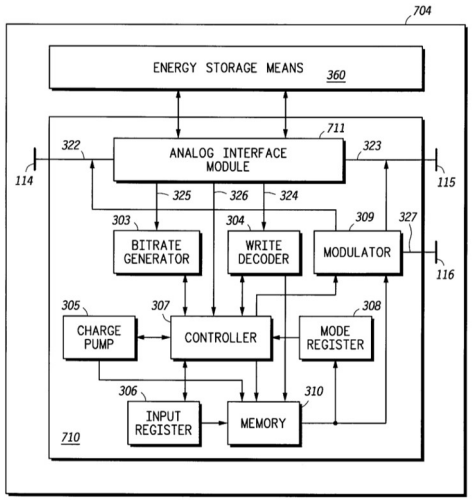
Claim Element	**Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")**
1[pre]. A mobile device comprising:	By providing this disclosure, Defendants do not take a position on whether the preamble is a claim limitation. Vega discloses or renders obvious "[a] mobile device." For example: Vega at Abstract An active electrostatic transceiver is provided that has electrostatic electrodes, an energy storage means such as a battery and a transceiver circuit for communication within an electrostatic RFID communication system. The transceiver circuit includes power management features so that the energy storage means is not quickly depleted. Additionally the transceiver circuit includes amplifiers and filters so that the read range is further increased and noise sources are better filtered out. In a first embodiment, the transceiver circuit has a clock extractor that extracts a clock from the incoming data signal such that the clock and the data signal are synchronized so that demodulating the data from the data signal is simplified. In a second embodiment, the transceiver circuit has its own clock generator for initiating transmission of signals so that a reader need not have an exciter to generate an excitation signal. Each embodiment of the transceiver circuit has power management features so that power is conserved. Additionally, each transceiver circuit has the ability to operate in a passive mode, when there is insufficient charge in the energy storage means or a lower power mode is desirable.

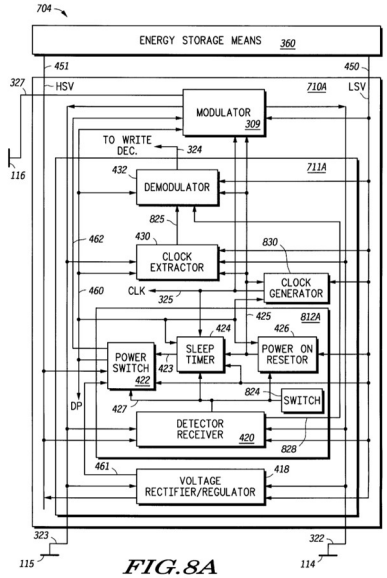
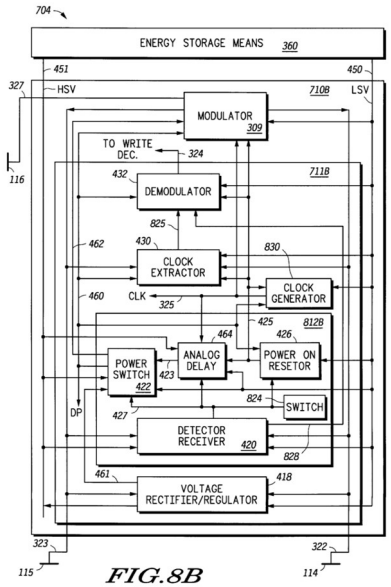
Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	Vega at 3:28–45 Briefly, an active electrostatic transceiver is provided that has electrostatic electrodes, an energy storage means such as a battery and a transceiver circuit for communication within an electrostatic RFID communication system. The transceiver circuit includes power management features so that the energy storage means is not quickly depleted. Additionally the transceiver circuit includes amplifiers and filters so that the read range is further increased and noise filtering is improved. In a first embodiment, the transceiver circuit has a clock extractor that extracts a clock from the incoming data signal such that the clock and the data signal are synchronized so that demodulating the data from the data signal is simplified. In a second embodiment, the transceiver circuit has its own clock generator for initiating transmission of signals so that a reader need not have an exciter to generate an excitation signal. Both embodiments of the transceiver circuit have power management features that can decrease power consumption. Vega at 3:49–52 Another object of the present invention is to introduce power conservation techniques into an active electrostatic transceiver so that the read range between the electrostatic reader and electrostatic transceiver may be increased. Vega at 4:26–28 FIG. 6B is a block diagram of an electrostatic reader for supporting automatic detection and activation of an active electrostatic transceiver. Vega at 5:26–68 FIG. 1 illustrates the preferred embodiment of the combined electrostatic communication system 100 which includes an electrostatic reader 101, a passive electrostatic transceiver 102, host computer system 103 and an active electrostatic transceiver 104. Electrostatic reader 101, illustrated in a monopole configuration, includes an electrostatic electrode 105 for transmission of an excitation signal and modulated data signals on a carrier by means of electrostatic energy. The signals are transmitted by the reader to either an electrostatic transceiver, transponder, tag, badge, smart card, or other such RFID transceiver such as passive electrostatic transceiver 102 or active electrostatic transceiver 104. Electrostatic reader 101 includes an electrostatic electrode 106 for receiving data signals on a carrier by means of electrostatic energy. The data signals are communicated by either a passive electrostatic transceiver such as passive electrostatic transceiver 102 or active electrostatic transceiver 104. The passive electrostatic transceiver 102 includes at least two electrostatic electrodes 112 and 113 in order to

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	communicate using electrostatic signals. The electrostatic electrodes 112 and 113 may have differing shapes and be made of different materials. Some of the shapes for the electrostatic electrodes 112 and 113 include flat rectangular plates and bow tie shaped plates. The active electrostatic transceiver 104 includes at least two electrostatic electrodes 114 and 115 in order to receive electrostatic energy and communicate using electrostatic signals. As illustrated in FIG. 1, active electrostatic transceiver 104 includes an additional electrostatic electrode 116 for transmitting electrostatic signals. The electrostatic electrodes may also be referred to as antenna, capacitor plates, contactless electrodes, wireless electrodes or isolation electrodes. These electrostatic electrodes provide for the antenna, contactless, wireless and the somewhat isolated functionality of an electrostatic system which requires no physical contact between the electrostatic electrodes in order to communicate. Passive electrostatic transceiver 102 and active electrostatic transceiver 104 can communicate information to/from the electrostatic reader 101 by means of electrostatic signals and capacitive coupling. Host computer 103 is coupled to the electrostatic reader 101 and may couple to other electrostatic readers, electromagnetic readers or electrostatic readers (not shown in FIG. 1) in order to have other points of communication. To the extent this limitation is not disclosed by Vega, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Vega, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[1a] a power source;	Vega discloses or renders obvious "a power source." For example: Vega at Abstract An active electrostatic transceiver is provided that has electrostatic electrodes, an energy storage means such as a battery and a transceiver circuit for communication within an electrostatic RFID communication system. The transceiver circuit includes power management features so that the energy storage means is not quickly depleted. Additionally the transceiver circuit includes amplifiers and filters so that the read range is further increased and noise sources are better filtered out. In a first embodiment, the transceiver circuit has a clock extractor that extracts a clock from the incoming data signal such that the clock and the data signal are synchronized so that demodulating the data from the data signal is simplified. In a second embodiment, the transceiver circuit has its own clock generator for initiating transmission of signals so that a reader need not have an exciter to generate an excitation signal. Each embodiment of the transceiver circuit has power management features so that power is conserved. Additionally, each transceiver circuit has the ability to operate in a passive mode, when there is insufficient charge in the energy storage means or a lower power mode is desirable.

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	Vega at Figure 3  *FIG.3* Vega at Figure 4A

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	 *FIG.4A* Vega at Figure 4B  *FIG.4B*

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	Vega at Figure 7  *FIG. 7* Vega at Figure 8A

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	 FIG.8A Vega at Figure 8B  FIG.8B

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	Vega at 3:28–45 Briefly, an active electrostatic transceiver is provided that has electrostatic electrodes, an energy storage means such as a battery and a transceiver circuit for communication within an electrostatic RFID communication system. The transceiver circuit includes power management features so that the energy storage means is not quickly depleted. Additionally the transceiver circuit includes amplifiers and filters so that the read range is further increased and noise filtering is improved. In a first embodiment, the transceiver circuit has a clock extractor that extracts a clock from the incoming data signal such that the clock and the data signal are synchronized so that demodulating the data from the data signal is simplified. In a second embodiment, the transceiver circuit has its own clock generator for initiating transmission of signals so that a reader need not have an exciter to generate an excitation signal. Both embodiments of the transceiver circuit have power management features that can decrease power consumption. Vega at 4:51–5:7 The present invention includes a method, apparatus and system for providing electrostatic communication utilizing capacitance-based technology with active and passive electrostatic transceivers. Passive electrostatic transceivers derive their power from electrostatic signals being transmitted by an electrostatic reader or other electrostatic signal source. An active electrostatic transceiver has its own internal power source and need not rely on an electrostatic signal source from an electrostatic reader or other source to power up and perform certain functions. Electrostatic communication is accomplished through capacitive coupling which requires no physical contact or wires between a reader and an electrostatic transceiver (a.k.a. electrostatic tag or electrostatic transponder). In the electrostatic communication system, the voltage applied to the capacitively coupled plates is an AC voltage generated by an electric field (i.e. an electrostatic ("ES") field is developed) as opposed to an electromagnetic ("EM") field in order for a charge or signal to be communicated. In short, an electrostatic field is an energy (electrical) field created between two electrodes having a voltage differential. An electrostatic transceiver needs to be in the proximity of the reader, referred to as the read range, in order to have sufficient capacitive coupling to transceive electrostatic signals. Vega at 5:8–25 Briefly, an active electrostatic transceiver is provided that has electrostatic electrodes, an energy storage means, such as a battery, and a transceiver circuit for communication within an electrostatic RFID communication system. The transceiver circuit includes power management features so that the energy storage means is not quickly depleted. Additionally the transceiver circuit includes amplifiers and filters

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	so that the read range is further increased and noise filtering is improved. In a first embodiment, the transceiver circuit has a clock extractor that extracts a clock from the incoming data signal such that the clock and the data signal are synchronized so that demodulating the data from the data signal is simplified. In a second embodiment, the transceiver circuit has its own clock generator for initiating transmission of signals so that a reader need not have an exciter to generate an excitation signal. Both embodiments of the transceiver circuit have power management features that improve power conservation. Vega at 6:1–22 FIG. 1 illustrates the advantage that an active electrostatic transceiver 104 has over a passive electrostatic transceiver 102. The distance between an electrostatic transceiver and an electrostatic reader where communication may start to occur is referred to as the read range. In FIG. 1 the passive read range 125 between passive ES transceiver 102 and ES reader 101 is significantly smaller than the active read range 126 between active ES transceiver 104 and ES reader 101. This is because an energy storage means within the active electrostatic transceiver 104 allows for active transmission of signals using an amplifier. Because of its passive nature, the passive electrostatic transceiver 102 relies on a load modulation technique for communication of signals by reflecting back the energy of the excitation signal to the electrostatic reader 101. The reflection of the excitation signal requires that the passive electrostatic transceiver 102 be nearer the reader 101. The larger read range provided by reflected ES signals using load modulation or transmitted ES signals using an active transmitter allows the active electrostatic transceiver 104 to be used in other applications of RFID communication systems where a passive electrostatic transceiver 102 would not. Vega at 7:14–56 In general, electrostatic reader 101 generates an electrostatic (electrical) field for use both as a power source for the passive electrostatic transceiver 102 and for transferring information between electrostatic reader 101 and passive electrostatic transceiver 102 or active electrostatic transceiver 104. As such, electrostatic reader 101 electrostatically generates and transmits an excitation signal to the surrounding air, gas, atmosphere or non-electrically conductive medium via the reader's electrostatic electrodes, except for the return path in a monopole system. The excitation signal is an AC signal which activates the passive electrostatic transceiver 102 when it is comes within the capacitance coupling range of reader 101. Upon being sufficiently energized, the passive electrostatic transceiver 102 may respond by electrostatically transmitting a read data signal carrying the information stored in its memory to electrostatic reader 101 (as part of a read operation). Active electrostatic transceiver 104 includes an energy storage means such that it

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	may not require the excitation signal to become sufficiently energized. In accordance to the present invention, reader 101 may also electrostatically couple a write signal to communicate and write information to the passive electrostatic transceiver 102 or active ES transceiver(as part of a write operation). Alternatively, such programming or charging can be carried out by a separate ES programming, ES encoding or electrostatic charger unit (not illustrated). It is to be appreciated that the excitation signal must be generated and transmitted by electrostatic reader 101 to excite the passive electrostatic transceiver 102 or charge the active electrostatic transceiver 104. The excitation signal is an AC energy source and can be a continuous waveform or a varying waveform (i.e. amplitude, frequency, time, etc. of the waveform may vary). Alternatively a user could manually cause the electrostatic reader 101 or a charger to generate the excitation signal to charge or communicate with the passive electrostatic transceiver 102 or active electrostatic transceiver 104 by selecting a button or switch. The reader 101 usually has available a larger power source than the passive electrostatic transceiver 102 or active electrostatic transceiver 104. Thus, the reader 101 has very sensitive receiving and high energy transmission when compared with the passive electrostatic transceiver 102 or active electrostatic transceiver 104. Vega at 8:46–62 When in proximity of a reader 101, the active electrostatic transceiver 104 first detects the excitation signal being emitted by an electrostatic reader 101. The excitation signal is generated by reader 101 at a carrier frequency, commonly referred to as a power carrier frequency or exciter frequency. The power carrier frequency, which may be modulated with data, is preferably 125 k Hz. After detecting the excitation signal, the first embodiment of the active electrostatic transceiver 104 goes through a power management sequence and powers up in order to derive a square wave based on the excitation signal at the carrier frequency which is used as a clock signal for the active transceiver. In this manner of generating a clock signal, information received by the active electrostatic transceiver 104 is synchronized with the clock signal. This alleviates generating a clock with a clock oscillator and synchronizing the data and clock using phase-locked loop techniques. Vega at 9:30–60 Now referring to FIG. 4A, a detailed block diagram of components of the analog interface module 301 within the active transceiver 104 is illustrated including digital timing elements. The active electrostatic transceiver 104 includes the first electrostatic electrode 114, the second electrostatic electrode 115, the third electrostatic electrode 116, the transceiver circuit 300, and an energy storage means 360. The energy storage means 360 can be any type of energy storage means, including an electrochemical storage cell,

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	such as a rechargeable battery or a non-rechargeable battery, or a capacitor, but is preferably a thin foil battery to conform to a form factor of a smart card, tag, or badge. The transceiver circuit 300A as illustrated in FIG. 4A shows the relevant components in the first embodiment of the present invention. In FIG. 4A, the transceiver circuit 300A is illustrated as including the analog interface module 301 and the modulator 309. In FIG. 4A, the relevant components of the analog interface module 301 include a power manager 412A, a DC voltage rectifier/regulator 418, a clock extractor 430, and a demodulator 432. The power manager 412A includes a detector/receiver 420, a power switch 422, a sleep timer 424, and a power-on-resetor (POR) 426. The DC voltage rectifier/regulator 418 includes a rectifier, a voltage regulator and voltage control functionality such that a DC voltage and energy source may be generated from the excitation signal or other signals received by the active electrostatic transceiver 104 and selectively used to power the transceiver 104 or charge the energy storage means 360. The DC voltage rectifier/regulator 418 couples to the power switch 422 for selection and to the energy storage means 360 for charging. Vega at 9:61–10:33 The detector/receiver 420 in the active electrostatic transceiver 104 may receive power directly from the energy storage means 360 in order to be actively listening for an excitation signal from an electrostatic reader 101. Alternatively, the detector/receiver 420 may have passive components sufficient to detect and receive signals when the energy storage means has insufficient energy to power active components. The detector/receiver 420 may have an amplifier for receiving and amplifying the incoming electrostatic signals, a bandpass filter for filtering unwanted frequencies outside a range of the carrier frequency, and a detector for detecting the presence of the carrier frequency in an excitation signal indicating that the transceiver is within the read range of an electrostatic reader 101. The detector may detect a number of oscillations in the received waveform at the carrier frequency indicating that it is not a noise source generating the waveform. In the preferred embodiment, if the detector detects any signal in the band of the carrier it provides an indication signal. Upon detection of the excitation signal, the detector/receiver 420 generates a wakeup signal on signal line 427 indicating that the active electrostatic transceiver 104 is within range of an electrostatic field and that the active electrostatic transceiver 104 needs to go through its wake up procedure. When outside the range of an electrostatic field, the signal line 427 indicates a go to-sleep signal so that the transceiver may go into a low power sleep state. The wakeup signal 427 is provided to the power on resetor 426, the sleep timer 424, the power switch 422 and clock extractor 430. Upon receiving the wakeup signal 427, power on resetor 426 monitors the device power line 460 to be sure that sufficient power is available to other components within the active electrostatic transceiver 104 before de-asserting a reset signal 425. Once sufficient power is generated in the device power line 460,

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	reset signal 425 is de-asserted and other components may start functioning within the active electrostatic transceiver 104. In FIG. 4A the reset signal line 425 is coupled to the sleep timer 424, the clock extractor 430, the demodulator 432, the modulator 309 and other components of the active electrostatic transceiver 104. Vega at 10:34–52 The sleep timer 424 of the active electrostatic transceiver of FIG. 4A is a digital counter that counts to a predetermined count value using the clock signal on clock line 325 received from the clock extractor 430. Upon reaching the predetermined count value, the sleep timer 424 turns off active components within the modulator 309. While the sleep timer 424 is counting a transmit signal is indicated on signal line 423. When the sleep timer 424 reaches the predetermined count value, signal line 423 indicates a receive signal and the active electrostatic transceiver powers off the active components within the modulator 309. While in this mode, the transceiver may still use passive components and the load modulators within the modulator 309 to communicate with a reader. Further, while in this mode, the transceiver may receive and respond to encoded write data transmitted by the reader. The predetermined count value is determined based on the time, in number of clock cycles, that it takes for the active electrostatic transceiver to complete a transmission cycle with an electrostatic reader 101. Vega at 10:53–11:6 Referring to FIG. 4B, the power manager 412B includes the detector/receiver 420, the power switch 422, an analog delay block 464, and the power-on-resetor (POR) 426. The digital sleep timer 424 of FIG. 4A is replaced with the analog delay block 464 within the power manager block 412B while other blocks function similar to the description of FIG. 4A. Analog delay block 464 provides an analog delay by using resistor and capacitor elements in conjunction with a threshold detector or comparator. The analog delay block is preferably designed to provide a lengthy delay such as a couple of seconds. The circuitry of the analog delay block is simpler than that of the sleep timer 424. Upon detection of a received signal, the wakeup signal on signal line 427 causes the analog delay block to initiate the RC delay. The transmit signal on signal line 423 is coupled to the power switch 422 and causes it to select power, if available, from the energy storage means 360 for the active transmitter of the modulator 309. Upon completion of the RC delay, a receive signal is indicated on signal line 423 causing the power switch 422 to disconnect power from the active transmitter of the modulator 309. Vega at 11:7–12:16 Power switch 422 is coupled to the detector/receiver 420 through the signal line 427 and to the sleep timer 424 or the analog delay block 464 through the signal line 423. The power switch 422 controls the

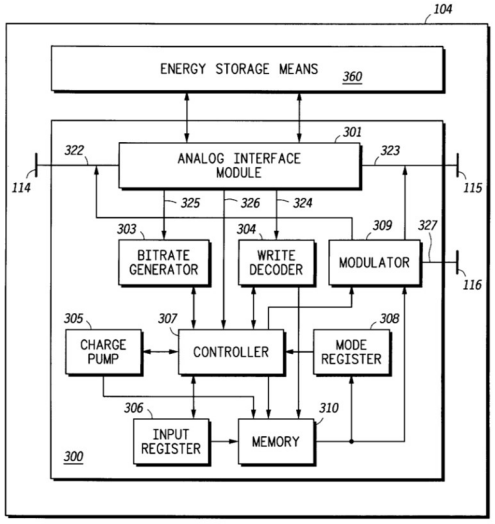
Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	switching of the high level power supply voltage 451 from the energy storage means 360 or the rectified voltage 461 and provides the analog interface module 301 with the means to manage power consumption. These energy sources may be coupled to the device power line 460 feeding power to other components of the active electrostatic transceiver 104. FIG. 4C illustrates the basic components of the power switch 422 that provide power selection for the active electrostatic transceiver 104. These components include the power analyzer 465, the multiplexor 466 and the multiplexor 469. Multiplexor 469 may optionally be a switch with one end connected to the amplifier power line 462 and another end connected to the device power line 460. Power analyzer 465 performs an analysis on the energy provided by the DC voltage rectifier/regulator 418 with that supplied by the energy storage means 360. The power analyzer 465 receives the rectified voltage 461, the high level supply voltage 451 and the low level supply voltage 450 in order to perform the analysis. Additionally, control signals 423, 427 and any other control signals are received by the power analyzer 465 to further control the multiplexor 466 and multiplexor 469. Signal lines 423 and 427 are exemplary control signals input into the power analyzer 465. Typically, if the energy storage means 360 has higher energy levels it is selectively coupled to the device power line 460 and the amplifier power line 462 when signal line 427 indicates a transmit signal. Optionally when the transceiver 104 is in an active mode for active transmission by amplifier 477 and when signal line 427 indicates a receive signal, the energy storage means may be selectively decoupled from the amplifier power line 462, have the rectified voltage 461 coupled to the amplifier power line 462 or alternatively have no power source coupled to the amplifier power line 462 powering OFF the circuitry of amplifier 477 in each case conserving power in the energy storage means. If it is the case that the energy storage means 360 has lower energy levels than that of the rectified voltage 461, the rectified voltage may be selectively coupled to the device power line 460 by multiplexor 466 and to the amplifier power line 462 by multiplexor 469 such that the load modulator 473 and the amplifier 477 can perform passive load modulation and passive transmission of electrostatic signals in a passive mode. Additionally if it is desirable to conserve power or more efficiently charge the energy storage means, multiplexor 466 or 469 can operate as switches decoupling the device power line 460 or the amplifier power line 462 from any power source. After selecting a power source where the power switch 422 couples the high level power supply 451 or the rectified voltage 461 with the device power line 460, circuitry within the active electrostatic transceiver goes into a power on reset sequence controlled by the power on resetor 426. When out of the power on reset sequence, the active electrostatic transceiver 104 can go through a communication cycle with the electrostatic reader 101 while in the read range and the sleep timer 424 starts counting or the analog delay cycle of the analog delay block 464 begins. If the active electrostatic transceiver remains in the electrostatic field (i.e. read range) and the sleep timer 424 reaches its predetermined count value or the analog delay block completes the predetermined RC delay time, a

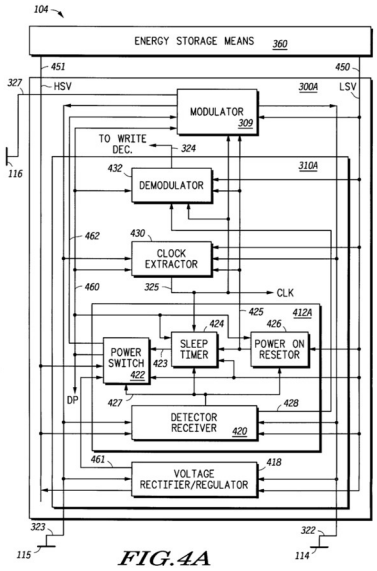
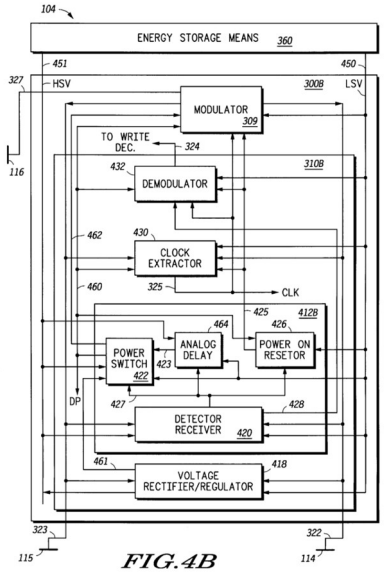
Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	receive signal is indicated on signal line 423 to the power switch 422. The active electrostatic transceiver 104 continues to listen for signals from reader 101 or other sources that communicate on the carrier frequency. If the active electrostatic transceiver 104 is removed from the electrostatic field, the detector/receiver 420 resets and a sleep signal is indicated on signal line 427. Upon receiving the sleep signal, the power switch 422 selectively disconnects the high level voltage supply 451 from the device power line 460 so that components coupled to the device power line 460 become powered off and enter the sleep mode. In this manner when the active electrostatic transceiver 104 is outside the electrostatic field (i.e. read range) it goes into its low power sleep mode. Vega at 12:60–13:6 Modulator 309 is coupled to the power switch 422 through the device power line 460, the energy storage means 360 through the low level power supply 450, the electrostatic electrodes 114-116 respectively through signal lines 322, 323 and 327, power on resetor 426 through signal line 425, and the clock extractor 430 through clock signal line 325. Modulator 309 includes a load modulator for electrostatic electrodes 114-115 and an active power amplifier in order to amplify signals for the extra transmission distance to the reader over the electrostatic electrode 116. A passive electrostatic transceiver may not function properly at large read ranges because of weak signals. The electrostatic reader's receiver may require increased sensitivity in order to receive signals from large read ranges. Vega at 13:7–14:10 Referring now to FIG. 4D, a block diagram is illustrated of the components within the modulator 309 for active and passive load modulation and active transmission. Active and passive load modulation are accomplished by the modulator controller and the load modulator. Active load modulation occurs when the energy storage means 360 is coupled to the device power line 460 and the circuitry of the modulator controller 471. Passive load modulation occurs when the DC voltage rectifier/regulator within the transceiver 104 provides the rectified voltage and is coupled through the power switch to the device power line 460 and the modulator controller 471. Load modulation is accomplished by varying the impedance between the electrostatic electrodes 114 and 115. Varying the impedance between the electrostatic electrodes, that are capacitively coupled with the electrostatic electrodes of the reader 101, causes the excitation signal generated by the reader 101 to be reflected back. A data signal and a carrier signal is input into the modulator controller 471 at line 474 and 476 respectively to control the load modulator 473. The carrier signal 476 is commonly referred to as the data carrier and has a carrier frequency. Preferably the carrier frequency of the data carrier is 62.5 K Hz or one-half the power carrier frequency. FIG. 4E illustrates a few load modulators 473A-473D. Load modulator 473A consists of a

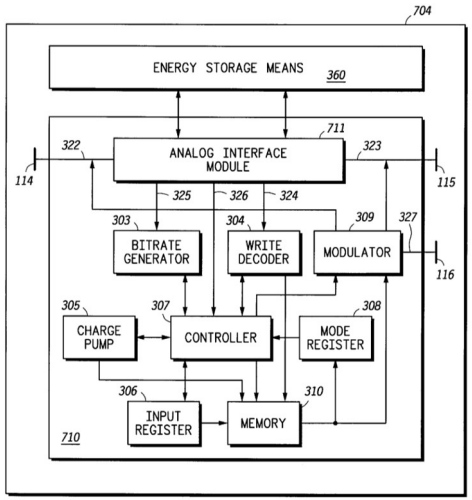
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	variable impedance 480 coupled between the electrostatic electrodes 114 and 115 that has its impedance varied or switched by control signal 472 from the modulator controller 471. Load modulator 473B includes transistors 481 and 482, each coupled respectively between an electrostatic electrode and the low level supply voltage 450. The transistors are preferably turned ON and OFF by having their gates switched by a digital drive signal supplied on control signal 472. Load modulator 473C includes transistor 483 coupled between the electrostatic electrodes 114 and 115. Transistor 483 is preferably turned ON and OFF by having its gate switched by a digital drive signal supplied on control signal 472. Load modulator 473D includes transistor 484 coupled between one electrostatic electrode 322 and the low level supply voltage 450. This is an asymmetrical load modulation technique where circuitry within a rectifier provides the return path through the opposite electrostatic electrode 323. Referring back to FIG. 4D, active and passive transmission is accomplished by the modulator controller 471 and amplifier 477. Amplifier 477 is preferably a CMOS fully complementary inverter or buffer with its VDD input connected to the amplifier power line 462 and its VSS connection coupled to the low level power supply 450. Active transmission occurs when power is coupled from the high level power supply 451 through the power switch and onto the amplifier power line 462 by multiplexor 469. Passive transmission occurs when the DC voltage rectifier/regulator 418 within the transceiver 104 provides the rectified voltage and is coupled through the power switch to the amplifier power line 462 by multiplexor 469. Multiplexor 469 and 466 can further operate as a switch to selectively turn power OFF to circuitry connected to the device power line 460 or the amplifier power line 462 by turning OFF both of the transistor switches 467-468 or 470 and 475. Data 474 input into the modulator controller 471 is modulated with the input carrier signal 476 to generate the data signal on line 478. Signal line 478 is separate from signal line 472 such that the load modulator 473 and the amplifier 477 can be enabled or disabled independent from one another. Disabling the load modulator 473 or the amplifier 477 may be performed by setting the signal on line 472 or 478 respectively to a high or low DC logic level. The signal on signal line 478 is input into the amplifier 477. The amplifier 477 amplifies the signal on line 478 and transmits the information electrostatically over the electrostatic electrode 116. In active mode, after the transmit time has occurred, the power to the amplifier 477 may be turned OFF to conserve power. Vega at 15:20–37 The analog interface module 711 generally performs the power management function for the active electrostatic transceiver 704. Additionally, it generates its own clock from a free running low power clock oscillator. This generated clock is provided to other components of the active electrostatic transceiver 704 which require a clock including the bitrate generator 303. The analog interface module 711 also demodulates the received signal to generate a received data stream. The analog interface module 711 also

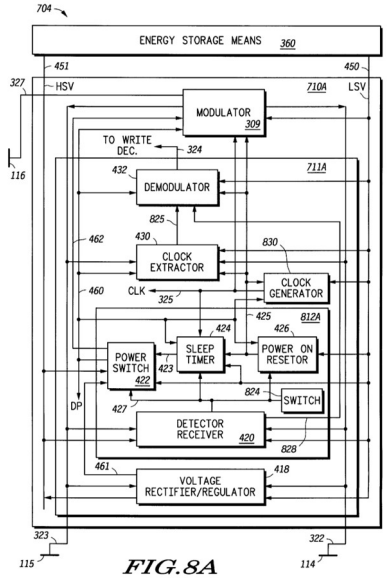
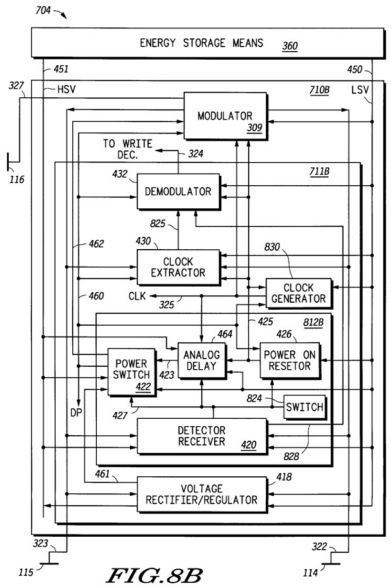
Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	analyzes the received data stream in order to determine if the active electrostatic transceiver 704 should perform some operation such as a read operation or a write operation and communicates the results of the analysis to the controller 307 and the write decoder 304. It preferably performs this analysis by searching for predetermined gaps in the received data stream. Modulator 309 as previously described in detail communicates information from the active electrostatic transceiver to a reader. Vega at 15:38–61 Now referring to FIG. 8A, selected details of the analog interface module 711 within the active electrostatic transceiver 704 are illustrated. The active electrostatic transceiver 704 includes the first electrostatic electrode 114, the second electrostatic electrode 115, the third electrostatic electrode 116, the transceiver circuit 710, and an energy storage means 360. The energy storage means 360 can be any type of energy storage means, including a battery or capacitor, preferably it is a thin foil battery to conform to a form factor for a smart card, tag, or badge. The transceiver circuit 710 as illustrated in FIG. 8A shows the relevant components for the second embodiment of the present invention. In FIG. 8A, the transceiver circuit 710 includes the analog interface module 711 and modulator 309. Components of the analog interface module 711 include a DC voltage rectifier/regulator 418, a power manager 812A, a clock extractor 430, a clock generator 830, a demodulator 432, and a modulator 309. The power manager 812A includes a detector/receiver 420, a power switch 422, a sleep timer 424, a power-on-resetor (POR) 426, and a manual switch 824. Except as otherwise described below, like numbered components of the transceiver circuit 710 operate similar to the similarly numbered components of the transceiver circuit 300 of the active electrostatic transceiver 104. Vega at 15:62–16:8 In the second embodiment of the present invention the active electrostatic transceiver 704 may not receive an excitation signal from which to extract a clock signal, particularly when coupled to the reader 601 of FIG. 6A. Thus, the transceiver circuit 710 includes its own clock generator 830. A clock extractor 430 is retained to generate an extracted clock 825 for demodulation of signals that may be received from readers other than reader 601. Clock generator 830 receives power by coupling to the device power line 460 and the low level power supply 450. Clock generator 830 has its own low power clock oscillator in order to generate a clock. The clock signal on clock line 325 is provided to the sleep timer 424 amongst other components of the transceiver circuit 710. Vega at 16:36–48 Power on resetor 426 monitors the device power line 460 to be sure that sufficient power is available to other components within the active electrostatic transceiver 704 before de-asserting a reset signal 425.

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	Once sufficient power is generated in the device power line 460, reset signal 425 is de-asserted and other components may start functioning within the active electrostatic transceiver 704. In FIG. 8A the reset signal line 425 is coupled to the sleep timer 424, the demodulator 432, the modulator 309 and other components of the active electrostatic transceiver 704. In FIG. 8B, the reset signal line 425 is coupled to the analog delay block 464, the demodulator 432, the modulator 309 and other components of the active electrostatic transceiver 704. Vega at 16:53–17:8 The present invention has many advantages over the prior art. The present invention provides a larger read range over passive RFID communication systems and therefore increases the applicability of electrostatic communication systems. Additionally, the present invention provides for greater flexibility in choosing components for an electrostatic transceiver. Also, the present invention provides greater operational functionality in an electrostatic transceiver because the available power is greater. Furthermore, the present invention provides for greater integration in circuitry and reduces the amount space utilized for an active electrostatic transceiver. Additionally the present invention in its second embodiment reduces the interference and noise in an electrostatic communication system so that it may be used in environments requiring low noise emission. The present invention provides for lower cost RFID transceivers such that disposable applications are possible. Furthermore, the present invention provides the capability to operate an active electrostatic transceiver in an active mode operating under the power of an energy storage means or in a passive mode under the power generated by a voltage rectifier/regulator when the energy storage means power is too low or if in the case of a desirable low-power operational mode. To the extent this limitation is not disclosed by Vega, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Vega, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[1b] a smartcard controller coupled to the power source to receive power;	Vega discloses or renders obvious "a smartcard controller coupled to the power source to receive power." For example: Vega at Abstract An active electrostatic transceiver is provided that has electrostatic electrodes, an energy storage means such as a battery and a transceiver circuit for communication within an electrostatic RFID communication system. The transceiver circuit includes power management features so that the energy storage means is not quickly depleted. Additionally the transceiver circuit includes amplifiers and filters so that the read range is further increased and noise sources are better filtered out. In a first embodiment, the transceiver

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	circuit has a clock extractor that extracts a clock from the incoming data signal such that the clock and the data signal are synchronized so that demodulating the data from the data signal is simplified. In a second embodiment, the transceiver circuit has its own clock generator for initiating transmission of signals so that a reader need not have an exciter to generate an excitation signal. Each embodiment of the transceiver circuit has power management features so that power is conserved. Additionally, each transceiver circuit has the ability to operate in a passive mode, when there is insufficient charge in the energy storage means or a lower power mode is desirable. Vega at Figure 3  FIG.3 Vega at Figure 4A

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	 *FIG.4A* Vega at Figure 4B  *FIG.4B*

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	Vega at Figure 7  *FIG. 7* Vega at Figure 8A

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	 FIG.8A Vega at Figure 8B  FIG.8B

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	Vega at 3:28–45 Briefly, an active electrostatic transceiver is provided that has electrostatic electrodes, an energy storage means such as a battery and a transceiver circuit for communication within an electrostatic RFID communication system. The transceiver circuit includes power management features so that the energy storage means is not quickly depleted. Additionally the transceiver circuit includes amplifiers and filters so that the read range is further increased and noise filtering is improved. In a first embodiment, the transceiver circuit has a clock extractor that extracts a clock from the incoming data signal such that the clock and the data signal are synchronized so that demodulating the data from the data signal is simplified. In a second embodiment, the transceiver circuit has its own clock generator for initiating transmission of signals so that a reader need not have an exciter to generate an excitation signal. Both embodiments of the transceiver circuit have power management features that can decrease power consumption. Vega at 4:51–5:7 The present invention includes a method, apparatus and system for providing electrostatic communication utilizing capacitance-based technology with active and passive electrostatic transceivers. Passive electrostatic transceivers derive their power from electrostatic signals being transmitted by an electrostatic reader or other electrostatic signal source. An active electrostatic transceiver has its own internal power source and need not rely on an electrostatic signal source from an electrostatic reader or other source to power up and perform certain functions. Electrostatic communication is accomplished through capacitive coupling which requires no physical contact or wires between a reader and an electrostatic transceiver (a.k.a. electrostatic tag or electrostatic transponder). In the electrostatic communication system, the voltage applied to the capacitively coupled plates is an AC voltage generated by an electric field (i.e. an electrostatic ("ES") field is developed) as opposed to an electromagnetic ("EM") field in order for a charge or signal to be communicated. In short, an electrostatic field is an energy (electrical) field created between two electrodes having a voltage differential. An electrostatic transceiver needs to be in the proximity of the reader, referred to as the read range, in order to have sufficient capacitive coupling to transceive electrostatic signals. Vega at 5:8–25 Briefly, an active electrostatic transceiver is provided that has electrostatic electrodes, an energy storage means, such as a battery, and a transceiver circuit for communication within an electrostatic RFID communication system. The transceiver circuit includes power management features so that the energy storage means is not quickly depleted. Additionally the transceiver circuit includes amplifiers and filters

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	so that the read range is further increased and noise filtering is improved. In a first embodiment, the transceiver circuit has a clock extractor that extracts a clock from the incoming data signal such that the clock and the data signal are synchronized so that demodulating the data from the data signal is simplified. In a second embodiment, the transceiver circuit has its own clock generator for initiating transmission of signals so that a reader need not have an exciter to generate an excitation signal. Both embodiments of the transceiver circuit have power management features that improve power conservation. Vega at 6:1–22 FIG. 1 illustrates the advantage that an active electrostatic transceiver 104 has over a passive electrostatic transceiver 102. The distance between an electrostatic transceiver and an electrostatic reader where communication may start to occur is referred to as the read range. In FIG. 1 the passive read range 125 between passive ES transceiver 102 and ES reader 101 is significantly smaller than the active read range 126 between active ES transceiver 104 and ES reader 101. This is because an energy storage means within the active electrostatic transceiver 104 allows for active transmission of signals using an amplifier. Because of its passive nature, the passive electrostatic transceiver 102 relies on a load modulation technique for communication of signals by reflecting back the energy of the excitation signal to the electrostatic reader 101. The reflection of the excitation signal requires that the passive electrostatic transceiver 102 be nearer the reader 101. The larger read range provided by reflected ES signals using load modulation or transmitted ES signals using an active transmitter allows the active electrostatic transceiver 104 to be used in other applications of RFID communication systems where a passive electrostatic transceiver 102 would not. Vega at 7:14–56 In general, electrostatic reader 101 generates an electrostatic (electrical) field for use both as a power source for the passive electrostatic transceiver 102 and for transferring information between electrostatic reader 101 and passive electrostatic transceiver 102 or active electrostatic transceiver 104. As such, electrostatic reader 101 electrostatically generates and transmits an excitation signal to the surrounding air, gas, atmosphere or non-electrically conductive medium via the reader's electrostatic electrodes, except for the return path in a monopole system. The excitation signal is an AC signal which activates the passive electrostatic transceiver 102 when it is comes within the capacitance coupling range of reader 101. Upon being sufficiently energized, the passive electrostatic transceiver 102 may respond by electrostatically transmitting a read data signal carrying the information stored in its memory to electrostatic reader 101 (as part of a read operation). Active electrostatic transceiver 104 includes an energy storage means such that it

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	may not require the excitation signal to become sufficiently energized. In accordance to the present invention, reader 101 may also electrostatically couple a write signal to communicate and write information to the passive electrostatic transceiver 102 or active ES transceiver(as part of a write operation). Alternatively, such programming or charging can be carried out by a separate ES programming, ES encoding or electrostatic charger unit (not illustrated). It is to be appreciated that the excitation signal must be generated and transmitted by electrostatic reader 101 to excite the passive electrostatic transceiver 102 or charge the active electrostatic transceiver 104. The excitation signal is an AC energy source and can be a continuous waveform or a varying waveform (i.e. amplitude, frequency, time, etc. of the waveform may vary). Alternatively a user could manually cause the electrostatic reader 101 or a charger to generate the excitation signal to charge or communicate with the passive electrostatic transceiver 102 or active electrostatic transceiver 104 by selecting a button or switch. The reader 101 usually has available a larger power source than the passive electrostatic transceiver 102 or active electrostatic transceiver 104. Thus, the reader 101 has very sensitive receiving and high energy transmission when compared with the passive electrostatic transceiver 102 or active electrostatic transceiver 104. Vega at 8:46–62 When in proximity of a reader 101, the active electrostatic transceiver 104 first detects the excitation signal being emitted by an electrostatic reader 101. The excitation signal is generated by reader 101 at a carrier frequency, commonly referred to as a power carrier frequency or exciter frequency. The power carrier frequency, which may be modulated with data, is preferably 125 k Hz. After detecting the excitation signal, the first embodiment of the active electrostatic transceiver 104 goes through a power management sequence and powers up in order to derive a square wave based on the excitation signal at the carrier frequency which is used as a clock signal for the active transceiver. In this manner of generating a clock signal, information received by the active electrostatic transceiver 104 is synchronized with the clock signal. This alleviates generating a clock with a clock oscillator and synchronizing the data and clock using phase-locked loop techniques. Vega at 9:30–60 Now referring to FIG. 4A, a detailed block diagram of components of the analog interface module 301 within the active transceiver 104 is illustrated including digital timing elements. The active electrostatic transceiver 104 includes the first electrostatic electrode 114, the second electrostatic electrode 115, the third electrostatic electrode 116, the transceiver circuit 300, and an energy storage means 360. The energy storage means 360 can be any type of energy storage means, including an electrochemical storage cell,

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	such as a rechargeable battery or a non-rechargeable battery, or a capacitor, but is preferably a thin foil battery to conform to a form factor of a smart card, tag, or badge. The transceiver circuit 300A as illustrated in FIG. 4A shows the relevant components in the first embodiment of the present invention. In FIG. 4A, the transceiver circuit 300A is illustrated as including the analog interface module 301 and the modulator 309. In FIG. 4A, the relevant components of the analog interface module 301 include a power manager 412A, a DC voltage rectifier/regulator 418, a clock extractor 430, and a demodulator 432. The power manager 412A includes a detector/receiver 420, a power switch 422, a sleep timer 424, and a power-on-resetor (POR) 426. The DC voltage rectifier/regulator 418 includes a rectifier, a voltage regulator and voltage control functionality such that a DC voltage and energy source may be generated from the excitation signal or other signals received by the active electrostatic transceiver 104 and selectively used to power the transceiver 104 or charge the energy storage means 360. The DC voltage rectifier/regulator 418 couples to the power switch 422 for selection and to the energy storage means 360 for charging. Vega at 9:61–10:33 The detector/receiver 420 in the active electrostatic transceiver 104 may receive power directly from the energy storage means 360 in order to be actively listening for an excitation signal from an electrostatic reader 101. Alternatively, the detector/receiver 420 may have passive components sufficient to detect and receive signals when the energy storage means has insufficient energy to power active components. The detector/receiver 420 may have an amplifier for receiving and amplifying the incoming electrostatic signals, a bandpass filter for filtering unwanted frequencies outside a range of the carrier frequency, and a detector for detecting the presence of the carrier frequency in an excitation signal indicating that the transceiver is within the read range of an electrostatic reader 101. The detector may detect a number of oscillations in the received waveform at the carrier frequency indicating that it is not a noise source generating the waveform. In the preferred embodiment, if the detector detects any signal in the band of the carrier it provides an indication signal. Upon detection of the excitation signal, the detector/receiver 420 generates a wakeup signal on signal line 427 indicating that the active electrostatic transceiver 104 is within range of an electrostatic field and that the active electrostatic transceiver 104 needs to go through its wake up procedure. When outside the range of an electrostatic field, the signal line 427 indicates a go to-sleep signal so that the transceiver may go into a low power sleep state. The wakeup signal 427 is provided to the power on resetor 426, the sleep timer 424, the power switch 422 and clock extractor 430. Upon receiving the wakeup signal 427, power on resetor 426 monitors the device power line 460 to be sure that sufficient power is available to other components within the active electrostatic transceiver 104 before de-asserting a reset signal 425. Once sufficient power is generated in the device power line 460,

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	reset signal 425 is de-asserted and other components may start functioning within the active electrostatic transceiver 104. In FIG. 4A the reset signal line 425 is coupled to the sleep timer 424, the clock extractor 430, the demodulator 432, the modulator 309 and other components of the active electrostatic transceiver 104. Vega at 10:34–52 The sleep timer 424 of the active electrostatic transceiver of FIG. 4A is a digital counter that counts to a predetermined count value using the clock signal on clock line 325 received from the clock extractor 430. Upon reaching the predetermined count value, the sleep timer 424 turns off active components within the modulator 309. While the sleep timer 424 is counting a transmit signal is indicated on signal line 423. When the sleep timer 424 reaches the predetermined count value, signal line 423 indicates a receive signal and the active electrostatic transceiver powers off the active components within the modulator 309. While in this mode, the transceiver may still use passive components and the load modulators within the modulator 309 to communicate with a reader. Further, while in this mode, the transceiver may receive and respond to encoded write data transmitted by the reader. The predetermined count value is determined based on the time, in number of clock cycles, that it takes for the active electrostatic transceiver to complete a transmission cycle with an electrostatic reader 101. Vega at 10:53–11:6 Referring to FIG. 4B, the power manager 412B includes the detector/receiver 420, the power switch 422, an analog delay block 464, and the power-on-resetor (POR) 426. The digital sleep timer 424 of FIG. 4A is replaced with the analog delay block 464 within the power manager block 412B while other blocks function similar to the description of FIG. 4A. Analog delay block 464 provides an analog delay by using resistor and capacitor elements in conjunction with a threshold detector or comparator. The analog delay block is preferably designed to provide a lengthy delay such as a couple of seconds. The circuitry of the analog delay block is simpler than that of the sleep timer 424. Upon detection of a received signal, the wakeup signal on signal line 427 causes the analog delay block to initiate the RC delay. The transmit signal on signal line 423 is coupled to the power switch 422 and causes it to select power, if available, from the energy storage means 360 for the active transmitter of the modulator 309. Upon completion of the RC delay, a receive signal is indicated on signal line 423 causing the power switch 422 to disconnect power from the active transmitter of the modulator 309. Vega at 11:7–12:16 Power switch 422 is coupled to the detector/receiver 420 through the signal line 427 and to the sleep timer 424 or the analog delay block 464 through the signal line 423. The power switch 422 controls the

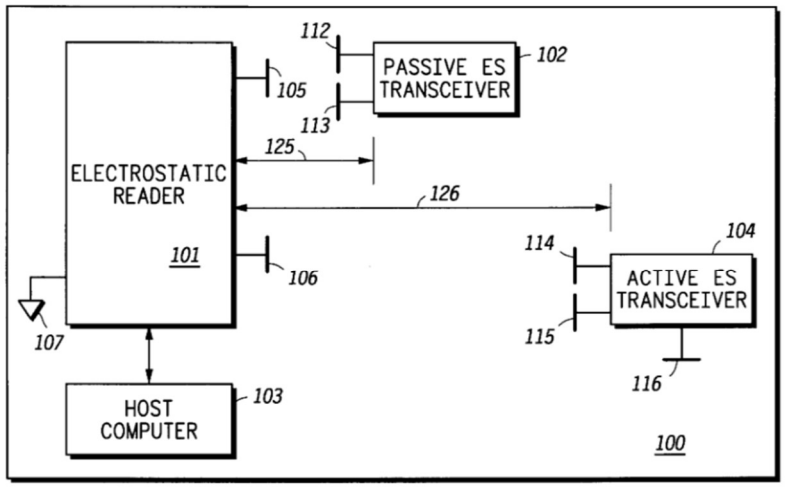
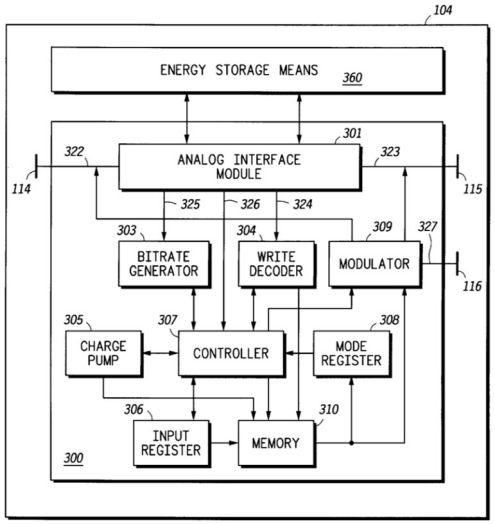
Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	switching of the high level power supply voltage 451 from the energy storage means 360 or the rectified voltage 461 and provides the analog interface module 301 with the means to manage power consumption. These energy sources may be coupled to the device power line 460 feeding power to other components of the active electrostatic transceiver 104. FIG. 4C illustrates the basic components of the power switch 422 that provide power selection for the active electrostatic transceiver 104. These components include the power analyzer 465, the multiplexor 466 and the multiplexor 469. Multiplexor 469 may optionally be a switch with one end connected to the amplifier power line 462 and another end connected to the device power line 460. Power analyzer 465 performs an analysis on the energy provided by the DC voltage rectifier/regulator 418 with that supplied by the energy storage means 360. The power analyzer 465 receives the rectified voltage 461, the high level supply voltage 451 and the low level supply voltage 450 in order to perform the analysis. Additionally, control signals 423, 427 and any other control signals are received by the power analyzer 465 to further control the multiplexor 466 and multiplexor 469. Signal lines 423 and 427 are exemplary control signals input into the power analyzer 465. Typically, if the energy storage means 360 has higher energy levels it is selectively coupled to the device power line 460 and the amplifier power line 462 when signal line 427 indicates a transmit signal. Optionally when the transceiver 104 is in an active mode for active transmission by amplifier 477 and when signal line 427 indicates a receive signal, the energy storage means may be selectively decoupled from the amplifier power line 462, have the rectified voltage 461 coupled to the amplifier power line 462 or alternatively have no power source coupled to the amplifier power line 462 powering OFF the circuitry of amplifier 477 in each case conserving power in the energy storage means. If it is the case that the energy storage means 360 has lower energy levels than that of the rectified voltage 461, the rectified voltage may be selectively coupled to the device power line 460 by multiplexor 466 and to the amplifier power line 462 by multiplexor 469 such that the load modulator 473 and the amplifier 477 can perform passive load modulation and passive transmission of electrostatic signals in a passive mode. Additionally if it is desirable to conserve power or more efficiently charge the energy storage means, multiplexor 466 or 469 can operate as switches decoupling the device power line 460 or the amplifier power line 462 from any power source. After selecting a power source where the power switch 422 couples the high level power supply 451 or the rectified voltage 461 with the device power line 460, circuitry within the active electrostatic transceiver goes into a power on reset sequence controlled by the power on resetor 426. When out of the power on reset sequence, the active electrostatic transceiver 104 can go through a communication cycle with the electrostatic reader 101 while in the read range and the sleep timer 424 starts counting or the analog delay cycle of the analog delay block 464 begins. If the active electrostatic transceiver remains in the electrostatic field (i.e. read range) and the sleep timer 424 reaches its predetermined count value or the analog delay block completes the predetermined RC delay time, a

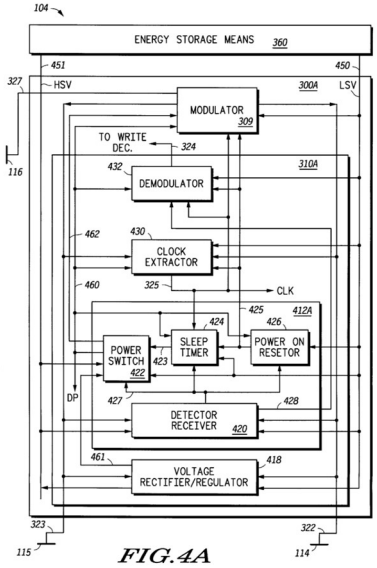
Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	receive signal is indicated on signal line 423 to the power switch 422. The active electrostatic transceiver 104 continues to listen for signals from reader 101 or other sources that communicate on the carrier frequency. If the active electrostatic transceiver 104 is removed from the electrostatic field, the detector/receiver 420 resets and a sleep signal is indicated on signal line 427. Upon receiving the sleep signal, the power switch 422 selectively disconnects the high level voltage supply 451 from the device power line 460 so that components coupled to the device power line 460 become powered off and enter the sleep mode. In this manner when the active electrostatic transceiver 104 is outside the electrostatic field (i.e. read range) it goes into its low power sleep mode. Vega at 12:60–13:6 Modulator 309 is coupled to the power switch 422 through the device power line 460, the energy storage means 360 through the low level power supply 450, the electrostatic electrodes 114-116 respectively through signal lines 322, 323 and 327, power on resetor 426 through signal line 425, and the clock extractor 430 through clock signal line 325. Modulator 309 includes a load modulator for electrostatic electrodes 114-115 and an active power amplifier in order to amplify signals for the extra transmission distance to the reader over the electrostatic electrode 116. A passive electrostatic transceiver may not function properly at large read ranges because of weak signals. The electrostatic reader's receiver may require increased sensitivity in order to receive signals from large read ranges. Vega at 13:7–14:10 Referring now to FIG. 4D, a block diagram is illustrated of the components within the modulator 309 for active and passive load modulation and active transmission. Active and passive load modulation are accomplished by the modulator controller and the load modulator. Active load modulation occurs when the energy storage means 360 is coupled to the device power line 460 and the circuitry of the modulator controller 471. Passive load modulation occurs when the DC voltage rectifier/regulator within the transceiver 104 provides the rectified voltage and is coupled through the power switch to the device power line 460 and the modulator controller 471. Load modulation is accomplished by varying the impedance between the electrostatic electrodes 114 and 115. Varying the impedance between the electrostatic electrodes, that are capacitively coupled with the electrostatic electrodes of the reader 101, causes the excitation signal generated by the reader 101 to be reflected back. A data signal and a carrier signal is input into the modulator controller 471 at line 474 and 476 respectively to control the load modulator 473. The carrier signal 476 is commonly referred to as the data carrier and has a carrier frequency. Preferably the carrier frequency of the data carrier is 62.5 K Hz or one-half the power carrier frequency. FIG. 4E illustrates a few load modulators 473A-473D. Load modulator 473A consists of a

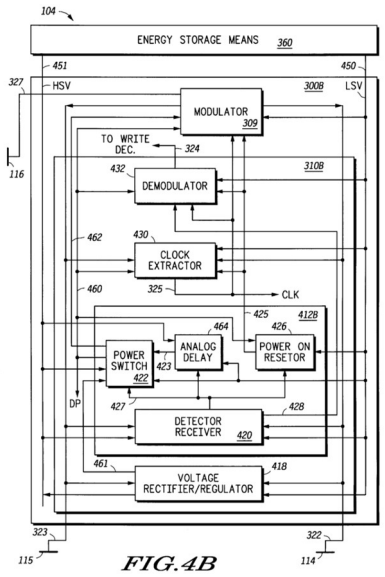
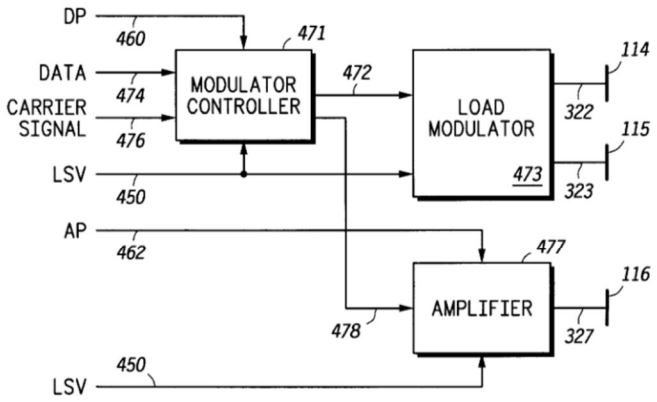
Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	variable impedance 480 coupled between the electrostatic electrodes 114 and 115 that has its impedance varied or switched by control signal 472 from the modulator controller 471. Load modulator 473B includes transistors 481 and 482, each coupled respectively between an electrostatic electrode and the low level supply voltage 450. The transistors are preferably turned ON and OFF by having their gates switched by a digital drive signal supplied on control signal 472. Load modulator 473C includes transistor 483 coupled between the electrostatic electrodes 114 and 115. Transistor 483 is preferably turned ON and OFF by having its gate switched by a digital drive signal supplied on control signal 472. Load modulator 473D includes transistor 484 coupled between one electrostatic electrode 322 and the low level supply voltage 450. This is an asymmetrical load modulation technique where circuitry within a rectifier provides the return path through the opposite electrostatic electrode 323. Referring back to FIG. 4D, active and passive transmission is accomplished by the modulator controller 471 and amplifier 477. Amplifier 477 is preferably a CMOS fully complementary inverter or buffer with its VDD input connected to the amplifier power line 462 and its VSS connection coupled to the low level power supply 450. Active transmission occurs when power is coupled from the high level power supply 451 through the power switch and onto the amplifier power line 462 by multiplexor 469. Passive transmission occurs when the DC voltage rectifier/regulator 418 within the transceiver 104 provides the rectified voltage and is coupled through the power switch to the amplifier power line 462 by multiplexor 469. Multiplexor 469 and 466 can further operate as a switch to selectively turn power OFF to circuitry connected to the device power line 460 or the amplifier power line 462 by turning OFF both of the transistor switches 467-468 or 470 and 475. Data 474 input into the modulator controller 471 is modulated with the input carrier signal 476 to generate the data signal on line 478. Signal line 478 is separate from signal line 472 such that the load modulator 473 and the amplifier 477 can be enabled or disabled independent from one another. Disabling the load modulator 473 or the amplifier 477 may be performed by setting the signal on line 472 or 478 respectively to a high or low DC logic level. The signal on signal line 478 is input into the amplifier 477. The amplifier 477 amplifies the signal on line 478 and transmits the information electrostatically over the electrostatic electrode 116. In active mode, after the transmit time has occurred, the power to the amplifier 477 may be turned OFF to conserve power. Vega at 15:20–37 The analog interface module 711 generally performs the power management function for the active electrostatic transceiver 704. Additionally, it generates its own clock from a free running low power clock oscillator. This generated clock is provided to other components of the active electrostatic transceiver 704 which require a clock including the bitrate generator 303. The analog interface module 711 also demodulates the received signal to generate a received data stream. The analog interface module 711 also

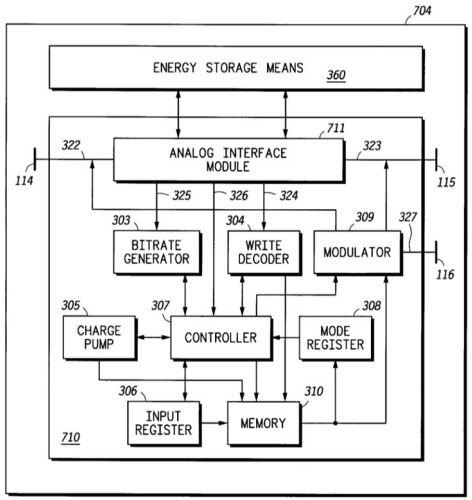
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	analyzes the received data stream in order to determine if the active electrostatic transceiver 704 should perform some operation such as a read operation or a write operation and communicates the results of the analysis to the controller 307 and the write decoder 304. It preferably performs this analysis by searching for predetermined gaps in the received data stream. Modulator 309 as previously described in detail communicates information from the active electrostatic transceiver to a reader. Vega at 15:38–61 Now referring to FIG. 8A, selected details of the analog interface module 711 within the active electrostatic transceiver 704 are illustrated. The active electrostatic transceiver 704 includes the first electrostatic electrode 114, the second electrostatic electrode 115, the third electrostatic electrode 116, the transceiver circuit 710, and an energy storage means 360. The energy storage means 360 can be any type of energy storage means, including a battery or capacitor, preferably it is a thin foil battery to conform to a form factor for a smart card, tag, or badge. The transceiver circuit 710 as illustrated in FIG. 8A shows the relevant components for the second embodiment of the present invention. In FIG. 8A, the transceiver circuit 710 includes the analog interface module 711 and modulator 309. Components of the analog interface module 711 include a DC voltage rectifier/regulator 418, a power manager 812A, a clock extractor 430, a clock generator 830, a demodulator 432, and a modulator 309. The power manager 812A includes a detector/receiver 420, a power switch 422, a sleep timer 424, a power-on-resetor (POR) 426, and a manual switch 824. Except as otherwise described below, like numbered components of the transceiver circuit 710 operate similar to the similarly numbered components of the transceiver circuit 300 of the active electrostatic transceiver 104. Vega at 16:36–48 Power on resetor 426 monitors the device power line 460 to be sure that sufficient power is available to other components within the active electrostatic transceiver 704 before de-asserting a reset signal 425. Once sufficient power is generated in the device power line 460, reset signal 425 is de-asserted and other components may start functioning within the active electrostatic transceiver 704. In FIG. 8A the reset signal line 425 is coupled to the sleep timer 424, the demodulator 432, the modulator 309 and other components of the active electrostatic transceiver 704. In FIG. 8B, the reset signal line 425 is coupled to the analog delay block 464, the demodulator 432, the modulator 309 and other components of the active electrostatic transceiver 704. Vega at 16:53–17:8 The present invention has many advantages over the prior art. The present invention provides a larger read range over passive RFID communication systems and therefore increases the applicability of electrostatic

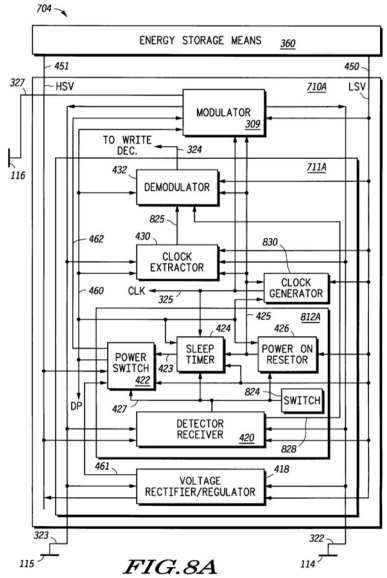
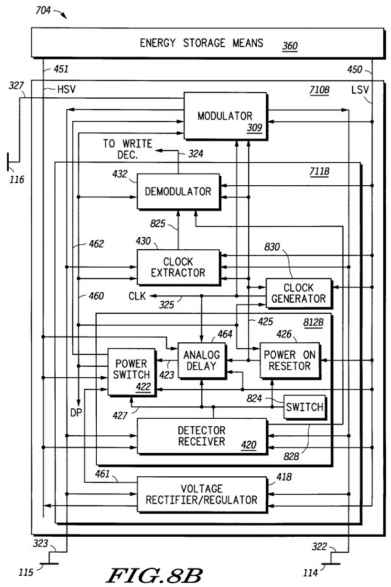
Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	communication systems. Additionally, the present invention provides for greater flexibility in choosing components for an electrostatic transceiver. Also, the present invention provides greater operational functionality in an electrostatic transceiver because the available power is greater. Furthermore, the present invention provides for greater integration in circuitry and reduces the amount space utilized for an active electrostatic transceiver. Additionally the present invention in its second embodiment reduces the interference and noise in an electrostatic communication system so that it may be used in environments requiring low noise emission. The present invention provides for lower cost RFID transceivers such that disposable applications are possible. Furthermore, the present invention provides the capability to operate an active electrostatic transceiver in an active mode operating under the power of an energy storage means or in a passive mode under the power generated by a voltage rectifier/regulator when the energy storage means power is too low or if in the case of a desirable low-power operational mode. To the extent this limitation is not disclosed by Vega, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Vega, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[1c] an antenna tuned to operate at substantially 13.56 MHz, wherein the antenna interacts with a Near Field Communication (NFC) reader external to the mobile device; and	Vega discloses or renders obvious "an antenna tuned to operate at substantially 13.56 MHz, wherein the antenna interacts with a Near Field Communication (NFC) reader external to the mobile device." For example: Vega at Abstract An active electrostatic transceiver is provided that has electrostatic electrodes, an energy storage means such as a battery and a transceiver circuit for communication within an electrostatic RFID communication system. The transceiver circuit includes power management features so that the energy storage means is not quickly depleted. Additionally the transceiver circuit includes amplifiers and filters so that the read range is further increased and noise sources are better filtered out. In a first embodiment, the transceiver circuit has a clock extractor that extracts a clock from the incoming data signal such that the clock and the data signal are synchronized so that demodulating the data from the data signal is simplified. In a second embodiment, the transceiver circuit has its own clock generator for initiating transmission of signals so that a reader need not have an exciter to generate an excitation signal. Each embodiment of the transceiver circuit has power management features so that power is conserved. Additionally, each transceiver circuit has the ability to operate in a passive mode, when there is insufficient charge in the energy storage means or a lower power mode is desirable. Vega at Figure 1

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	 *FIG.1* Vega at Figure 3  *FIG.3*

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	Vega at Figure 4A  FIG.4A Vega at Figure 4B

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	 FIG.4B Vega at Figure 4D  FIG.4D

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	Vega at Figure 7  *FIG. 7* Vega at Figure 8A

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	 FIG.8A Vega at Figure 8B  FIG.8B

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	Vega at 2:4–26 In contrast, conventional RFID technology is inductance-based. More precisely, conventional RFID technology uses near field electromagnetic waves which are also known as induction waves. Unlike radio waves, the field strength of induction waves is proportional to the inverse square of the distance involved. In inductance-based RFID technology, an electromagnetic field is generated for use both as a power source for the transponder and for transferring information between the reader and transponder. Inductance waves are generated using closed circuit alternating current coils that have multiple turns. Inductance coils are required to optimally transmit and receive electromagnetic signals are usually a wire wound or etched metal coil. Using inductance coils adversely impacts the costs, manufacturability, and packaging flexibility of inductance-based RFID technology particularly when used with high number of RFID tags usually required in a system. Due to the prohibitive costs and high degree of manufacturing difficulty, electromagnetic RFID technology is not practical in high volume and low cost applications such as in disposable applications. The bulky packaging, which is typical for electromagnetic RFID, further limits its application to those where thickness is not of primary importance. Vega at 2:27–40 Traditionally electromagnetic transponders in electromagnetic RFID systems derive their power from the electromagnetic signals being transmitted by an electromagnetic reader through induction coupling and have no power storage device. These electromagnetic transponders are often referred to as passive electromagnetic transponders. Because they require inductive coupling, the distance for communication between an electromagnetic reader and a passive electromagnetic transponder, referred to as the read range, is limited. The read range is limited because a sufficient amount of charge to power up the components within a passive electromagnetic transponder is required and is only available within certain distances from the electromagnetic reader. Vega at 3:28–45 Briefly, an active electrostatic transceiver is provided that has electrostatic electrodes, an energy storage means such as a battery and a transceiver circuit for communication within an electrostatic RFID communication system. The transceiver circuit includes power management features so that the energy storage means is not quickly depleted. Additionally the transceiver circuit includes amplifiers and filters so that the read range is further increased and noise filtering is improved. In a first embodiment, the transceiver circuit has a clock extractor that extracts a clock from the incoming data signal such that the clock and the data signal are synchronized so that demodulating the data from the data signal is simplified. In a second embodiment, the transceiver circuit has its own clock generator for initiating

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	transmission of signals so that a reader need not have an exciter to generate an excitation signal. Both embodiments of the transceiver circuit have power management features that can decrease power consumption. Vega at 3:49–52 Another object of the present invention is to introduce power conservation techniques into an active electrostatic transceiver so that the read range between the electrostatic reader and electrostatic transceiver may be increased. Vega at 4:26–28 FIG. 6B is a block diagram of an electrostatic reader for supporting automatic detection and activation of an active electrostatic transceiver. Vega at 4:51–5:7 The present invention includes a method, apparatus and system for providing electrostatic communication utilizing capacitance-based technology with active and passive electrostatic transceivers. Passive electrostatic transceivers derive their power from electrostatic signals being transmitted by an electrostatic reader or other electrostatic signal source. An active electrostatic transceiver has its own internal power source and need not rely on an electrostatic signal source from an electrostatic reader or other source to power up and perform certain functions. Electrostatic communication is accomplished through capacitive coupling which requires no physical contact or wires between a reader and an electrostatic transceiver (a.k.a. electrostatic tag or electrostatic transponder). In the electrostatic communication system, the voltage applied to the capacitively coupled plates is an AC voltage generated by an electric field (i.e. an electrostatic ("ES") field is developed) as opposed to an electromagnetic ("EM") field in order for a charge or signal to be communicated. In short, an electrostatic field is an energy (electrical) field created between two electrodes having a voltage differential. An electrostatic transceiver needs to be in the proximity of the reader, referred to as the read range, in order to have sufficient capacitive coupling to transceive electrostatic signals. Vega at 5:8–25 Briefly, an active electrostatic transceiver is provided that has electrostatic electrodes, an energy storage means, such as a battery, and a transceiver circuit for communication within an electrostatic RFID communication system. The transceiver circuit includes power management features so that the energy storage means is not quickly depleted. Additionally the transceiver circuit includes amplifiers and filters so that the read range is further increased and noise filtering is improved. In a first embodiment, the

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	transceiver circuit has a clock extractor that extracts a clock from the incoming data signal such that the clock and the data signal are synchronized so that demodulating the data from the data signal is simplified. In a second embodiment, the transceiver circuit has its own clock generator for initiating transmission of signals so that a reader need not have an exciter to generate an excitation signal. Both embodiments of the transceiver circuit have power management features that improve power conservation. Vega at 5:26–68 FIG. 1 illustrates the preferred embodiment of the combined electrostatic communication system 100 which includes an electrostatic reader 101, a passive electrostatic transceiver 102, host computer system 103 and an active electrostatic transceiver 104. Electrostatic reader 101, illustrated in a monopole configuration, includes an electrostatic electrode 105 for transmission of an excitation signal and modulated data signals on a carrier by means of electrostatic energy. The signals are transmitted by the reader to either an electrostatic transceiver, transponder, tag, badge, smart card, or other such RFID transceiver such as passive electrostatic transceiver 102 or active electrostatic transceiver 104. Electrostatic reader 101 includes an electrostatic electrode 106 for receiving data signals on a carrier by means of electrostatic energy. The data signals are communicated by either a passive electrostatic transceiver such as passive electrostatic transceiver 102 or active electrostatic transceiver 104. The passive electrostatic transceiver 102 includes at least two electrostatic electrodes 112 and 113 in order to communicate using electrostatic signals. The electrostatic electrodes 112 and 113 may have differing shapes and be made of different materials. Some of the shapes for the electrostatic electrodes 112 and 113 include flat rectangular plates and bow tie shaped plates. The active electrostatic transceiver 104 includes at least two electrostatic electrodes 114 and 115 in order to receive electrostatic energy and communicate using electrostatic signals. As illustrated in FIG. 1, active electrostatic transceiver 104 includes an additional electrostatic electrode 116 for transmitting electrostatic signals. The electrostatic electrodes may also be referred to as antenna, capacitor plates, contactless electrodes, wireless electrodes or isolation electrodes. These electrostatic electrodes provide for the antenna, contactless, wireless and the somewhat isolated functionality of an electrostatic system which requires no physical contact between the electrostatic electrodes in order to communicate. Passive electrostatic transceiver 102 and active electrostatic transceiver 104 can communicate information to/from the electrostatic reader 101 by means of electrostatic signals and capacitive coupling. Host computer 103 is coupled to the electrostatic reader 101 and may couple to other electrostatic readers, electromagnetic readers or electrostatic readers (not shown in FIG. 1) in order to have other points of communication.

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	Vega at 6:1–22 FIG. 1 illustrates the advantage that an active electrostatic transceiver 104 has over a passive electrostatic transceiver 102. The distance between an electrostatic transceiver and an electrostatic reader where communication may start to occur is referred to as the read range. In FIG. 1 the passive read range 125 between passive ES transceiver 102 and ES reader 101 is significantly smaller than the active read range 126 between active ES transceiver 104 and ES reader 101. This is because an energy storage means within the active electrostatic transceiver 104 allows for active transmission of signals using an amplifier. Because of its passive nature, the passive electrostatic transceiver 102 relies on a load modulation technique for communication of signals by reflecting back the energy of the excitation signal to the electrostatic reader 101. The reflection of the excitation signal requires that the passive electrostatic transceiver 102 be nearer the reader 101. The larger read range provided by reflected ES signals using load modulation or transmitted ES signals using an active transmitter allows the active electrostatic transceiver 104 to be used in other applications of RFID communication systems where a passive electrostatic transceiver 102 would not. Vega at 6:23–33 An active electrostatic transceiver 104 is not simply formed by adding an energy storage means to the passive electrostatic transceiver 102. Components of a passive electrostatic transceiver require modification, particularly in the area of power management. The power or energy of an energy storage means must be conserved and properly managed in order for the active electrostatic transceiver to have greater utility. Additionally noise must be properly filtered out to avoid false signal detection and power inadvertently being applied to circuits within the active electrostatic transceiver in order to more properly conserve power. Vega at 6:34–52 Electrostatic electrodes 112 and 113 of passive ES transceiver 102 and ES electrodes 114 and 115 of active transceiver 104 are one part of the capacitive plates for capacitive coupling in order to receive electrostatic charges and communications. The other part of the capacitive plates are provided by the electrostatic reader 101 or other ES source. The space between the coupled electrostatic electrodes defines the dielectric medium between the two parts of the capacitive plates. The capacitive plates of the electrostatic reader 101 can be in either a monopole or a dipole configuration. In a monopole configuration, only one set of coupling plates is used. Earth ground acts as a low impedance return path. The electrostatic transceiver may couple to earth ground through a human body or other relatively low impedance that couples to one or the other of the electrostatic electrodes. In a dipole configuration the

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	reader had two electrostatic electrodes for receiving and two electrostatic electrodes for transmitting and none of the electrostatic electrodes has a preferential coupling path to earth ground. Vega at 7:14–56 In general, electrostatic reader 101 generates an electrostatic (electrical) field for use both as a power source for the passive electrostatic transceiver 102 and for transferring information between electrostatic reader 101 and passive electrostatic transceiver 102 or active electrostatic transceiver 104. As such, electrostatic reader 101 electrostatically generates and transmits an excitation signal to the surrounding air, gas, atmosphere or non-electrically conductive medium via the reader's electrostatic electrodes, except for the return path in a monopole system. The excitation signal is an AC signal which activates the passive electrostatic transceiver 102 when it is comes within the capacitance coupling range of reader 101. Upon being sufficiently energized, the passive electrostatic transceiver 102 may respond by electrostatically transmitting a read data signal carrying the information stored in its memory to electrostatic reader 101 (as part of a read operation). Active electrostatic transceiver 104 includes an energy storage means such that it may not require the excitation signal to become sufficiently energized. In accordance to the present invention, reader 101 may also electrostatically couple a write signal to communicate and write information to the passive electrostatic transceiver 102 or active ES transceiver(as part of a write operation). Alternatively, such programming or charging can be carried out by a separate ES programming, ES encoding or electrostatic charger unit (not illustrated). It is to be appreciated that the excitation signal must be generated and transmitted by electrostatic reader 101 to excite the passive electrostatic transceiver 102 or charge the active electrostatic transceiver 104. The excitation signal is an AC energy source and can be a continuous waveform or a varying waveform (i.e. amplitude, frequency, time, etc. of the waveform may vary). Alternatively a user could manually cause the electrostatic reader 101 or a charger to generate the excitation signal to charge or communicate with the passive electrostatic transceiver 102 or active electrostatic transceiver 104 by selecting a button or switch. The reader 101 usually has available a larger power source than the passive electrostatic transceiver 102 or active electrostatic transceiver 104. Thus, the reader 101 has very sensitive receiving and high energy transmission when compared with the passive electrostatic transceiver 102 or active electrostatic transceiver 104. Vega at 7:57–8:17 Reference is now made to FIG. 3 illustrating in greater detail the components of a first embodiment of the active electrostatic transceiver 104. As shown in FIG. 3, transceiver 104 may include a circuit 300 having an analog interface module 301, a bitrate generator 303, a write decoder 304, an optional charge pump

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	305, an input register 306, a controller 307, a mode register 308, a modulator 309, a memory 310, and electrostatic electrodes 114-116. As previously discussed, electrostatic electrodes 114 and 115 receive electrostatic signals from the electrostatic reader 101 and may communicate electrostatic signals back to the electrostatic reader 101. Electrostatic electrode 116 and 115 may also communicate electrostatic signals back to the electrostatic reader 101. Electrostatic electrode 114 and electrostatic electrode 115 are coupled to the analog interface module 301 over the bidirectional signal lines 322 and 333 respectively. The analog interface module 301 couples to the bitrate generator 303 through the clock signal line 325. Analog interface module 301 couples to the controller 307 through the control signal lines 326 and to the write decoder 304 through the data in signal line 324. The modulator 309 couples to the electrostatic electrode 114 and electrostatic electrode 115 by signal lines 322 and 333 respectively. Additionally, the modulator 309 couples to the electrostatic electrode 116 by signal line 327. For optimum electrostatic performance, it is desirable to keep the parasitic capacitance measured between signal lines 322 and 323 as small as possible. Vega at 8:18–45 Controller 307 controls the functionality of the transceiver 104 in conjunction with the analog interface module 301. Controller 307 couples to nearly all components of the active electrostatic transceiver 104 except for the electrostatic electrodes and pads. Memory 310 may be a volatile memory requiring a constant supply of energy or a non-volatile memory such as an EEPROM memory or ferro-electric memory that retains its information when power is no longer supplied. In the case of EEPROM memory, the optional charge pump 305 may be required in order to boost the power supply voltage to write data into the EEPROM memory. Input register 306 temporarily stores information that is to be written into memory 310. It may need to store the information due to a delay in the write cycle caused by the charge pump 305 pumping up or other reasons. In any case, storing data into the input register 306 allows the controller 307 to process other information for the transceiver 104. Mode register 308 reads configuration information for the active electrostatic transceiver 104 from memory 310 and provides this to the controller 307. Write decoder 304 analyzes a data sequence being received by the electrostatic transceiver 104 and determines whether the transceiver should go into a write mode or whether it needs to remain in a receive mode. Modulator 309 prepares data read from memory 310 for communication by the active electrostatic transceiver 104. Modulator 309 can encode and modulate data read from memory 310 in a number of ways for communication with the reader 101. Vega at 8:46–62

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	When in proximity of a reader 101, the active electrostatic transceiver 104 first detects the excitation signal being emitted by an electrostatic reader 101. The excitation signal is generated by reader 101 at a carrier frequency, commonly referred to as a power carrier frequency or exciter frequency. The power carrier frequency, which may be modulated with data, is preferably 125 k Hz. After detecting the excitation signal, the first embodiment of the active electrostatic transceiver 104 goes through a power management sequence and powers up in order to derive a square wave based on the excitation signal at the carrier frequency which is used as a clock signal for the active transceiver. In this manner of generating a clock signal, information received by the active electrostatic transceiver 104 is synchronized with the clock signal. This alleviates generating a clock with a clock oscillator and synchronizing the data and clock using phase-locked loop techniques. Vega at 9:30–60 Now referring to FIG. 4A, a detailed block diagram of components of the analog interface module 301 within the active transceiver 104 is illustrated including digital timing elements. The active electrostatic transceiver 104 includes the first electrostatic electrode 114, the second electrostatic electrode 115, the third electrostatic electrode 116, the transceiver circuit 300, and an energy storage means 360. The energy storage means 360 can be any type of energy storage means, including an electrochemical storage cell, such as a rechargeable battery or a non-rechargeable battery, or a capacitor, but is preferably a thin foil battery to conform to a form factor of a smart card, tag, or badge. The transceiver circuit 300A as illustrated in FIG. 4A shows the relevant components in the first embodiment of the present invention. In FIG. 4A, the transceiver circuit 300A is illustrated as including the analog interface module 301 and the modulator 309. In FIG. 4A, the relevant components of the analog interface module 301 include a power manager 412A, a DC voltage rectifier/regulator 418, a clock extractor 430, and a demodulator 432. The power manager 412A includes a detector/receiver 420, a power switch 422, a sleep timer 424, and a power-on-resetor (POR) 426. The DC voltage rectifier/regulator 418 includes a rectifier, a voltage regulator and voltage control functionality such that a DC voltage and energy source may be generated from the excitation signal or other signals received by the active electrostatic transceiver 104 and selectively used to power the transceiver 104 or charge the energy storage means 360. The DC voltage rectifier/regulator 418 couples to the power switch 422 for selection and to the energy storage means 360 for charging. Vega at 9:61–10:33 The detector/receiver 420 in the active electrostatic transceiver 104 may receive power directly from the energy storage means 360 in order to be actively listening for an excitation signal from an electrostatic

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	reader 101. Alternatively, the detector/receiver 420 may have passive components sufficient to detect and receive signals when the energy storage means has insufficient energy to power active components. The detector/receiver 420 may have an amplifier for receiving and amplifying the incoming electrostatic signals, a bandpass filter for filtering unwanted frequencies outside a range of the carrier frequency, and a detector for detecting the presence of the carrier frequency in an excitation signal indicating that the transceiver is within the read range of an electrostatic reader 101. The detector may detect a number of oscillations in the received waveform at the carrier frequency indicating that it is not a noise source generating the waveform. In the preferred embodiment, if the detector detects any signal in the band of the carrier it provides an indication signal. Upon detection of the excitation signal, the detector/receiver 420 generates a wakeup signal on signal line 427 indicating that the active electrostatic transceiver 104 is within range of an electrostatic field and that the active electrostatic transceiver 104 needs to go through its wake up procedure. When outside the range of an electrostatic field, the signal line 427 indicates a go to-sleep signal so that the transceiver may go into a low power sleep state. The wakeup signal 427 is provided to the power on resetor 426, the sleep timer 424, the power switch 422 and clock extractor 430. Upon receiving the wakeup signal 427, power on resetor 426 monitors the device power line 460 to be sure that sufficient power is available to other components within the active electrostatic transceiver 104 before de-asserting a reset signal 425. Once sufficient power is generated in the device power line 460, reset signal 425 is de-asserted and other components may start functioning within the active electrostatic transceiver 104. In FIG. 4A the reset signal line 425 is coupled to the sleep timer 424, the clock extractor 430, the demodulator 432, the modulator 309 and other components of the active electrostatic transceiver 104. Vega at 10:34–52 The sleep timer 424 of the active electrostatic transceiver of FIG. 4A is a digital counter that counts to a predetermined count value using the clock signal on clock line 325 received from the clock extractor 430. Upon reaching the predetermined count value, the sleep timer 424 turns off active components within the modulator 309. While the sleep timer 424 is counting a transmit signal is indicated on signal line 423. When the sleep timer 424 reaches the predetermined count value, signal line 423 indicates a receive signal and the active electrostatic transceiver powers off the active components within the modulator 309. While in this mode, the transceiver may still use passive components and the load modulators within the modulator 309 to communicate with a reader. Further, while in this mode, the transceiver may receive and respond to encoded write data transmitted by the reader. The predetermined count value is determined based on the time, in number of clock cycles, that it takes for the active electrostatic transceiver to complete a transmission cycle with an electrostatic reader 101.

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	Vega at 11:7–12:16 Power switch 422 is coupled to the detector/receiver 420 through the signal line 427 and to the sleep timer 424 or the analog delay block 464 through the signal line 423. The power switch 422 controls the switching of the high level power supply voltage 451 from the energy storage means 360 or the rectified voltage 461 and provides the analog interface module 301 with the means to manage power consumption. These energy sources may be coupled to the device power line 460 feeding power to other components of the active electrostatic transceiver 104. FIG. 4C illustrates the basic components of the power switch 422 that provide power selection for the active electrostatic transceiver 104. These components include the power analyzer 465, the multiplexor 466 and the multiplexor 469. Multiplexor 469 may optionally be a switch with one end connected to the amplifier power line 462 and another end connected to the device power line 460. Power analyzer 465 performs an analysis on the energy provided by the DC voltage rectifier/regulator 418 with that supplied by the energy storage means 360. The power analyzer 465 receives the rectified voltage 461, the high level supply voltage 451 and the low level supply voltage 450 in order to perform the analysis. Additionally, control signals 423, 427 and any other control signals are received by the power analyzer 465 to further control the multiplexor 466 and multiplexor 469. Signal lines 423 and 427 are exemplary control signals input into the power analyzer 465. Typically, if the energy storage means 360 has higher energy levels it is selectively coupled to the device power line 460 and the amplifier power line 462 when signal line 427 indicates a transmit signal. Optionally when the transceiver 104 is in an active mode for active transmission by amplifier 477 and when signal line 427 indicates a receive signal, the energy storage means may be selectively decoupled from the amplifier power line 462, have the rectified voltage 461 coupled to the amplifier power line 462 or alternatively have no power source coupled to the amplifier power line 462 powering OFF the circuitry of amplifier 477 in each case conserving power in the energy storage means. If it is the case that the energy storage means 360 has lower energy levels than that of the rectified voltage 461, the rectified voltage may be selectively coupled to the device power line 460 by multiplexor 466 and to the amplifier power line 462 by multiplexor 469 such that the load modulator 473 and the amplifier 477 can perform passive load modulation and passive transmission of electrostatic signals in a passive mode. Additionally if it is desirable to conserve power or more efficiently charge the energy storage means, multiplexor 466 or 469 can operate as switches decoupling the device power line 460 or the amplifier power line 462 from any power source. After selecting a power source where the power switch 422 couples the high level power supply 451 or the rectified voltage 461 with the device power line 460, circuitry within the active electrostatic transceiver goes into a power on reset sequence controlled by the power on resetor 426. When out of the power on reset sequence, the active electrostatic transceiver 104 can go through a

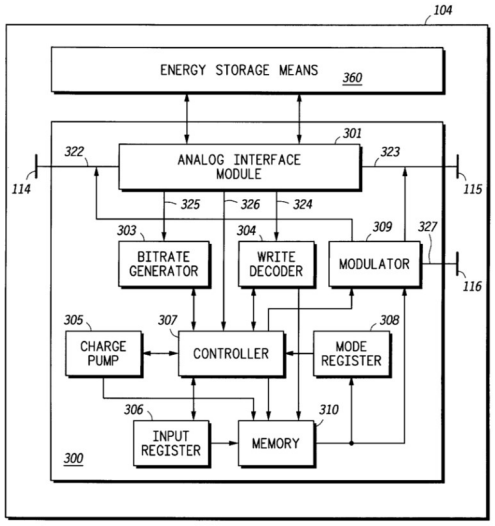
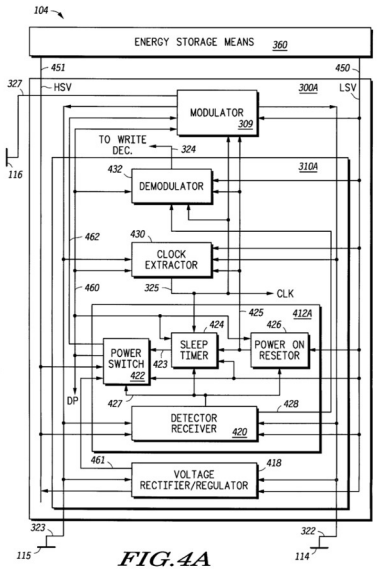
Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	communication cycle with the electrostatic reader 101 while in the read range and the sleep timer 424 starts counting or the analog delay cycle of the analog delay block 464 begins. If the active electrostatic transceiver remains in the electrostatic field (i.e. read range) and the sleep timer 424 reaches its predetermined count value or the analog delay block completes the predetermined RC delay time, a receive signal is indicated on signal line 423 to the power switch 422. The active electrostatic transceiver 104 continues to listen for signals from reader 101 or other sources that communicate on the carrier frequency. If the active electrostatic transceiver 104 is removed from the electrostatic field, the detector/receiver 420 resets and a sleep signal is indicated on signal line 427. Upon receiving the sleep signal, the power switch 422 selectively disconnects the high level voltage supply 451 from the device power line 460 so that components coupled to the device power line 460 become powered off and enter the sleep mode. In this manner when the active electrostatic transceiver 104 is outside the electrostatic field (i.e. read range) it goes into its low power sleep mode. Vega at 12:37–59 Demodulator 432 is coupled to the power switch 422 through the device power line 460, the energy storage means through the low level power supply 450, the detector/receiver 420 through signal line 428, power on resetor 426 through signal line 425, clock extractor 430 through clock signal line 325, and write decoder 304 through signal line 324. The demodulator converts an analog signal received from the detector/receiver 420 and converts it into a digital waveform. It then extracts transmitted information from this digital waveform by using the clock signal on the clock signal line 325, because data on the digital waveform is synchronized with the extracted clock signal. Knowing that data is aligned with the clock allows one to simply sample a data waveform after a predetermined time from a clock rise or fall transition. The digital waveform may have been encoded with NRZ, Manchester, or some other encoding and is additionally decoded by the demodulator 432 into the digital information that may have been transmitted by the electrostatic reader 101. Demodulator 432 receives its power from the device power line 460 and so it may be put into a low power sleep mode when the power switch disconnects the high level voltage supply 451 from the device power line 460. Vega at 12:60–13:6 Modulator 309 is coupled to the power switch 422 through the device power line 460, the energy storage means 360 through the low level power supply 450, the electrostatic electrodes 114-116 respectively through signal lines 322, 323 and 327, power on resetor 426 through signal line 425, and the clock extractor 430 through clock signal line 325. Modulator 309 includes a load modulator for electrostatic electrodes 114-115 and an active power amplifier in order to amplify signals for the extra transmission

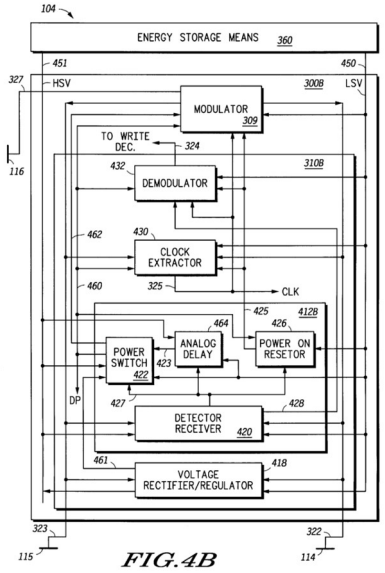
Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	distance to the reader over the electrostatic electrode 116. A passive electrostatic transceiver may not function properly at large read ranges because of weak signals. The electrostatic reader's receiver may require increased sensitivity in order to receive signals from large read ranges. Vega at 13:7–14:10 Referring now to FIG. 4D, a block diagram is illustrated of the components within the modulator 309 for active and passive load modulation and active transmission. Active and passive load modulation are accomplished by the modulator controller and the load modulator. Active load modulation occurs when the energy storage means 360 is coupled to the device power line 460 and the circuitry of the modulator controller 471. Passive load modulation occurs when the DC voltage rectifier/regulator within the transceiver 104 provides the rectified voltage and is coupled through the power switch to the device power line 460 and the modulator controller 471. Load modulation is accomplished by varying the impedance between the electrostatic electrodes 114 and 115. Varying the impedance between the electrostatic electrodes, that are capacitively coupled with the electrostatic electrodes of the reader 101, causes the excitation signal generated by the reader 101 to be reflected back. A data signal and a carrier signal is input into the modulator controller 471 at line 474 and 476 respectively to control the load modulator 473. The carrier signal 476 is commonly referred to as the data carrier and has a carrier frequency. Preferably the carrier frequency of the data carrier is 62.5 K Hz or one-half the power carrier frequency. FIG. 4E illustrates a few load modulators 473A-473D. Load modulator 473A consists of a variable impedance 480 coupled between the electrostatic electrodes 114 and 115 that has its impedance varied or switched by control signal 472 from the modulator controller 471. Load modulator 473B includes transistors 481 and 482, each coupled respectively between an electrostatic electrode and the low level supply voltage 450. The transistors are preferably turned ON and OFF by having their gates switched by a digital drive signal supplied on control signal 472. Load modulator 473C includes transistor 483 coupled between the electrostatic electrodes 114 and 115. Transistor 483 is preferably turned ON and OFF by having its gate switched by a digital drive signal supplied on control signal 472. Load modulator 473D includes transistor 484 coupled between one electrostatic electrode 322 and the low level supply voltage 450. This is an asymmetrical load modulation technique where circuitry within a rectifier provides the return path through the opposite electrostatic electrode 323. Referring back to FIG. 4D, active and passive transmission is accomplished by the modulator controller 471 and amplifier 477. Amplifier 477 is preferably a CMOS fully complementary inverter or buffer with its VDD input connected to the amplifier power line 462 and its VSS connection coupled to the low level power supply 450. Active transmission occurs when power is coupled from the high level power supply 451 through the power switch and onto the amplifier power line 462 by multiplexor 469. Passive transmission occurs when the DC voltage

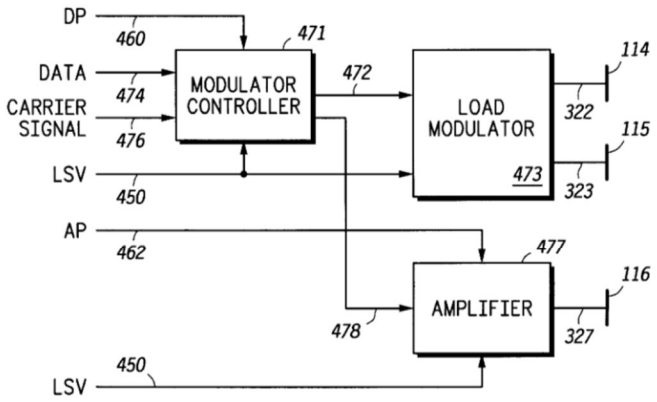
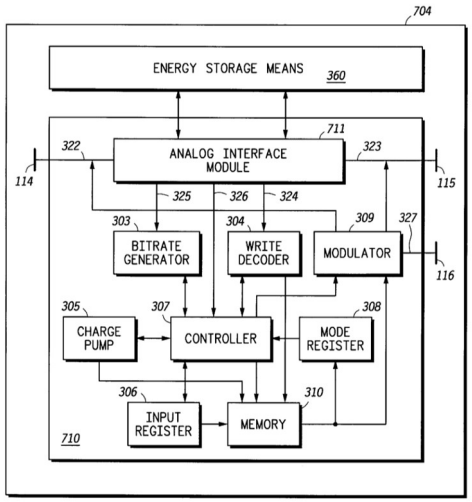
Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	rectifier/regulator 418 within the transceiver 104 provides the rectified voltage and is coupled through the power switch to the amplifier power line 462 by multiplexor 469. Multiplexor 469 and 466 can further operate as a switch to selectively turn power OFF to circuitry connected to the device power line 460 or the amplifier power line 462 by turning OFF both of the transistor switches 467-468 or 470 and 475. Data 474 input into the modulator controller 471 is modulated with the input carrier signal 476 to generate the data signal on line 478. Signal line 478 is separate from signal line 472 such that the load modulator 473 and the amplifier 477 can be enabled or disabled independent from one another. Disabling the load modulator 473 or the amplifier 477 may be performed by setting the signal on line 472 or 478 respectively to a high or low DC logic level. The signal on signal line 478 is input into the amplifier 477. The amplifier 477 amplifies the signal on line 478 and transmits the information electrostatically over the electrostatic electrode 116. In active mode, after the transmit time has occurred, the power to the amplifier 477 may be turned OFF to conserve power. Vega at 14:11–44 Now referring to FIG. 5, a waveform diagram illustrates the exemplary current consumption for the active electrostatic transceiver 104 in various power managed levels. In FIG. 5 the logarithm of current consumption 500 is plotted against time 501. The idealized waveform 502 illustrates the current consumption from the energy storage means 360 during various operating conditions and states of the active electrostatic transceiver 104. In an out of range or out of electrostatic field state during time 503, the active electrostatic transceiver is in a sleep state which is its lowest current consumption state at current level 504. In this condition nearly all circuitry in the active transceiver 104 is turned off except for the detector/receiver 420. In sleep mode, the current consumption of current level 504 is preferably on the order of eight hundred nanoamps. When in the read range or the range of the electrostatic field during time 513, the current consumption level is at least at level 508 which is at all times greater than the out of read range mode illustrated during time 503. During a communication cycle of transmission and reception by the active electrostatic transceiver, such as time 513, the current consumption is relatively large compared to the sleep mode when outside of the read range. During periods of transmission, such as time 507, current consumption is at its highest level 510. During the receive time period, such as time 509, current consumption is at level 508 which is less than that of the transmission current consumption level 510. Time period 507 is exemplary of the predetermined count value for the sleep timer 424 or the RC delay time of the analog delay block 464. After performing a transmission phase during time 507, the active electrostatic transceiver goes into a receive phase during time 509. If transceiver is closely coupled to reader, transceiver data can be detected by reader when the active transceiver is passively load modulating.

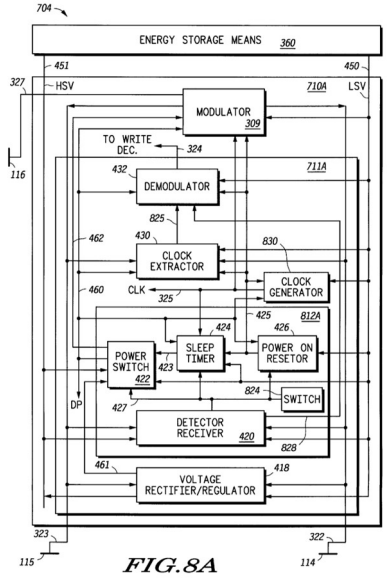
Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	Vega at 15:20–37 The analog interface module 711 generally performs the power management function for the active electrostatic transceiver 704. Additionally, it generates its own clock from a free running low power clock oscillator. This generated clock is provided to other components of the active electrostatic transceiver 704 which require a clock including the bitrate generator 303. The analog interface module 711 also demodulates the received signal to generate a received data stream. The analog interface module 711 also analyzes the received data stream in order to determine if the active electrostatic transceiver 704 should perform some operation such as a read operation or a write operation and communicates the results of the analysis to the controller 307 and the write decoder 304. It preferably performs this analysis by searching for predetermined gaps in the received data stream. Modulator 309 as previously described in detail communicates information from the active electrostatic transceiver to a reader. Vega at 15:38–61 Now referring to FIG. 8A, selected details of the analog interface module 711 within the active electrostatic transceiver 704 are illustrated. The active electrostatic transceiver 704 includes the first electrostatic electrode 114, the second electrostatic electrode 115, the third electrostatic electrode 116, the transceiver circuit 710, and an energy storage means 360. The energy storage means 360 can be any type of energy storage means, including a battery or capacitor, preferably it is a thin foil battery to conform to a form factor for a smart card, tag, or badge. The transceiver circuit 710 as illustrated in FIG. 8A shows the relevant components for the second embodiment of the present invention. In FIG. 8A, the transceiver circuit 710 includes the analog interface module 711 and modulator 309. Components of the analog interface module 711 include a DC voltage rectifier/regulator 418, a power manager 812A, a clock extractor 430, a clock generator 830, a demodulator 432, and a modulator 309. The power manager 812A includes a detector/receiver 420, a power switch 422, a sleep timer 424, a power-on-resetor (POR) 426, and a manual switch 824. Except as otherwise described below, like numbered components of the transceiver circuit 710 operate similar to the similarly numbered components of the transceiver circuit 300 of the active electrostatic transceiver 104. Vega at 15:62–16:8 In the second embodiment of the present invention the active electrostatic transceiver 704 may not receive an excitation signal from which to extract a clock signal, particularly when coupled to the reader 601 of FIG. 6A. Thus, the transceiver circuit 710 includes its own clock generator 830. A clock extractor 430 is retained to generate an extracted clock 825 for demodulation of signals that may be received from readers other than reader 601. Clock generator 830 receives power by coupling to the device power line 460 and

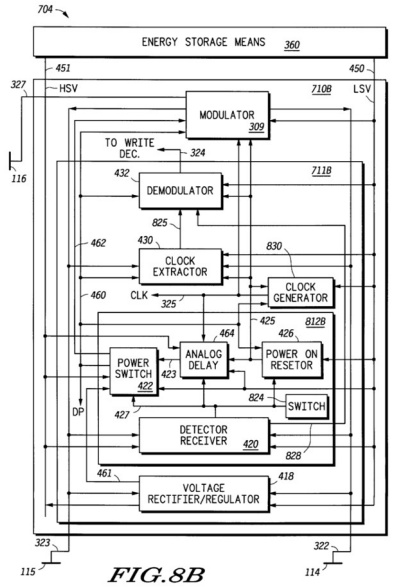
Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	the low level power supply 450. Clock generator 830 has its own low power clock oscillator in order to generate a clock. The clock signal on clock line 325 is provided to the sleep timer 424 amongst other components of the transceiver circuit 710. To the extent this limitation is not disclosed by Vega, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Vega, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[1d] an active transmit driver circuit coupled to the power source to receive the power, wherein the active transmit driver circuit affects transmission of data between the antenna and the NFC reader.	Vega discloses or renders obvious "an active transmit driver circuit coupled to the power source to receive the power, wherein the active transmit driver circuit affects transmission of data between the antenna and the NFC reader." For example: Vega at Abstract An active electrostatic transceiver is provided that has electrostatic electrodes, an energy storage means such as a battery and a transceiver circuit for communication within an electrostatic RFID communication system. The transceiver circuit includes power management features so that the energy storage means is not quickly depleted. Additionally the transceiver circuit includes amplifiers and filters so that the read range is further increased and noise sources are better filtered out. In a first embodiment, the transceiver circuit has a clock extractor that extracts a clock from the incoming data signal such that the clock and the data signal are synchronized so that demodulating the data from the data signal is simplified. In a second embodiment, the transceiver circuit has its own clock generator for initiating transmission of signals so that a reader need not have an exciter to generate an excitation signal. Each embodiment of the transceiver circuit has power management features so that power is conserved. Additionally, each transceiver circuit has the ability to operate in a passive mode, when there is insufficient charge in the energy storage means or a lower power mode is desirable. Vega at Figure 3

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	 *FIG.3* Vega at Figure 4A  *FIG.4A*

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	Vega at Figure 4B  FIG.4B Vega at Figure 4D

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	 FIG. 4D Vega at Figure 7  FIG. 7

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	Vega at Figure 8A  FIG.8A Vega at Figure 8B

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	 *FIG.8B* Vega at 3:28–45 Briefly, an active electrostatic transceiver is provided that has electrostatic electrodes, an energy storage means such as a battery and a transceiver circuit for communication within an electrostatic RFID communication system. The transceiver circuit includes power management features so that the energy storage means is not quickly depleted. Additionally the transceiver circuit includes amplifiers and filters so that the read range is further increased and noise filtering is improved. In a first embodiment, the transceiver circuit has a clock extractor that extracts a clock from the incoming data signal such that the clock and the data signal are synchronized so that demodulating the data from the data signal is simplified. In a second embodiment, the transceiver circuit has its own clock generator for initiating transmission of signals so that a reader need not have an exciter to generate an excitation signal. Both embodiments of the transceiver circuit have power management features that can decrease power consumption. Vega at 4:14–16 FIG. 4D is a block diagram of components of the modulator block within the active electrostatic transceiver of FIG. 3.

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	Vega at 4:51–5:7 The present invention includes a method, apparatus and system for providing electrostatic communication utilizing capacitance-based technology with active and passive electrostatic transceivers. Passive electrostatic transceivers derive their power from electrostatic signals being transmitted by an electrostatic reader or other electrostatic signal source. An active electrostatic transceiver has its own internal power source and need not rely on an electrostatic signal source from an electrostatic reader or other source to power up and perform certain functions. Electrostatic communication is accomplished through capacitive coupling which requires no physical contact or wires between a reader and an electrostatic transceiver (a.k.a. electrostatic tag or electrostatic transponder). In the electrostatic communication system, the voltage applied to the capacitively coupled plates is an AC voltage generated by an electric field (i.e. an electrostatic ("ES") field is developed) as opposed to an electromagnetic ("EM") field in order for a charge or signal to be communicated. In short, an electrostatic field is an energy (electrical) field created between two electrodes having a voltage differential. An electrostatic transceiver needs to be in the proximity of the reader, referred to as the read range, in order to have sufficient capacitive coupling to transceive electrostatic signals. Vega at 5:8–25 Briefly, an active electrostatic transceiver is provided that has electrostatic electrodes, an energy storage means, such as a battery, and a transceiver circuit for communication within an electrostatic RFID communication system. The transceiver circuit includes power management features so that the energy storage means is not quickly depleted. Additionally the transceiver circuit includes amplifiers and filters so that the read range is further increased and noise filtering is improved. In a first embodiment, the transceiver circuit has a clock extractor that extracts a clock from the incoming data signal such that the clock and the data signal are synchronized so that demodulating the data from the data signal is simplified. In a second embodiment, the transceiver circuit has its own clock generator for initiating transmission of signals so that a reader need not have an exciter to generate an excitation signal. Both embodiments of the transceiver circuit have power management features that improve power conservation. Vega at 6:1–22 FIG. 1 illustrates the advantage that an active electrostatic transceiver 104 has over a passive electrostatic transceiver 102. The distance between an electrostatic transceiver and an electrostatic reader where communication may start to occur is referred to as the read range. In FIG. 1 the passive read range 125 between passive ES transceiver 102 and ES reader 101 is significantly smaller than the active read range

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	126 between active ES transceiver 104 and ES reader 101. This is because an energy storage means within the active electrostatic transceiver 104 allows for active transmission of signals using an amplifier. Because of its passive nature, the passive electrostatic transceiver 102 relies on a load modulation technique for communication of signals by reflecting back the energy of the excitation signal to the electrostatic reader 101. The reflection of the excitation signal requires that the passive electrostatic transceiver 102 be nearer the reader 101. The larger read range provided by reflected ES signals using load modulation or transmitted ES signals using an active transmitter allows the active electrostatic transceiver 104 to be used in other applications of RFID communication systems where a passive electrostatic transceiver 102 would not. Vega at 6:23–33 An active electrostatic transceiver 104 is not simply formed by adding an energy storage means to the passive electrostatic transceiver 102. Components of a passive electrostatic transceiver require modification, particularly in the area of power management. The power or energy of an energy storage means must be conserved and properly managed in order for the active electrostatic transceiver to have greater utility. Additionally noise must be properly filtered out to avoid false signal detection and power inadvertently being applied to circuits within the active electrostatic transceiver in order to more properly conserve power. Vega at 7:14–56 In general, electrostatic reader 101 generates an electrostatic (electrical) field for use both as a power source for the passive electrostatic transceiver 102 and for transferring information between electrostatic reader 101 and passive electrostatic transceiver 102 or active electrostatic transceiver 104. As such, electrostatic reader 101 electrostatically generates and transmits an excitation signal to the surrounding air, gas, atmosphere or non-electrically conductive medium via the reader's electrostatic electrodes, except for the return path in a monopole system. The excitation signal is an AC signal which activates the passive electrostatic transceiver 102 when it is comes within the capacitance coupling range of reader 101. Upon being sufficiently energized, the passive electrostatic transceiver 102 may respond by electrostatically transmitting a read data signal carrying the information stored in its memory to electrostatic reader 101 (as part of a read operation). Active electrostatic transceiver 104 includes an energy storage means such that it may not require the excitation signal to become sufficiently energized. In accordance to the present invention, reader 101 may also electrostatically couple a write signal to communicate and write information to the passive electrostatic transceiver 102 or active ES transceiver(as part of a write operation). Alternatively, such programming or charging can be carried out by a separate ES

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	programming, ES encoding or electrostatic charger unit (not illustrated). It is to be appreciated that the excitation signal must be generated and transmitted by electrostatic reader 101 to excite the passive electrostatic transceiver 102 or charge the active electrostatic transceiver 104. The excitation signal is an AC energy source and can be a continuous waveform or a varying waveform (i.e. amplitude, frequency, time, etc. of the waveform may vary). Alternatively a user could manually cause the electrostatic reader 101 or a charger to generate the excitation signal to charge or communicate with the passive electrostatic transceiver 102 or active electrostatic transceiver 104 by selecting a button or switch. The reader 101 usually has available a larger power source than the passive electrostatic transceiver 102 or active electrostatic transceiver 104. Thus, the reader 101 has very sensitive receiving and high energy transmission when compared with the passive electrostatic transceiver 102 or active electrostatic transceiver 104. Vega at 8:18–45 Controller 307 controls the functionality of the transceiver 104 in conjunction with the analog interface module 301. Controller 307 couples to nearly all components of the active electrostatic transceiver 104 except for the electrostatic electrodes and pads. Memory 310 may be a volatile memory requiring a constant supply of energy or a non-volatile memory such as an EEPROM memory or ferro-electric memory that retains its information when power is no longer supplied. In the case of EEPROM memory, the optional charge pump 305 may be required in order to boost the power supply voltage to write data into the EEPROM memory. Input register 306 temporarily stores information that is to be written into memory 310. It may need to store the information due to a delay in the write cycle caused by the charge pump 305 pumping up or other reasons. In any case, storing data into the input register 306 allows the controller 307 to process other information for the transceiver 104. Mode register 308 reads configuration information for the active electrostatic transceiver 104 from memory 310 and provides this to the controller 307. Write decoder 304 analyzes a data sequence being received by the electrostatic transceiver 104 and determines whether the transceiver should go into a write mode or whether it needs to remain in a receive mode. Modulator 309 prepares data read from memory 310 for communication by the active electrostatic transceiver 104. Modulator 309 can encode and modulate data read from memory 310 in a number of ways for communication with the reader 101. Vega at 8:46–62 When in proximity of a reader 101, the active electrostatic transceiver 104 first detects the excitation signal being emitted by an electrostatic reader 101. The excitation signal is generated by reader 101 at a carrier frequency, commonly referred to as a power carrier frequency or exciter frequency. The power

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	carrier frequency, which may be modulated with data, is preferably 125 k Hz. After detecting the excitation signal, the first embodiment of the active electrostatic transceiver 104 goes through a power management sequence and powers up in order to derive a square wave based on the excitation signal at the carrier frequency which is used as a clock signal for the active transceiver. In this manner of generating a clock signal, information received by the active electrostatic transceiver 104 is synchronized with the clock signal. This alleviates generating a clock with a clock oscillator and synchronizing the data and clock using phase-locked loop techniques. Vega at 9:30–60 Now referring to FIG. 4A, a detailed block diagram of components of the analog interface module 301 within the active transceiver 104 is illustrated including digital timing elements. The active electrostatic transceiver 104 includes the first electrostatic electrode 114, the second electrostatic electrode 115, the third electrostatic electrode 116, the transceiver circuit 300, and an energy storage means 360. The energy storage means 360 can be any type of energy storage means, including an electrochemical storage cell, such as a rechargeable battery or a non-rechargeable battery, or a capacitor, but is preferably a thin foil battery to conform to a form factor of a smart card, tag, or badge. The transceiver circuit 300A as illustrated in FIG. 4A shows the relevant components in the first embodiment of the present invention. In FIG. 4A, the transceiver circuit 300A is illustrated as including the analog interface module 301 and the modulator 309. In FIG. 4A, the relevant components of the analog interface module 301 include a power manager 412A, a DC voltage rectifier/regulator 418, a clock extractor 430, and a demodulator 432. The power manager 412A includes a detector/receiver 420, a power switch 422, a sleep timer 424, and a power-on-resetor (POR) 426. The DC voltage rectifier/regulator 418 includes a rectifier, a voltage regulator and voltage control functionality such that a DC voltage and energy source may be generated from the excitation signal or other signals received by the active electrostatic transceiver 104 and selectively used to power the transceiver 104 or charge the energy storage means 360. The DC voltage rectifier/regulator 418 couples to the power switch 422 for selection and to the energy storage means 360 for charging. Vega at 9:61–10:33 The detector/receiver 420 in the active electrostatic transceiver 104 may receive power directly from the energy storage means 360 in order to be actively listening for an excitation signal from an electrostatic reader 101. Alternatively, the detector/receiver 420 may have passive components sufficient to detect and receive signals when the energy storage means has insufficient energy to power active components. The detector/receiver 420 may have an amplifier for receiving and amplifying the incoming electrostatic

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	signals, a bandpass filter for filtering unwanted frequencies outside a range of the carrier frequency, and a detector for detecting the presence of the carrier frequency in an excitation signal indicating that the transceiver is within the read range of an electrostatic reader 101. The detector may detect a number of oscillations in the received waveform at the carrier frequency indicating that it is not a noise source generating the waveform. In the preferred embodiment, if the detector detects any signal in the band of the carrier it provides an indication signal. Upon detection of the excitation signal, the detector/receiver 420 generates a wakeup signal on signal line 427 indicating that the active electrostatic transceiver 104 is within range of an electrostatic field and that the active electrostatic transceiver 104 needs to go through its wake up procedure. When outside the range of an electrostatic field, the signal line 427 indicates a go to-sleep signal so that the transceiver may go into a low power sleep state. The wakeup signal 427 is provided to the power on resetor 426, the sleep timer 424, the power switch 422 and clock extractor 430. Upon receiving the wakeup signal 427, power on resetor 426 monitors the device power line 460 to be sure that sufficient power is available to other components within the active electrostatic transceiver 104 before de-asserting a reset signal 425. Once sufficient power is generated in the device power line 460, reset signal 425 is de-asserted and other components may start functioning within the active electrostatic transceiver 104. In FIG. 4A the reset signal line 425 is coupled to the sleep timer 424, the clock extractor 430, the demodulator 432, the modulator 309 and other components of the active electrostatic transceiver 104. Vega at 10:34–52 The sleep timer 424 of the active electrostatic transceiver of FIG. 4A is a digital counter that counts to a predetermined count value using the clock signal on clock line 325 received from the clock extractor 430. Upon reaching the predetermined count value, the sleep timer 424 turns off active components within the modulator 309. While the sleep timer 424 is counting a transmit signal is indicated on signal line 423. When the sleep timer 424 reaches the predetermined count value, signal line 423 indicates a receive signal and the active electrostatic transceiver powers off the active components within the modulator 309. While in this mode, the transceiver may still use passive components and the load modulators within the modulator 309 to communicate with a reader. Further, while in this mode, the transceiver may receive and respond to encoded write data transmitted by the reader. The predetermined count value is determined based on the time, in number of clock cycles, that it takes for the active electrostatic transceiver to complete a transmission cycle with an electrostatic reader 101. Vega at 10:53–11:6

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	Referring to FIG. 4B, the power manager 412B includes the detector/receiver 420, the power switch 422, an analog delay block 464, and the power-on-resetor (POR) 426. The digital sleep timer 424 of FIG. 4A is replaced with the analog delay block 464 within the power manager block 412B while other blocks function similar to the description of FIG. 4A. Analog delay block 464 provides an analog delay by using resistor and capacitor elements in conjunction with a threshold detector or comparator. The analog delay block is preferably designed to provide a lengthy delay such as a couple of seconds. The circuitry of the analog delay block is simpler than that of the sleep timer 424. Upon detection of a received signal, the wakeup signal on signal line 427 causes the analog delay block to initiate the RC delay. The transmit signal on signal line 423 is coupled to the power switch 422 and causes it to select power, if available, from the energy storage means 360 for the active transmitter of the modulator 309. Upon completion of the RC delay, a receive signal is indicated on signal line 423 causing the power switch 422 to disconnect power from the active transmitter of the modulator 309. Vega at 11:7–12:16 Power switch 422 is coupled to the detector/receiver 420 through the signal line 427 and to the sleep timer 424 or the analog delay block 464 through the signal line 423. The power switch 422 controls the switching of the high level power supply voltage 451 from the energy storage means 360 or the rectified voltage 461 and provides the analog interface module 301 with the means to manage power consumption. These energy sources may be coupled to the device power line 460 feeding power to other components of the active electrostatic transceiver 104. FIG. 4C illustrates the basic components of the power switch 422 that provide power selection for the active electrostatic transceiver 104. These components include the power analyzer 465, the multiplexor 466 and the multiplexor 469. Multiplexor 469 may optionally be a switch with one end connected to the amplifier power line 462 and another end connected to the device power line 460. Power analyzer 465 performs an analysis on the energy provided by the DC voltage rectifier/regulator 418 with that supplied by the energy storage means 360. The power analyzer 465 receives the rectified voltage 461, the high level supply voltage 451 and the low level supply voltage 450 in order to perform the analysis. Additionally, control signals 423, 427 and any other control signals are received by the power analyzer 465 to further control the multiplexor 466 and multiplexor 469. Signal lines 423 and 427 are exemplary control signals input into the power analyzer 465. Typically, if the energy storage means 360 has higher energy levels it is selectively coupled to the device power line 460 and the amplifier power line 462 when signal line 427 indicates a transmit signal. Optionally when the transceiver 104 is in an active mode for active transmission by amplifier 477 and when signal line 427 indicates a receive signal, the energy storage means may be selectively decoupled from the amplifier power line 462, have the rectified voltage 461 coupled to the amplifier power line 462 or alternatively

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	have no power source coupled to the amplifier power line 462 powering OFF the circuitry of amplifier 477 in each case conserving power in the energy storage means. If it is the case that the energy storage means 360 has lower energy levels than that of the rectified voltage 461, the rectified voltage may be selectively coupled to the device power line 460 by multiplexor 466 and to the amplifier power line 462 by multiplexor 469 such that the load modulator 473 and the amplifier 477 can perform passive load modulation and passive transmission of electrostatic signals in a passive mode. Additionally if it is desirable to conserve power or more efficiently charge the energy storage means, multiplexor 466 or 469 can operate as switches decoupling the device power line 460 or the amplifier power line 462 from any power source. After selecting a power source where the power switch 422 couples the high level power supply 451 or the rectified voltage 461 with the device power line 460, circuitry within the active electrostatic transceiver goes into a power on reset sequence controlled by the power on resetor 426. When out of the power on reset sequence, the active electrostatic transceiver 104 can go through a communication cycle with the electrostatic reader 101 while in the read range and the sleep timer 424 starts counting or the analog delay cycle of the analog delay block 464 begins. If the active electrostatic transceiver remains in the electrostatic field (i.e. read range) and the sleep timer 424 reaches its predetermined count value or the analog delay block completes the predetermined RC delay time, a receive signal is indicated on signal line 423 to the power switch 422. The active electrostatic transceiver 104 continues to listen for signals from reader 101 or other sources that communicate on the carrier frequency. If the active electrostatic transceiver 104 is removed from the electrostatic field, the detector/receiver 420 resets and a sleep signal is indicated on signal line 427. Upon receiving the sleep signal, the power switch 422 selectively disconnects the high level voltage supply 451 from the device power line 460 so that components coupled to the device power line 460 become powered off and enter the sleep mode. In this manner when the active electrostatic transceiver 104 is outside the electrostatic field (i.e. read range) it goes into its low power sleep mode. Vega at 12:60–13:6 Modulator 309 is coupled to the power switch 422 through the device power line 460, the energy storage means 360 through the low level power supply 450, the electrostatic electrodes 114-116 respectively through signal lines 322, 323 and 327, power on resetor 426 through signal line 425, and the clock extractor 430 through clock signal line 325. Modulator 309 includes a load modulator for electrostatic electrodes 114-115 and an active power amplifier in order to amplify signals for the extra transmission distance to the reader over the electrostatic electrode 116. A passive electrostatic transceiver may not function properly at large read ranges because of weak signals. The electrostatic reader's receiver may require increased sensitivity in order to receive signals from large read ranges.

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	Vega at 13:7–14:10 Referring now to FIG. 4D, a block diagram is illustrated of the components within the modulator 309 for active and passive load modulation and active transmission. Active and passive load modulation are accomplished by the modulator controller and the load modulator. Active load modulation occurs when the energy storage means 360 is coupled to the device power line 460 and the circuitry of the modulator controller 471. Passive load modulation occurs when the DC voltage rectifier/regulator within the transceiver 104 provides the rectified voltage and is coupled through the power switch to the device power line 460 and the modulator controller 471. Load modulation is accomplished by varying the impedance between the electrostatic electrodes 114 and 115. Varying the impedance between the electrostatic electrodes, that are capacitively coupled with the electrostatic electrodes of the reader 101, causes the excitation signal generated by the reader 101 to be reflected back. A data signal and a carrier signal is input into the modulator controller 471 at line 474 and 476 respectively to control the load modulator 473. The carrier signal 476 is commonly referred to as the data carrier and has a carrier frequency. Preferably the carrier frequency of the data carrier is 62.5 K Hz or one-half the power carrier frequency. FIG. 4E illustrates a few load modulators 473A-473D. Load modulator 473A consists of a variable impedance 480 coupled between the electrostatic electrodes 114 and 115 that has its impedance varied or switched by control signal 472 from the modulator controller 471. Load modulator 473B includes transistors 481 and 482, each coupled respectively between an electrostatic electrode and the low level supply voltage 450. The transistors are preferably turned ON and OFF by having their gates switched by a digital drive signal supplied on control signal 472. Load modulator 473C includes transistor 483 coupled between the electrostatic electrodes 114 and 115. Transistor 483 is preferably turned ON and OFF by having its gate switched by a digital drive signal supplied on control signal 472. Load modulator 473D includes transistor 484 coupled between one electrostatic electrode 322 and the low level supply voltage 450. This is an asymmetrical load modulation technique where circuitry within a rectifier provides the return path through the opposite electrostatic electrode 323. Referring back to FIG. 4D, active and passive transmission is accomplished by the modulator controller 471 and amplifier 477. Amplifier 477 is preferably a CMOS fully complementary inverter or buffer with its VDD input connected to the amplifier power line 462 and its VSS connection coupled to the low level power supply 450. Active transmission occurs when power is coupled from the high level power supply 451 through the power switch and onto the amplifier power line 462 by multiplexor 469. Passive transmission occurs when the DC voltage rectifier/regulator 418 within the transceiver 104 provides the rectified voltage and is coupled through the power switch to the amplifier power line 462 by multiplexor 469. Multiplexor 469 and 466 can further operate as a switch to selectively turn power OFF to circuitry connected to the device power line 460 or

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	the amplifier power line 462 by turning OFF both of the transistor switches 467-468 or 470 and 475. Data 474 input into the modulator controller 471 is modulated with the input carrier signal 476 to generate the data signal on line 478. Signal line 478 is separate from signal line 472 such that the load modulator 473 and the amplifier 477 can be enabled or disabled independent from one another. Disabling the load modulator 473 or the amplifier 477 may be performed by setting the signal on line 472 or 478 respectively to a high or low DC logic level. The signal on signal line 478 is input into the amplifier 477. The amplifier 477 amplifies the signal on line 478 and transmits the information electrostatically over the electrostatic electrode 116. In active mode, after the transmit time has occurred, the power to the amplifier 477 may be turned OFF to conserve power. Vega at 15:20–37 The analog interface module 711 generally performs the power management function for the active electrostatic transceiver 704. Additionally, it generates its own clock from a free running low power clock oscillator. This generated clock is provided to other components of the active electrostatic transceiver 704 which require a clock including the bitrate generator 303. The analog interface module 711 also demodulates the received signal to generate a received data stream. The analog interface module 711 also analyzes the received data stream in order to determine if the active electrostatic transceiver 704 should perform some operation such as a read operation or a write operation and communicates the results of the analysis to the controller 307 and the write decoder 304. It preferably performs this analysis by searching for predetermined gaps in the received data stream. Modulator 309 as previously described in detail communicates information from the active electrostatic transceiver to a reader. Vega at 15:38–61 Now referring to FIG. 8A, selected details of the analog interface module 711 within the active electrostatic transceiver 704 are illustrated. The active electrostatic transceiver 704 includes the first electrostatic electrode 114, the second electrostatic electrode 115, the third electrostatic electrode 116, the transceiver circuit 710, and an energy storage means 360. The energy storage means 360 can be any type of energy storage means, including a battery or capacitor, preferably it is a thin foil battery to conform to a form factor for a smart card, tag, or badge. The transceiver circuit 710 as illustrated in FIG. 8A shows the relevant components for the second embodiment of the present invention. In FIG. 8A, the transceiver circuit 710 includes the analog interface module 711 and modulator 309. Components of the analog interface module 711 include a DC voltage rectifier/regulator 418, a power manager 812A, a clock extractor 430, a clock generator 830, a demodulator 432, and a modulator 309. The power manager 812A includes a detector/receiver 420, a power switch 422, a sleep timer 424, a power-on-resetor (POR) 426,

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	and a manual switch 824. Except as otherwise described below, like numbered components of the transceiver circuit 710 operate similar to the similarly numbered components of the transceiver circuit 300 of the active electrostatic transceiver 104. Vega at 15:62–16:8 In the second embodiment of the present invention the active electrostatic transceiver 704 may not receive an excitation signal from which to extract a clock signal, particularly when coupled to the reader 601 of FIG. 6A. Thus, the transceiver circuit 710 includes its own clock generator 830. A clock extractor 430 is retained to generate an extracted clock 825 for demodulation of signals that may be received from readers other than reader 601. Clock generator 830 receives power by coupling to the device power line 460 and the low level power supply 450. Clock generator 830 has its own low power clock oscillator in order to generate a clock. The clock signal on clock line 325 is provided to the sleep timer 424 amongst other components of the transceiver circuit 710. Vega at 16:36–48 Power on resetor 426 monitors the device power line 460 to be sure that sufficient power is available to other components within the active electrostatic transceiver 704 before de-asserting a reset signal 425. Once sufficient power is generated in the device power line 460, reset signal 425 is de-asserted and other components may start functioning within the active electrostatic transceiver 704. In FIG. 8A the reset signal line 425 is coupled to the sleep timer 424, the demodulator 432, the modulator 309 and other components of the active electrostatic transceiver 704. In FIG. 8B, the reset signal line 425 is coupled to the analog delay block 464, the demodulator 432, the modulator 309 and other components of the active electrostatic transceiver 704. Vega at 16:53–17:8 The present invention has many advantages over the prior art. The present invention provides a larger read range over passive RFID communication systems and therefore increases the applicability of electrostatic communication systems. Additionally, the present invention provides for greater flexibility in choosing components for an electrostatic transceiver. Also, the present invention provides greater operational functionality in an electrostatic transceiver because the available power is greater. Furthermore, the present invention provides for greater integration in circuitry and reduces the amount space utilized for an active electrostatic transceiver. Additionally the present invention in its second embodiment reduces the interference and noise in an electrostatic communication system so that it may be used in environments requiring low noise emission. The present invention provides for lower cost RFID transceivers such that disposable applications are possible. Furthermore, the present invention provides the capability to operate

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	an active electrostatic transceiver in an active mode operating under the power of an energy storage means or in a passive mode under the power generated by a voltage rectifier/regulator when the energy storage means power is too low or if in the case of a desirable low-power operational mode. To the extent this limitation is not disclosed by Vega, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Vega, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
2. The mobile device of claim 1, wherein the transmitted data includes ticketing information for a mass transit system.	Vega discloses or renders obvious "[t]he mobile device of claim 1, wherein the transmitted data includes ticketing information for a mass transit system." For example: Vega at 2:66–3:9 In certain applications it is desirable to have an RFID communication system with larger read range than available with passive electromagnetic transponders. Typical read range for passive electromagnetic transponders is on the order of four inches to thirty inches. An exemplary application for larger read range is a ticket admittance system. It may be desirable to have a reader be quite a distance away, such as five to eight feet, when a ticket holder passes through an entrance of the ticket admittance system. In cases such as this, it is difficult to bring an electromagnetic transponder within the passive read range. To the extent this limitation is not disclosed by Vega, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Vega, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 1 above.
3. The mobile device of claim 1, wherein the transmitted data includes transaction information for a mobile payment.	Vega discloses or renders obvious "[t]he mobile device of claim 1, wherein the transmitted data includes transaction information for a mobile payment." For example: To the extent this limitation is not disclosed by Vega, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Vega, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.\ *See also* claim 1 above.
4. The mobile device of claim 1, wherein the NFC reader is a point-of-sale NFC reader.	Vega discloses or renders obvious "[t]he mobile device of claim 1, wherein the NFC reader is a point-of-sale NFC reader." For example:

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	To the extent this limitation is not disclosed by Vega, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Vega, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 1 above.
5. The mobile device of claim 1, wherein the antenna includes an inductive element.	Vega discloses or renders obvious "[t]he mobile device of claim 1, wherein the antenna includes an inductive element." For example: Vega at 2:4–26 In contrast, conventional RFID technology is inductance-based. More precisely, conventional RFID technology uses near field electromagnetic waves which are also known as induction waves. Unlike radio waves, the field strength of induction waves is proportional to the inverse square of the distance involved. In inductance-based RFID technology, an electromagnetic field is generated for use both as a power source for the transponder and for transferring information between the reader and transponder. Inductance waves are generated using closed circuit alternating current coils that have multiple turns. Inductance coils are required to optimally transmit and receive electromagnetic signals are usually a wire wound or etched metal coil. Using inductance coils adversely impacts the costs, manufacturability, and packaging flexibility of inductance-based RFID technology particularly when used with high number of RFID tags usually required in a system. Due to the prohibitive costs and high degree of manufacturing difficulty, electromagnetic RFID technology is not practical in high volume and low cost applications such as in disposable applications. The bulky packaging, which is typical for electromagnetic RFID, further limits its application to those where thickness is not of primary importance. Vega at 2:27–40 Traditionally electromagnetic transponders in electromagnetic RFID systems derive their power from the electromagnetic signals being transmitted by an electromagnetic reader through induction coupling and have no power storage device. These electromagnetic transponders are often referred to as passive electromagnetic transponders. Because they require inductive coupling, the distance for communication between an electromagnetic reader and a passive electromagnetic transponder, referred to as the read range, is limited. The read range is limited because a sufficient amount of charge to power up the components within a passive electromagnetic transponder is required and is only available within certain distances from the electromagnetic reader. Vega at 2:41–52

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	Additionally, only certain amounts of power are available for components within a passive electromagnetic transponder. This limited amount of power constrains the choices of components used within a passive electromagnetic transponder. For example amplifiers may be restricted in their power consumption and gain or they may not be used at all within a passive electromagnetic transponder. Additionally certain passive components are often used due to the limited power and take up larger amounts of space than otherwise might be required. Furthermore the limited of amount of available power in a passive electromagnetic transponder reduces the available functionality and operation of a transponder. Vega at 2:66–3:9 In certain applications it is desirable to have an RFID communication system with larger read range than available with passive electromagnetic transponders. Typical read range for passive electromagnetic transponders is on the order of four inches to thirty inches. An exemplary application for larger read range is a ticket admittance system. It may be desirable to have a reader be quite a distance away, such as five to eight feet, when a ticket holder passes through an entrance of the ticket admittance system. In cases such as this, it is difficult to bring an electromagnetic transponder within the passive read range. Vega at 3:28–45 Briefly, an active electrostatic transceiver is provided that has electrostatic electrodes, an energy storage means such as a battery and a transceiver circuit for communication within an electrostatic RFID communication system. The transceiver circuit includes power management features so that the energy storage means is not quickly depleted. Additionally the transceiver circuit includes amplifiers and filters so that the read range is further increased and noise filtering is improved. In a first embodiment, the transceiver circuit has a clock extractor that extracts a clock from the incoming data signal such that the clock and the data signal are synchronized so that demodulating the data from the data signal is simplified. In a second embodiment, the transceiver circuit has its own clock generator for initiating transmission of signals so that a reader need not have an exciter to generate an excitation signal. Both embodiments of the transceiver circuit have power management features that can decrease power consumption. Vega at 4:51–5:7 The present invention includes a method, apparatus and system for providing electrostatic communication utilizing capacitance-based technology with active and passive electrostatic transceivers. Passive electrostatic transceivers derive their power from electrostatic signals being transmitted by an electrostatic reader or other electrostatic signal source. An active electrostatic transceiver has its own internal power

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	source and need not rely on an electrostatic signal source from an electrostatic reader or other source to power up and perform certain functions. Electrostatic communication is accomplished through capacitive coupling which requires no physical contact or wires between a reader and an electrostatic transceiver (a.k.a. electrostatic tag or electrostatic transponder). In the electrostatic communication system, the voltage applied to the capacitively coupled plates is an AC voltage generated by an electric field (i.e. an electrostatic ("ES") field is developed) as opposed to an electromagnetic ("EM") field in order for a charge or signal to be communicated. In short, an electrostatic field is an energy (electrical) field created between two electrodes having a voltage differential. An electrostatic transceiver needs to be in the proximity of the reader, referred to as the read range, in order to have sufficient capacitive coupling to transceive electrostatic signals. Vega at 5:26–68 FIG. 1 illustrates the preferred embodiment of the combined electrostatic communication system 100 which includes an electrostatic reader 101, a passive electrostatic transceiver 102, host computer system 103 and an active electrostatic transceiver 104. Electrostatic reader 101, illustrated in a monopole configuration, includes an electrostatic electrode 105 for transmission of an excitation signal and modulated data signals on a carrier by means of electrostatic energy. The signals are transmitted by the reader to either an electrostatic transceiver, transponder, tag, badge, smart card, or other such RFID transceiver such as passive electrostatic transceiver 102 or active electrostatic transceiver 104. Electrostatic reader 101 includes an electrostatic electrode 106 for receiving data signals on a carrier by means of electrostatic energy. The data signals are communicated by either a passive electrostatic transceiver such as passive electrostatic transceiver 102 or active electrostatic transceiver 104. The passive electrostatic transceiver 102 includes at least two electrostatic electrodes 112 and 113 in order to communicate using electrostatic signals. The electrostatic electrodes 112 and 113 may have differing shapes and be made of different materials. Some of the shapes for the electrostatic electrodes 112 and 113 include flat rectangular plates and bow tie shaped plates. The active electrostatic transceiver 104 includes at least two electrostatic electrodes 114 and 115 in order to receive electrostatic energy and communicate using electrostatic signals. As illustrated in FIG. 1, active electrostatic transceiver 104 includes an additional electrostatic electrode 116 for transmitting electrostatic signals. The electrostatic electrodes may also be referred to as antenna, capacitor plates, contactless electrodes, wireless electrodes or isolation electrodes. These electrostatic electrodes provide for the antenna, contactless, wireless and the somewhat isolated functionality of an electrostatic system which requires no physical contact between the electrostatic electrodes in order to communicate. Passive electrostatic transceiver 102 and active electrostatic transceiver 104 can communicate information to/from the electrostatic reader 101 by means

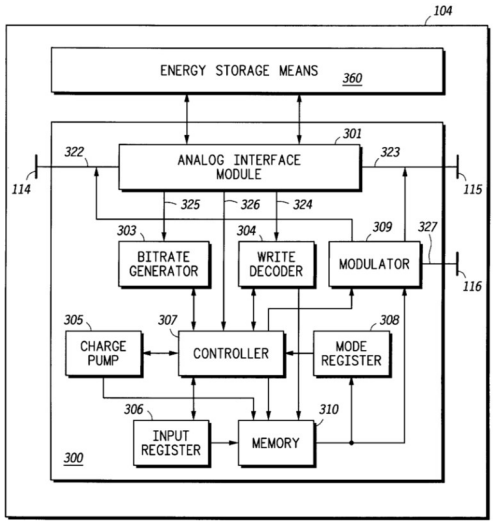
Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	of electrostatic signals and capacitive coupling. Host computer 103 is coupled to the electrostatic reader 101 and may couple to other electrostatic readers, electromagnetic readers or electrostatic readers (not shown in FIG. 1) in order to have other points of communication. Vega at 6:34–52 Electrostatic electrodes 112 and 113 of passive ES transceiver 102 and ES electrodes 114 and 115 of active transceiver 104 are one part of the capacitive plates for capacitive coupling in order to receive electrostatic charges and communications. The other part of the capacitive plates are provided by the electrostatic reader 101 or other ES source. The space between the coupled electrostatic electrodes defines the dielectric medium between the two parts of the capacitive plates. The capacitive plates of the electrostatic reader 101 can be in either a monopole or a dipole configuration. In a monopole configuration, only one set of coupling plates is used. Earth ground acts as a low impedance return path. The electrostatic transceiver may couple to earth ground through a human body or other relatively low impedance that couples to one or the other of the electrostatic electrodes. In a dipole configuration the reader had two electrostatic electrodes for receiving and two electrostatic electrodes for transmitting and none of the electrostatic electrodes has a preferential coupling path to earth ground. Vega at 7:14–56 In general, electrostatic reader 101 generates an electrostatic (electrical) field for use both as a power source for the passive electrostatic transceiver 102 and for transferring information between electrostatic reader 101 and passive electrostatic transceiver 102 or active electrostatic transceiver 104. As such, electrostatic reader 101 electrostatically generates and transmits an excitation signal to the surrounding air, gas, atmosphere or non-electrically conductive medium via the reader's electrostatic electrodes, except for the return path in a monopole system. The excitation signal is an AC signal which activates the passive electrostatic transceiver 102 when it is comes within the capacitance coupling range of reader 101. Upon being sufficiently energized, the passive electrostatic transceiver 102 may respond by electrostatically transmitting a read data signal carrying the information stored in its memory to electrostatic reader 101 (as part of a read operation). Active electrostatic transceiver 104 includes an energy storage means such that it may not require the excitation signal to become sufficiently energized. In accordance to the present invention, reader 101 may also electrostatically couple a write signal to communicate and write information to the passive electrostatic transceiver 102 or active ES transceiver(as part of a write operation). Alternatively, such programming or charging can be carried out by a separate ES programming, ES encoding or electrostatic charger unit (not illustrated). It is to be appreciated that the excitation signal must be generated and transmitted by electrostatic reader 101 to excite the passive

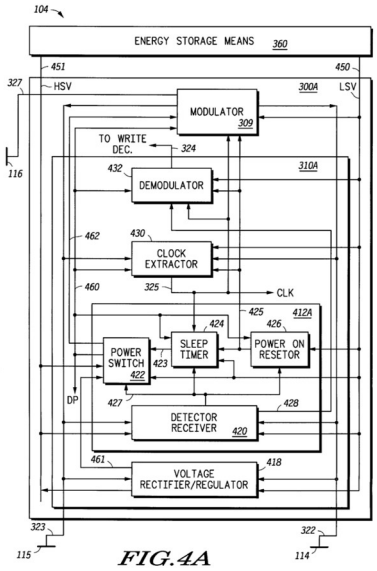
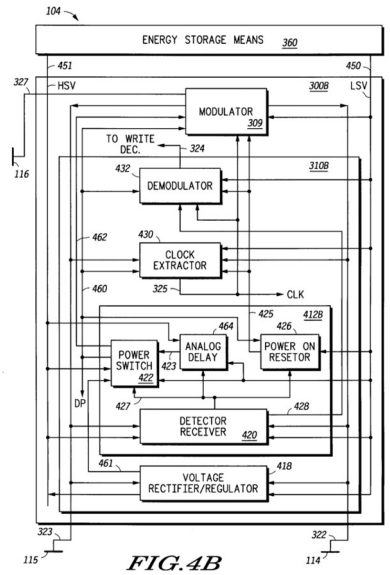
Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	electrostatic transceiver 102 or charge the active electrostatic transceiver 104. The excitation signal is an AC energy source and can be a continuous waveform or a varying waveform (i.e. amplitude, frequency, time, etc. of the waveform may vary). Alternatively a user could manually cause the electrostatic reader 101 or a charger to generate the excitation signal to charge or communicate with the passive electrostatic transceiver 102 or active electrostatic transceiver 104 by selecting a button or switch. The reader 101 usually has available a larger power source than the passive electrostatic transceiver 102 or active electrostatic transceiver 104. Thus, the reader 101 has very sensitive receiving and high energy transmission when compared with the passive electrostatic transceiver 102 or active electrostatic transceiver 104. Vega at 9:30–60 Now referring to FIG. 4A, a detailed block diagram of components of the analog interface module 301 within the active transceiver 104 is illustrated including digital timing elements. The active electrostatic transceiver 104 includes the first electrostatic electrode 114, the second electrostatic electrode 115, the third electrostatic electrode 116, the transceiver circuit 300, and an energy storage means 360. The energy storage means 360 can be any type of energy storage means, including an electrochemical storage cell, such as a rechargeable battery or a non-rechargeable battery, or a capacitor, but is preferably a thin foil battery to conform to a form factor of a smart card, tag, or badge. The transceiver circuit 300A as illustrated in FIG. 4A shows the relevant components in the first embodiment of the present invention. In FIG. 4A, the transceiver circuit 300A is illustrated as including the analog interface module 301 and the modulator 309. In FIG. 4A, the relevant components of the analog interface module 301 include a power manager 412A, a DC voltage rectifier/regulator 418, a clock extractor 430, and a demodulator 432. The power manager 412A includes a detector/receiver 420, a power switch 422, a sleep timer 424, and a power-on-resetor (POR) 426. The DC voltage rectifier/regulator 418 includes a rectifier, a voltage regulator and voltage control functionality such that a DC voltage and energy source may be generated from the excitation signal or other signals received by the active electrostatic transceiver 104 and selectively used to power the transceiver 104 or charge the energy storage means 360. The DC voltage rectifier/regulator 418 couples to the power switch 422 for selection and to the energy storage means 360 for charging. Vega at 9:61–10:33 The detector/receiver 420 in the active electrostatic transceiver 104 may receive power directly from the energy storage means 360 in order to be actively listening for an excitation signal from an electrostatic reader 101. Alternatively, the detector/receiver 420 may have passive components sufficient to detect and

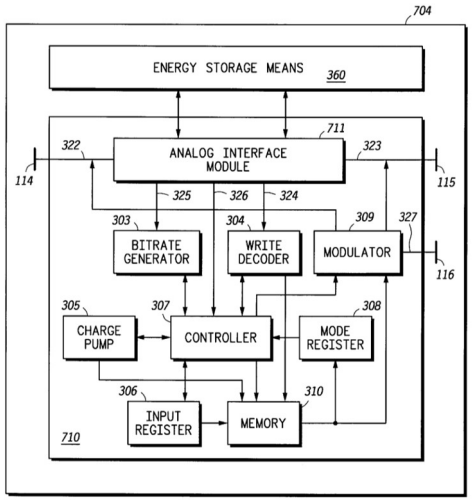
Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	receive signals when the energy storage means has insufficient energy to power active components. The detector/receiver 420 may have an amplifier for receiving and amplifying the incoming electrostatic signals, a bandpass filter for filtering unwanted frequencies outside a range of the carrier frequency, and a detector for detecting the presence of the carrier frequency in an excitation signal indicating that the transceiver is within the read range of an electrostatic reader 101. The detector may detect a number of oscillations in the received waveform at the carrier frequency indicating that it is not a noise source generating the waveform. In the preferred embodiment, if the detector detects any signal in the band of the carrier it provides an indication signal. Upon detection of the excitation signal, the detector/receiver 420 generates a wakeup signal on signal line 427 indicating that the active electrostatic transceiver 104 is within range of an electrostatic field and that the active electrostatic transceiver 104 needs to go through its wake up procedure. When outside the range of an electrostatic field, the signal line 427 indicates a go to-sleep signal so that the transceiver may go into a low power sleep state. The wakeup signal 427 is provided to the power on resetor 426, the sleep timer 424, the power switch 422 and clock extractor 430. Upon receiving the wakeup signal 427, power on resetor 426 monitors the device power line 460 to be sure that sufficient power is available to other components within the active electrostatic transceiver 104 before de-asserting a reset signal 425. Once sufficient power is generated in the device power line 460, reset signal 425 is de-asserted and other components may start functioning within the active electrostatic transceiver 104. In FIG. 4A the reset signal line 425 is coupled to the sleep timer 424, the clock extractor 430, the demodulator 432, the modulator 309 and other components of the active electrostatic transceiver 104. Vega at 12:60–13:6 Modulator 309 is coupled to the power switch 422 through the device power line 460, the energy storage means 360 through the low level power supply 450, the electrostatic electrodes 114-116 respectively through signal lines 322, 323 and 327, power on resetor 426 through signal line 425, and the clock extractor 430 through clock signal line 325. Modulator 309 includes a load modulator for electrostatic electrodes 114-115 and an active power amplifier in order to amplify signals for the extra transmission distance to the reader over the electrostatic electrode 116. A passive electrostatic transceiver may not function properly at large read ranges because of weak signals. The electrostatic reader's receiver may require increased sensitivity in order to receive signals from large read ranges. Vega at 13:7–14:10 Referring now to FIG. 4D, a block diagram is illustrated of the components within the modulator 309 for active and passive load modulation and active transmission. Active and passive load modulation are

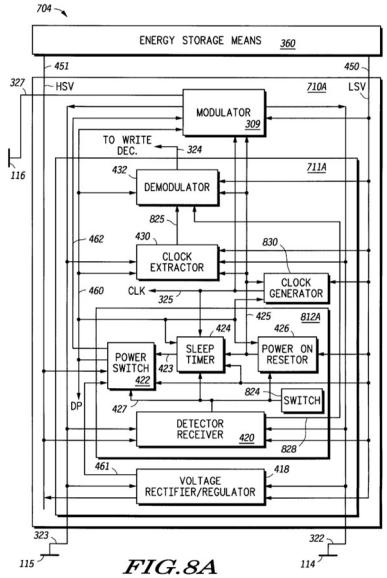
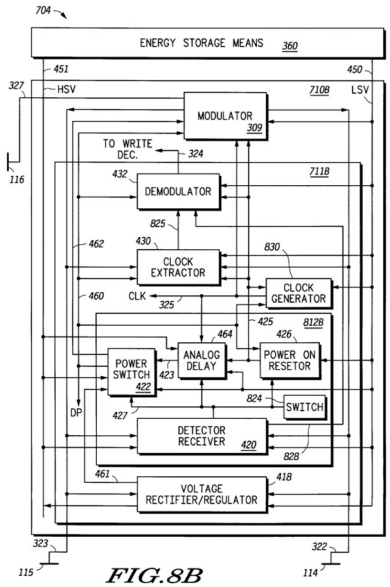
Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	accomplished by the modulator controller and the load modulator. Active load modulation occurs when the energy storage means 360 is coupled to the device power line 460 and the circuitry of the modulator controller 471. Passive load modulation occurs when the DC voltage rectifier/regulator within the transceiver 104 provides the rectified voltage and is coupled through the power switch to the device power line 460 and the modulator controller 471. Load modulation is accomplished by varying the impedance between the electrostatic electrodes 114 and 115. Varying the impedance between the electrostatic electrodes, that are capacitively coupled with the electrostatic electrodes of the reader 101, causes the excitation signal generated by the reader 101 to be reflected back. A data signal and a carrier signal is input into the modulator controller 471 at line 474 and 476 respectively to control the load modulator 473. The carrier signal 476 is commonly referred to as the data carrier and has a carrier frequency. Preferably the carrier frequency of the data carrier is 62.5 K Hz or one-half the power carrier frequency. FIG. 4E illustrates a few load modulators 473A-473D. Load modulator 473A consists of a variable impedance 480 coupled between the electrostatic electrodes 114 and 115 that has its impedance varied or switched by control signal 472 from the modulator controller 471. Load modulator 473B includes transistors 481 and 482, each coupled respectively between an electrostatic electrode and the low level supply voltage 450. The transistors are preferably turned ON and OFF by having their gates switched by a digital drive signal supplied on control signal 472. Load modulator 473C includes transistor 483 coupled between the electrostatic electrodes 114 and 115. Transistor 483 is preferably turned ON and OFF by having its gate switched by a digital drive signal supplied on control signal 472. Load modulator 473D includes transistor 484 coupled between one electrostatic electrode 322 and the low level supply voltage 450. This is an asymmetrical load modulation technique where circuitry within a rectifier provides the return path through the opposite electrostatic electrode 323. Referring back to FIG. 4D, active and passive transmission is accomplished by the modulator controller 471 and amplifier 477. Amplifier 477 is preferably a CMOS fully complementary inverter or buffer with its VDD input connected to the amplifier power line 462 and its VSS connection coupled to the low level power supply 450. Active transmission occurs when power is coupled from the high level power supply 451 through the power switch and onto the amplifier power line 462 by multiplexor 469. Passive transmission occurs when the DC voltage rectifier/regulator 418 within the transceiver 104 provides the rectified voltage and is coupled through the power switch to the amplifier power line 462 by multiplexor 469. Multiplexor 469 and 466 can further operate as a switch to selectively turn power OFF to circuitry connected to the device power line 460 or the amplifier power line 462 by turning OFF both of the transistor switches 467-468 or 470 and 475. Data 474 input into the modulator controller 471 is modulated with the input carrier signal 476 to generate the data signal on line 478. Signal line 478 is separate from signal line 472 such that the load modulator 473 and the amplifier 477 can be enabled or disabled independent from one another. Disabling the load

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	modulator 473 or the amplifier 477 may be performed by setting the signal on line 472 or 478 respectively to a high or low DC logic level. The signal on signal line 478 is input into the amplifier 477. The amplifier 477 amplifies the signal on line 478 and transmits the information electrostatically over the electrostatic electrode 116. In active mode, after the transmit time has occurred, the power to the amplifier 477 may be turned OFF to conserve power. Vega at 15:38–61 Now referring to FIG. 8A, selected details of the analog interface module 711 within the active electrostatic transceiver 704 are illustrated. The active electrostatic transceiver 704 includes the first electrostatic electrode 114, the second electrostatic electrode 115, the third electrostatic electrode 116, the transceiver circuit 710, and an energy storage means 360. The energy storage means 360 can be any type of energy storage means, including a battery or capacitor, preferably it is a thin foil battery to conform to a form factor for a smart card, tag, or badge. The transceiver circuit 710 as illustrated in FIG. 8A shows the relevant components for the second embodiment of the present invention. In FIG. 8A, the transceiver circuit 710 includes the analog interface module 711 and modulator 309. Components of the analog interface module 711 include a DC voltage rectifier/regulator 418, a power manager 812A, a clock extractor 430, a clock generator 830, a demodulator 432, and a modulator 309. The power manager 812A includes a detector/receiver 420, a power switch 422, a sleep timer 424, a power-on-resetor (POR) 426, and a manual switch 824. Except as otherwise described below, like numbered components of the transceiver circuit 710 operate similar to the similarly numbered components of the transceiver circuit 300 of the active electrostatic transceiver 104. *See also* Vega at Abstract, 5:8–25, 6:1–22, and 16:53–17:8. To the extent this limitation is not disclosed by Vega, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Vega, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 1 above.
6. The mobile device of claim 1, wherein the active transmit driver circuit includes one or more of an amplifier filter, oscillator, and/or modulator.	Vega discloses or renders obvious "[t]he mobile device of claim 1, wherein the active transmit driver circuit includes one or more of an amplifier filter, oscillator, and/or modulator." For example: Vega at Abstract An active electrostatic transceiver is provided that has electrostatic electrodes, an energy storage means such as a battery and a transceiver circuit for communication within an electrostatic RFID communication

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	system. The transceiver circuit includes power management features so that the energy storage means is not quickly depleted. Additionally the transceiver circuit includes amplifiers and filters so that the read range is further increased and noise sources are better filtered out. In a first embodiment, the transceiver circuit has a clock extractor that extracts a clock from the incoming data signal such that the clock and the data signal are synchronized so that demodulating the data from the data signal is simplified. In a second embodiment, the transceiver circuit has its own clock generator for initiating transmission of signals so that a reader need not have an exciter to generate an excitation signal. Each embodiment of the transceiver circuit has power management features so that power is conserved. Additionally, each transceiver circuit has the ability to operate in a passive mode, when there is insufficient charge in the energy storage means or a lower power mode is desirable. Vega at Figure 3  FIG.3 Vega at Figure 4A

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	 *FIG.4A* Vega at Figure 4B  *FIG.4B*

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	Vega at Figure 7  *FIG. 7* Vega at Figure 8A

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	 FIG.8A Vega at Figure 8B  FIG.8B

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	Vega at 3:28–45 Briefly, an active electrostatic transceiver is provided that has electrostatic electrodes, an energy storage means such as a battery and a transceiver circuit for communication within an electrostatic RFID communication system. The transceiver circuit includes power management features so that the energy storage means is not quickly depleted. Additionally the transceiver circuit includes amplifiers and filters so that the read range is further increased and noise filtering is improved. In a first embodiment, the transceiver circuit has a clock extractor that extracts a clock from the incoming data signal such that the clock and the data signal are synchronized so that demodulating the data from the data signal is simplified. In a second embodiment, the transceiver circuit has its own clock generator for initiating transmission of signals so that a reader need not have an exciter to generate an excitation signal. Both embodiments of the transceiver circuit have power management features that can decrease power consumption. Vega at 4:14–16 FIG. 4D is a block diagram of components of the modulator block within the active electrostatic transceiver of FIG. 3. Vega at 5:8–25 Briefly, an active electrostatic transceiver is provided that has electrostatic electrodes, an energy storage means, such as a battery, and a transceiver circuit for communication within an electrostatic RFID communication system. The transceiver circuit includes power management features so that the energy storage means is not quickly depleted. Additionally the transceiver circuit includes amplifiers and filters so that the read range is further increased and noise filtering is improved. In a first embodiment, the transceiver circuit has a clock extractor that extracts a clock from the incoming data signal such that the clock and the data signal are synchronized so that demodulating the data from the data signal is simplified. In a second embodiment, the transceiver circuit has its own clock generator for initiating transmission of signals so that a reader need not have an exciter to generate an excitation signal. Both embodiments of the transceiver circuit have power management features that improve power conservation. Vega at 6:23–33 An active electrostatic transceiver 104 is not simply formed by adding an energy storage means to the passive electrostatic transceiver 102. Components of a passive electrostatic transceiver require modification, particularly in the area of power management. The power or energy of an energy storage

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	means must be conserved and properly managed in order for the active electrostatic transceiver to have greater utility. Additionally noise must be properly filtered out to avoid false signal detection and power inadvertently being applied to circuits within the active electrostatic transceiver in order to more properly conserve power. Vega at 7:57–8:17 Reference is now made to FIG. 3 illustrating in greater detail the components of a first embodiment of the active electrostatic transceiver 104. As shown in FIG. 3, transceiver 104 may include a circuit 300 having an analog interface module 301, a bitrate generator 303, a write decoder 304, an optional charge pump 305, an input register 306, a controller 307, a mode register 308, a modulator 309, a memory 310, and electrostatic electrodes 114-116. As previously discussed, electrostatic electrodes 114 and 115 receive electrostatic signals from the electrostatic reader 101 and may communicate electrostatic signals back to the electrostatic reader 101. Electrostatic electrode 116 and 115 may also communicate electrostatic signals back to the electrostatic reader 101. Electrostatic electrode 114 and electrostatic electrode 115 are coupled to the analog interface module 301 over the bidirectional signal lines 322 and 333 respectively. The analog interface module 301 couples to the bitrate generator 303 through the clock signal line 325. Analog interface module 301 couples to the controller 307 through the control signal lines 326 and to the write decoder 304 through the data in signal line 324. The modulator 309 couples to the electrostatic electrode 114 and electrostatic electrode 115 by signal lines 322 and 333 respectively. Additionally, the modulator 309 couples to the electrostatic electrode 116 by signal line 327. For optimum electrostatic performance, it is desirable to keep the parasitic capacitance measured between signal lines 322 and 323 as small as possible. Vega at 8:18–45 Controller 307 controls the functionality of the transceiver 104 in conjunction with the analog interface module 301. Controller 307 couples to nearly all components of the active electrostatic transceiver 104 except for the electrostatic electrodes and pads. Memory 310 may be a volatile memory requiring a constant supply of energy or a non-volatile memory such as an EEPROM memory or ferro-electric memory that retains its information when power is no longer supplied. In the case of EEPROM memory, the optional charge pump 305 may be required in order to boost the power supply voltage to write data into the EEPROM memory. Input register 306 temporarily stores information that is to be written into memory 310. It may need to store the information due to a delay in the write cycle caused by the charge pump 305 pumping up or other reasons. In any case, storing data into the input register 306 allows the controller 307 to process other information for the transceiver 104. Mode register 308 reads configuration

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	information for the active electrostatic transceiver 104 from memory 310 and provides this to the controller 307. Write decoder 304 analyzes a data sequence being received by the electrostatic transceiver 104 and determines whether the transceiver should go into a write mode or whether it needs to remain in a receive mode. Modulator 309 prepares data read from memory 310 for communication by the active electrostatic transceiver 104. Modulator 309 can encode and modulate data read from memory 310 in a number of ways for communication with the reader 101. Vega at 9:30–60 Now referring to FIG. 4A, a detailed block diagram of components of the analog interface module 301 within the active transceiver 104 is illustrated including digital timing elements. The active electrostatic transceiver 104 includes the first electrostatic electrode 114, the second electrostatic electrode 115, the third electrostatic electrode 116, the transceiver circuit 300, and an energy storage means 360. The energy storage means 360 can be any type of energy storage means, including an electrochemical storage cell, such as a rechargeable battery or a non-rechargeable battery, or a capacitor, but is preferably a thin foil battery to conform to a form factor of a smart card, tag, or badge. The transceiver circuit 300A as illustrated in FIG. 4A shows the relevant components in the first embodiment of the present invention. In FIG. 4A, the transceiver circuit 300A is illustrated as including the analog interface module 301 and the modulator 309. In FIG. 4A, the relevant components of the analog interface module 301 include a power manager 412A, a DC voltage rectifier/regulator 418, a clock extractor 430, and a demodulator 432. The power manager 412A includes a detector/receiver 420, a power switch 422, a sleep timer 424, and a power-on-resetor (POR) 426. The DC voltage rectifier/regulator 418 includes a rectifier, a voltage regulator and voltage control functionality such that a DC voltage and energy source may be generated from the excitation signal or other signals received by the active electrostatic transceiver 104 and selectively used to power the transceiver 104 or charge the energy storage means 360. The DC voltage rectifier/regulator 418 couples to the power switch 422 for selection and to the energy storage means 360 for charging. Vega at 9:61–10:33 The detector/receiver 420 in the active electrostatic transceiver 104 may receive power directly from the energy storage means 360 in order to be actively listening for an excitation signal from an electrostatic reader 101. Alternatively, the detector/receiver 420 may have passive components sufficient to detect and receive signals when the energy storage means has insufficient energy to power active components. The detector/receiver 420 may have an amplifier for receiving and amplifying the incoming electrostatic signals, a bandpass filter for filtering unwanted frequencies outside a range of the carrier frequency, and a

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	detector for detecting the presence of the carrier frequency in an excitation signal indicating that the transceiver is within the read range of an electrostatic reader 101. The detector may detect a number of oscillations in the received waveform at the carrier frequency indicating that it is not a noise source generating the waveform. In the preferred embodiment, if the detector detects any signal in the band of the carrier it provides an indication signal. Upon detection of the excitation signal, the detector/receiver 420 generates a wakeup signal on signal line 427 indicating that the active electrostatic transceiver 104 is within range of an electrostatic field and that the active electrostatic transceiver 104 needs to go through its wake up procedure. When outside the range of an electrostatic field, the signal line 427 indicates a go to-sleep signal so that the transceiver may go into a low power sleep state. The wakeup signal 427 is provided to the power on resetor 426, the sleep timer 424, the power switch 422 and clock extractor 430. Upon receiving the wakeup signal 427, power on resetor 426 monitors the device power line 460 to be sure that sufficient power is available to other components within the active electrostatic transceiver 104 before de-asserting a reset signal 425. Once sufficient power is generated in the device power line 460, reset signal 425 is de-asserted and other components may start functioning within the active electrostatic transceiver 104. In FIG. 4A the reset signal line 425 is coupled to the sleep timer 424, the clock extractor 430, the demodulator 432, the modulator 309 and other components of the active electrostatic transceiver 104. Vega at 10:34–52 The sleep timer 424 of the active electrostatic transceiver of FIG. 4A is a digital counter that counts to a predetermined count value using the clock signal on clock line 325 received from the clock extractor 430. Upon reaching the predetermined count value, the sleep timer 424 turns off active components within the modulator 309. While the sleep timer 424 is counting a transmit signal is indicated on signal line 423. When the sleep timer 424 reaches the predetermined count value, signal line 423 indicates a receive signal and the active electrostatic transceiver powers off the active components within the modulator 309. While in this mode, the transceiver may still use passive components and the load modulators within the modulator 309 to communicate with a reader. Further, while in this mode, the transceiver may receive and respond to encoded write data transmitted by the reader. The predetermined count value is determined based on the time, in number of clock cycles, that it takes for the active electrostatic transceiver to complete a transmission cycle with an electrostatic reader 101. Vega at 10:53–11:6 Referring to FIG. 4B, the power manager 412B includes the detector/receiver 420, the power switch 422, an analog delay block 464, and the power-on-resetor (POR) 426. The digital sleep timer 424 of FIG. 4A is

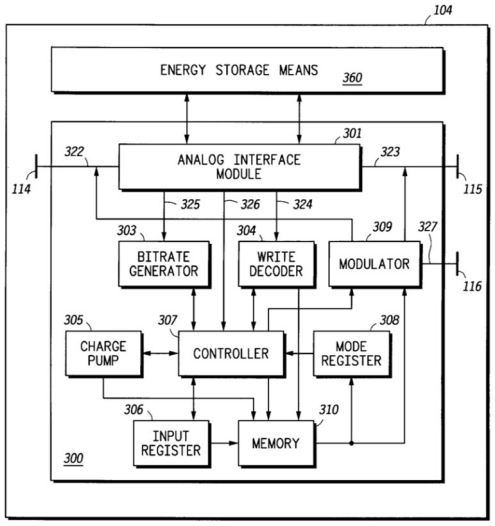
Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	replaced with the analog delay block 464 within the power manager block 412B while other blocks function similar to the description of FIG. 4A. Analog delay block 464 provides an analog delay by using resistor and capacitor elements in conjunction with a threshold detector or comparator. The analog delay block is preferably designed to provide a lengthy delay such as a couple of seconds. The circuitry of the analog delay block is simpler than that of the sleep timer 424. Upon detection of a received signal, the wakeup signal on signal line 427 causes the analog delay block to initiate the RC delay. The transmit signal on signal line 423 is coupled to the power switch 422 and causes it to select power, if available, from the energy storage means 360 for the active transmitter of the modulator 309. Upon completion of the RC delay, a receive signal is indicated on signal line 423 causing the power switch 422 to disconnect power from the active transmitter of the modulator 309. Vega at 11:7–12:16 Power switch 422 is coupled to the detector/receiver 420 through the signal line 427 and to the sleep timer 424 or the analog delay block 464 through the signal line 423. The power switch 422 controls the switching of the high level power supply voltage 451 from the energy storage means 360 or the rectified voltage 461 and provides the analog interface module 301 with the means to manage power consumption. These energy sources may be coupled to the device power line 460 feeding power to other components of the active electrostatic transceiver 104. FIG. 4C illustrates the basic components of the power switch 422 that provide power selection for the active electrostatic transceiver 104. These components include the power analyzer 465, the multiplexor 466 and the multiplexor 469. Multiplexor 469 may optionally be a switch with one end connected to the amplifier power line 462 and another end connected to the device power line 460. Power analyzer 465 performs an analysis on the energy provided by the DC voltage rectifier/regulator 418 with that supplied by the energy storage means 360. The power analyzer 465 receives the rectified voltage 461, the high level supply voltage 451 and the low level supply voltage 450 in order to perform the analysis. Additionally, control signals 423, 427 and any other control signals are received by the power analyzer 465 to further control the multiplexor 466 and multiplexor 469. Signal lines 423 and 427 are exemplary control signals input into the power analyzer 465. Typically, if the energy storage means 360 has higher energy levels it is selectively coupled to the device power line 460 and the amplifier power line 462 when signal line 427 indicates a transmit signal. Optionally when the transceiver 104 is in an active mode for active transmission by amplifier 477 and when signal line 427 indicates a receive signal, the energy storage means may be selectively decoupled from the amplifier power line 462, have the rectified voltage 461 coupled to the amplifier power line 462 or alternatively have no power source coupled to the amplifier power line 462 powering OFF the circuitry of amplifier 477 in each case conserving power in the energy storage means. If it is the case that the energy storage

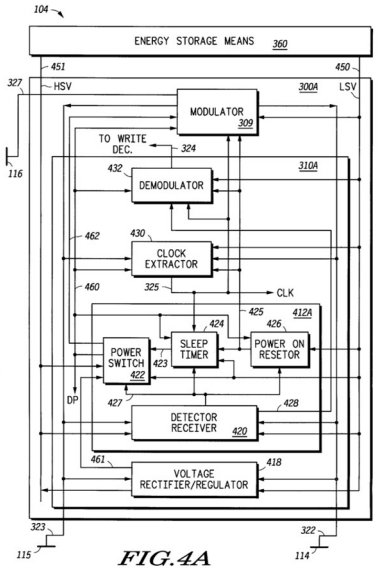
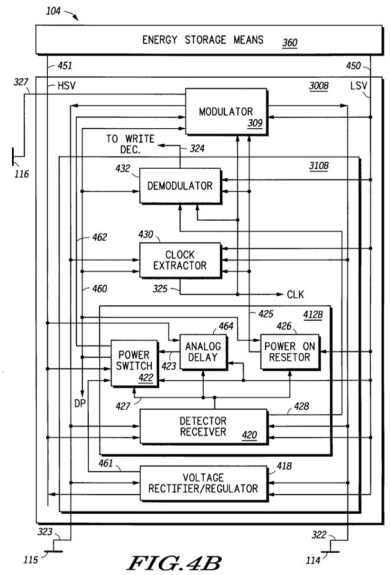
Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	means 360 has lower energy levels than that of the rectified voltage 461, the rectified voltage may be selectively coupled to the device power line 460 by multiplexor 466 and to the amplifier power line 462 by multiplexor 469 such that the load modulator 473 and the amplifier 477 can perform passive load modulation and passive transmission of electrostatic signals in a passive mode. Additionally if it is desirable to conserve power or more efficiently charge the energy storage means, multiplexor 466 or 469 can operate as switches decoupling the device power line 460 or the amplifier power line 462 from any power source. After selecting a power source where the power switch 422 couples the high level power supply 451 or the rectified voltage 461 with the device power line 460, circuitry within the active electrostatic transceiver goes into a power on reset sequence controlled by the power on resetor 426. When out of the power on reset sequence, the active electrostatic transceiver 104 can go through a communication cycle with the electrostatic reader 101 while in the read range and the sleep timer 424 starts counting or the analog delay cycle of the analog delay block 464 begins. If the active electrostatic transceiver remains in the electrostatic field (i.e. read range) and the sleep timer 424 reaches its predetermined count value or the analog delay block completes the predetermined RC delay time, a receive signal is indicated on signal line 423 to the power switch 422. The active electrostatic transceiver 104 continues to listen for signals from reader 101 or other sources that communicate on the carrier frequency. If the active electrostatic transceiver 104 is removed from the electrostatic field, the detector/receiver 420 resets and a sleep signal is indicated on signal line 427. Upon receiving the sleep signal, the power switch 422 selectively disconnects the high level voltage supply 451 from the device power line 460 so that components coupled to the device power line 460 become powered off and enter the sleep mode. In this manner when the active electrostatic transceiver 104 is outside the electrostatic field (i.e. read range) it goes into its low power sleep mode. Vega at 12:60–13:6 Modulator 309 is coupled to the power switch 422 through the device power line 460, the energy storage means 360 through the low level power supply 450, the electrostatic electrodes 114-116 respectively through signal lines 322, 323 and 327, power on resetor 426 through signal line 425, and the clock extractor 430 through clock signal line 325. Modulator 309 includes a load modulator for electrostatic electrodes 114-115 and an active power amplifier in order to amplify signals for the extra transmission distance to the reader over the electrostatic electrode 116. A passive electrostatic transceiver may not function properly at large read ranges because of weak signals. The electrostatic reader's receiver may require increased sensitivity in order to receive signals from large read ranges. Vega at 13:7–14:10

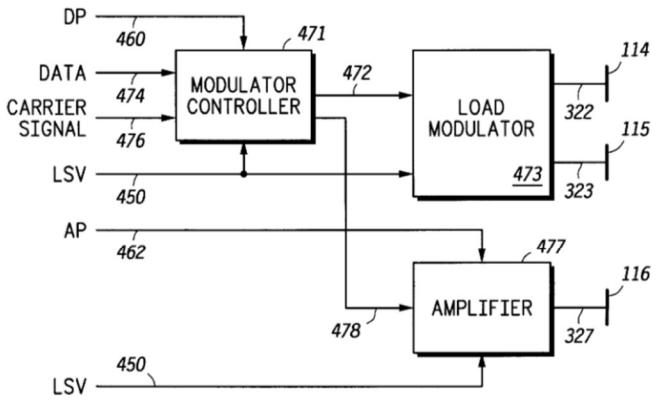
Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	Referring now to FIG. 4D, a block diagram is illustrated of the components within the modulator 309 for active and passive load modulation and active transmission. Active and passive load modulation are accomplished by the modulator controller and the load modulator. Active load modulation occurs when the energy storage means 360 is coupled to the device power line 460 and the circuitry of the modulator controller 471. Passive load modulation occurs when the DC voltage rectifier/regulator within the transceiver 104 provides the rectified voltage and is coupled through the power switch to the device power line 460 and the modulator controller 471. Load modulation is accomplished by varying the impedance between the electrostatic electrodes 114 and 115. Varying the impedance between the electrostatic electrodes, that are capacitively coupled with the electrostatic electrodes of the reader 101, causes the excitation signal generated by the reader 101 to be reflected back. A data signal and a carrier signal is input into the modulator controller 471 at line 474 and 476 respectively to control the load modulator 473. The carrier signal 476 is commonly referred to as the data carrier and has a carrier frequency. Preferably the carrier frequency of the data carrier is 62.5 K Hz or one-half the power carrier frequency. FIG. 4E illustrates a few load modulators 473A-473D. Load modulator 473A consists of a variable impedance 480 coupled between the electrostatic electrodes 114 and 115 that has its impedance varied or switched by control signal 472 from the modulator controller 471. Load modulator 473B includes transistors 481 and 482, each coupled respectively between an electrostatic electrode and the low level supply voltage 450. The transistors are preferably turned ON and OFF by having their gates switched by a digital drive signal supplied on control signal 472. Load modulator 473C includes transistor 483 coupled between the electrostatic electrodes 114 and 115. Transistor 483 is preferably turned ON and OFF by having its gate switched by a digital drive signal supplied on control signal 472. Load modulator 473D includes transistor 484 coupled between one electrostatic electrode 322 and the low level supply voltage 450. This is an asymmetrical load modulation technique where circuitry within a rectifier provides the return path through the opposite electrostatic electrode 323. Referring back to FIG. 4D, active and passive transmission is accomplished by the modulator controller 471 and amplifier 477. Amplifier 477 is preferably a CMOS fully complementary inverter or buffer with its VDD input connected to the amplifier power line 462 and its VSS connection coupled to the low level power supply 450. Active transmission occurs when power is coupled from the high level power supply 451 through the power switch and onto the amplifier power line 462 by multiplexor 469. Passive transmission occurs when the DC voltage rectifier/regulator 418 within the transceiver 104 provides the rectified voltage and is coupled through the power switch to the amplifier power line 462 by multiplexor 469. Multiplexor 469 and 466 can further operate as a switch to selectively turn power OFF to circuitry connected to the device power line 460 or the amplifier power line 462 by turning OFF both of the transistor switches 467-468 or 470 and 475. Data 474 input into the modulator controller 471 is modulated with the input carrier signal 476 to generate the

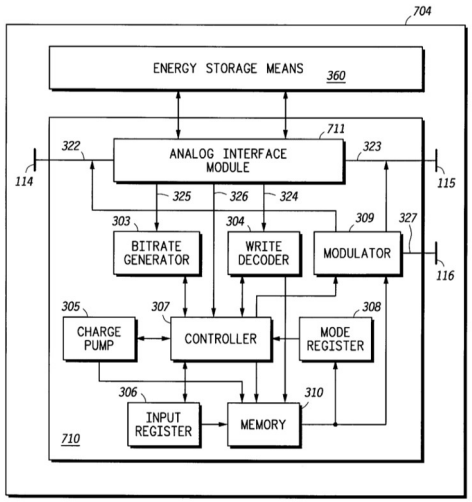
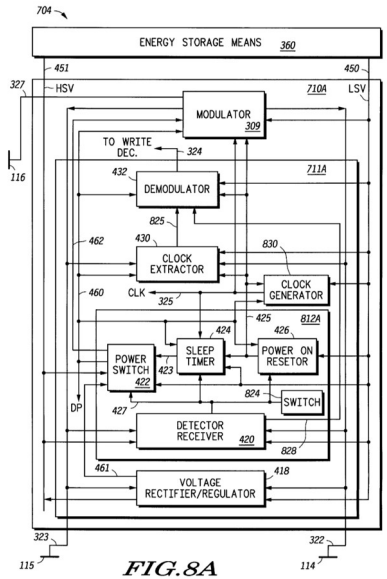
Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	data signal on line 478. Signal line 478 is separate from signal line 472 such that the load modulator 473 and the amplifier 477 can be enabled or disabled independent from one another. Disabling the load modulator 473 or the amplifier 477 may be performed by setting the signal on line 472 or 478 respectively to a high or low DC logic level. The signal on signal line 478 is input into the amplifier 477. The amplifier 477 amplifies the signal on line 478 and transmits the information electrostatically over the electrostatic electrode 116. In active mode, after the transmit time has occurred, the power to the amplifier 477 may be turned OFF to conserve power. Vega at 15:20–37 The analog interface module 711 generally performs the power management function for the active electrostatic transceiver 704. Additionally, it generates its own clock from a free running low power clock oscillator. This generated clock is provided to other components of the active electrostatic transceiver 704 which require a clock including the bitrate generator 303. The analog interface module 711 also demodulates the received signal to generate a received data stream. The analog interface module 711 also analyzes the received data stream in order to determine if the active electrostatic transceiver 704 should perform some operation such as a read operation or a write operation and communicates the results of the analysis to the controller 307 and the write decoder 304. It preferably performs this analysis by searching for predetermined gaps in the received data stream. Modulator 309 as previously described in detail communicates information from the active electrostatic transceiver to a reader. Vega at 15:38–61 Now referring to FIG. 8A, selected details of the analog interface module 711 within the active electrostatic transceiver 704 are illustrated. The active electrostatic transceiver 704 includes the first electrostatic electrode 114, the second electrostatic electrode 115, the third electrostatic electrode 116, the transceiver circuit 710, and an energy storage means 360. The energy storage means 360 can be any type of energy storage means, including a battery or capacitor, preferably it is a thin foil battery to conform to a form factor for a smart card, tag, or badge. The transceiver circuit 710 as illustrated in FIG. 8A shows the relevant components for the second embodiment of the present invention. In FIG. 8A, the transceiver circuit 710 includes the analog interface module 711 and modulator 309. Components of the analog interface module 711 include a DC voltage rectifier/regulator 418, a power manager 812A, a clock extractor 430, a clock generator 830, a demodulator 432, and a modulator 309. The power manager 812A includes a detector/receiver 420, a power switch 422, a sleep timer 424, a power-on-resetor (POR) 426, and a manual switch 824. Except as otherwise described below, like numbered components of the

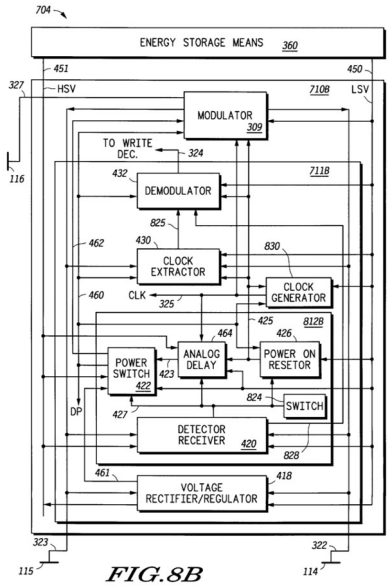
Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	transceiver circuit 710 operate similar to the similarly numbered components of the transceiver circuit 300 of the active electrostatic transceiver 104. Vega at 15:62–16:8 In the second embodiment of the present invention the active electrostatic transceiver 704 may not receive an excitation signal from which to extract a clock signal, particularly when coupled to the reader 601 of FIG. 6A. Thus, the transceiver circuit 710 includes its own clock generator 830. A clock extractor 430 is retained to generate an extracted clock 825 for demodulation of signals that may be received from readers other than reader 601. Clock generator 830 receives power by coupling to the device power line 460 and the low level power supply 450. Clock generator 830 has its own low power clock oscillator in order to generate a clock. The clock signal on clock line 325 is provided to the sleep timer 424 amongst other components of the transceiver circuit 710. Vega at 16:36–48 Power on resetor 426 monitors the device power line 460 to be sure that sufficient power is available to other components within the active electrostatic transceiver 704 before de-asserting a reset signal 425. Once sufficient power is generated in the device power line 460, reset signal 425 is de-asserted and other components may start functioning within the active electrostatic transceiver 704. In FIG. 8A the reset signal line 425 is coupled to the sleep timer 424, the demodulator 432, the modulator 309 and other components of the active electrostatic transceiver 704. In FIG. 8B, the reset signal line 425 is coupled to the analog delay block 464, the demodulator 432, the modulator 309 and other components of the active electrostatic transceiver 704. To the extent this limitation is not disclosed by Vega, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Vega, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 1 above.
7. The mobile device of claim 1 comprising an amplifier coupled to the power source to receive the power, wherein the amplifier is further coupled to the antenna.	Vega discloses or renders obvious "[t]he mobile device of claim 1 comprising an amplifier coupled to the power source to receive the power, wherein the amplifier is further coupled to the antenna." For example: Vega at Abstract An active electrostatic transceiver is provided that has electrostatic electrodes, an energy storage means such as a battery and a transceiver circuit for communication within an electrostatic RFID communication system. The transceiver circuit includes power management features so that the energy storage means is

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	not quickly depleted. Additionally the transceiver circuit includes amplifiers and filters so that the read range is further increased and noise sources are better filtered out. In a first embodiment, the transceiver circuit has a clock extractor that extracts a clock from the incoming data signal such that the clock and the data signal are synchronized so that demodulating the data from the data signal is simplified. In a second embodiment, the transceiver circuit has its own clock generator for initiating transmission of signals so that a reader need not have an exciter to generate an excitation signal. Each embodiment of the transceiver circuit has power management features so that power is conserved. Additionally, each transceiver circuit has the ability to operate in a passive mode, when there is insufficient charge in the energy storage means or a lower power mode is desirable. Vega at Figure 3  *FIG.3* Vega at Figure 4A

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	 *FIG.4A* Vega at Figure 4B  *FIG.4B*

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	Vega at Figure 4D  FIG. 4D Vega at Figure 7

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	 *FIG. 7* Vega at Figure 8A  *FIG. 8A*

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	Vega at Figure 8B  FIG.8B Vega at 3:28–45 Briefly, an active electrostatic transceiver is provided that has electrostatic electrodes, an energy storage means such as a battery and a transceiver circuit for communication within an electrostatic RFID communication system. The transceiver circuit includes power management features so that the energy storage means is not quickly depleted. Additionally the transceiver circuit includes amplifiers and filters so that the read range is further increased and noise filtering is improved. In a first embodiment, the transceiver circuit has a clock extractor that extracts a clock from the incoming data signal such that the clock and the data signal are synchronized so that demodulating the data from the data signal is simplified. In a second embodiment, the transceiver circuit has its own clock generator for initiating transmission of signals so that a reader need not have an exciter to generate an excitation signal. Both embodiments of the transceiver circuit have power management features that can decrease power consumption. Vega at 4:51–5:7

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	The present invention includes a method, apparatus and system for providing electrostatic communication utilizing capacitance-based technology with active and passive electrostatic transceivers. Passive electrostatic transceivers derive their power from electrostatic signals being transmitted by an electrostatic reader or other electrostatic signal source. An active electrostatic transceiver has its own internal power source and need not rely on an electrostatic signal source from an electrostatic reader or other source to power up and perform certain functions. Electrostatic communication is accomplished through capacitive coupling which requires no physical contact or wires between a reader and an electrostatic transceiver (a.k.a. electrostatic tag or electrostatic transponder). In the electrostatic communication system, the voltage applied to the capacitively coupled plates is an AC voltage generated by an electric field (i.e. an electrostatic ("ES") field is developed) as opposed to an electromagnetic ("EM") field in order for a charge or signal to be communicated. In short, an electrostatic field is an energy (electrical) field created between two electrodes having a voltage differential. An electrostatic transceiver needs to be in the proximity of the reader, referred to as the read range, in order to have sufficient capacitive coupling to transceive electrostatic signals. Vega at 5:8–25 Briefly, an active electrostatic transceiver is provided that has electrostatic electrodes, an energy storage means, such as a battery, and a transceiver circuit for communication within an electrostatic RFID communication system. The transceiver circuit includes power management features so that the energy storage means is not quickly depleted. Additionally the transceiver circuit includes amplifiers and filters so that the read range is further increased and noise filtering is improved. In a first embodiment, the transceiver circuit has a clock extractor that extracts a clock from the incoming data signal such that the clock and the data signal are synchronized so that demodulating the data from the data signal is simplified. In a second embodiment, the transceiver circuit has its own clock generator for initiating transmission of signals so that a reader need not have an exciter to generate an excitation signal. Both embodiments of the transceiver circuit have power management features that improve power conservation. Vega at 6:1–22 FIG. 1 illustrates the advantage that an active electrostatic transceiver 104 has over a passive electrostatic transceiver 102. The distance between an electrostatic transceiver and an electrostatic reader where communication may start to occur is referred to as the read range. In FIG. 1 the passive read range 125 between passive ES transceiver 102 and ES reader 101 is significantly smaller than the active read range 126 between active ES transceiver 104 and ES reader 101. This is because an energy storage means

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	within the active electrostatic transceiver 104 allows for active transmission of signals using an amplifier. Because of its passive nature, the passive electrostatic transceiver 102 relies on a load modulation technique for communication of signals by reflecting back the energy of the excitation signal to the electrostatic reader 101. The reflection of the excitation signal requires that the passive electrostatic transceiver 102 be nearer the reader 101. The larger read range provided by reflected ES signals using load modulation or transmitted ES signals using an active transmitter allows the active electrostatic transceiver 104 to be used in other applications of RFID communication systems where a passive electrostatic transceiver 102 would not. Vega at 7:14–56 In general, electrostatic reader 101 generates an electrostatic (electrical) field for use both as a power source for the passive electrostatic transceiver 102 and for transferring information between electrostatic reader 101 and passive electrostatic transceiver 102 or active electrostatic transceiver 104. As such, electrostatic reader 101 electrostatically generates and transmits an excitation signal to the surrounding air, gas, atmosphere or non-electrically conductive medium via the reader's electrostatic electrodes, except for the return path in a monopole system. The excitation signal is an AC signal which activates the passive electrostatic transceiver 102 when it is comes within the capacitance coupling range of reader 101. Upon being sufficiently energized, the passive electrostatic transceiver 102 may respond by electrostatically transmitting a read data signal carrying the information stored in its memory to electrostatic reader 101 (as part of a read operation). Active electrostatic transceiver 104 includes an energy storage means such that it may not require the excitation signal to become sufficiently energized. In accordance to the present invention, reader 101 may also electrostatically couple a write signal to communicate and write information to the passive electrostatic transceiver 102 or active ES transceiver(as part of a write operation). Alternatively, such programming or charging can be carried out by a separate ES programming, ES encoding or electrostatic charger unit (not illustrated). It is to be appreciated that the excitation signal must be generated and transmitted by electrostatic reader 101 to excite the passive electrostatic transceiver 102 or charge the active electrostatic transceiver 104. The excitation signal is an AC energy source and can be a continuous waveform or a varying waveform (i.e. amplitude, frequency, time, etc. of the waveform may vary). Alternatively a user could manually cause the electrostatic reader 101 or a charger to generate the excitation signal to charge or communicate with the passive electrostatic transceiver 102 or active electrostatic transceiver 104 by selecting a button or switch. The reader 101 usually has available a larger power source than the passive electrostatic transceiver 102 or active electrostatic transceiver 104. Thus, the reader 101 has very sensitive receiving and high energy

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	transmission when compared with the passive electrostatic transceiver 102 or active electrostatic transceiver 104. Vega at 8:46–62 When in proximity of a reader 101, the active electrostatic transceiver 104 first detects the excitation signal being emitted by an electrostatic reader 101. The excitation signal is generated by reader 101 at a carrier frequency, commonly referred to as a power carrier frequency or exciter frequency. The power carrier frequency, which may be modulated with data, is preferably 125 k Hz. After detecting the excitation signal, the first embodiment of the active electrostatic transceiver 104 goes through a power management sequence and powers up in order to derive a square wave based on the excitation signal at the carrier frequency which is used as a clock signal for the active transceiver. In this manner of generating a clock signal, information received by the active electrostatic transceiver 104 is synchronized with the clock signal. This alleviates generating a clock with a clock oscillator and synchronizing the data and clock using phase-locked loop techniques. Vega at 9:30–60 Now referring to FIG. 4A, a detailed block diagram of components of the analog interface module 301 within the active transceiver 104 is illustrated including digital timing elements. The active electrostatic transceiver 104 includes the first electrostatic electrode 114, the second electrostatic electrode 115, the third electrostatic electrode 116, the transceiver circuit 300, and an energy storage means 360. The energy storage means 360 can be any type of energy storage means, including an electrochemical storage cell, such as a rechargeable battery or a non-rechargeable battery, or a capacitor, but is preferably a thin foil battery to conform to a form factor of a smart card, tag, or badge. The transceiver circuit 300A as illustrated in FIG. 4A shows the relevant components in the first embodiment of the present invention. In FIG. 4A, the transceiver circuit 300A is illustrated as including the analog interface module 301 and the modulator 309. In FIG. 4A, the relevant components of the analog interface module 301 include a power manager 412A, a DC voltage rectifier/regulator 418, a clock extractor 430, and a demodulator 432. The power manager 412A includes a detector/receiver 420, a power switch 422, a sleep timer 424, and a power-on-resetor (POR) 426. The DC voltage rectifier/regulator 418 includes a rectifier, a voltage regulator and voltage control functionality such that a DC voltage and energy source may be generated from the excitation signal or other signals received by the active electrostatic transceiver 104 and selectively used to power the transceiver 104 or charge the energy storage means 360. The DC voltage rectifier/regulator 418 couples to the power switch 422 for selection and to the energy storage means 360 for charging.

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	Vega at 9:61–10:33 The detector/receiver 420 in the active electrostatic transceiver 104 may receive power directly from the energy storage means 360 in order to be actively listening for an excitation signal from an electrostatic reader 101. Alternatively, the detector/receiver 420 may have passive components sufficient to detect and receive signals when the energy storage means has insufficient energy to power active components. The detector/receiver 420 may have an amplifier for receiving and amplifying the incoming electrostatic signals, a bandpass filter for filtering unwanted frequencies outside a range of the carrier frequency, and a detector for detecting the presence of the carrier frequency in an excitation signal indicating that the transceiver is within the read range of an electrostatic reader 101. The detector may detect a number of oscillations in the received waveform at the carrier frequency indicating that it is not a noise source generating the waveform. In the preferred embodiment, if the detector detects any signal in the band of the carrier it provides an indication signal. Upon detection of the excitation signal, the detector/receiver 420 generates a wakeup signal on signal line 427 indicating that the active electrostatic transceiver 104 is within range of an electrostatic field and that the active electrostatic transceiver 104 needs to go through its wake up procedure. When outside the range of an electrostatic field, the signal line 427 indicates a go to-sleep signal so that the transceiver may go into a low power sleep state. The wakeup signal 427 is provided to the power on resetor 426, the sleep timer 424, the power switch 422 and clock extractor 430. Upon receiving the wakeup signal 427, power on resetor 426 monitors the device power line 460 to be sure that sufficient power is available to other components within the active electrostatic transceiver 104 before de-asserting a reset signal 425. Once sufficient power is generated in the device power line 460, reset signal 425 is de-asserted and other components may start functioning within the active electrostatic transceiver 104. In FIG. 4A the reset signal line 425 is coupled to the sleep timer 424, the clock extractor 430, the demodulator 432, the modulator 309 and other components of the active electrostatic transceiver 104. Vega at 10:34–52 The sleep timer 424 of the active electrostatic transceiver of FIG. 4A is a digital counter that counts to a predetermined count value using the clock signal on clock line 325 received from the clock extractor 430. Upon reaching the predetermined count value, the sleep timer 424 turns off active components within the modulator 309. While the sleep timer 424 is counting a transmit signal is indicated on signal line 423. When the sleep timer 424 reaches the predetermined count value, signal line 423 indicates a receive signal and the active electrostatic transceiver powers off the active components within the modulator 309. While in this mode, the transceiver may still use passive components and the load modulators within the

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	modulator 309 to communicate with a reader. Further, while in this mode, the transceiver may receive and respond to encoded write data transmitted by the reader. The predetermined count value is determined based on the time, in number of clock cycles, that it takes for the active electrostatic transceiver to complete a transmission cycle with an electrostatic reader 101. Vega at 10:53–11:6 Referring to FIG. 4B, the power manager 412B includes the detector/receiver 420, the power switch 422, an analog delay block 464, and the power-on-resetor (POR) 426. The digital sleep timer 424 of FIG. 4A is replaced with the analog delay block 464 within the power manager block 412B while other blocks function similar to the description of FIG. 4A. Analog delay block 464 provides an analog delay by using resistor and capacitor elements in conjunction with a threshold detector or comparator. The analog delay block is preferably designed to provide a lengthy delay such as a couple of seconds. The circuitry of the analog delay block is simpler than that of the sleep timer 424. Upon detection of a received signal, the wakeup signal on signal line 427 causes the analog delay block to initiate the RC delay. The transmit signal on signal line 423 is coupled to the power switch 422 and causes it to select power, if available, from the energy storage means 360 for the active transmitter of the modulator 309. Upon completion of the RC delay, a receive signal is indicated on signal line 423 causing the power switch 422 to disconnect power from the active transmitter of the modulator 309. Vega at 11:7–12:16 Power switch 422 is coupled to the detector/receiver 420 through the signal line 427 and to the sleep timer 424 or the analog delay block 464 through the signal line 423. The power switch 422 controls the switching of the high level power supply voltage 451 from the energy storage means 360 or the rectified voltage 461 and provides the analog interface module 301 with the means to manage power consumption. These energy sources may be coupled to the device power line 460 feeding power to other components of the active electrostatic transceiver 104. FIG. 4C illustrates the basic components of the power switch 422 that provide power selection for the active electrostatic transceiver 104. These components include the power analyzer 465, the multiplexor 466 and the multiplexor 469. Multiplexor 469 may optionally be a switch with one end connected to the amplifier power line 462 and another end connected to the device power line 460. Power analyzer 465 performs an analysis on the energy provided by the DC voltage rectifier/regulator 418 with that supplied by the energy storage means 360. The power analyzer 465 receives the rectified voltage 461, the high level supply voltage 451 and the low level supply voltage 450 in order to perform the analysis. Additionally, control signals 423, 427 and any other control signals are received by the power analyzer 465 to further control the multiplexor 466 and multiplexor 469. Signal

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	lines 423 and 427 are exemplary control signals input into the power analyzer 465. Typically, if the energy storage means 360 has higher energy levels it is selectively coupled to the device power line 460 and the amplifier power line 462 when signal line 427 indicates a transmit signal. Optionally when the transceiver 104 is in an active mode for active transmission by amplifier 477 and when signal line 427 indicates a receive signal, the energy storage means may be selectively decoupled from the amplifier power line 462, have the rectified voltage 461 coupled to the amplifier power line 462 or alternatively have no power source coupled to the amplifier power line 462 powering OFF the circuitry of amplifier 477 in each case conserving power in the energy storage means. If it is the case that the energy storage means 360 has lower energy levels than that of the rectified voltage 461, the rectified voltage may be selectively coupled to the device power line 460 by multiplexor 466 and to the amplifier power line 462 by multiplexor 469 such that the load modulator 473 and the amplifier 477 can perform passive load modulation and passive transmission of electrostatic signals in a passive mode. Additionally if it is desirable to conserve power or more efficiently charge the energy storage means, multiplexor 466 or 469 can operate as switches decoupling the device power line 460 or the amplifier power line 462 from any power source. After selecting a power source where the power switch 422 couples the high level power supply 451 or the rectified voltage 461 with the device power line 460, circuitry within the active electrostatic transceiver goes into a power on reset sequence controlled by the power on resetor 426. When out of the power on reset sequence, the active electrostatic transceiver 104 can go through a communication cycle with the electrostatic reader 101 while in the read range and the sleep timer 424 starts counting or the analog delay cycle of the analog delay block 464 begins. If the active electrostatic transceiver remains in the electrostatic field (i.e. read range) and the sleep timer 424 reaches its predetermined count value or the analog delay block completes the predetermined RC delay time, a receive signal is indicated on signal line 423 to the power switch 422. The active electrostatic transceiver 104 continues to listen for signals from reader 101 or other sources that communicate on the carrier frequency. If the active electrostatic transceiver 104 is removed from the electrostatic field, the detector/receiver 420 resets and a sleep signal is indicated on signal line 427. Upon receiving the sleep signal, the power switch 422 selectively disconnects the high level voltage supply 451 from the device power line 460 so that components coupled to the device power line 460 become powered off and enter the sleep mode. In this manner when the active electrostatic transceiver 104 is outside the electrostatic field (i.e. read range) it goes into its low power sleep mode. Vega at 12:60–13:6 Modulator 309 is coupled to the power switch 422 through the device power line 460, the energy storage means 360 through the low level power supply 450, the electrostatic electrodes 114-116 respectively

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	through signal lines 322, 323 and 327, power on resetor 426 through signal line 425, and the clock extractor 430 through clock signal line 325. Modulator 309 includes a load modulator for electrostatic electrodes 114-115 and an active power amplifier in order to amplify signals for the extra transmission distance to the reader over the electrostatic electrode 116. A passive electrostatic transceiver may not function properly at large read ranges because of weak signals. The electrostatic reader's receiver may require increased sensitivity in order to receive signals from large read ranges. Vega at 13:7–14:10 Referring now to FIG. 4D, a block diagram is illustrated of the components within the modulator 309 for active and passive load modulation and active transmission. Active and passive load modulation are accomplished by the modulator controller and the load modulator. Active load modulation occurs when the energy storage means 360 is coupled to the device power line 460 and the circuitry of the modulator controller 471. Passive load modulation occurs when the DC voltage rectifier/regulator within the transceiver 104 provides the rectified voltage and is coupled through the power switch to the device power line 460 and the modulator controller 471. Load modulation is accomplished by varying the impedance between the electrostatic electrodes 114 and 115. Varying the impedance between the electrostatic electrodes, that are capacitively coupled with the electrostatic electrodes of the reader 101, causes the excitation signal generated by the reader 101 to be reflected back. A data signal and a carrier signal is input into the modulator controller 471 at line 474 and 476 respectively to control the load modulator 473. The carrier signal 476 is commonly referred to as the data carrier and has a carrier frequency. Preferably the carrier frequency of the data carrier is 62.5 K Hz or one-half the power carrier frequency. FIG. 4E illustrates a few load modulators 473A-473D. Load modulator 473A consists of a variable impedance 480 coupled between the electrostatic electrodes 114 and 115 that has its impedance varied or switched by control signal 472 from the modulator controller 471. Load modulator 473B includes transistors 481 and 482, each coupled respectively between an electrostatic electrode and the low level supply voltage 450. The transistors are preferably turned ON and OFF by having their gates switched by a digital drive signal supplied on control signal 472. Load modulator 473C includes transistor 483 coupled between the electrostatic electrodes 114 and 115. Transistor 483 is preferably turned ON and OFF by having its gate switched by a digital drive signal supplied on control signal 472. Load modulator 473D includes transistor 484 coupled between one electrostatic electrode 322 and the low level supply voltage 450. This is an asymmetrical load modulation technique where circuitry within a rectifier provides the return path through the opposite electrostatic electrode 323. Referring back to FIG. 4D, active and passive transmission is accomplished by the modulator controller 471 and amplifier 477. Amplifier 477 is preferably a CMOS fully complementary inverter or buffer with its VDD input connected to the amplifier

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	power line 462 and its VSS connection coupled to the low level power supply 450. Active transmission occurs when power is coupled from the high level power supply 451 through the power switch and onto the amplifier power line 462 by multiplexor 469. Passive transmission occurs when the DC voltage rectifier/regulator 418 within the transceiver 104 provides the rectified voltage and is coupled through the power switch to the amplifier power line 462 by multiplexor 469. Multiplexor 469 and 466 can further operate as a switch to selectively turn power OFF to circuitry connected to the device power line 460 or the amplifier power line 462 by turning OFF both of the transistor switches 467-468 or 470 and 475. Data 474 input into the modulator controller 471 is modulated with the input carrier signal 476 to generate the data signal on line 478. Signal line 478 is separate from signal line 472 such that the load modulator 473 and the amplifier 477 can be enabled or disabled independent from one another. Disabling the load modulator 473 or the amplifier 477 may be performed by setting the signal on line 472 or 478 respectively to a high or low DC logic level. The signal on signal line 478 is input into the amplifier 477. The amplifier 477 amplifies the signal on line 478 and transmits the information electrostatically over the electrostatic electrode 116. In active mode, after the transmit time has occurred, the power to the amplifier 477 may be turned OFF to conserve power. Vega at 15:20–37 The analog interface module 711 generally performs the power management function for the active electrostatic transceiver 704. Additionally, it generates its own clock from a free running low power clock oscillator. This generated clock is provided to other components of the active electrostatic transceiver 704 which require a clock including the bitrate generator 303. The analog interface module 711 also demodulates the received signal to generate a received data stream. The analog interface module 711 also analyzes the received data stream in order to determine if the active electrostatic transceiver 704 should perform some operation such as a read operation or a write operation and communicates the results of the analysis to the controller 307 and the write decoder 304. It preferably performs this analysis by searching for predetermined gaps in the received data stream. Modulator 309 as previously described in detail communicates information from the active electrostatic transceiver to a reader. Vega at 15:38–61 Now referring to FIG. 8A, selected details of the analog interface module 711 within the active electrostatic transceiver 704 are illustrated. The active electrostatic transceiver 704 includes the first electrostatic electrode 114, the second electrostatic electrode 115, the third electrostatic electrode 116, the transceiver circuit 710, and an energy storage means 360. The energy storage means 360 can be any type of energy storage means, including a battery or capacitor, preferably it is a thin foil battery to conform to a

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	form factor for a smart card, tag, or badge. The transceiver circuit 710 as illustrated in FIG. 8A shows the relevant components for the second embodiment of the present invention. In FIG. 8A, the transceiver circuit 710 includes the analog interface module 711 and modulator 309. Components of the analog interface module 711 include a DC voltage rectifier/regulator 418, a power manager 812A, a clock extractor 430, a clock generator 830, a demodulator 432, and a modulator 309. The power manager 812A includes a detector/receiver 420, a power switch 422, a sleep timer 424, a power-on-resetor (POR) 426, and a manual switch 824. Except as otherwise described below, like numbered components of the transceiver circuit 710 operate similar to the similarly numbered components of the transceiver circuit 300 of the active electrostatic transceiver 104. Vega at 15:62–16:8 In the second embodiment of the present invention the active electrostatic transceiver 704 may not receive an excitation signal from which to extract a clock signal, particularly when coupled to the reader 601 of FIG. 6A. Thus, the transceiver circuit 710 includes its own clock generator 830. A clock extractor 430 is retained to generate an extracted clock 825 for demodulation of signals that may be received from readers other than reader 601. Clock generator 830 receives power by coupling to the device power line 460 and the low level power supply 450. Clock generator 830 has its own low power clock oscillator in order to generate a clock. The clock signal on clock line 325 is provided to the sleep timer 424 amongst other components of the transceiver circuit 710. Vega at 16:36–48 Power on resetor 426 monitors the device power line 460 to be sure that sufficient power is available to other components within the active electrostatic transceiver 704 before de-asserting a reset signal 425. Once sufficient power is generated in the device power line 460, reset signal 425 is de-asserted and other components may start functioning within the active electrostatic transceiver 704. In FIG. 8A the reset signal line 425 is coupled to the sleep timer 424, the demodulator 432, the modulator 309 and other components of the active electrostatic transceiver 704. In FIG. 8B, the reset signal line 425 is coupled to the analog delay block 464, the demodulator 432, the modulator 309 and other components of the active electrostatic transceiver 704. Vega at 16:53–17:8 The present invention has many advantages over the prior art. The present invention provides a larger read range over passive RFID communication systems and therefore increases the applicability of electrostatic communication systems. Additionally, the present invention provides for greater flexibility in choosing components for an electrostatic transceiver. Also, the present invention provides greater operational

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	functionality in an electrostatic transceiver because the available power is greater. Furthermore, the present invention provides for greater integration in circuitry and reduces the amount space utilized for an active electrostatic transceiver. Additionally the present invention in its second embodiment reduces the interference and noise in an electrostatic communication system so that it may be used in environments requiring low noise emission. The present invention provides for lower cost RFID transceivers such that disposable applications are possible. Furthermore, the present invention provides the capability to operate an active electrostatic transceiver in an active mode operating under the power of an energy storage means or in a passive mode under the power generated by a voltage rectifier/regulator when the energy storage means power is too low or if in the case of a desirable low-power operational mode. To the extent this limitation is not disclosed by Vega, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Vega, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 1 above.
8. The mobile device of claim 7, wherein the amplifier amplifies a signal received at the antenna and generates an amplified signal, and provides the amplified signal to the smartcard controller.	Vega discloses or renders obvious "[t]he mobile device of claim 7, wherein the amplifier amplifies a signal received at the antenna and generates an amplified signal, and provides the amplified signal to the smartcard controller." For example: Vega at 5:8–25 Briefly, an active electrostatic transceiver is provided that has electrostatic electrodes, an energy storage means, such as a battery, and a transceiver circuit for communication within an electrostatic RFID communication system. The transceiver circuit includes power management features so that the energy storage means is not quickly depleted. Additionally the transceiver circuit includes amplifiers and filters so that the read range is further increased and noise filtering is improved. In a first embodiment, the transceiver circuit has a clock extractor that extracts a clock from the incoming data signal such that the clock and the data signal are synchronized so that demodulating the data from the data signal is simplified. In a second embodiment, the transceiver circuit has its own clock generator for initiating transmission of signals so that a reader need not have an exciter to generate an excitation signal. Both embodiments of the transceiver circuit have power management features that improve power conservation. Vega at 6:1–22 FIG. 1 illustrates the advantage that an active electrostatic transceiver 104 has over a passive electrostatic transceiver 102. The distance between an electrostatic transceiver and an electrostatic reader where

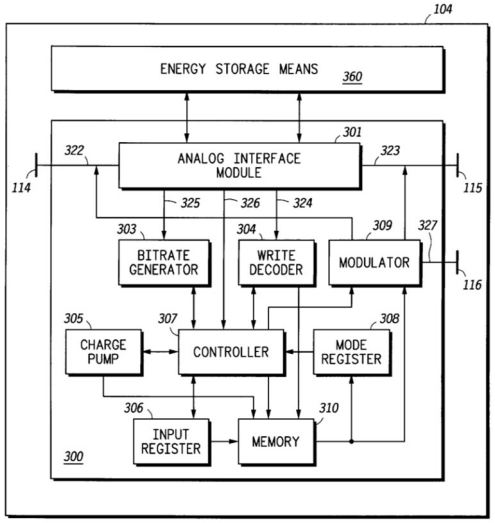
Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	communication may start to occur is referred to as the read range. In FIG. 1 the passive read range 125 between passive ES transceiver 102 and ES reader 101 is significantly smaller than the active read range 126 between active ES transceiver 104 and ES reader 101. This is because an energy storage means within the active electrostatic transceiver 104 allows for active transmission of signals using an amplifier. Because of its passive nature, the passive electrostatic transceiver 102 relies on a load modulation technique for communication of signals by reflecting back the energy of the excitation signal to the electrostatic reader 101. The reflection of the excitation signal requires that the passive electrostatic transceiver 102 be nearer the reader 101. The larger read range provided by reflected ES signals using load modulation or transmitted ES signals using an active transmitter allows the active electrostatic transceiver 104 to be used in other applications of RFID communication systems where a passive electrostatic transceiver 102 would not. Vega at 9:61–10:33 The detector/receiver 420 in the active electrostatic transceiver 104 may receive power directly from the energy storage means 360 in order to be actively listening for an excitation signal from an electrostatic reader 101. Alternatively, the detector/receiver 420 may have passive components sufficient to detect and receive signals when the energy storage means has insufficient energy to power active components. The detector/receiver 420 may have an amplifier for receiving and amplifying the incoming electrostatic signals, a bandpass filter for filtering unwanted frequencies outside a range of the carrier frequency, and a detector for detecting the presence of the carrier frequency in an excitation signal indicating that the transceiver is within the read range of an electrostatic reader 101. The detector may detect a number of oscillations in the received waveform at the carrier frequency indicating that it is not a noise source generating the waveform. In the preferred embodiment, if the detector detects any signal in the band of the carrier it provides an indication signal. Upon detection of the excitation signal, the detector/receiver 420 generates a wakeup signal on signal line 427 indicating that the active electrostatic transceiver 104 is within range of an electrostatic field and that the active electrostatic transceiver 104 needs to go through its wake up procedure. When outside the range of an electrostatic field, the signal line 427 indicates a go to-sleep signal so that the transceiver may go into a low power sleep state. The wakeup signal 427 is provided to the power on resetor 426, the sleep timer 424, the power switch 422 and clock extractor 430. Upon receiving the wakeup signal 427, power on resetor 426 monitors the device power line 460 to be sure that sufficient power is available to other components within the active electrostatic transceiver 104 before de-asserting a reset signal 425. Once sufficient power is generated in the device power line 460, reset signal 425 is de-asserted and other components may start functioning within the active electrostatic transceiver 104. In FIG. 4A the reset signal line 425 is coupled to the sleep timer 424, the clock extractor

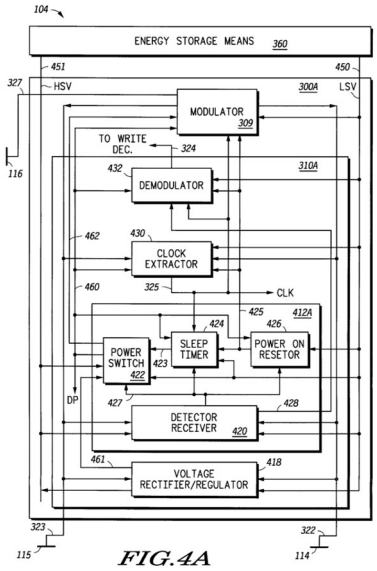
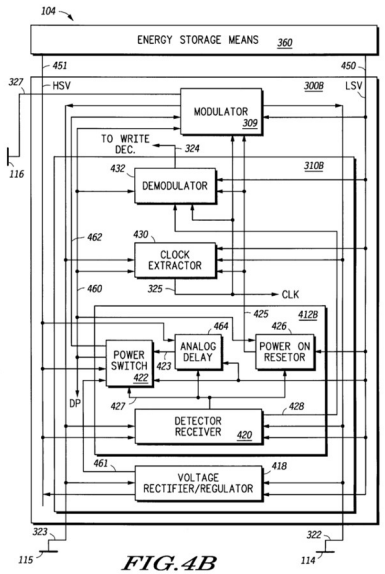
Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	430, the demodulator 432, the modulator 309 and other components of the active electrostatic transceiver 104. Vega at 11:7–12:16 Power switch 422 is coupled to the detector/receiver 420 through the signal line 427 and to the sleep timer 424 or the analog delay block 464 through the signal line 423. The power switch 422 controls the switching of the high level power supply voltage 451 from the energy storage means 360 or the rectified voltage 461 and provides the analog interface module 301 with the means to manage power consumption. These energy sources may be coupled to the device power line 460 feeding power to other components of the active electrostatic transceiver 104. FIG. 4C illustrates the basic components of the power switch 422 that provide power selection for the active electrostatic transceiver 104. These components include the power analyzer 465, the multiplexor 466 and the multiplexor 469. Multiplexor 469 may optionally be a switch with one end connected to the amplifier power line 462 and another end connected to the device power line 460. Power analyzer 465 performs an analysis on the energy provided by the DC voltage rectifier/regulator 418 with that supplied by the energy storage means 360. The power analyzer 465 receives the rectified voltage 461, the high level supply voltage 451 and the low level supply voltage 450 in order to perform the analysis. Additionally, control signals 423, 427 and any other control signals are received by the power analyzer 465 to further control the multiplexor 466 and multiplexor 469. Signal lines 423 and 427 are exemplary control signals input into the power analyzer 465. Typically, if the energy storage means 360 has higher energy levels it is selectively coupled to the device power line 460 and the amplifier power line 462 when signal line 427 indicates a transmit signal. Optionally when the transceiver 104 is in an active mode for active transmission by amplifier 477 and when signal line 427 indicates a receive signal, the energy storage means may be selectively decoupled from the amplifier power line 462, have the rectified voltage 461 coupled to the amplifier power line 462 or alternatively have no power source coupled to the amplifier power line 462 powering OFF the circuitry of amplifier 477 in each case conserving power in the energy storage means. If it is the case that the energy storage means 360 has lower energy levels than that of the rectified voltage 461, the rectified voltage may be selectively coupled to the device power line 460 by multiplexor 466 and to the amplifier power line 462 by multiplexor 469 such that the load modulator 473 and the amplifier 477 can perform passive load modulation and passive transmission of electrostatic signals in a passive mode. Additionally if it is desirable to conserve power or more efficiently charge the energy storage means, multiplexor 466 or 469 can operate as switches decoupling the device power line 460 or the amplifier power line 462 from any power source. After selecting a power source where the power switch 422 couples the high level power supply 451 or the rectified voltage 461 with the device power line 460, circuitry within the active

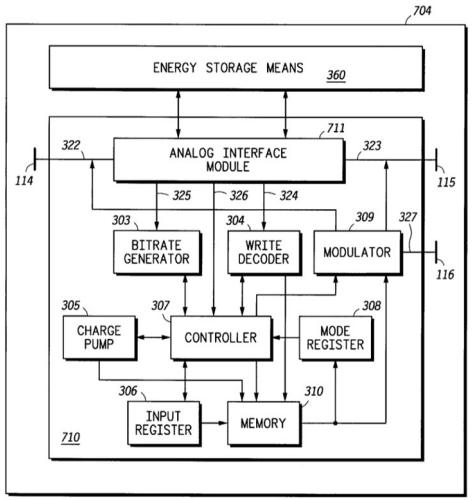
Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	electrostatic transceiver goes into a power on reset sequence controlled by the power on resetor 426. When out of the power on reset sequence, the active electrostatic transceiver 104 can go through a communication cycle with the electrostatic reader 101 while in the read range and the sleep timer 424 starts counting or the analog delay cycle of the analog delay block 464 begins. If the active electrostatic transceiver remains in the electrostatic field (i.e. read range) and the sleep timer 424 reaches its predetermined count value or the analog delay block completes the predetermined RC delay time, a receive signal is indicated on signal line 423 to the power switch 422. The active electrostatic transceiver 104 continues to listen for signals from reader 101 or other sources that communicate on the carrier frequency. If the active electrostatic transceiver 104 is removed from the electrostatic field, the detector/receiver 420 resets and a sleep signal is indicated on signal line 427. Upon receiving the sleep signal, the power switch 422 selectively disconnects the high level voltage supply 451 from the device power line 460 so that components coupled to the device power line 460 become powered off and enter the sleep mode. In this manner when the active electrostatic transceiver 104 is outside the electrostatic field (i.e. read range) it goes into its low power sleep mode. To the extent this limitation is not disclosed by Vega, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Vega, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 7 above.
17[pre]. A method of near field communication between a mobile device and an NFC reader, the method comprising:	Vega discloses or renders obvious "[a] method of near field communication between a mobile device and an NFC reader, the method." For example: *See* [1d] above. Vega at Abstract An active electrostatic transceiver is provided that has electrostatic electrodes, an energy storage means such as a battery and a transceiver circuit for communication within an electrostatic RFID communication system. The transceiver circuit includes power management features so that the energy storage means is not quickly depleted. Additionally the transceiver circuit includes amplifiers and filters so that the read range is further increased and noise sources are better filtered out. In a first embodiment, the transceiver circuit has a clock extractor that extracts a clock from the incoming data signal such that the clock and the data signal are synchronized so that demodulating the data from the data signal is simplified. In a second embodiment, the transceiver circuit has its own clock generator for initiating transmission of signals so that a reader need not have an exciter to generate an excitation signal. Each embodiment of the transceiver

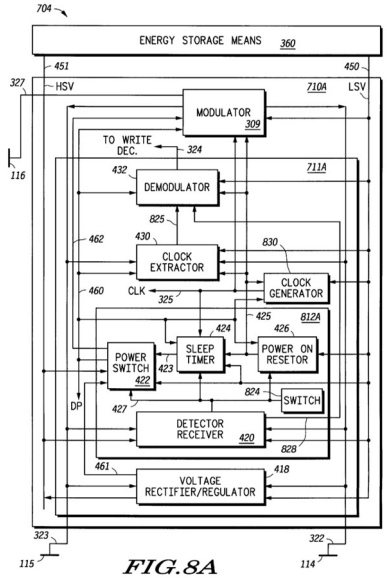
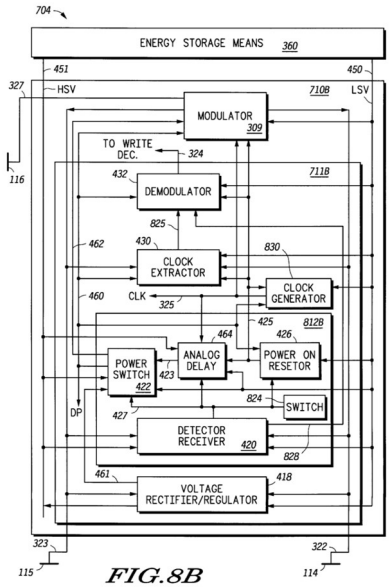
Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	circuit has power management features so that power is conserved. Additionally, each transceiver circuit has the ability to operate in a passive mode, when there is insufficient charge in the energy storage means or a lower power mode is desirable. Vega at 3:28–45 Briefly, an active electrostatic transceiver is provided that has electrostatic electrodes, an energy storage means such as a battery and a transceiver circuit for communication within an electrostatic RFID communication system. The transceiver circuit includes power management features so that the energy storage means is not quickly depleted. Additionally the transceiver circuit includes amplifiers and filters so that the read range is further increased and noise filtering is improved. In a first embodiment, the transceiver circuit has a clock extractor that extracts a clock from the incoming data signal such that the clock and the data signal are synchronized so that demodulating the data from the data signal is simplified. In a second embodiment, the transceiver circuit has its own clock generator for initiating transmission of signals so that a reader need not have an exciter to generate an excitation signal. Both embodiments of the transceiver circuit have power management features that can decrease power consumption. Vega at 3:49–52 Another object of the present invention is to introduce power conservation techniques into an active electrostatic transceiver so that the read range between the electrostatic reader and electrostatic transceiver may be increased. Vega at 4:26–28 FIG. 6B is a block diagram of an electrostatic reader for supporting automatic detection and activation of an active electrostatic transceiver. Vega at 5:26–68 FIG. 1 illustrates the preferred embodiment of the combined electrostatic communication system 100 which includes an electrostatic reader 101, a passive electrostatic transceiver 102, host computer system 103 and an active electrostatic transceiver 104. Electrostatic reader 101, illustrated in a monopole configuration, includes an electrostatic electrode 105 for transmission of an excitation signal and modulated data signals on a carrier by means of electrostatic energy. The signals are transmitted by the reader to either an electrostatic transceiver, transponder, tag, badge, smart card, or other such RFID transceiver such as passive electrostatic transceiver 102 or active electrostatic transceiver 104. Electrostatic reader 101 includes an electrostatic electrode 106 for receiving data signals on a carrier by

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	means of electrostatic energy. The data signals are communicated by either a passive electrostatic transceiver such as passive electrostatic transceiver 102 or active electrostatic transceiver 104. The passive electrostatic transceiver 102 includes at least two electrostatic electrodes 112 and 113 in order to communicate using electrostatic signals. The electrostatic electrodes 112 and 113 may have differing shapes and be made of different materials. Some of the shapes for the electrostatic electrodes 112 and 113 include flat rectangular plates and bow tie shaped plates. The active electrostatic transceiver 104 includes at least two electrostatic electrodes 114 and 115 in order to receive electrostatic energy and communicate using electrostatic signals. As illustrated in FIG. 1, active electrostatic transceiver 104 includes an additional electrostatic electrode 116 for transmitting electrostatic signals. The electrostatic electrodes may also be referred to as antenna, capacitor plates, contactless electrodes, wireless electrodes or isolation electrodes. These electrostatic electrodes provide for the antenna, contactless, wireless and the somewhat isolated functionality of an electrostatic system which requires no physical contact between the electrostatic electrodes in order to communicate. Passive electrostatic transceiver 102 and active electrostatic transceiver 104 can communicate information to/from the electrostatic reader 101 by means of electrostatic signals and capacitive coupling. Host computer 103 is coupled to the electrostatic reader 101 and may couple to other electrostatic readers, electromagnetic readers or electrostatic readers (not shown in FIG. 1) in order to have other points of communication. To the extent this limitation is not disclosed by Vega, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Vega, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[17a] coupling a smartcard controller and an active transmit driver circuit to a power source of the mobile device;	Vega discloses or renders obvious "coupling a smartcard controller and an active transmit driver circuit to a power source of the mobile device." For example: Vega at Abstract An active electrostatic transceiver is provided that has electrostatic electrodes, an energy storage means such as a battery and a transceiver circuit for communication within an electrostatic RFID communication system. The transceiver circuit includes power management features so that the energy storage means is not quickly depleted. Additionally the transceiver circuit includes amplifiers and filters so that the read range is further increased and noise sources are better filtered out. In a first embodiment, the transceiver circuit has a clock extractor that extracts a clock from the incoming data signal such that the clock and the data signal are synchronized so that demodulating the data from the data signal is simplified. In a second embodiment, the transceiver circuit has its own clock generator for initiating transmission of signals so that a reader need not have an exciter to generate an excitation signal. Each embodiment of the transceiver

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	circuit has power management features so that power is conserved. Additionally, each transceiver circuit has the ability to operate in a passive mode, when there is insufficient charge in the energy storage means or a lower power mode is desirable. Vega at Figure 3  *FIG.3* Vega at Figure 4A

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	 *FIG.4A* Vega at Figure 4B  *FIG.4B*

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	Vega at Figure 7  *FIG. 7* Vega at Figure 8A

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	 FIG.8A Vega at Figure 8B  FIG.8B

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	Vega at 3:28–45 Briefly, an active electrostatic transceiver is provided that has electrostatic electrodes, an energy storage means such as a battery and a transceiver circuit for communication within an electrostatic RFID communication system. The transceiver circuit includes power management features so that the energy storage means is not quickly depleted. Additionally the transceiver circuit includes amplifiers and filters so that the read range is further increased and noise filtering is improved. In a first embodiment, the transceiver circuit has a clock extractor that extracts a clock from the incoming data signal such that the clock and the data signal are synchronized so that demodulating the data from the data signal is simplified. In a second embodiment, the transceiver circuit has its own clock generator for initiating transmission of signals so that a reader need not have an exciter to generate an excitation signal. Both embodiments of the transceiver circuit have power management features that can decrease power consumption. Vega at 4:51–5:7 The present invention includes a method, apparatus and system for providing electrostatic communication utilizing capacitance-based technology with active and passive electrostatic transceivers. Passive electrostatic transceivers derive their power from electrostatic signals being transmitted by an electrostatic reader or other electrostatic signal source. An active electrostatic transceiver has its own internal power source and need not rely on an electrostatic signal source from an electrostatic reader or other source to power up and perform certain functions. Electrostatic communication is accomplished through capacitive coupling which requires no physical contact or wires between a reader and an electrostatic transceiver (a.k.a. electrostatic tag or electrostatic transponder). In the electrostatic communication system, the voltage applied to the capacitively coupled plates is an AC voltage generated by an electric field (i.e. an electrostatic ("ES") field is developed) as opposed to an electromagnetic ("EM") field in order for a charge or signal to be communicated. In short, an electrostatic field is an energy (electrical) field created between two electrodes having a voltage differential. An electrostatic transceiver needs to be in the proximity of the reader, referred to as the read range, in order to have sufficient capacitive coupling to transceive electrostatic signals. Vega at 5:8–25 Briefly, an active electrostatic transceiver is provided that has electrostatic electrodes, an energy storage means, such as a battery, and a transceiver circuit for communication within an electrostatic RFID communication system. The transceiver circuit includes power management features so that the energy storage means is not quickly depleted. Additionally the transceiver circuit includes amplifiers and filters

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	so that the read range is further increased and noise filtering is improved. In a first embodiment, the transceiver circuit has a clock extractor that extracts a clock from the incoming data signal such that the clock and the data signal are synchronized so that demodulating the data from the data signal is simplified. In a second embodiment, the transceiver circuit has its own clock generator for initiating transmission of signals so that a reader need not have an exciter to generate an excitation signal. Both embodiments of the transceiver circuit have power management features that improve power conservation. Vega at 6:1–22 FIG. 1 illustrates the advantage that an active electrostatic transceiver 104 has over a passive electrostatic transceiver 102. The distance between an electrostatic transceiver and an electrostatic reader where communication may start to occur is referred to as the read range. In FIG. 1 the passive read range 125 between passive ES transceiver 102 and ES reader 101 is significantly smaller than the active read range 126 between active ES transceiver 104 and ES reader 101. This is because an energy storage means within the active electrostatic transceiver 104 allows for active transmission of signals using an amplifier. Because of its passive nature, the passive electrostatic transceiver 102 relies on a load modulation technique for communication of signals by reflecting back the energy of the excitation signal to the electrostatic reader 101. The reflection of the excitation signal requires that the passive electrostatic transceiver 102 be nearer the reader 101. The larger read range provided by reflected ES signals using load modulation or transmitted ES signals using an active transmitter allows the active electrostatic transceiver 104 to be used in other applications of RFID communication systems where a passive electrostatic transceiver 102 would not. Vega at 7:14–56 In general, electrostatic reader 101 generates an electrostatic (electrical) field for use both as a power source for the passive electrostatic transceiver 102 and for transferring information between electrostatic reader 101 and passive electrostatic transceiver 102 or active electrostatic transceiver 104. As such, electrostatic reader 101 electrostatically generates and transmits an excitation signal to the surrounding air, gas, atmosphere or non-electrically conductive medium via the reader's electrostatic electrodes, except for the return path in a monopole system. The excitation signal is an AC signal which activates the passive electrostatic transceiver 102 when it is comes within the capacitance coupling range of reader 101. Upon being sufficiently energized, the passive electrostatic transceiver 102 may respond by electrostatically transmitting a read data signal carrying the information stored in its memory to electrostatic reader 101 (as part of a read operation). Active electrostatic transceiver 104 includes an energy storage means such that it

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	may not require the excitation signal to become sufficiently energized. In accordance to the present invention, reader 101 may also electrostatically couple a write signal to communicate and write information to the passive electrostatic transceiver 102 or active ES transceiver(as part of a write operation). Alternatively, such programming or charging can be carried out by a separate ES programming, ES encoding or electrostatic charger unit (not illustrated). It is to be appreciated that the excitation signal must be generated and transmitted by electrostatic reader 101 to excite the passive electrostatic transceiver 102 or charge the active electrostatic transceiver 104. The excitation signal is an AC energy source and can be a continuous waveform or a varying waveform (i.e. amplitude, frequency, time, etc. of the waveform may vary). Alternatively a user could manually cause the electrostatic reader 101 or a charger to generate the excitation signal to charge or communicate with the passive electrostatic transceiver 102 or active electrostatic transceiver 104 by selecting a button or switch. The reader 101 usually has available a larger power source than the passive electrostatic transceiver 102 or active electrostatic transceiver 104. Thus, the reader 101 has very sensitive receiving and high energy transmission when compared with the passive electrostatic transceiver 102 or active electrostatic transceiver 104. Vega at 8:46–62 When in proximity of a reader 101, the active electrostatic transceiver 104 first detects the excitation signal being emitted by an electrostatic reader 101. The excitation signal is generated by reader 101 at a carrier frequency, commonly referred to as a power carrier frequency or exciter frequency. The power carrier frequency, which may be modulated with data, is preferably 125 k Hz. After detecting the excitation signal, the first embodiment of the active electrostatic transceiver 104 goes through a power management sequence and powers up in order to derive a square wave based on the excitation signal at the carrier frequency which is used as a clock signal for the active transceiver. In this manner of generating a clock signal, information received by the active electrostatic transceiver 104 is synchronized with the clock signal. This alleviates generating a clock with a clock oscillator and synchronizing the data and clock using phase-locked loop techniques. Vega at 9:30–60 Now referring to FIG. 4A, a detailed block diagram of components of the analog interface module 301 within the active transceiver 104 is illustrated including digital timing elements. The active electrostatic transceiver 104 includes the first electrostatic electrode 114, the second electrostatic electrode 115, the third electrostatic electrode 116, the transceiver circuit 300, and an energy storage means 360. The energy storage means 360 can be any type of energy storage means, including an electrochemical storage cell,

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	such as a rechargeable battery or a non-rechargeable battery, or a capacitor, but is preferably a thin foil battery to conform to a form factor of a smart card, tag, or badge. The transceiver circuit 300A as illustrated in FIG. 4A shows the relevant components in the first embodiment of the present invention. In FIG. 4A, the transceiver circuit 300A is illustrated as including the analog interface module 301 and the modulator 309. In FIG. 4A, the relevant components of the analog interface module 301 include a power manager 412A, a DC voltage rectifier/regulator 418, a clock extractor 430, and a demodulator 432. The power manager 412A includes a detector/receiver 420, a power switch 422, a sleep timer 424, and a power-on-resetor (POR) 426. The DC voltage rectifier/regulator 418 includes a rectifier, a voltage regulator and voltage control functionality such that a DC voltage and energy source may be generated from the excitation signal or other signals received by the active electrostatic transceiver 104 and selectively used to power the transceiver 104 or charge the energy storage means 360. The DC voltage rectifier/regulator 418 couples to the power switch 422 for selection and to the energy storage means 360 for charging. Vega at 9:61–10:33 The detector/receiver 420 in the active electrostatic transceiver 104 may receive power directly from the energy storage means 360 in order to be actively listening for an excitation signal from an electrostatic reader 101. Alternatively, the detector/receiver 420 may have passive components sufficient to detect and receive signals when the energy storage means has insufficient energy to power active components. The detector/receiver 420 may have an amplifier for receiving and amplifying the incoming electrostatic signals, a bandpass filter for filtering unwanted frequencies outside a range of the carrier frequency, and a detector for detecting the presence of the carrier frequency in an excitation signal indicating that the transceiver is within the read range of an electrostatic reader 101. The detector may detect a number of oscillations in the received waveform at the carrier frequency indicating that it is not a noise source generating the waveform. In the preferred embodiment, if the detector detects any signal in the band of the carrier it provides an indication signal. Upon detection of the excitation signal, the detector/receiver 420 generates a wakeup signal on signal line 427 indicating that the active electrostatic transceiver 104 is within range of an electrostatic field and that the active electrostatic transceiver 104 needs to go through its wake up procedure. When outside the range of an electrostatic field, the signal line 427 indicates a go to-sleep signal so that the transceiver may go into a low power sleep state. The wakeup signal 427 is provided to the power on resetor 426, the sleep timer 424, the power switch 422 and clock extractor 430. Upon receiving the wakeup signal 427, power on resetor 426 monitors the device power line 460 to be sure that sufficient power is available to other components within the active electrostatic transceiver 104 before de-asserting a reset signal 425. Once sufficient power is generated in the device power line 460,

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	reset signal 425 is de-asserted and other components may start functioning within the active electrostatic transceiver 104. In FIG. 4A the reset signal line 425 is coupled to the sleep timer 424, the clock extractor 430, the demodulator 432, the modulator 309 and other components of the active electrostatic transceiver 104. Vega at 10:34–52 The sleep timer 424 of the active electrostatic transceiver of FIG. 4A is a digital counter that counts to a predetermined count value using the clock signal on clock line 325 received from the clock extractor 430. Upon reaching the predetermined count value, the sleep timer 424 turns off active components within the modulator 309. While the sleep timer 424 is counting a transmit signal is indicated on signal line 423. When the sleep timer 424 reaches the predetermined count value, signal line 423 indicates a receive signal and the active electrostatic transceiver powers off the active components within the modulator 309. While in this mode, the transceiver may still use passive components and the load modulators within the modulator 309 to communicate with a reader. Further, while in this mode, the transceiver may receive and respond to encoded write data transmitted by the reader. The predetermined count value is determined based on the time, in number of clock cycles, that it takes for the active electrostatic transceiver to complete a transmission cycle with an electrostatic reader 101. Vega at 10:53–11:6 Referring to FIG. 4B, the power manager 412B includes the detector/receiver 420, the power switch 422, an analog delay block 464, and the power-on-resetor (POR) 426. The digital sleep timer 424 of FIG. 4A is replaced with the analog delay block 464 within the power manager block 412B while other blocks function similar to the description of FIG. 4A. Analog delay block 464 provides an analog delay by using resistor and capacitor elements in conjunction with a threshold detector or comparator. The analog delay block is preferably designed to provide a lengthy delay such as a couple of seconds. The circuitry of the analog delay block is simpler than that of the sleep timer 424. Upon detection of a received signal, the wakeup signal on signal line 427 causes the analog delay block to initiate the RC delay. The transmit signal on signal line 423 is coupled to the power switch 422 and causes it to select power, if available, from the energy storage means 360 for the active transmitter of the modulator 309. Upon completion of the RC delay, a receive signal is indicated on signal line 423 causing the power switch 422 to disconnect power from the active transmitter of the modulator 309. Vega at 11:7–12:16 Power switch 422 is coupled to the detector/receiver 420 through the signal line 427 and to the sleep timer 424 or the analog delay block 464 through the signal line 423. The power switch 422 controls the

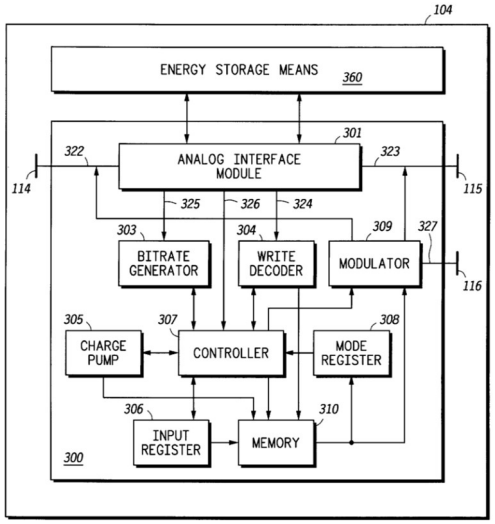
Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	switching of the high level power supply voltage 451 from the energy storage means 360 or the rectified voltage 461 and provides the analog interface module 301 with the means to manage power consumption. These energy sources may be coupled to the device power line 460 feeding power to other components of the active electrostatic transceiver 104. FIG. 4C illustrates the basic components of the power switch 422 that provide power selection for the active electrostatic transceiver 104. These components include the power analyzer 465, the multiplexor 466 and the multiplexor 469. Multiplexor 469 may optionally be a switch with one end connected to the amplifier power line 462 and another end connected to the device power line 460. Power analyzer 465 performs an analysis on the energy provided by the DC voltage rectifier/regulator 418 with that supplied by the energy storage means 360. The power analyzer 465 receives the rectified voltage 461, the high level supply voltage 451 and the low level supply voltage 450 in order to perform the analysis. Additionally, control signals 423, 427 and any other control signals are received by the power analyzer 465 to further control the multiplexor 466 and multiplexor 469. Signal lines 423 and 427 are exemplary control signals input into the power analyzer 465. Typically, if the energy storage means 360 has higher energy levels it is selectively coupled to the device power line 460 and the amplifier power line 462 when signal line 427 indicates a transmit signal. Optionally when the transceiver 104 is in an active mode for active transmission by amplifier 477 and when signal line 427 indicates a receive signal, the energy storage means may be selectively decoupled from the amplifier power line 462, have the rectified voltage 461 coupled to the amplifier power line 462 or alternatively have no power source coupled to the amplifier power line 462 powering OFF the circuitry of amplifier 477 in each case conserving power in the energy storage means. If it is the case that the energy storage means 360 has lower energy levels than that of the rectified voltage 461, the rectified voltage may be selectively coupled to the device power line 460 by multiplexor 466 and to the amplifier power line 462 by multiplexor 469 such that the load modulator 473 and the amplifier 477 can perform passive load modulation and passive transmission of electrostatic signals in a passive mode. Additionally if it is desirable to conserve power or more efficiently charge the energy storage means, multiplexor 466 or 469 can operate as switches decoupling the device power line 460 or the amplifier power line 462 from any power source. After selecting a power source where the power switch 422 couples the high level power supply 451 or the rectified voltage 461 with the device power line 460, circuitry within the active electrostatic transceiver goes into a power on reset sequence controlled by the power on resetor 426. When out of the power on reset sequence, the active electrostatic transceiver 104 can go through a communication cycle with the electrostatic reader 101 while in the read range and the sleep timer 424 starts counting or the analog delay cycle of the analog delay block 464 begins. If the active electrostatic transceiver remains in the electrostatic field (i.e. read range) and the sleep timer 424 reaches its predetermined count value or the analog delay block completes the predetermined RC delay time, a

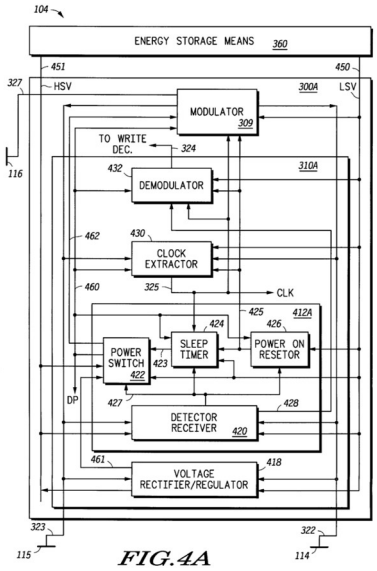
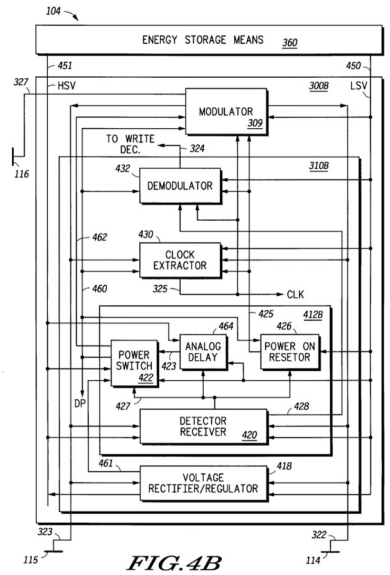
Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	receive signal is indicated on signal line 423 to the power switch 422. The active electrostatic transceiver 104 continues to listen for signals from reader 101 or other sources that communicate on the carrier frequency. If the active electrostatic transceiver 104 is removed from the electrostatic field, the detector/receiver 420 resets and a sleep signal is indicated on signal line 427. Upon receiving the sleep signal, the power switch 422 selectively disconnects the high level voltage supply 451 from the device power line 460 so that components coupled to the device power line 460 become powered off and enter the sleep mode. In this manner when the active electrostatic transceiver 104 is outside the electrostatic field (i.e. read range) it goes into its low power sleep mode. Vega at 12:60–13:6 Modulator 309 is coupled to the power switch 422 through the device power line 460, the energy storage means 360 through the low level power supply 450, the electrostatic electrodes 114-116 respectively through signal lines 322, 323 and 327, power on resetor 426 through signal line 425, and the clock extractor 430 through clock signal line 325. Modulator 309 includes a load modulator for electrostatic electrodes 114-115 and an active power amplifier in order to amplify signals for the extra transmission distance to the reader over the electrostatic electrode 116. A passive electrostatic transceiver may not function properly at large read ranges because of weak signals. The electrostatic reader's receiver may require increased sensitivity in order to receive signals from large read ranges. Vega at 13:7–14:10 Referring now to FIG. 4D, a block diagram is illustrated of the components within the modulator 309 for active and passive load modulation and active transmission. Active and passive load modulation are accomplished by the modulator controller and the load modulator. Active load modulation occurs when the energy storage means 360 is coupled to the device power line 460 and the circuitry of the modulator controller 471. Passive load modulation occurs when the DC voltage rectifier/regulator within the transceiver 104 provides the rectified voltage and is coupled through the power switch to the device power line 460 and the modulator controller 471. Load modulation is accomplished by varying the impedance between the electrostatic electrodes 114 and 115. Varying the impedance between the electrostatic electrodes, that are capacitively coupled with the electrostatic electrodes of the reader 101, causes the excitation signal generated by the reader 101 to be reflected back. A data signal and a carrier signal is input into the modulator controller 471 at line 474 and 476 respectively to control the load modulator 473. The carrier signal 476 is commonly referred to as the data carrier and has a carrier frequency. Preferably the carrier frequency of the data carrier is 62.5 K Hz or one-half the power carrier frequency. FIG. 4E illustrates a few load modulators 473A-473D. Load modulator 473A consists of a

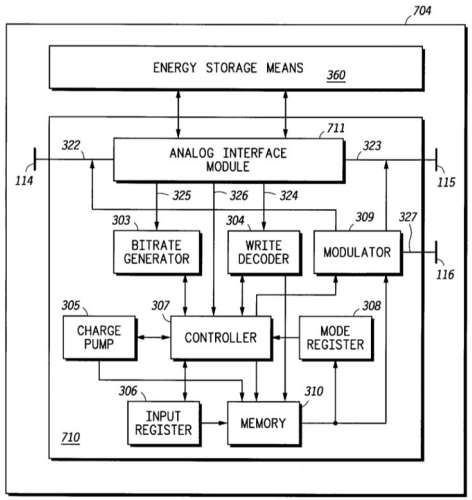
Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	variable impedance 480 coupled between the electrostatic electrodes 114 and 115 that has its impedance varied or switched by control signal 472 from the modulator controller 471. Load modulator 473B includes transistors 481 and 482, each coupled respectively between an electrostatic electrode and the low level supply voltage 450. The transistors are preferably turned ON and OFF by having their gates switched by a digital drive signal supplied on control signal 472. Load modulator 473C includes transistor 483 coupled between the electrostatic electrodes 114 and 115. Transistor 483 is preferably turned ON and OFF by having its gate switched by a digital drive signal supplied on control signal 472. Load modulator 473D includes transistor 484 coupled between one electrostatic electrode 322 and the low level supply voltage 450. This is an asymmetrical load modulation technique where circuitry within a rectifier provides the return path through the opposite electrostatic electrode 323. Referring back to FIG. 4D, active and passive transmission is accomplished by the modulator controller 471 and amplifier 477. Amplifier 477 is preferably a CMOS fully complementary inverter or buffer with its VDD input connected to the amplifier power line 462 and its VSS connection coupled to the low level power supply 450. Active transmission occurs when power is coupled from the high level power supply 451 through the power switch and onto the amplifier power line 462 by multiplexor 469. Passive transmission occurs when the DC voltage rectifier/regulator 418 within the transceiver 104 provides the rectified voltage and is coupled through the power switch to the amplifier power line 462 by multiplexor 469. Multiplexor 469 and 466 can further operate as a switch to selectively turn power OFF to circuitry connected to the device power line 460 or the amplifier power line 462 by turning OFF both of the transistor switches 467-468 or 470 and 475. Data 474 input into the modulator controller 471 is modulated with the input carrier signal 476 to generate the data signal on line 478. Signal line 478 is separate from signal line 472 such that the load modulator 473 and the amplifier 477 can be enabled or disabled independent from one another. Disabling the load modulator 473 or the amplifier 477 may be performed by setting the signal on line 472 or 478 respectively to a high or low DC logic level. The signal on signal line 478 is input into the amplifier 477. The amplifier 477 amplifies the signal on line 478 and transmits the information electrostatically over the electrostatic electrode 116. In active mode, after the transmit time has occurred, the power to the amplifier 477 may be turned OFF to conserve power. Vega at 15:20–37 The analog interface module 711 generally performs the power management function for the active electrostatic transceiver 704. Additionally, it generates its own clock from a free running low power clock oscillator. This generated clock is provided to other components of the active electrostatic transceiver 704 which require a clock including the bitrate generator 303. The analog interface module 711 also demodulates the received signal to generate a received data stream. The analog interface module 711 also

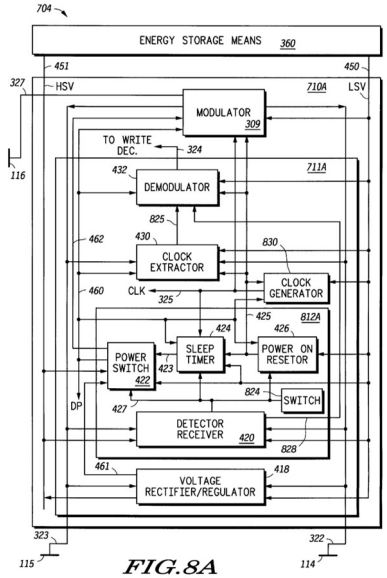
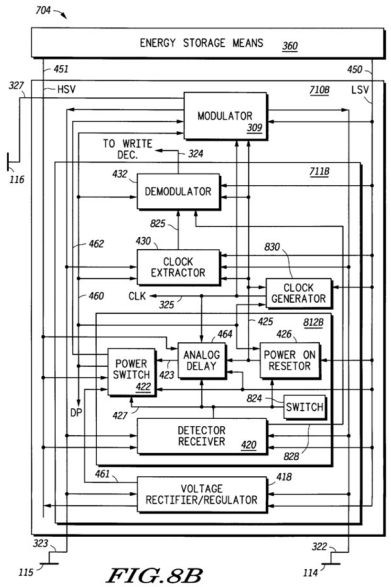
Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	analyzes the received data stream in order to determine if the active electrostatic transceiver 704 should perform some operation such as a read operation or a write operation and communicates the results of the analysis to the controller 307 and the write decoder 304. It preferably performs this analysis by searching for predetermined gaps in the received data stream. Modulator 309 as previously described in detail communicates information from the active electrostatic transceiver to a reader. Vega at 15:38–61 Now referring to FIG. 8A, selected details of the analog interface module 711 within the active electrostatic transceiver 704 are illustrated. The active electrostatic transceiver 704 includes the first electrostatic electrode 114, the second electrostatic electrode 115, the third electrostatic electrode 116, the transceiver circuit 710, and an energy storage means 360. The energy storage means 360 can be any type of energy storage means, including a battery or capacitor, preferably it is a thin foil battery to conform to a form factor for a smart card, tag, or badge. The transceiver circuit 710 as illustrated in FIG. 8A shows the relevant components for the second embodiment of the present invention. In FIG. 8A, the transceiver circuit 710 includes the analog interface module 711 and modulator 309. Components of the analog interface module 711 include a DC voltage rectifier/regulator 418, a power manager 812A, a clock extractor 430, a clock generator 830, a demodulator 432, and a modulator 309. The power manager 812A includes a detector/receiver 420, a power switch 422, a sleep timer 424, a power-on-resetor (POR) 426, and a manual switch 824. Except as otherwise described below, like numbered components of the transceiver circuit 710 operate similar to the similarly numbered components of the transceiver circuit 300 of the active electrostatic transceiver 104. Vega at 15:62–16:8 In the second embodiment of the present invention the active electrostatic transceiver 704 may not receive an excitation signal from which to extract a clock signal, particularly when coupled to the reader 601 of FIG. 6A. Thus, the transceiver circuit 710 includes its own clock generator 830. A clock extractor 430 is retained to generate an extracted clock 825 for demodulation of signals that may be received from readers other than reader 601. Clock generator 830 receives power by coupling to the device power line 460 and the low level power supply 450. Clock generator 830 has its own low power clock oscillator in order to generate a clock. The clock signal on clock line 325 is provided to the sleep timer 424 amongst other components of the transceiver circuit 710. Vega at 16:36–48 Power on resetor 426 monitors the device power line 460 to be sure that sufficient power is available to other components within the active electrostatic transceiver 704 before de-asserting a reset signal 425.

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	Once sufficient power is generated in the device power line 460, reset signal 425 is de-asserted and other components may start functioning within the active electrostatic transceiver 704. In FIG. 8A the reset signal line 425 is coupled to the sleep timer 424, the demodulator 432, the modulator 309 and other components of the active electrostatic transceiver 704. In FIG. 8B, the reset signal line 425 is coupled to the analog delay block 464, the demodulator 432, the modulator 309 and other components of the active electrostatic transceiver 704. Vega at 16:53–17:8 The present invention has many advantages over the prior art. The present invention provides a larger read range over passive RFID communication systems and therefore increases the applicability of electrostatic communication systems. Additionally, the present invention provides for greater flexibility in choosing components for an electrostatic transceiver. Also, the present invention provides greater operational functionality in an electrostatic transceiver because the available power is greater. Furthermore, the present invention provides for greater integration in circuitry and reduces the amount space utilized for an active electrostatic transceiver. Additionally the present invention in its second embodiment reduces the interference and noise in an electrostatic communication system so that it may be used in environments requiring low noise emission. The present invention provides for lower cost RFID transceivers such that disposable applications are possible. Furthermore, the present invention provides the capability to operate an active electrostatic transceiver in an active mode operating under the power of an energy storage means or in a passive mode under the power generated by a voltage rectifier/regulator when the energy storage means power is too low or if in the case of a desirable low-power operational mode. To the extent this limitation is not disclosed by Vega, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Vega, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[17b] providing power to the smartcard controller and the active transmit driver circuit from the power source of the mobile device;	Vega discloses or renders obvious "providing power to the smartcard controller and the active transmit driver circuit from the power source of the mobile device." For example: *See* [17a] above. Vega at Abstract An active electrostatic transceiver is provided that has electrostatic electrodes, an energy storage means such as a battery and a transceiver circuit for communication within an electrostatic RFID communication system. The transceiver circuit includes power management features so that the energy storage means is not quickly depleted. Additionally the transceiver circuit includes amplifiers and filters so that the read

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	range is further increased and noise sources are better filtered out. In a first embodiment, the transceiver circuit has a clock extractor that extracts a clock from the incoming data signal such that the clock and the data signal are synchronized so that demodulating the data from the data signal is simplified. In a second embodiment, the transceiver circuit has its own clock generator for initiating transmission of signals so that a reader need not have an exciter to generate an excitation signal. Each embodiment of the transceiver circuit has power management features so that power is conserved. Additionally, each transceiver circuit has the ability to operate in a passive mode, when there is insufficient charge in the energy storage means or a lower power mode is desirable. Vega at Figure 3  FIG.3 Vega at Figure 4A

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	 *FIG.4A* Vega at Figure 4B  *FIG.4B*

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	Vega at Figure 7  *FIG. 7* Vega at Figure 8A

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	 FIG.8A Vega at Figure 8B  FIG.8B

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	Vega at 3:28–45 Briefly, an active electrostatic transceiver is provided that has electrostatic electrodes, an energy storage means such as a battery and a transceiver circuit for communication within an electrostatic RFID communication system. The transceiver circuit includes power management features so that the energy storage means is not quickly depleted. Additionally the transceiver circuit includes amplifiers and filters so that the read range is further increased and noise filtering is improved. In a first embodiment, the transceiver circuit has a clock extractor that extracts a clock from the incoming data signal such that the clock and the data signal are synchronized so that demodulating the data from the data signal is simplified. In a second embodiment, the transceiver circuit has its own clock generator for initiating transmission of signals so that a reader need not have an exciter to generate an excitation signal. Both embodiments of the transceiver circuit have power management features that can decrease power consumption. Vega at 4:51–5:7 The present invention includes a method, apparatus and system for providing electrostatic communication utilizing capacitance-based technology with active and passive electrostatic transceivers. Passive electrostatic transceivers derive their power from electrostatic signals being transmitted by an electrostatic reader or other electrostatic signal source. An active electrostatic transceiver has its own internal power source and need not rely on an electrostatic signal source from an electrostatic reader or other source to power up and perform certain functions. Electrostatic communication is accomplished through capacitive coupling which requires no physical contact or wires between a reader and an electrostatic transceiver (a.k.a. electrostatic tag or electrostatic transponder). In the electrostatic communication system, the voltage applied to the capacitively coupled plates is an AC voltage generated by an electric field (i.e. an electrostatic ("ES") field is developed) as opposed to an electromagnetic ("EM") field in order for a charge or signal to be communicated. In short, an electrostatic field is an energy (electrical) field created between two electrodes having a voltage differential. An electrostatic transceiver needs to be in the proximity of the reader, referred to as the read range, in order to have sufficient capacitive coupling to transceive electrostatic signals. Vega at 5:8–25 Briefly, an active electrostatic transceiver is provided that has electrostatic electrodes, an energy storage means, such as a battery, and a transceiver circuit for communication within an electrostatic RFID communication system. The transceiver circuit includes power management features so that the energy storage means is not quickly depleted. Additionally the transceiver circuit includes amplifiers and filters

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	so that the read range is further increased and noise filtering is improved. In a first embodiment, the transceiver circuit has a clock extractor that extracts a clock from the incoming data signal such that the clock and the data signal are synchronized so that demodulating the data from the data signal is simplified. In a second embodiment, the transceiver circuit has its own clock generator for initiating transmission of signals so that a reader need not have an exciter to generate an excitation signal. Both embodiments of the transceiver circuit have power management features that improve power conservation. Vega at 6:1–22 FIG. 1 illustrates the advantage that an active electrostatic transceiver 104 has over a passive electrostatic transceiver 102. The distance between an electrostatic transceiver and an electrostatic reader where communication may start to occur is referred to as the read range. In FIG. 1 the passive read range 125 between passive ES transceiver 102 and ES reader 101 is significantly smaller than the active read range 126 between active ES transceiver 104 and ES reader 101. This is because an energy storage means within the active electrostatic transceiver 104 allows for active transmission of signals using an amplifier. Because of its passive nature, the passive electrostatic transceiver 102 relies on a load modulation technique for communication of signals by reflecting back the energy of the excitation signal to the electrostatic reader 101. The reflection of the excitation signal requires that the passive electrostatic transceiver 102 be nearer the reader 101. The larger read range provided by reflected ES signals using load modulation or transmitted ES signals using an active transmitter allows the active electrostatic transceiver 104 to be used in other applications of RFID communication systems where a passive electrostatic transceiver 102 would not. Vega at 7:14–56 In general, electrostatic reader 101 generates an electrostatic (electrical) field for use both as a power source for the passive electrostatic transceiver 102 and for transferring information between electrostatic reader 101 and passive electrostatic transceiver 102 or active electrostatic transceiver 104. As such, electrostatic reader 101 electrostatically generates and transmits an excitation signal to the surrounding air, gas, atmosphere or non-electrically conductive medium via the reader's electrostatic electrodes, except for the return path in a monopole system. The excitation signal is an AC signal which activates the passive electrostatic transceiver 102 when it is comes within the capacitance coupling range of reader 101. Upon being sufficiently energized, the passive electrostatic transceiver 102 may respond by electrostatically transmitting a read data signal carrying the information stored in its memory to electrostatic reader 101 (as part of a read operation). Active electrostatic transceiver 104 includes an energy storage means such that it

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	may not require the excitation signal to become sufficiently energized. In accordance to the present invention, reader 101 may also electrostatically couple a write signal to communicate and write information to the passive electrostatic transceiver 102 or active ES transceiver(as part of a write operation). Alternatively, such programming or charging can be carried out by a separate ES programming, ES encoding or electrostatic charger unit (not illustrated). It is to be appreciated that the excitation signal must be generated and transmitted by electrostatic reader 101 to excite the passive electrostatic transceiver 102 or charge the active electrostatic transceiver 104. The excitation signal is an AC energy source and can be a continuous waveform or a varying waveform (i.e. amplitude, frequency, time, etc. of the waveform may vary). Alternatively a user could manually cause the electrostatic reader 101 or a charger to generate the excitation signal to charge or communicate with the passive electrostatic transceiver 102 or active electrostatic transceiver 104 by selecting a button or switch. The reader 101 usually has available a larger power source than the passive electrostatic transceiver 102 or active electrostatic transceiver 104. Thus, the reader 101 has very sensitive receiving and high energy transmission when compared with the passive electrostatic transceiver 102 or active electrostatic transceiver 104. Vega at 8:46–62 When in proximity of a reader 101, the active electrostatic transceiver 104 first detects the excitation signal being emitted by an electrostatic reader 101. The excitation signal is generated by reader 101 at a carrier frequency, commonly referred to as a power carrier frequency or exciter frequency. The power carrier frequency, which may be modulated with data, is preferably 125 k Hz. After detecting the excitation signal, the first embodiment of the active electrostatic transceiver 104 goes through a power management sequence and powers up in order to derive a square wave based on the excitation signal at the carrier frequency which is used as a clock signal for the active transceiver. In this manner of generating a clock signal, information received by the active electrostatic transceiver 104 is synchronized with the clock signal. This alleviates generating a clock with a clock oscillator and synchronizing the data and clock using phase-locked loop techniques. Vega at 9:30–60 Now referring to FIG. 4A, a detailed block diagram of components of the analog interface module 301 within the active transceiver 104 is illustrated including digital timing elements. The active electrostatic transceiver 104 includes the first electrostatic electrode 114, the second electrostatic electrode 115, the third electrostatic electrode 116, the transceiver circuit 300, and an energy storage means 360. The energy storage means 360 can be any type of energy storage means, including an electrochemical storage cell,

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	such as a rechargeable battery or a non-rechargeable battery, or a capacitor, but is preferably a thin foil battery to conform to a form factor of a smart card, tag, or badge. The transceiver circuit 300A as illustrated in FIG. 4A shows the relevant components in the first embodiment of the present invention. In FIG. 4A, the transceiver circuit 300A is illustrated as including the analog interface module 301 and the modulator 309. In FIG. 4A, the relevant components of the analog interface module 301 include a power manager 412A, a DC voltage rectifier/regulator 418, a clock extractor 430, and a demodulator 432. The power manager 412A includes a detector/receiver 420, a power switch 422, a sleep timer 424, and a power-on-resetor (POR) 426. The DC voltage rectifier/regulator 418 includes a rectifier, a voltage regulator and voltage control functionality such that a DC voltage and energy source may be generated from the excitation signal or other signals received by the active electrostatic transceiver 104 and selectively used to power the transceiver 104 or charge the energy storage means 360. The DC voltage rectifier/regulator 418 couples to the power switch 422 for selection and to the energy storage means 360 for charging. Vega at 9:61–10:33 The detector/receiver 420 in the active electrostatic transceiver 104 may receive power directly from the energy storage means 360 in order to be actively listening for an excitation signal from an electrostatic reader 101. Alternatively, the detector/receiver 420 may have passive components sufficient to detect and receive signals when the energy storage means has insufficient energy to power active components. The detector/receiver 420 may have an amplifier for receiving and amplifying the incoming electrostatic signals, a bandpass filter for filtering unwanted frequencies outside a range of the carrier frequency, and a detector for detecting the presence of the carrier frequency in an excitation signal indicating that the transceiver is within the read range of an electrostatic reader 101. The detector may detect a number of oscillations in the received waveform at the carrier frequency indicating that it is not a noise source generating the waveform. In the preferred embodiment, if the detector detects any signal in the band of the carrier it provides an indication signal. Upon detection of the excitation signal, the detector/receiver 420 generates a wakeup signal on signal line 427 indicating that the active electrostatic transceiver 104 is within range of an electrostatic field and that the active electrostatic transceiver 104 needs to go through its wake up procedure. When outside the range of an electrostatic field, the signal line 427 indicates a go to-sleep signal so that the transceiver may go into a low power sleep state. The wakeup signal 427 is provided to the power on resetor 426, the sleep timer 424, the power switch 422 and clock extractor 430. Upon receiving the wakeup signal 427, power on resetor 426 monitors the device power line 460 to be sure that sufficient power is available to other components within the active electrostatic transceiver 104 before de-asserting a reset signal 425. Once sufficient power is generated in the device power line 460,

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	reset signal 425 is de-asserted and other components may start functioning within the active electrostatic transceiver 104. In FIG. 4A the reset signal line 425 is coupled to the sleep timer 424, the clock extractor 430, the demodulator 432, the modulator 309 and other components of the active electrostatic transceiver 104. Vega at 10:34–52 The sleep timer 424 of the active electrostatic transceiver of FIG. 4A is a digital counter that counts to a predetermined count value using the clock signal on clock line 325 received from the clock extractor 430. Upon reaching the predetermined count value, the sleep timer 424 turns off active components within the modulator 309. While the sleep timer 424 is counting a transmit signal is indicated on signal line 423. When the sleep timer 424 reaches the predetermined count value, signal line 423 indicates a receive signal and the active electrostatic transceiver powers off the active components within the modulator 309. While in this mode, the transceiver may still use passive components and the load modulators within the modulator 309 to communicate with a reader. Further, while in this mode, the transceiver may receive and respond to encoded write data transmitted by the reader. The predetermined count value is determined based on the time, in number of clock cycles, that it takes for the active electrostatic transceiver to complete a transmission cycle with an electrostatic reader 101. Vega at 10:53–11:6 Referring to FIG. 4B, the power manager 412B includes the detector/receiver 420, the power switch 422, an analog delay block 464, and the power-on-resetor (POR) 426. The digital sleep timer 424 of FIG. 4A is replaced with the analog delay block 464 within the power manager block 412B while other blocks function similar to the description of FIG. 4A. Analog delay block 464 provides an analog delay by using resistor and capacitor elements in conjunction with a threshold detector or comparator. The analog delay block is preferably designed to provide a lengthy delay such as a couple of seconds. The circuitry of the analog delay block is simpler than that of the sleep timer 424. Upon detection of a received signal, the wakeup signal on signal line 427 causes the analog delay block to initiate the RC delay. The transmit signal on signal line 423 is coupled to the power switch 422 and causes it to select power, if available, from the energy storage means 360 for the active transmitter of the modulator 309. Upon completion of the RC delay, a receive signal is indicated on signal line 423 causing the power switch 422 to disconnect power from the active transmitter of the modulator 309. Vega at 11:7–12:16 Power switch 422 is coupled to the detector/receiver 420 through the signal line 427 and to the sleep timer 424 or the analog delay block 464 through the signal line 423. The power switch 422 controls the

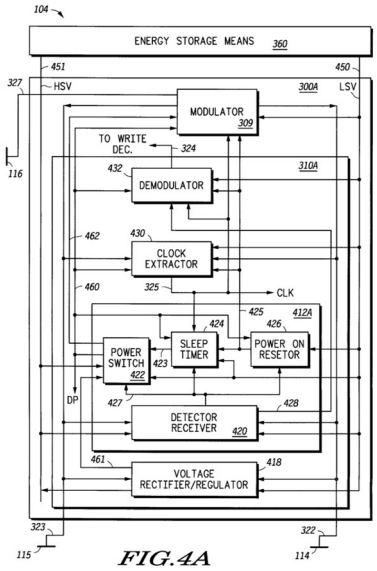
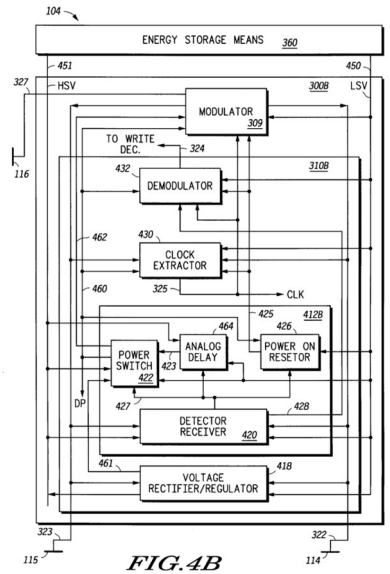
Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	switching of the high level power supply voltage 451 from the energy storage means 360 or the rectified voltage 461 and provides the analog interface module 301 with the means to manage power consumption. These energy sources may be coupled to the device power line 460 feeding power to other components of the active electrostatic transceiver 104. FIG. 4C illustrates the basic components of the power switch 422 that provide power selection for the active electrostatic transceiver 104. These components include the power analyzer 465, the multiplexor 466 and the multiplexor 469. Multiplexor 469 may optionally be a switch with one end connected to the amplifier power line 462 and another end connected to the device power line 460. Power analyzer 465 performs an analysis on the energy provided by the DC voltage rectifier/regulator 418 with that supplied by the energy storage means 360. The power analyzer 465 receives the rectified voltage 461, the high level supply voltage 451 and the low level supply voltage 450 in order to perform the analysis. Additionally, control signals 423, 427 and any other control signals are received by the power analyzer 465 to further control the multiplexor 466 and multiplexor 469. Signal lines 423 and 427 are exemplary control signals input into the power analyzer 465. Typically, if the energy storage means 360 has higher energy levels it is selectively coupled to the device power line 460 and the amplifier power line 462 when signal line 427 indicates a transmit signal. Optionally when the transceiver 104 is in an active mode for active transmission by amplifier 477 and when signal line 427 indicates a receive signal, the energy storage means may be selectively decoupled from the amplifier power line 462, have the rectified voltage 461 coupled to the amplifier power line 462 or alternatively have no power source coupled to the amplifier power line 462 powering OFF the circuitry of amplifier 477 in each case conserving power in the energy storage means. If it is the case that the energy storage means 360 has lower energy levels than that of the rectified voltage 461, the rectified voltage may be selectively coupled to the device power line 460 by multiplexor 466 and to the amplifier power line 462 by multiplexor 469 such that the load modulator 473 and the amplifier 477 can perform passive load modulation and passive transmission of electrostatic signals in a passive mode. Additionally if it is desirable to conserve power or more efficiently charge the energy storage means, multiplexor 466 or 469 can operate as switches decoupling the device power line 460 or the amplifier power line 462 from any power source. After selecting a power source where the power switch 422 couples the high level power supply 451 or the rectified voltage 461 with the device power line 460, circuitry within the active electrostatic transceiver goes into a power on reset sequence controlled by the power on resetor 426. When out of the power on reset sequence, the active electrostatic transceiver 104 can go through a communication cycle with the electrostatic reader 101 while in the read range and the sleep timer 424 starts counting or the analog delay cycle of the analog delay block 464 begins. If the active electrostatic transceiver remains in the electrostatic field (i.e. read range) and the sleep timer 424 reaches its predetermined count value or the analog delay block completes the predetermined RC delay time, a

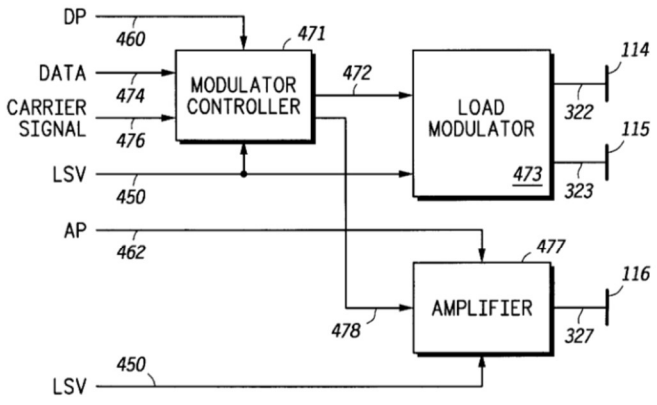
Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	receive signal is indicated on signal line 423 to the power switch 422. The active electrostatic transceiver 104 continues to listen for signals from reader 101 or other sources that communicate on the carrier frequency. If the active electrostatic transceiver 104 is removed from the electrostatic field, the detector/receiver 420 resets and a sleep signal is indicated on signal line 427. Upon receiving the sleep signal, the power switch 422 selectively disconnects the high level voltage supply 451 from the device power line 460 so that components coupled to the device power line 460 become powered off and enter the sleep mode. In this manner when the active electrostatic transceiver 104 is outside the electrostatic field (i.e. read range) it goes into its low power sleep mode. Vega at 12:60–13:6 Modulator 309 is coupled to the power switch 422 through the device power line 460, the energy storage means 360 through the low level power supply 450, the electrostatic electrodes 114-116 respectively through signal lines 322, 323 and 327, power on resetor 426 through signal line 425, and the clock extractor 430 through clock signal line 325. Modulator 309 includes a load modulator for electrostatic electrodes 114-115 and an active power amplifier in order to amplify signals for the extra transmission distance to the reader over the electrostatic electrode 116. A passive electrostatic transceiver may not function properly at large read ranges because of weak signals. The electrostatic reader's receiver may require increased sensitivity in order to receive signals from large read ranges. Vega at 13:7–14:10 Referring now to FIG. 4D, a block diagram is illustrated of the components within the modulator 309 for active and passive load modulation and active transmission. Active and passive load modulation are accomplished by the modulator controller and the load modulator. Active load modulation occurs when the energy storage means 360 is coupled to the device power line 460 and the circuitry of the modulator controller 471. Passive load modulation occurs when the DC voltage rectifier/regulator within the transceiver 104 provides the rectified voltage and is coupled through the power switch to the device power line 460 and the modulator controller 471. Load modulation is accomplished by varying the impedance between the electrostatic electrodes 114 and 115. Varying the impedance between the electrostatic electrodes, that are capacitively coupled with the electrostatic electrodes of the reader 101, causes the excitation signal generated by the reader 101 to be reflected back. A data signal and a carrier signal is input into the modulator controller 471 at line 474 and 476 respectively to control the load modulator 473. The carrier signal 476 is commonly referred to as the data carrier and has a carrier frequency. Preferably the carrier frequency of the data carrier is 62.5 K Hz or one-half the power carrier frequency. FIG. 4E illustrates a few load modulators 473A-473D. Load modulator 473A consists of a

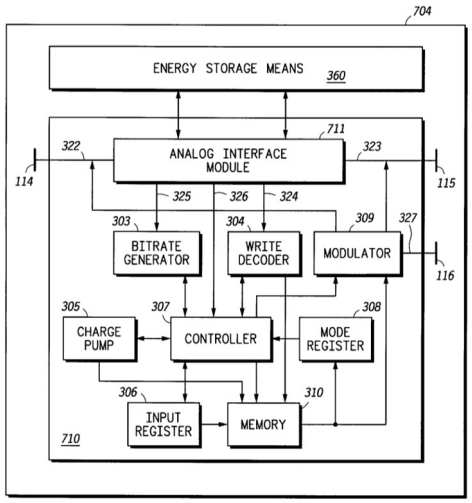
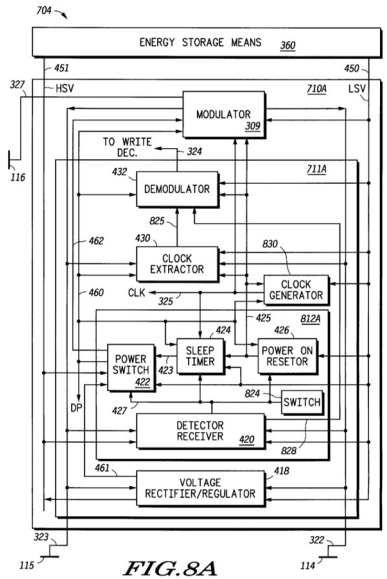
Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	variable impedance 480 coupled between the electrostatic electrodes 114 and 115 that has its impedance varied or switched by control signal 472 from the modulator controller 471. Load modulator 473B includes transistors 481 and 482, each coupled respectively between an electrostatic electrode and the low level supply voltage 450. The transistors are preferably turned ON and OFF by having their gates switched by a digital drive signal supplied on control signal 472. Load modulator 473C includes transistor 483 coupled between the electrostatic electrodes 114 and 115. Transistor 483 is preferably turned ON and OFF by having its gate switched by a digital drive signal supplied on control signal 472. Load modulator 473D includes transistor 484 coupled between one electrostatic electrode 322 and the low level supply voltage 450. This is an asymmetrical load modulation technique where circuitry within a rectifier provides the return path through the opposite electrostatic electrode 323. Referring back to FIG. 4D, active and passive transmission is accomplished by the modulator controller 471 and amplifier 477. Amplifier 477 is preferably a CMOS fully complementary inverter or buffer with its VDD input connected to the amplifier power line 462 and its VSS connection coupled to the low level power supply 450. Active transmission occurs when power is coupled from the high level power supply 451 through the power switch and onto the amplifier power line 462 by multiplexor 469. Passive transmission occurs when the DC voltage rectifier/regulator 418 within the transceiver 104 provides the rectified voltage and is coupled through the power switch to the amplifier power line 462 by multiplexor 469. Multiplexor 469 and 466 can further operate as a switch to selectively turn power OFF to circuitry connected to the device power line 460 or the amplifier power line 462 by turning OFF both of the transistor switches 467-468 or 470 and 475. Data 474 input into the modulator controller 471 is modulated with the input carrier signal 476 to generate the data signal on line 478. Signal line 478 is separate from signal line 472 such that the load modulator 473 and the amplifier 477 can be enabled or disabled independent from one another. Disabling the load modulator 473 or the amplifier 477 may be performed by setting the signal on line 472 or 478 respectively to a high or low DC logic level. The signal on signal line 478 is input into the amplifier 477. The amplifier 477 amplifies the signal on line 478 and transmits the information electrostatically over the electrostatic electrode 116. In active mode, after the transmit time has occurred, the power to the amplifier 477 may be turned OFF to conserve power. Vega at 15:20–37 The analog interface module 711 generally performs the power management function for the active electrostatic transceiver 704. Additionally, it generates its own clock from a free running low power clock oscillator. This generated clock is provided to other components of the active electrostatic transceiver 704 which require a clock including the bitrate generator 303. The analog interface module 711 also demodulates the received signal to generate a received data stream. The analog interface module 711 also

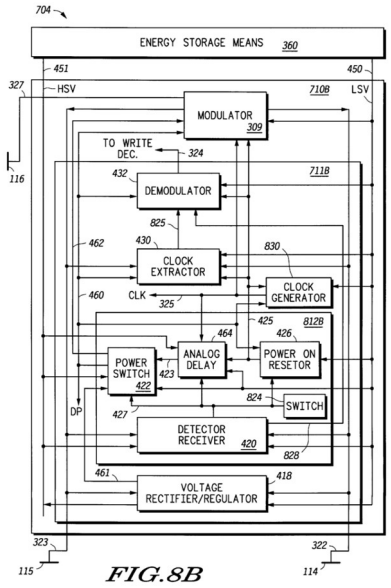
Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	analyzes the received data stream in order to determine if the active electrostatic transceiver 704 should perform some operation such as a read operation or a write operation and communicates the results of the analysis to the controller 307 and the write decoder 304. It preferably performs this analysis by searching for predetermined gaps in the received data stream. Modulator 309 as previously described in detail communicates information from the active electrostatic transceiver to a reader. Vega at 15:38–61 Now referring to FIG. 8A, selected details of the analog interface module 711 within the active electrostatic transceiver 704 are illustrated. The active electrostatic transceiver 704 includes the first electrostatic electrode 114, the second electrostatic electrode 115, the third electrostatic electrode 116, the transceiver circuit 710, and an energy storage means 360. The energy storage means 360 can be any type of energy storage means, including a battery or capacitor, preferably it is a thin foil battery to conform to a form factor for a smart card, tag, or badge. The transceiver circuit 710 as illustrated in FIG. 8A shows the relevant components for the second embodiment of the present invention. In FIG. 8A, the transceiver circuit 710 includes the analog interface module 711 and modulator 309. Components of the analog interface module 711 include a DC voltage rectifier/regulator 418, a power manager 812A, a clock extractor 430, a clock generator 830, a demodulator 432, and a modulator 309. The power manager 812A includes a detector/receiver 420, a power switch 422, a sleep timer 424, a power-on-resetor (POR) 426, and a manual switch 824. Except as otherwise described below, like numbered components of the transceiver circuit 710 operate similar to the similarly numbered components of the transceiver circuit 300 of the active electrostatic transceiver 104. Vega at 15:62–16:8 In the second embodiment of the present invention the active electrostatic transceiver 704 may not receive an excitation signal from which to extract a clock signal, particularly when coupled to the reader 601 of FIG. 6A. Thus, the transceiver circuit 710 includes its own clock generator 830. A clock extractor 430 is retained to generate an extracted clock 825 for demodulation of signals that may be received from readers other than reader 601. Clock generator 830 receives power by coupling to the device power line 460 and the low level power supply 450. Clock generator 830 has its own low power clock oscillator in order to generate a clock. The clock signal on clock line 325 is provided to the sleep timer 424 amongst other components of the transceiver circuit 710. Vega at 16:36–48 Power on resetor 426 monitors the device power line 460 to be sure that sufficient power is available to other components within the active electrostatic transceiver 704 before de-asserting a reset signal 425.

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	Once sufficient power is generated in the device power line 460, reset signal 425 is de-asserted and other components may start functioning within the active electrostatic transceiver 704. In FIG. 8A the reset signal line 425 is coupled to the sleep timer 424, the demodulator 432, the modulator 309 and other components of the active electrostatic transceiver 704. In FIG. 8B, the reset signal line 425 is coupled to the analog delay block 464, the demodulator 432, the modulator 309 and other components of the active electrostatic transceiver 704. Vega at 16:53–17:8 The present invention has many advantages over the prior art. The present invention provides a larger read range over passive RFID communication systems and therefore increases the applicability of electrostatic communication systems. Additionally, the present invention provides for greater flexibility in choosing components for an electrostatic transceiver. Also, the present invention provides greater operational functionality in an electrostatic transceiver because the available power is greater. Furthermore, the present invention provides for greater integration in circuitry and reduces the amount space utilized for an active electrostatic transceiver. Additionally the present invention in its second embodiment reduces the interference and noise in an electrostatic communication system so that it may be used in environments requiring low noise emission. The present invention provides for lower cost RFID transceivers such that disposable applications are possible. Furthermore, the present invention provides the capability to operate an active electrostatic transceiver in an active mode operating under the power of an energy storage means or in a passive mode under the power generated by a voltage rectifier/regulator when the energy storage means power is too low or if in the case of a desirable low-power operational mode. To the extent this limitation is not disclosed by Vega, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Vega, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[17c] coupling the active transmit driver circuit to an antenna of the mobile device, wherein the antenna is tuned to operate at substantially 13.56 MHz; and	Vega discloses or renders obvious "coupling the active transmit driver circuit to an antenna of the mobile device, wherein the antenna is tuned to operate at substantially 13.56 MHz." For example: *See* [1c] above. Vega at Figure 4A

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	 FIG.4A Vega at Figure 4B  FIG.4B

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	Vega at Figure 4D  FIG.4D Vega at Figure 7

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	 *FIG. 7* Vega at Figure 8A  *FIG. 8A*

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	Vega at Figure 8B  FIG.8B Vega at 2:4–26 In contrast, conventional RFID technology is inductance-based. More precisely, conventional RFID technology uses near field electromagnetic waves which are also known as induction waves. Unlike radio waves, the field strength of induction waves is proportional to the inverse square of the distance involved. In inductance-based RFID technology, an electromagnetic field is generated for use both as a power source for the transponder and for transferring information between the reader and transponder. Inductance waves are generated using closed circuit alternating current coils that have multiple turns. Inductance coils are required to optimally transmit and receive electromagnetic signals are usually a wire wound or etched metal coil. Using inductance coils adversely impacts the costs, manufacturability, and packaging flexibility of inductance-based RFID technology particularly when used with high number of RFID tags usually required in a system. Due to the prohibitive costs and high degree of manufacturing difficulty, electromagnetic RFID technology is not practical in high volume and low cost applications such as in disposable applications. The bulky packaging, which is typical for electromagnetic RFID, further limits its application to those where thickness is not of primary importance.

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	Vega at 4:14–16 FIG. 4D is a block diagram of components of the modulator block within the active electrostatic transceiver of FIG. 3. Vega at 6:1–22 FIG. 1 illustrates the advantage that an active electrostatic transceiver 104 has over a passive electrostatic transceiver 102. The distance between an electrostatic transceiver and an electrostatic reader where communication may start to occur is referred to as the read range. In FIG. 1 the passive read range 125 between passive ES transceiver 102 and ES reader 101 is significantly smaller than the active read range 126 between active ES transceiver 104 and ES reader 101. This is because an energy storage means within the active electrostatic transceiver 104 allows for active transmission of signals using an amplifier. Because of its passive nature, the passive electrostatic transceiver 102 relies on a load modulation technique for communication of signals by reflecting back the energy of the excitation signal to the electrostatic reader 101. The reflection of the excitation signal requires that the passive electrostatic transceiver 102 be nearer the reader 101. The larger read range provided by reflected ES signals using load modulation or transmitted ES signals using an active transmitter allows the active electrostatic transceiver 104 to be used in other applications of RFID communication systems where a passive electrostatic transceiver 102 would not. Vega at 6:23–33 An active electrostatic transceiver 104 is not simply formed by adding an energy storage means to the passive electrostatic transceiver 102. Components of a passive electrostatic transceiver require modification, particularly in the area of power management. The power or energy of an energy storage means must be conserved and properly managed in order for the active electrostatic transceiver to have greater utility. Additionally noise must be properly filtered out to avoid false signal detection and power inadvertently being applied to circuits within the active electrostatic transceiver in order to more properly conserve power. Vega at 7:14–56 In general, electrostatic reader 101 generates an electrostatic (electrical) field for use both as a power source for the passive electrostatic transceiver 102 and for transferring information between electrostatic reader 101 and passive electrostatic transceiver 102 or active electrostatic transceiver 104. As such, electrostatic reader 101 electrostatically generates and transmits an excitation signal to the surrounding air, gas, atmosphere or non-electrically conductive medium via the reader's electrostatic electrodes, except

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	for the return path in a monopole system. The excitation signal is an AC signal which activates the passive electrostatic transceiver 102 when it is comes within the capacitance coupling range of reader 101. Upon being sufficiently energized, the passive electrostatic transceiver 102 may respond by electrostatically transmitting a read data signal carrying the information stored in its memory to electrostatic reader 101 (as part of a read operation). Active electrostatic transceiver 104 includes an energy storage means such that it may not require the excitation signal to become sufficiently energized. In accordance to the present invention, reader 101 may also electrostatically couple a write signal to communicate and write information to the passive electrostatic transceiver 102 or active ES transceiver(as part of a write operation). Alternatively, such programming or charging can be carried out by a separate ES programming, ES encoding or electrostatic charger unit (not illustrated). It is to be appreciated that the excitation signal must be generated and transmitted by electrostatic reader 101 to excite the passive electrostatic transceiver 102 or charge the active electrostatic transceiver 104. The excitation signal is an AC energy source and can be a continuous waveform or a varying waveform (i.e. amplitude, frequency, time, etc. of the waveform may vary). Alternatively a user could manually cause the electrostatic reader 101 or a charger to generate the excitation signal to charge or communicate with the passive electrostatic transceiver 102 or active electrostatic transceiver 104 by selecting a button or switch. The reader 101 usually has available a larger power source than the passive electrostatic transceiver 102 or active electrostatic transceiver 104. Thus, the reader 101 has very sensitive receiving and high energy transmission when compared with the passive electrostatic transceiver 102 or active electrostatic transceiver 104. Vega at 8:18–45 Controller 307 controls the functionality of the transceiver 104 in conjunction with the analog interface module 301. Controller 307 couples to nearly all components of the active electrostatic transceiver 104 except for the electrostatic electrodes and pads. Memory 310 may be a volatile memory requiring a constant supply of energy or a non-volatile memory such as an EEPROM memory or ferro-electric memory that retains its information when power is no longer supplied. In the case of EEPROM memory, the optional charge pump 305 may be required in order to boost the power supply voltage to write data into the EEPROM memory. Input register 306 temporarily stores information that is to be written into memory 310. It may need to store the information due to a delay in the write cycle caused by the charge pump 305 pumping up or other reasons. In any case, storing data into the input register 306 allows the controller 307 to process other information for the transceiver 104. Mode register 308 reads configuration information for the active electrostatic transceiver 104 from memory 310 and provides this to the controller 307. Write decoder 304 analyzes a data sequence being received by the electrostatic transceiver

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	104 and determines whether the transceiver should go into a write mode or whether it needs to remain in a receive mode. Modulator 309 prepares data read from memory 310 for communication by the active electrostatic transceiver 104. Modulator 309 can encode and modulate data read from memory 310 in a number of ways for communication with the reader 101. Vega at 9:61–10:33 The detector/receiver 420 in the active electrostatic transceiver 104 may receive power directly from the energy storage means 360 in order to be actively listening for an excitation signal from an electrostatic reader 101. Alternatively, the detector/receiver 420 may have passive components sufficient to detect and receive signals when the energy storage means has insufficient energy to power active components. The detector/receiver 420 may have an amplifier for receiving and amplifying the incoming electrostatic signals, a bandpass filter for filtering unwanted frequencies outside a range of the carrier frequency, and a detector for detecting the presence of the carrier frequency in an excitation signal indicating that the transceiver is within the read range of an electrostatic reader 101. The detector may detect a number of oscillations in the received waveform at the carrier frequency indicating that it is not a noise source generating the waveform. In the preferred embodiment, if the detector detects any signal in the band of the carrier it provides an indication signal. Upon detection of the excitation signal, the detector/receiver 420 generates a wakeup signal on signal line 427 indicating that the active electrostatic transceiver 104 is within range of an electrostatic field and that the active electrostatic transceiver 104 needs to go through its wake up procedure. When outside the range of an electrostatic field, the signal line 427 indicates a go to-sleep signal so that the transceiver may go into a low power sleep state. The wakeup signal 427 is provided to the power on resetor 426, the sleep timer 424, the power switch 422 and clock extractor 430. Upon receiving the wakeup signal 427, power on resetor 426 monitors the device power line 460 to be sure that sufficient power is available to other components within the active electrostatic transceiver 104 before de-asserting a reset signal 425. Once sufficient power is generated in the device power line 460, reset signal 425 is de-asserted and other components may start functioning within the active electrostatic transceiver 104. In FIG. 4A the reset signal line 425 is coupled to the sleep timer 424, the clock extractor 430, the demodulator 432, the modulator 309 and other components of the active electrostatic transceiver 104. Vega at 10:34–52 The sleep timer 424 of the active electrostatic transceiver of FIG. 4A is a digital counter that counts to a predetermined count value using the clock signal on clock line 325 received from the clock extractor 430. Upon reaching the predetermined count value, the sleep timer 424 turns off active components within the

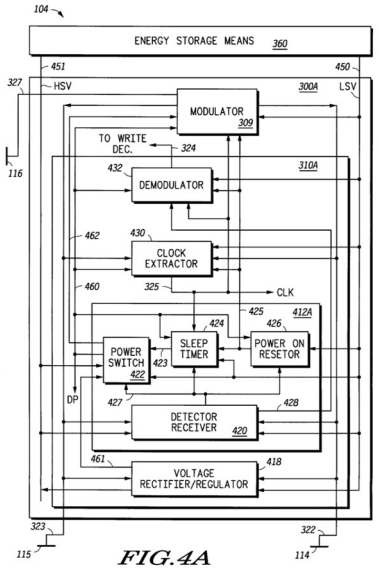
Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	modulator 309. While the sleep timer 424 is counting a transmit signal is indicated on signal line 423. When the sleep timer 424 reaches the predetermined count value, signal line 423 indicates a receive signal and the active electrostatic transceiver powers off the active components within the modulator 309. While in this mode, the transceiver may still use passive components and the load modulators within the modulator 309 to communicate with a reader. Further, while in this mode, the transceiver may receive and respond to encoded write data transmitted by the reader. The predetermined count value is determined based on the time, in number of clock cycles, that it takes for the active electrostatic transceiver to complete a transmission cycle with an electrostatic reader 101. Vega at 10:53–11:6 Referring to FIG. 4B, the power manager 412B includes the detector/receiver 420, the power switch 422, an analog delay block 464, and the power-on-resetor (POR) 426. The digital sleep timer 424 of FIG. 4A is replaced with the analog delay block 464 within the power manager block 412B while other blocks function similar to the description of FIG. 4A. Analog delay block 464 provides an analog delay by using resistor and capacitor elements in conjunction with a threshold detector or comparator. The analog delay block is preferably designed to provide a lengthy delay such as a couple of seconds. The circuitry of the analog delay block is simpler than that of the sleep timer 424. Upon detection of a received signal, the wakeup signal on signal line 427 causes the analog delay block to initiate the RC delay. The transmit signal on signal line 423 is coupled to the power switch 422 and causes it to select power, if available, from the energy storage means 360 for the active transmitter of the modulator 309. Upon completion of the RC delay, a receive signal is indicated on signal line 423 causing the power switch 422 to disconnect power from the active transmitter of the modulator 309. Vega at 11:7–12:16 Power switch 422 is coupled to the detector/receiver 420 through the signal line 427 and to the sleep timer 424 or the analog delay block 464 through the signal line 423. The power switch 422 controls the switching of the high level power supply voltage 451 from the energy storage means 360 or the rectified voltage 461 and provides the analog interface module 301 with the means to manage power consumption. These energy sources may be coupled to the device power line 460 feeding power to other components of the active electrostatic transceiver 104. FIG. 4C illustrates the basic components of the power switch 422 that provide power selection for the active electrostatic transceiver 104. These components include the power analyzer 465, the multiplexor 466 and the multiplexor 469. Multiplexor 469 may optionally be a switch with one end connected to the amplifier power line 462 and another end connected to the device power line 460. Power analyzer 465 performs an analysis on the energy provided by the DC voltage

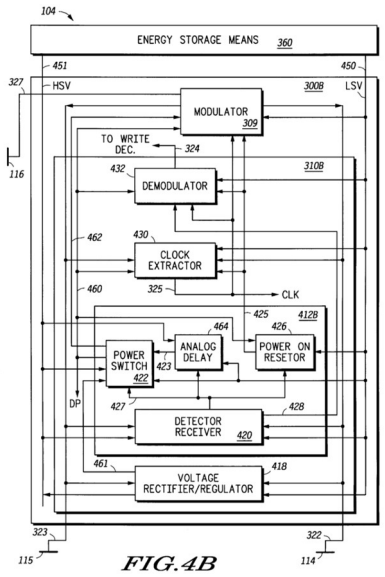
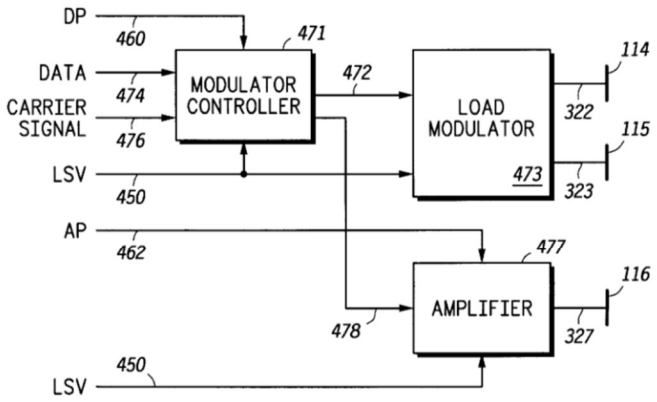
Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	rectifier/regulator 418 with that supplied by the energy storage means 360. The power analyzer 465 receives the rectified voltage 461, the high level supply voltage 451 and the low level supply voltage 450 in order to perform the analysis. Additionally, control signals 423, 427 and any other control signals are received by the power analyzer 465 to further control the multiplexor 466 and multiplexor 469. Signal lines 423 and 427 are exemplary control signals input into the power analyzer 465. Typically, if the energy storage means 360 has higher energy levels it is selectively coupled to the device power line 460 and the amplifier power line 462 when signal line 427 indicates a transmit signal. Optionally when the transceiver 104 is in an active mode for active transmission by amplifier 477 and when signal line 427 indicates a receive signal, the energy storage means may be selectively decoupled from the amplifier power line 462, have the rectified voltage 461 coupled to the amplifier power line 462 or alternatively have no power source coupled to the amplifier power line 462 powering OFF the circuitry of amplifier 477 in each case conserving power in the energy storage means. If it is the case that the energy storage means 360 has lower energy levels than that of the rectified voltage 461, the rectified voltage may be selectively coupled to the device power line 460 by multiplexor 466 and to the amplifier power line 462 by multiplexor 469 such that the load modulator 473 and the amplifier 477 can perform passive load modulation and passive transmission of electrostatic signals in a passive mode. Additionally if it is desirable to conserve power or more efficiently charge the energy storage means, multiplexor 466 or 469 can operate as switches decoupling the device power line 460 or the amplifier power line 462 from any power source. After selecting a power source where the power switch 422 couples the high level power supply 451 or the rectified voltage 461 with the device power line 460, circuitry within the active electrostatic transceiver goes into a power on reset sequence controlled by the power on resetor 426. When out of the power on reset sequence, the active electrostatic transceiver 104 can go through a communication cycle with the electrostatic reader 101 while in the read range and the sleep timer 424 starts counting or the analog delay cycle of the analog delay block 464 begins. If the active electrostatic transceiver remains in the electrostatic field (i.e. read range) and the sleep timer 424 reaches its predetermined count value or the analog delay block completes the predetermined RC delay time, a receive signal is indicated on signal line 423 to the power switch 422. The active electrostatic transceiver 104 continues to listen for signals from reader 101 or other sources that communicate on the carrier frequency. If the active electrostatic transceiver 104 is removed from the electrostatic field, the detector/receiver 420 resets and a sleep signal is indicated on signal line 427. Upon receiving the sleep signal, the power switch 422 selectively disconnects the high level voltage supply 451 from the device power line 460 so that components coupled to the device power line 460 become powered off and enter the sleep mode. In this manner when the active electrostatic transceiver 104 is outside the electrostatic field (i.e. read range) it goes into its low power sleep mode.

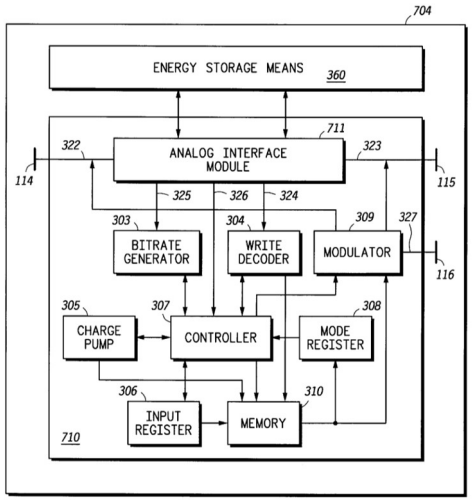
Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	Vega at 12:60–13:6 Modulator 309 is coupled to the power switch 422 through the device power line 460, the energy storage means 360 through the low level power supply 450, the electrostatic electrodes 114-116 respectively through signal lines 322, 323 and 327, power on resetor 426 through signal line 425, and the clock extractor 430 through clock signal line 325. Modulator 309 includes a load modulator for electrostatic electrodes 114-115 and an active power amplifier in order to amplify signals for the extra transmission distance to the reader over the electrostatic electrode 116. A passive electrostatic transceiver may not function properly at large read ranges because of weak signals. The electrostatic reader's receiver may require increased sensitivity in order to receive signals from large read ranges. Vega at 13:7–14:10 Referring now to FIG. 4D, a block diagram is illustrated of the components within the modulator 309 for active and passive load modulation and active transmission. Active and passive load modulation are accomplished by the modulator controller and the load modulator. Active load modulation occurs when the energy storage means 360 is coupled to the device power line 460 and the circuitry of the modulator controller 471. Passive load modulation occurs when the DC voltage rectifier/regulator within the transceiver 104 provides the rectified voltage and is coupled through the power switch to the device power line 460 and the modulator controller 471. Load modulation is accomplished by varying the impedance between the electrostatic electrodes 114 and 115. Varying the impedance between the electrostatic electrodes, that are capacitively coupled with the electrostatic electrodes of the reader 101, causes the excitation signal generated by the reader 101 to be reflected back. A data signal and a carrier signal is input into the modulator controller 471 at line 474 and 476 respectively to control the load modulator 473. The carrier signal 476 is commonly referred to as the data carrier and has a carrier frequency. Preferably the carrier frequency of the data carrier is 62.5 K Hz or one-half the power carrier frequency. FIG. 4E illustrates a few load modulators 473A-473D. Load modulator 473A consists of a variable impedance 480 coupled between the electrostatic electrodes 114 and 115 that has its impedance varied or switched by control signal 472 from the modulator controller 471. Load modulator 473B includes transistors 481 and 482, each coupled respectively between an electrostatic electrode and the low level supply voltage 450. The transistors are preferably turned ON and OFF by having their gates switched by a digital drive signal supplied on control signal 472. Load modulator 473C includes transistor 483 coupled between the electrostatic electrodes 114 and 115. Transistor 483 is preferably turned ON and OFF by having its gate switched by a digital drive signal supplied on control signal 472. Load modulator 473D includes transistor 484 coupled between one electrostatic electrode 322 and the low level supply

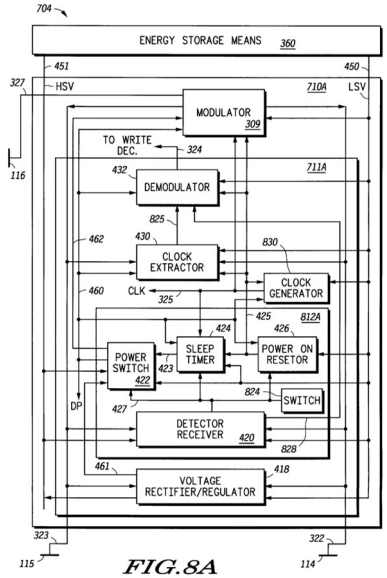
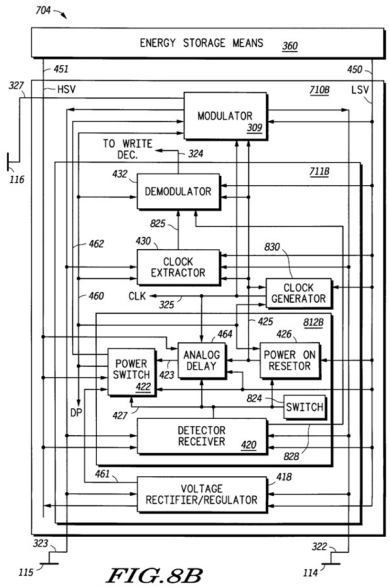
Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	voltage 450. This is an asymmetrical load modulation technique where circuitry within a rectifier provides the return path through the opposite electrostatic electrode 323. Referring back to FIG. 4D, active and passive transmission is accomplished by the modulator controller 471 and amplifier 477. Amplifier 477 is preferably a CMOS fully complementary inverter or buffer with its VDD input connected to the amplifier power line 462 and its VSS connection coupled to the low level power supply 450. Active transmission occurs when power is coupled from the high level power supply 451 through the power switch and onto the amplifier power line 462 by multiplexor 469. Passive transmission occurs when the DC voltage rectifier/regulator 418 within the transceiver 104 provides the rectified voltage and is coupled through the power switch to the amplifier power line 462 by multiplexor 469. Multiplexor 469 and 466 can further operate as a switch to selectively turn power OFF to circuitry connected to the device power line 460 or the amplifier power line 462 by turning OFF both of the transistor switches 467-468 or 470 and 475. Data 474 input into the modulator controller 471 is modulated with the input carrier signal 476 to generate the data signal on line 478. Signal line 478 is separate from signal line 472 such that the load modulator 473 and the amplifier 477 can be enabled or disabled independent from one another. Disabling the load modulator 473 or the amplifier 477 may be performed by setting the signal on line 472 or 478 respectively to a high or low DC logic level. The signal on signal line 478 is input into the amplifier 477. The amplifier 477 amplifies the signal on line 478 and transmits the information electrostatically over the electrostatic electrode 116. In active mode, after the transmit time has occurred, the power to the amplifier 477 may be turned OFF to conserve power. Vega at 15:20–37 The analog interface module 711 generally performs the power management function for the active electrostatic transceiver 704. Additionally, it generates its own clock from a free running low power clock oscillator. This generated clock is provided to other components of the active electrostatic transceiver 704 which require a clock including the bitrate generator 303. The analog interface module 711 also demodulates the received signal to generate a received data stream. The analog interface module 711 also analyzes the received data stream in order to determine if the active electrostatic transceiver 704 should perform some operation such as a read operation or a write operation and communicates the results of the analysis to the controller 307 and the write decoder 304. It preferably performs this analysis by searching for predetermined gaps in the received data stream. Modulator 309 as previously described in detail communicates information from the active electrostatic transceiver to a reader. Vega at 15:38–61

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	Now referring to FIG. 8A, selected details of the analog interface module 711 within the active electrostatic transceiver 704 are illustrated. The active electrostatic transceiver 704 includes the first electrostatic electrode 114, the second electrostatic electrode 115, the third electrostatic electrode 116, the transceiver circuit 710, and an energy storage means 360. The energy storage means 360 can be any type of energy storage means, including a battery or capacitor, preferably it is a thin foil battery to conform to a form factor for a smart card, tag, or badge. The transceiver circuit 710 as illustrated in FIG. 8A shows the relevant components for the second embodiment of the present invention. In FIG. 8A, the transceiver circuit 710 includes the analog interface module 711 and modulator 309. Components of the analog interface module 711 include a DC voltage rectifier/regulator 418, a power manager 812A, a clock extractor 430, a clock generator 830, a demodulator 432, and a modulator 309. The power manager 812A includes a detector/receiver 420, a power switch 422, a sleep timer 424, a power-on-resetor (POR) 426, and a manual switch 824. Except as otherwise described below, like numbered components of the transceiver circuit 710 operate similar to the similarly numbered components of the transceiver circuit 300 of the active electrostatic transceiver 104. Vega at 16:36–48 Power on resetor 426 monitors the device power line 460 to be sure that sufficient power is available to other components within the active electrostatic transceiver 704 before de-asserting a reset signal 425. Once sufficient power is generated in the device power line 460, reset signal 425 is de-asserted and other components may start functioning within the active electrostatic transceiver 704. In FIG. 8A the reset signal line 425 is coupled to the sleep timer 424, the demodulator 432, the modulator 309 and other components of the active electrostatic transceiver 704. In FIG. 8B, the reset signal line 425 is coupled to the analog delay block 464, the demodulator 432, the modulator 309 and other components of the active electrostatic transceiver 704. Vega at 16:53–17:8 The present invention has many advantages over the prior art. The present invention provides a larger read range over passive RFID communication systems and therefore increases the applicability of electrostatic communication systems. Additionally, the present invention provides for greater flexibility in choosing components for an electrostatic transceiver. Also, the present invention provides greater operational functionality in an electrostatic transceiver because the available power is greater. Furthermore, the present invention provides for greater integration in circuitry and reduces the amount space utilized for an active electrostatic transceiver. Additionally the present invention in its second embodiment reduces the interference and noise in an electrostatic communication system so that it may be used in environments

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	requiring low noise emission. The present invention provides for lower cost RFID transceivers such that disposable applications are possible. Furthermore, the present invention provides the capability to operate an active electrostatic transceiver in an active mode operating under the power of an energy storage means or in a passive mode under the power generated by a voltage rectifier/regulator when the energy storage means power is too low or if in the case of a desirable low-power operational mode. To the extent this limitation is not disclosed by Vega, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Vega, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[17d] driving transmission of data by the active transmit driver circuit from the antenna to the NFC reader.	Vega discloses or renders obvious "driving transmission of data by the active transmit driver circuit from the antenna to the NFC reader." For example: *See* [1d] above. Vega at Figure 4A  *FIG.4A* Vega at Figure 4B

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	 *FIG.4B* Vega at Figure 4D  *FIG.4D*

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	Vega at Figure 7  *FIG. 7* Vega at Figure 8A

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	 FIG.8A Vega at Figure 8B  FIG.8B

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	Vega at 4:14–16 FIG. 4D is a block diagram of components of the modulator block within the active electrostatic transceiver of FIG. 3. Vega at 6:1–22 FIG. 1 illustrates the advantage that an active electrostatic transceiver 104 has over a passive electrostatic transceiver 102. The distance between an electrostatic transceiver and an electrostatic reader where communication may start to occur is referred to as the read range. In FIG. 1 the passive read range 125 between passive ES transceiver 102 and ES reader 101 is significantly smaller than the active read range 126 between active ES transceiver 104 and ES reader 101. This is because an energy storage means within the active electrostatic transceiver 104 allows for active transmission of signals using an amplifier. Because of its passive nature, the passive electrostatic transceiver 102 relies on a load modulation technique for communication of signals by reflecting back the energy of the excitation signal to the electrostatic reader 101. The reflection of the excitation signal requires that the passive electrostatic transceiver 102 be nearer the reader 101. The larger read range provided by reflected ES signals using load modulation or transmitted ES signals using an active transmitter allows the active electrostatic transceiver 104 to be used in other applications of RFID communication systems where a passive electrostatic transceiver 102 would not. Vega at 6:23–33 An active electrostatic transceiver 104 is not simply formed by adding an energy storage means to the passive electrostatic transceiver 102. Components of a passive electrostatic transceiver require modification, particularly in the area of power management. The power or energy of an energy storage means must be conserved and properly managed in order for the active electrostatic transceiver to have greater utility. Additionally noise must be properly filtered out to avoid false signal detection and power inadvertently being applied to circuits within the active electrostatic transceiver in order to more properly conserve power. Vega at 7:14–56 In general, electrostatic reader 101 generates an electrostatic (electrical) field for use both as a power source for the passive electrostatic transceiver 102 and for transferring information between electrostatic reader 101 and passive electrostatic transceiver 102 or active electrostatic transceiver 104. As such, electrostatic reader 101 electrostatically generates and transmits an excitation signal to the surrounding air, gas, atmosphere or non-electrically conductive medium via the reader's electrostatic electrodes, except

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	104 and determines whether the transceiver should go into a write mode or whether it needs to remain in a receive mode. Modulator 309 prepares data read from memory 310 for communication by the active electrostatic transceiver 104. Modulator 309 can encode and modulate data read from memory 310 in a number of ways for communication with the reader 101. Vega at 9:61–10:33 The detector/receiver 420 in the active electrostatic transceiver 104 may receive power directly from the energy storage means 360 in order to be actively listening for an excitation signal from an electrostatic reader 101. Alternatively, the detector/receiver 420 may have passive components sufficient to detect and receive signals when the energy storage means has insufficient energy to power active components. The detector/receiver 420 may have an amplifier for receiving and amplifying the incoming electrostatic signals, a bandpass filter for filtering unwanted frequencies outside a range of the carrier frequency, and a detector for detecting the presence of the carrier frequency in an excitation signal indicating that the transceiver is within the read range of an electrostatic reader 101. The detector may detect a number of oscillations in the received waveform at the carrier frequency indicating that it is not a noise source generating the waveform. In the preferred embodiment, if the detector detects any signal in the band of the carrier it provides an indication signal. Upon detection of the excitation signal, the detector/receiver 420 generates a wakeup signal on signal line 427 indicating that the active electrostatic transceiver 104 is within range of an electrostatic field and that the active electrostatic transceiver 104 needs to go through its wake up procedure. When outside the range of an electrostatic field, the signal line 427 indicates a go to-sleep signal so that the transceiver may go into a low power sleep state. The wakeup signal 427 is provided to the power on resetor 426, the sleep timer 424, the power switch 422 and clock extractor 430. Upon receiving the wakeup signal 427, power on resetor 426 monitors the device power line 460 to be sure that sufficient power is available to other components within the active electrostatic transceiver 104 before de-asserting a reset signal 425. Once sufficient power is generated in the device power line 460, reset signal 425 is de-asserted and other components may start functioning within the active electrostatic transceiver 104. In FIG. 4A the reset signal line 425 is coupled to the sleep timer 424, the clock extractor 430, the demodulator 432, the modulator 309 and other components of the active electrostatic transceiver 104. Vega at 10:34–52 The sleep timer 424 of the active electrostatic transceiver of FIG. 4A is a digital counter that counts to a predetermined count value using the clock signal on clock line 325 received from the clock extractor 430. Upon reaching the predetermined count value, the sleep timer 424 turns off active components within the

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	modulator 309. While the sleep timer 424 is counting a transmit signal is indicated on signal line 423. When the sleep timer 424 reaches the predetermined count value, signal line 423 indicates a receive signal and the active electrostatic transceiver powers off the active components within the modulator 309. While in this mode, the transceiver may still use passive components and the load modulators within the modulator 309 to communicate with a reader. Further, while in this mode, the transceiver may receive and respond to encoded write data transmitted by the reader. The predetermined count value is determined based on the time, in number of clock cycles, that it takes for the active electrostatic transceiver to complete a transmission cycle with an electrostatic reader 101. Vega at 10:53–11:6 Referring to FIG. 4B, the power manager 412B includes the detector/receiver 420, the power switch 422, an analog delay block 464, and the power-on-resetor (POR) 426. The digital sleep timer 424 of FIG. 4A is replaced with the analog delay block 464 within the power manager block 412B while other blocks function similar to the description of FIG. 4A. Analog delay block 464 provides an analog delay by using resistor and capacitor elements in conjunction with a threshold detector or comparator. The analog delay block is preferably designed to provide a lengthy delay such as a couple of seconds. The circuitry of the analog delay block is simpler than that of the sleep timer 424. Upon detection of a received signal, the wakeup signal on signal line 427 causes the analog delay block to initiate the RC delay. The transmit signal on signal line 423 is coupled to the power switch 422 and causes it to select power, if available, from the energy storage means 360 for the active transmitter of the modulator 309. Upon completion of the RC delay, a receive signal is indicated on signal line 423 causing the power switch 422 to disconnect power from the active transmitter of the modulator 309. Vega at 11:7–12:16 Power switch 422 is coupled to the detector/receiver 420 through the signal line 427 and to the sleep timer 424 or the analog delay block 464 through the signal line 423. The power switch 422 controls the switching of the high level power supply voltage 451 from the energy storage means 360 or the rectified voltage 461 and provides the analog interface module 301 with the means to manage power consumption. These energy sources may be coupled to the device power line 460 feeding power to other components of the active electrostatic transceiver 104. FIG. 4C illustrates the basic components of the power switch 422 that provide power selection for the active electrostatic transceiver 104. These components include the power analyzer 465, the multiplexor 466 and the multiplexor 469. Multiplexor 469 may optionally be a switch with one end connected to the amplifier power line 462 and another end connected to the device power line 460. Power analyzer 465 performs an analysis on the energy provided by the DC voltage

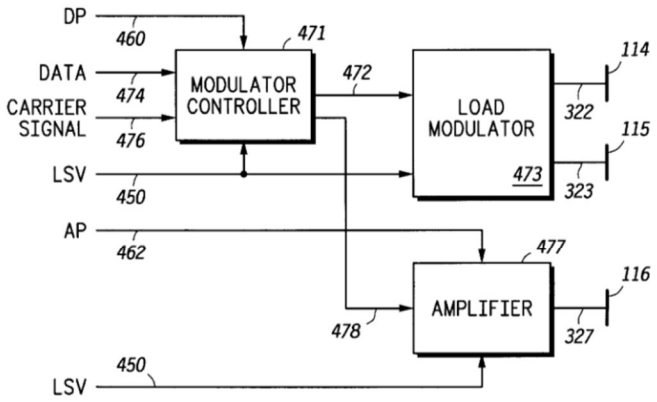
Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	rectifier/regulator 418 with that supplied by the energy storage means 360. The power analyzer 465 receives the rectified voltage 461, the high level supply voltage 451 and the low level supply voltage 450 in order to perform the analysis. Additionally, control signals 423, 427 and any other control signals are received by the power analyzer 465 to further control the multiplexor 466 and multiplexor 469. Signal lines 423 and 427 are exemplary control signals input into the power analyzer 465. Typically, if the energy storage means 360 has higher energy levels it is selectively coupled to the device power line 460 and the amplifier power line 462 when signal line 427 indicates a transmit signal. Optionally when the transceiver 104 is in an active mode for active transmission by amplifier 477 and when signal line 427 indicates a receive signal, the energy storage means may be selectively decoupled from the amplifier power line 462, have the rectified voltage 461 coupled to the amplifier power line 462 or alternatively have no power source coupled to the amplifier power line 462 powering OFF the circuitry of amplifier 477 in each case conserving power in the energy storage means. If it is the case that the energy storage means 360 has lower energy levels than that of the rectified voltage 461, the rectified voltage may be selectively coupled to the device power line 460 by multiplexor 466 and to the amplifier power line 462 by multiplexor 469 such that the load modulator 473 and the amplifier 477 can perform passive load modulation and passive transmission of electrostatic signals in a passive mode. Additionally if it is desirable to conserve power or more efficiently charge the energy storage means, multiplexor 466 or 469 can operate as switches decoupling the device power line 460 or the amplifier power line 462 from any power source. After selecting a power source where the power switch 422 couples the high level power supply 451 or the rectified voltage 461 with the device power line 460, circuitry within the active electrostatic transceiver goes into a power on reset sequence controlled by the power on resetor 426. When out of the power on reset sequence, the active electrostatic transceiver 104 can go through a communication cycle with the electrostatic reader 101 while in the read range and the sleep timer 424 starts counting or the analog delay cycle of the analog delay block 464 begins. If the active electrostatic transceiver remains in the electrostatic field (i.e. read range) and the sleep timer 424 reaches its predetermined count value or the analog delay block completes the predetermined RC delay time, a receive signal is indicated on signal line 423 to the power switch 422. The active electrostatic transceiver 104 continues to listen for signals from reader 101 or other sources that communicate on the carrier frequency. If the active electrostatic transceiver 104 is removed from the electrostatic field, the detector/receiver 420 resets and a sleep signal is indicated on signal line 427. Upon receiving the sleep signal, the power switch 422 selectively disconnects the high level voltage supply 451 from the device power line 460 so that components coupled to the device power line 460 become powered off and enter the sleep mode. In this manner when the active electrostatic transceiver 104 is outside the electrostatic field (i.e. read range) it goes into its low power sleep mode.

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	Vega at 12:60–13:6 Modulator 309 is coupled to the power switch 422 through the device power line 460, the energy storage means 360 through the low level power supply 450, the electrostatic electrodes 114-116 respectively through signal lines 322, 323 and 327, power on resetor 426 through signal line 425, and the clock extractor 430 through clock signal line 325. Modulator 309 includes a load modulator for electrostatic electrodes 114-115 and an active power amplifier in order to amplify signals for the extra transmission distance to the reader over the electrostatic electrode 116. A passive electrostatic transceiver may not function properly at large read ranges because of weak signals. The electrostatic reader's receiver may require increased sensitivity in order to receive signals from large read ranges. Vega at 13:7–14:10 Referring now to FIG. 4D, a block diagram is illustrated of the components within the modulator 309 for active and passive load modulation and active transmission. Active and passive load modulation are accomplished by the modulator controller and the load modulator. Active load modulation occurs when the energy storage means 360 is coupled to the device power line 460 and the circuitry of the modulator controller 471. Passive load modulation occurs when the DC voltage rectifier/regulator within the transceiver 104 provides the rectified voltage and is coupled through the power switch to the device power line 460 and the modulator controller 471. Load modulation is accomplished by varying the impedance between the electrostatic electrodes 114 and 115. Varying the impedance between the electrostatic electrodes, that are capacitively coupled with the electrostatic electrodes of the reader 101, causes the excitation signal generated by the reader 101 to be reflected back. A data signal and a carrier signal is input into the modulator controller 471 at line 474 and 476 respectively to control the load modulator 473. The carrier signal 476 is commonly referred to as the data carrier and has a carrier frequency. Preferably the carrier frequency of the data carrier is 62.5 K Hz or one-half the power carrier frequency. FIG. 4E illustrates a few load modulators 473A-473D. Load modulator 473A consists of a variable impedance 480 coupled between the electrostatic electrodes 114 and 115 that has its impedance varied or switched by control signal 472 from the modulator controller 471. Load modulator 473B includes transistors 481 and 482, each coupled respectively between an electrostatic electrode and the low level supply voltage 450. The transistors are preferably turned ON and OFF by having their gates switched by a digital drive signal supplied on control signal 472. Load modulator 473C includes transistor 483 coupled between the electrostatic electrodes 114 and 115. Transistor 483 is preferably turned ON and OFF by having its gate switched by a digital drive signal supplied on control signal 472. Load modulator 473D includes transistor 484 coupled between one electrostatic electrode 322 and the low level supply

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	voltage 450. This is an asymmetrical load modulation technique where circuitry within a rectifier provides the return path through the opposite electrostatic electrode 323. Referring back to FIG. 4D, active and passive transmission is accomplished by the modulator controller 471 and amplifier 477. Amplifier 477 is preferably a CMOS fully complementary inverter or buffer with its VDD input connected to the amplifier power line 462 and its VSS connection coupled to the low level power supply 450. Active transmission occurs when power is coupled from the high level power supply 451 through the power switch and onto the amplifier power line 462 by multiplexor 469. Passive transmission occurs when the DC voltage rectifier/regulator 418 within the transceiver 104 provides the rectified voltage and is coupled through the power switch to the amplifier power line 462 by multiplexor 469. Multiplexor 469 and 466 can further operate as a switch to selectively turn power OFF to circuitry connected to the device power line 460 or the amplifier power line 462 by turning OFF both of the transistor switches 467-468 or 470 and 475. Data 474 input into the modulator controller 471 is modulated with the input carrier signal 476 to generate the data signal on line 478. Signal line 478 is separate from signal line 472 such that the load modulator 473 and the amplifier 477 can be enabled or disabled independent from one another. Disabling the load modulator 473 or the amplifier 477 may be performed by setting the signal on line 472 or 478 respectively to a high or low DC logic level. The signal on signal line 478 is input into the amplifier 477. The amplifier 477 amplifies the signal on line 478 and transmits the information electrostatically over the electrostatic electrode 116. In active mode, after the transmit time has occurred, the power to the amplifier 477 may be turned OFF to conserve power. Vega at 15:20–37 The analog interface module 711 generally performs the power management function for the active electrostatic transceiver 704. Additionally, it generates its own clock from a free running low power clock oscillator. This generated clock is provided to other components of the active electrostatic transceiver 704 which require a clock including the bitrate generator 303. The analog interface module 711 also demodulates the received signal to generate a received data stream. The analog interface module 711 also analyzes the received data stream in order to determine if the active electrostatic transceiver 704 should perform some operation such as a read operation or a write operation and communicates the results of the analysis to the controller 307 and the write decoder 304. It preferably performs this analysis by searching for predetermined gaps in the received data stream. Modulator 309 as previously described in detail communicates information from the active electrostatic transceiver to a reader. Vega at 15:38–61

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	Now referring to FIG. 8A, selected details of the analog interface module 711 within the active electrostatic transceiver 704 are illustrated. The active electrostatic transceiver 704 includes the first electrostatic electrode 114, the second electrostatic electrode 115, the third electrostatic electrode 116, the transceiver circuit 710, and an energy storage means 360. The energy storage means 360 can be any type of energy storage means, including a battery or capacitor, preferably it is a thin foil battery to conform to a form factor for a smart card, tag, or badge. The transceiver circuit 710 as illustrated in FIG. 8A shows the relevant components for the second embodiment of the present invention. In FIG. 8A, the transceiver circuit 710 includes the analog interface module 711 and modulator 309. Components of the analog interface module 711 include a DC voltage rectifier/regulator 418, a power manager 812A, a clock extractor 430, a clock generator 830, a demodulator 432, and a modulator 309. The power manager 812A includes a detector/receiver 420, a power switch 422, a sleep timer 424, a power-on-resetor (POR) 426, and a manual switch 824. Except as otherwise described below, like numbered components of the transceiver circuit 710 operate similar to the similarly numbered components of the transceiver circuit 300 of the active electrostatic transceiver 104. Vega at 16:36–48 Power on resetor 426 monitors the device power line 460 to be sure that sufficient power is available to other components within the active electrostatic transceiver 704 before de-asserting a reset signal 425. Once sufficient power is generated in the device power line 460, reset signal 425 is de-asserted and other components may start functioning within the active electrostatic transceiver 704. In FIG. 8A the reset signal line 425 is coupled to the sleep timer 424, the demodulator 432, the modulator 309 and other components of the active electrostatic transceiver 704. In FIG. 8B, the reset signal line 425 is coupled to the analog delay block 464, the demodulator 432, the modulator 309 and other components of the active electrostatic transceiver 704. Vega at 16:53–17:8 The present invention has many advantages over the prior art. The present invention provides a larger read range over passive RFID communication systems and therefore increases the applicability of electrostatic communication systems. Additionally, the present invention provides for greater flexibility in choosing components for an electrostatic transceiver. Also, the present invention provides greater operational functionality in an electrostatic transceiver because the available power is greater. Furthermore, the present invention provides for greater integration in circuitry and reduces the amount space utilized for an active electrostatic transceiver. Additionally the present invention in its second embodiment reduces the interference and noise in an electrostatic communication system so that it may be used in environments

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	requiring low noise emission. The present invention provides for lower cost RFID transceivers such that disposable applications are possible. Furthermore, the present invention provides the capability to operate an active electrostatic transceiver in an active mode operating under the power of an energy storage means or in a passive mode under the power generated by a voltage rectifier/regulator when the energy storage means power is too low or if in the case of a desirable low-power operational mode. To the extent this limitation is not disclosed by Vega, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Vega, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
18[pre]. The method of claim 17 further comprising:	Vega discloses or renders obvious "[t]he method of claim 17 further comprising." *See* claim 17 above.
[18a] amplifying a signal received from the antenna to generate an amplified signal; and	Vega discloses or renders obvious "amplifying a signal received from the antenna to generate an amplified signal." For example: Vega at Abstract An active electrostatic transceiver is provided that has electrostatic electrodes, an energy storage means such as a battery and a transceiver circuit for communication within an electrostatic RFID communication system. The transceiver circuit includes power management features so that the energy storage means is not quickly depleted. Additionally the transceiver circuit includes amplifiers and filters so that the read range is further increased and noise sources are better filtered out. In a first embodiment, the transceiver circuit has a clock extractor that extracts a clock from the incoming data signal such that the clock and the data signal are synchronized so that demodulating the data from the data signal is simplified. In a second embodiment, the transceiver circuit has its own clock generator for initiating transmission of signals so that a reader need not have an exciter to generate an excitation signal. Each embodiment of the transceiver circuit has power management features so that power is conserved. Additionally, each transceiver circuit has the ability to operate in a passive mode, when there is insufficient charge in the energy storage means or a lower power mode is desirable. Vega at Figure 4D

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	 FIG.4D Vega at 3:28–45 Briefly, an active electrostatic transceiver is provided that has electrostatic electrodes, an energy storage means such as a battery and a transceiver circuit for communication within an electrostatic RFID communication system. The transceiver circuit includes power management features so that the energy storage means is not quickly depleted. Additionally the transceiver circuit includes amplifiers and filters so that the read range is further increased and noise filtering is improved. In a first embodiment, the transceiver circuit has a clock extractor that extracts a clock from the incoming data signal such that the clock and the data signal are synchronized so that demodulating the data from the data signal is simplified. In a second embodiment, the transceiver circuit has its own clock generator for initiating transmission of signals so that a reader need not have an exciter to generate an excitation signal. Both embodiments of the transceiver circuit have power management features that can decrease power consumption. Vega at 5:8–25 Briefly, an active electrostatic transceiver is provided that has electrostatic electrodes, an energy storage means, such as a battery, and a transceiver circuit for communication within an electrostatic RFID communication system. The transceiver circuit includes power management features so that the energy

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	storage means is not quickly depleted. Additionally the transceiver circuit includes amplifiers and filters so that the read range is further increased and noise filtering is improved. In a first embodiment, the transceiver circuit has a clock extractor that extracts a clock from the incoming data signal such that the clock and the data signal are synchronized so that demodulating the data from the data signal is simplified. In a second embodiment, the transceiver circuit has its own clock generator for initiating transmission of signals so that a reader need not have an exciter to generate an excitation signal. Both embodiments of the transceiver circuit have power management features that improve power conservation. Vega at 6:1–22 FIG. 1 illustrates the advantage that an active electrostatic transceiver 104 has over a passive electrostatic transceiver 102. The distance between an electrostatic transceiver and an electrostatic reader where communication may start to occur is referred to as the read range. In FIG. 1 the passive read range 125 between passive ES transceiver 102 and ES reader 101 is significantly smaller than the active read range 126 between active ES transceiver 104 and ES reader 101. This is because an energy storage means within the active electrostatic transceiver 104 allows for active transmission of signals using an amplifier. Because of its passive nature, the passive electrostatic transceiver 102 relies on a load modulation technique for communication of signals by reflecting back the energy of the excitation signal to the electrostatic reader 101. The reflection of the excitation signal requires that the passive electrostatic transceiver 102 be nearer the reader 101. The larger read range provided by reflected ES signals using load modulation or transmitted ES signals using an active transmitter allows the active electrostatic transceiver 104 to be used in other applications of RFID communication systems where a passive electrostatic transceiver 102 would not. Vega at 9:61–10:33 The detector/receiver 420 in the active electrostatic transceiver 104 may receive power directly from the energy storage means 360 in order to be actively listening for an excitation signal from an electrostatic reader 101. Alternatively, the detector/receiver 420 may have passive components sufficient to detect and receive signals when the energy storage means has insufficient energy to power active components. The detector/receiver 420 may have an amplifier for receiving and amplifying the incoming electrostatic signals, a bandpass filter for filtering unwanted frequencies outside a range of the carrier frequency, and a detector for detecting the presence of the carrier frequency in an excitation signal indicating that the transceiver is within the read range of an electrostatic reader 101. The detector may detect a number of oscillations in the received waveform at the carrier frequency indicating that it is not a noise source

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	generating the waveform. In the preferred embodiment, if the detector detects any signal in the band of the carrier it provides an indication signal. Upon detection of the excitation signal, the detector/receiver 420 generates a wakeup signal on signal line 427 indicating that the active electrostatic transceiver 104 is within range of an electrostatic field and that the active electrostatic transceiver 104 needs to go through its wake up procedure. When outside the range of an electrostatic field, the signal line 427 indicates a go to-sleep signal so that the transceiver may go into a low power sleep state. The wakeup signal 427 is provided to the power on resetor 426, the sleep timer 424, the power switch 422 and clock extractor 430. Upon receiving the wakeup signal 427, power on resetor 426 monitors the device power line 460 to be sure that sufficient power is available to other components within the active electrostatic transceiver 104 before de-asserting a reset signal 425. Once sufficient power is generated in the device power line 460, reset signal 425 is de-asserted and other components may start functioning within the active electrostatic transceiver 104. In FIG. 4A the reset signal line 425 is coupled to the sleep timer 424, the clock extractor 430, the demodulator 432, the modulator 309 and other components of the active electrostatic transceiver 104. Vega at 11:7–12:16 Power switch 422 is coupled to the detector/receiver 420 through the signal line 427 and to the sleep timer 424 or the analog delay block 464 through the signal line 423. The power switch 422 controls the switching of the high level power supply voltage 451 from the energy storage means 360 or the rectified voltage 461 and provides the analog interface module 301 with the means to manage power consumption. These energy sources may be coupled to the device power line 460 feeding power to other components of the active electrostatic transceiver 104. FIG. 4C illustrates the basic components of the power switch 422 that provide power selection for the active electrostatic transceiver 104. These components include the power analyzer 465, the multiplexor 466 and the multiplexor 469. Multiplexor 469 may optionally be a switch with one end connected to the amplifier power line 462 and another end connected to the device power line 460. Power analyzer 465 performs an analysis on the energy provided by the DC voltage rectifier/regulator 418 with that supplied by the energy storage means 360. The power analyzer 465 receives the rectified voltage 461, the high level supply voltage 451 and the low level supply voltage 450 in order to perform the analysis. Additionally, control signals 423, 427 and any other control signals are received by the power analyzer 465 to further control the multiplexor 466 and multiplexor 469. Signal lines 423 and 427 are exemplary control signals input into the power analyzer 465. Typically, if the energy storage means 360 has higher energy levels it is selectively coupled to the device power line 460 and the amplifier power line 462 when signal line 427 indicates a transmit signal. Optionally when the transceiver 104 is in an active mode for active transmission by amplifier 477 and when signal line 427

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	indicates a receive signal, the energy storage means may be selectively decoupled from the amplifier power line 462, have the rectified voltage 461 coupled to the amplifier power line 462 or alternatively have no power source coupled to the amplifier power line 462 powering OFF the circuitry of amplifier 477 in each case conserving power in the energy storage means. If it is the case that the energy storage means 360 has lower energy levels than that of the rectified voltage 461, the rectified voltage may be selectively coupled to the device power line 460 by multiplexor 466 and to the amplifier power line 462 by multiplexor 469 such that the load modulator 473 and the amplifier 477 can perform passive load modulation and passive transmission of electrostatic signals in a passive mode. Additionally if it is desirable to conserve power or more efficiently charge the energy storage means, multiplexor 466 or 469 can operate as switches decoupling the device power line 460 or the amplifier power line 462 from any power source. After selecting a power source where the power switch 422 couples the high level power supply 451 or the rectified voltage 461 with the device power line 460, circuitry within the active electrostatic transceiver goes into a power on reset sequence controlled by the power on resetor 426. When out of the power on reset sequence, the active electrostatic transceiver 104 can go through a communication cycle with the electrostatic reader 101 while in the read range and the sleep timer 424 starts counting or the analog delay cycle of the analog delay block 464 begins. If the active electrostatic transceiver remains in the electrostatic field (i.e. read range) and the sleep timer 424 reaches its predetermined count value or the analog delay block completes the predetermined RC delay time, a receive signal is indicated on signal line 423 to the power switch 422. The active electrostatic transceiver 104 continues to listen for signals from reader 101 or other sources that communicate on the carrier frequency. If the active electrostatic transceiver 104 is removed from the electrostatic field, the detector/receiver 420 resets and a sleep signal is indicated on signal line 427. Upon receiving the sleep signal, the power switch 422 selectively disconnects the high level voltage supply 451 from the device power line 460 so that components coupled to the device power line 460 become powered off and enter the sleep mode. In this manner when the active electrostatic transceiver 104 is outside the electrostatic field (i.e. read range) it goes into its low power sleep mode. Vega at 12:60–13:6 Modulator 309 is coupled to the power switch 422 through the device power line 460, the energy storage means 360 through the low level power supply 450, the electrostatic electrodes 114-116 respectively through signal lines 322, 323 and 327, power on resetor 426 through signal line 425, and the clock extractor 430 through clock signal line 325. Modulator 309 includes a load modulator for electrostatic electrodes 114-115 and an active power amplifier in order to amplify signals for the extra transmission distance to the reader over the electrostatic electrode 116. A passive electrostatic transceiver may not

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	function properly at large read ranges because of weak signals. The electrostatic reader's receiver may require increased sensitivity in order to receive signals from large read ranges. Vega at 13:7–14:10 Referring now to FIG. 4D, a block diagram is illustrated of the components within the modulator 309 for active and passive load modulation and active transmission. Active and passive load modulation are accomplished by the modulator controller and the load modulator. Active load modulation occurs when the energy storage means 360 is coupled to the device power line 460 and the circuitry of the modulator controller 471. Passive load modulation occurs when the DC voltage rectifier/regulator within the transceiver 104 provides the rectified voltage and is coupled through the power switch to the device power line 460 and the modulator controller 471. Load modulation is accomplished by varying the impedance between the electrostatic electrodes 114 and 115. Varying the impedance between the electrostatic electrodes, that are capacitively coupled with the electrostatic electrodes of the reader 101, causes the excitation signal generated by the reader 101 to be reflected back. A data signal and a carrier signal is input into the modulator controller 471 at line 474 and 476 respectively to control the load modulator 473. The carrier signal 476 is commonly referred to as the data carrier and has a carrier frequency. Preferably the carrier frequency of the data carrier is 62.5 K Hz or one-half the power carrier frequency. FIG. 4E illustrates a few load modulators 473A-473D. Load modulator 473A consists of a variable impedance 480 coupled between the electrostatic electrodes 114 and 115 that has its impedance varied or switched by control signal 472 from the modulator controller 471. Load modulator 473B includes transistors 481 and 482, each coupled respectively between an electrostatic electrode and the low level supply voltage 450. The transistors are preferably turned ON and OFF by having their gates switched by a digital drive signal supplied on control signal 472. Load modulator 473C includes transistor 483 coupled between the electrostatic electrodes 114 and 115. Transistor 483 is preferably turned ON and OFF by having its gate switched by a digital drive signal supplied on control signal 472. Load modulator 473D includes transistor 484 coupled between one electrostatic electrode 322 and the low level supply voltage 450. This is an asymmetrical load modulation technique where circuitry within a rectifier provides the return path through the opposite electrostatic electrode 323. Referring back to FIG. 4D, active and passive transmission is accomplished by the modulator controller 471 and amplifier 477. Amplifier 477 is preferably a CMOS fully complementary inverter or buffer with its VDD input connected to the amplifier power line 462 and its VSS connection coupled to the low level power supply 450. Active transmission occurs when power is coupled from the high level power supply 451 through the power switch and onto the amplifier power line 462 by multiplexor 469. Passive transmission occurs when the DC voltage rectifier/regulator 418 within the transceiver 104 provides the rectified voltage and is coupled through the

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	power switch to the amplifier power line 462 by multiplexor 469. Multiplexor 469 and 466 can further operate as a switch to selectively turn power OFF to circuitry connected to the device power line 460 or the amplifier power line 462 by turning OFF both of the transistor switches 467-468 or 470 and 475. Data 474 input into the modulator controller 471 is modulated with the input carrier signal 476 to generate the data signal on line 478. Signal line 478 is separate from signal line 472 such that the load modulator 473 and the amplifier 477 can be enabled or disabled independent from one another. Disabling the load modulator 473 or the amplifier 477 may be performed by setting the signal on line 472 or 478 respectively to a high or low DC logic level. The signal on signal line 478 is input into the amplifier 477. The amplifier 477 amplifies the signal on line 478 and transmits the information electrostatically over the electrostatic electrode 116. In active mode, after the transmit time has occurred, the power to the amplifier 477 may be turned OFF to conserve power. To the extent this limitation is not disclosed by Vega, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Vega, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 8 and claim 17 above.
[18b] providing the amplified signal to the smartcard controller.	Vega discloses or renders obvious "providing the amplified signal to the smartcard controller." *See* [18a] above. To the extent this limitation is not disclosed by Vega, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Vega, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 8 and claim 17 above.
19. The method of claim 10 or 17, wherein the transmitted data includes ticketing information for a mass transit system.	Vega discloses or renders obvious "[t]he method of claim 10 or 17, wherein the transmitted data includes ticketing information for a mass transit system." *See* claim 2 above. *See also* claims 10 and 17 above.
20. The method of claim 10 or 17, wherein the transmitted data includes transaction information for a mobile payment.	Vega discloses or renders obvious "[t]he method of claim 10 or 17, wherein the transmitted data includes transaction information for a mobile payment." *See* claim 3 above.

Claim Element	Exemplary Citations to U.S. Pat. No. 6,282,407 ("Vega")
	See also claims 10 and 17 above.

DEFENDANTS' INVALIDITY CONTENTIONS FOR U.S. PAT. 11,694,053

EXHIBIT C07: W.O. 2007/135434 ("Wilson")

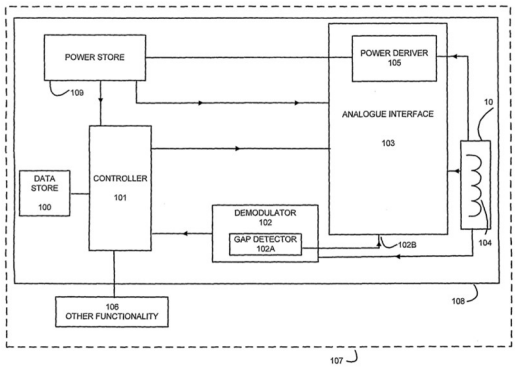
As demonstrated in the claim charts below, the claims of U.S. Patent No. 11,694,053 ("the '053 patent") are invalid (a) under one or more sections of 35 U.S.C. § 102 as anticipated by Wilson and (b) under 35 U.S.C. § 103(a) as obvious over Wilson standing alone and as set forth herein, and/or combined with the knowledge of a person of ordinary skill in the art, Applicant's Admitted Prior Art, and/or the additional prior art references discussed in Exhibit C and Exhibits C01–C09, the contents of which are hereby incorporated by reference into this chart. One of ordinary skill in the art, as of the priority date of the '053 patent, would have known to combine the prior art elements disclosed by the foregoing references using known methods, and to use these elements according to their established functions in order to achieve a known and predictable result.

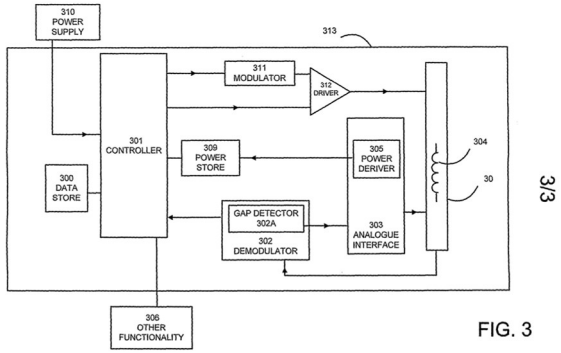
Defendants have conducted the invalidity analysis herein based at least in part and in some instance entirely upon Plaintiff's apparent application of the claims of the '053 patent. By charting the prior art against the claims and limitations herein, Defendants are not admitting or agreeing to Plaintiff's application of the claims at issue in this case, and these charts should not be interpreted as an admission or concession by Defendants that any particular construction or application of any claim limitation by Plaintiff is correct or proper. Additionally, these charts provide representative examples of portions of the charted references that disclose the indicated limitations of the claims; additional portions of these references other than the representative examples provided herein may also disclose the indicated limitation(s) and Defendants contend that the asserted claims are invalid in light of the charted reference(s) as a whole in its or their entirety. Where a particular figure is cited, the citation should be understood to encompass the caption and description of the figure as well as any text relating to or describing the figure. Conversely, where particular text referring to a figure is cited, the citation should be understood to include the figure as well.

Claim Element	**Exemplary Citations to W.O. 2007/135434 ("Wilson")**
1[pre]. A mobile device comprising:	By providing this disclosure, Defendants do not take a position on whether the preamble is a claim limitation. Wilson discloses or renders obvious "[a] mobile device." For example: Wilson at 1:6–13 Near field RF (radio frequency) communication requires an antenna of one near field RF communicator to be present within the alternating magnetic field (H field) generated by the antenna of another near field RF communicator by transmission of an RF signal (for example a 13.56 Mega Hertz signal) to enable the magnetic field (the H field) of the RF signal to be inductively coupled between the communicators. The RF signal may be modulated to enable communication of control and/or other data. Ranges of up to several centimetres (generally a maximum of 1 metre) are common for near field RF communicators. Wilson at 3:5–23 Near field RF communicators may be provided as standalone or discrete devices (for example an RF transponder or tag may be included within a key fob, poster or other media) or may be incorporated within or coupled to or otherwise associated with larger electrical devices or hosts (referred to below as near field RF communications-enabled devices). When incorporated within a larger device or host, a near field RF

Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	communicator may be a discrete entity or may be provided partly or wholly by functionality within the larger device or host. Examples of such larger devices or host devices are, for example, cellular telephone devices, portable computing devices (such as personal digital assistants, notebooks, lap-tops), other computing devices such as personal or desk top computers, computer peripherals such as printers, or other electrical devices such as portable audio and/or video players such as MP3 players, IPODs®, CD players, DVD players, consumer products such as domestic appliance or personal care products and other electrical and electronic devices, apparatus or systems. Some areas of application are payment systems, ticketing systems (for example RF transponders may be carried by tickets such as parking tickets, bus tickets, train tickets or entrance permits or entrance tickets) or in ticket checking systems, toys, games, posters, packaging, advertising material, product inventory checking systems and so on. Wilson at 9:26–10:19 As another possibility, the other functionality 106 may be an interface to another electrical device or host with which the near field RF transponder 108 may be associated to form a near field RF communications-enabled device. In this case, the near field RF transponder 108 may be associated with the host by, for example, a wired or wireless coupling. In such a case, a housing of the near field RF transponder 108 may be physically separate from or may be attached to the housing of the host; in the later case, the attachment may be permanent once made or the near field RF transponder 108 may be removable. As examples, the near field RF transponder 108 may be housed within: a housing attachable to another device; a housing portion, such as a fascia of the near field RF communications-enabled device or another device; an access card; a key fob; a token; or may have a housing shaped or configured to look like a smart card. As other examples, the near field RF transponder 108 may be coupled to a larger device by way of a communications link such as, for example, a USB link, or may be provided as a card (for example a PCMCIA card or a card that looks like a smart card) which can be received in an appropriate slot of the larger or host device. Examples of hosts are, for example, personal computers, mobile telephones (cell-phones), personal digital assistants, notebooks, other computing devices such as personal or desk top computers, computer peripherals such as printers, or other electrical devices such as portable audio and/or video players such as MP3 players, IPODs®, CD players, DVD players, other electrical or electronic products, for example consumer products such as domestic appliance or personal care products, and other electrical or electronic devices, apparatus or systems. Wilson at 17:23–18:1

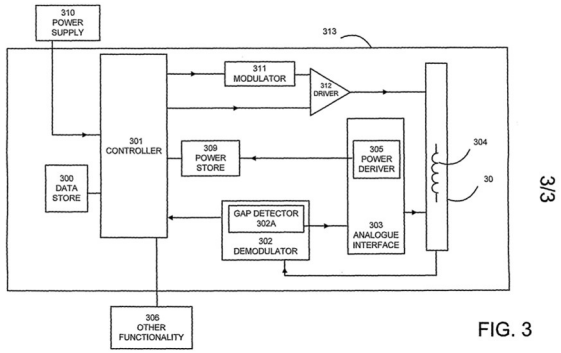
Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	In addition, however, the NFC communicator 313 also has the ability to generate or transmit its own RF field and also to modulate that RF field. In the example shown, this functionality consists of a driver 312 having an output coupled to the antenna circuit 30, one input coupled to the controller 301 and the other input coupled to a modulator 311 coupled to the controller. The NFC communicator 313 also has a power supply 310 which may be part of the NFC communicator or the other functionality, for example the power supply 310 may be provided by a host or. The power supply 310 may be, for example, a battery such as a button cell battery. Wilson at 18:9–19 As another possibility, the other functionality 306 may be an interface to another electrical device or host with which the NFC communicator 313 may be associated to form a near field RF communications-enabled device. The NFC communicator 313 may be associated with the host, for example by a wired or wireless coupling examples being as described above with reference to Figure 1. As another possibility, the other functionality 306 may include, for example, an interface to another electrical device thereby forming a near field RF communications-enabled device. For convenience, the functionality of the remainder of the near field RF communications-enabled device is not shown in Figure 3. Examples of such host devices may be the same as for the examples given above for Figure 1. Wilson at 19:3–16 In the initiator mode, the NFC communicator 313 may initiate communication with any compatible target which may be an NFC communicator 313 in target mode or a near field RF transponder of Figures 1 and 2 such as shown in Figures l and 2. In the target mode, the NFC communicator 313 may respond to initiation of communication by any compatible initiator which may be an RFDD transceiver or an NFC communicator in initiator mode. As used herein, compatible means operable at the same frequency and in accordance with the same protocols, for example in accordance with the protocols set out in various standards such as ISO/IEC 18092, ISO/IEC 21481, ISO/IEC 14443 and ISO/IEC 15693. Communication may be an active communication under which the initiator and target each generate their own RF field when communicating data and then turn off that RF field to await data communication from the other or passive communication under which the initiator transmits and maintains its RF field throughout the entire communication. Wilson at 20:27–21:8 The functionality of the controller is described above as being entirely within the near field RF transponder or NFC communicator. As other possibilities, the functionality of the controller may be

Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	entirely within any host device controller or distributed between the near field RF transponder or NFC communicator and the host device. As a further possibility for an NFC communicator, certain control functionality may reside within a separate unit which is attachable or removable or alternatively only used for certain transactions, for example a security device or ESD device which may only be used for payment transactions. Where the functionality of the controller is within a separate unit or within any host device, then instead of the controller the near field RF transponder or NFC communicator will have a coupling, possibly including an appropriate interface, to that controller. Wilson at 22:1–9 The components of the near field RF communicators described above, apart from the power supply, if present, and the antenna circuit may be provided by a single semiconductor integrated circuit chip or by several separate chips, for example one or more silicon integrated circuits, or discrete devices mounted on a printed circuit board. Whether particular functions are implemented by analogue or digital circuitry will depend on the design route chosen. Antennas will be constructed in a form suitable for system and circuit requirements and may, as described above be coils. Wilson at Figure 1  FIG. 1 Wilson at Figure 3

Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	 FIG. 3 To the extent this limitation is not disclosed by Wilson, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Wilson, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[1a] a power source;	Wilson discloses or renders obvious "a power source." For example: Wilson at 1:28–2:14 Communication of data between NFC communicators may be via an active communication mode in which the NFC communicator transmits or generates an alternating magnetic field modulated with the data to be communicated and the receiving NFC communicator responds by transmitting or generating its own modulated magnetic field. Communication of data between NFC communicators may be via a passive communication mode in which one NFC communicator transmits or generates an alternating magnetic field and maintains that field and the responding NFC communicator modulates the magnetic field to which it is inductively coupled with the data to be communicated, for example by modulating the load on the inductive coupling ("load modulation"). Near field RF communicators may also communicate actively or passively. Active communication is where communication requires the near field RF communicator to have an internal power source available to it. Passive communication is where a near field RF communicator derives a power supply from a received magnetic field. Generally an RF transceiver will use active communication while an RF transponder will use passive communication. An NFC communicator may use either active or passive communication. Wilson at 2:15–21

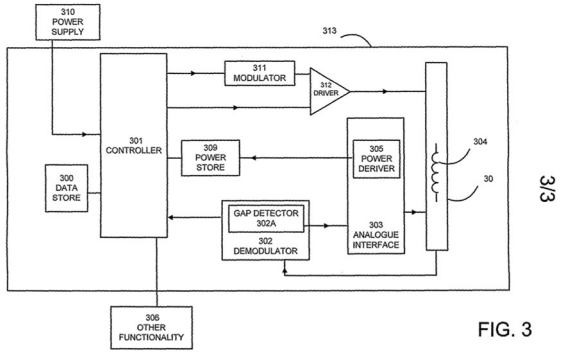
Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	A near field RF communicator may be independently powered, that is it may have its own power source or access to a host power source. Alternatively or additionally a near field RF communicator may be designed to derive at least part of is power from an inductively coupled RF field (as described above for passive communication). Generally RF transceivers have their own power source or access to a host power source while RF transponders will generally derive their power supply from an inductively coupled RF field. Wilson at 4:16–21 One way of addressing the effects on power derivation caused by a loss or weakening of the magnetic field may be to include a large capacitor to store power. However, such a capacitor would require a commensurately large amount of circuit area which would increase the overall size of the responsive near field RF communicator. Also, the introduction of additional capacitance may detrimentally affect, that is slow down, circuit response times. Wilson at 9:4–10 The near field RF transponder 108 has a power deriver 105 coupled to the antenna circuit 10 to derive at least a portion of a power supply for the near field RF transponder 108 from an inductively coupled alternating magnetic field and a power store 109 coupled to store power derived by the power deriver 105. The power store 109 may be a capacitor, or a number of capacitors. Although the power deriver 105 is shown in Figure 1 as being within the analogue interface 103, it may be separate from the analogue interface 103. Wilson at 9:11–14 The power store 109 is coupled to provide power for those components of the near field RF transponder 108 that require power. However, in the interests of clarity in Figure 1, not all of the couplings to the power store 109 are shown in Figure 1. Wilson at 17:23–18:1 In addition, however, the NFC communicator 313 also has the ability to generate or transmit its own RF field and also to modulate that RF field. In the example shown, this functionality consists of a driver 312 having an output coupled to the antenna circuit 30, one input coupled to the controller 301 and the other input coupled to a modulator 311 coupled to the controller. The NFC communicator 313 also has a power supply 310 which may be part of the NFC communicator or the other functionality, for example the power

Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	supply 310 may be provided by a host or. The power supply 310 may be, for example, a battery such as a button cell battery. Wilson at 19:3–16 In the initiator mode, the NFC communicator 313 may initiate communication with any compatible target which may be an NFC communicator 313 in target mode or a near field RF transponder of Figures 1 and 2 such as shown in Figures l and 2. In the target mode, the NFC communicator 313 may respond to initiation of communication by any compatible initiator which may be an RFDD transceiver or an NFC communicator in initiator mode. As used herein, compatible means operable at the same frequency and in accordance with the same protocols, for example in accordance with the protocols set out in various standards such as ISO/IEC 18092, ISO/IEC 21481, ISO/IEC 14443 and ISO/IEC 15693. Communication may be an active communication under which the initiator and target each generate their own RF field when communicating data and then turn off that RF field to await data communication from the other or passive communication under which the initiator transmits and maintains its RF field throughout the entire communication. Wilson at 19:21–28 Where the NFC communicator is in initiator mode and using active communication, the driver 312 is controlled by the controller 301 to drive the antenna circuit to produce the required RF field and the modulator 311 is controlled by the controller 301 to cause the RF field to be modulated in accordance with the data (information and/or control data) to be communicated. The controller 301 may use its own internal clock as an oscillator from which to derive the oscillating signal to produce the RF field or a separate oscillator may be provided either within the NFC communicator 313 or its host, if it has one. Wilson at 19:29–20:18 Where the NFC communicator is in target mode, then the operation of the NFC communicator will be similar to that described above for the near field RF transponder. For example, when the NFC communicator is in target mode and uses the circuitry shown in Figure 2, then, as described above with respect to Figure 2, the voltage between L1 and L2 is controlled by the error amplifier 206 and operation of the error amplifier is in turned controlled by the switches 203 and 204. Where the NFC communicator is independently powered (i.e. the power supply 310 is available), the error amplifier 206 may or may not be powered down in the event that the external magnetic field droops. Operation of the error amplifier may be controlled entirely by controller 301, that is only in circumstances where the NFC communicator is modulating a supplied RF field with data. The error amplifier 206 will be disconnected by the controller

Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	when the NFC communicator is providing its own RF field. As another possibility, the switches 203 and 204 (Figure 2) may be controlled by a signal from the modulator 311 rather than the controller 301, so that the error amplifier is only disconnected while the modulator is modulating the NFC communicator's own RF field. Even where the additional power supply 310 is available, the ability to re-direct power away from specific areas of the antenna circuitry (namely the error amplifier 206) may still be advantageous, for example where the additional power supply 310 is low or has been disconnected. Wilson at 22:1–9 The components of the near field RF communicators described above, apart from the power supply, if present, and the antenna circuit may be provided by a single semiconductor integrated circuit chip or by several separate chips, for example one or more silicon integrated circuits, or discrete devices mounted on a printed circuit board. Whether particular functions are implemented by analogue or digital circuitry will depend on the design route chosen. Antennas will be constructed in a form suitable for system and circuit requirements and may, as described above be coils. Wilson at Figure 3  FIG. 3 To the extent this limitation is not disclosed by Wilson, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Wilson, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[1b] a smartcard controller coupled to the power source to receive power;	Wilson discloses or renders obvious "a smartcard controller coupled to the power source to receive power." For example:

Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	Wilson at 1:28–2:14 Communication of data between NFC communicators may be via an active communication mode in which the NFC communicator transmits or generates an alternating magnetic field modulated with the data to be communicated and the receiving NFC communicator responds by transmitting or generating its own modulated magnetic field. Communication of data between NFC communicators may be via a passive communication mode in which one NFC communicator transmits or generates an alternating magnetic field and maintains that field and the responding NFC communicator modulates the magnetic field to which it is inductively coupled with the data to be communicated, for example by modulating the load on the inductive coupling ("load modulation"). Near field RF communicators may also communicate actively or passively. Active communication is where communication requires the near field RF communicator to have an internal power source available to it. Passive communication is where a near field RF communicator derives a power supply from a received magnetic field. Generally an RF transceiver will use active communication while an RF transponder will use passive communication. An NFC communicator may use either active or passive communication. Wilson at 9:11–14 The power store 109 is coupled to provide power for those components of the near field RF transponder 108 that require power. However, in the interests of clarity in Figure 1, not all of the couplings to the power store 109 are shown in Figure 1. Wilson at 17:23–18:1 In addition, however, the NFC communicator 313 also has the ability to generate or transmit its own RF field and also to modulate that RF field. In the example shown, this functionality consists of a driver 312 having an output coupled to the antenna circuit 30, one input coupled to the controller 301 and the other input coupled to a modulator 311 coupled to the controller. The NFC communicator 313 also has a power supply 310 which may be part of the NFC communicator or the other functionality, for example the power supply 310 may be provided by a host or. The power supply 310 may be, for example, a battery such as a button cell battery. Wilson at 19:3–16 In the initiator mode, the NFC communicator 313 may initiate communication with any compatible target which may be an NFC communicator 313 in target mode or a near field RF transponder of Figures 1 and 2 such as shown in Figures l and 2. In the target mode, the NFC communicator 313 may respond to initiation of communication by any compatible initiator which may be an RFDD transceiver or an NFC

Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	communicator in initiator mode. As used herein, compatible means operable at the same frequency and in accordance with the same protocols, for example in accordance with the protocols set out in various standards such as ISO/IEC 18092, ISO/IEC 21481, ISO/IEC 14443 and ISO/IEC 15693. Communication may be an active communication under which the initiator and target each generate their own RF field when communicating data and then turn off that RF field to await data communication from the other or passive communication under which the initiator transmits and maintains its RF field throughout the entire communication. Wilson at 19:21–28 Where the NFC communicator is in initiator mode and using active communication, the driver 312 is controlled by the controller 301 to drive the antenna circuit to produce the required RF field and the modulator 311 is controlled by the controller 301 to cause the RF field to be modulated in accordance with the data (information and/or control data) to be communicated. The controller 301 may use its own internal clock as an oscillator from which to derive the oscillating signal to produce the RF field or a separate oscillator may be provided either within the NFC communicator 313 or its host, if it has one. Wilson at 19:29–20:18 Where the NFC communicator is in target mode, then the operation of the NFC communicator will be similar to that described above for the near field RF transponder. For example, when the NFC communicator is in target mode and uses the circuitry shown in Figure 2, then, as described above with respect to Figure 2, the voltage between L1 and L2 is controlled by the error amplifier 206 and operation of the error amplifier is in turned controlled by the switches 203 and 204. Where the NFC communicator is independently powered (i.e. the power supply 310 is available), the error amplifier 206 may or may not be powered down in the event that the external magnetic field droops. Operation of the error amplifier may be controlled entirely by controller 301, that is only in circumstances where the NFC communicator is modulating a supplied RF field with data. The error amplifier 206 will be disconnected by the controller when the NFC communicator is providing its own RF field. As another possibility, the switches 203 and 204 (Figure 2) may be controlled by a signal from the modulator 311 rather than the controller 301, so that the error amplifier is only disconnected while the modulator is modulating the NFC communicator's own RF field. Even where the additional power supply 310 is available, the ability to re-direct power away from specific areas of the antenna circuitry (namely the error amplifier 206) may still be advantageous, for example where the additional power supply 310 is low or has been disconnected. Wilson at Figure 3

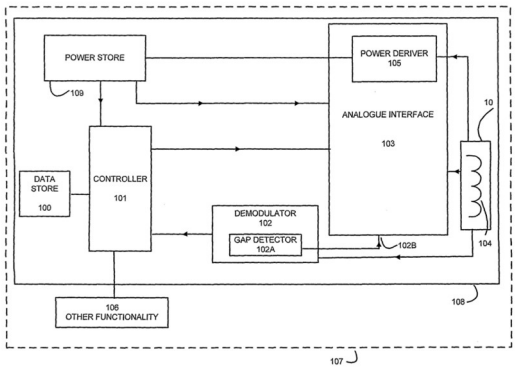
Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	 FIG. 3 To the extent this limitation is not disclosed by Wilson, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Wilson, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[1c] an antenna tuned to operate at substantially 13.56 MHz, wherein the antenna interacts with a Near Field Communication (NFC) reader external to the mobile device; and	Wilson discloses or renders obvious "an antenna tuned to operate at substantially 13.56 MHz, wherein the antenna interacts with a Near Field Communication (NFC) reader external to the mobile device." For example: Wilson at 1:6–13 Near field RF (radio frequency) communication requires an antenna of one near field RF communicator to be present within the alternating magnetic field (H field) generated by the antenna of another near field RF communicator by transmission of an RF signal (for example a 13.56 Mega Hertz signal) to enable the magnetic field (the H field) of the RF signal to be inductively coupled between the communicators. The RF signal may be modulated to enable communication of control and/or other data. Ranges of up to several centimetres (generally a maximum of 1 metre) are common for near field RF communicators. Wilson at 3:24–4:3 When a responsive near field RF communicator such as a near field RF transponder is within the alternating magnetic field (H field) generated by the antenna of an initiator near field RF communicator (an RFID transceiver or NFC communicate operating in initiator mode) transmitting an RF field, the alternating magnetic field will be inductively coupled to the antenna of the responsive near field communicator. A responsive near field RF communicator may derive power from the coupled RF field

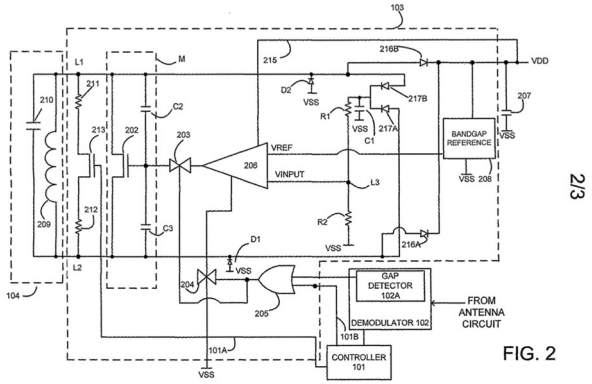
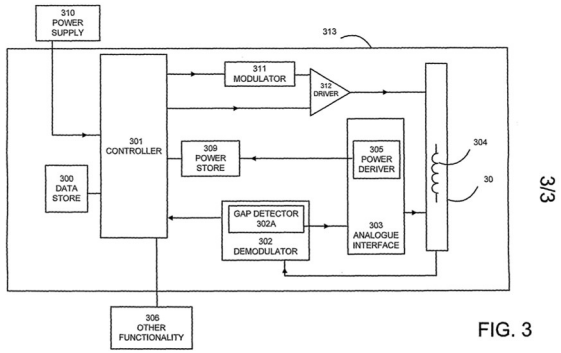
Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	and, once sufficient power has been derived, respond to the initiator near field RF communicator, for example through modulation of the received RF field. Wilson at 5:19–24 In an embodiment, the present invention provides a responsive near field RF communicator having an error amplifier to control a voltage within the near field RF communicator, for example within an antenna circuit of the near field RF communicator, and in which power supply to the error amplifier is controlled in accordance with signals dependent upon the strength of a magnetic field inductively coupled to the antenna and/or the presence of modulation. Wilson at 6:16–7:2 In an embodiment, the present invention provides an antenna apparatus suitable for use in a near field RF communicator, the antenna apparatus comprising an antenna circuit comprising an antenna coil and, in one example, at least one capacitor and at least two resistors, the apparatus further comprising an analogue interface coupled to the antenna circuit, the analogue interface comprising at least one error amplifier, at least one switch for controlling operation of the error amplifier, the switch being controlled by at least one of a demodulator, a gap detector and a modulation indicator, and a capacitor to store power derived from a supplied magnetic field. In one example, the switch is controlled so as not to provide power to the at least one error amplifier during at least one of modulation of the supplied magnetic field by the near field RF communicator and detection of any gap or reduction in level of supplied magnetic field. The modulation indicator may be provided by a controller of the near field RF communicator. Wilson at 7:3–12 An embodiment provides a near field RF communicator having: an inductive coupler to enable inductive coupling with a magnetic field of an RF signal; a demodulator to extract modulation from an inductively coupled magnetic field; an error amplifier operable to control a voltage of the near field RF communicator on the basis of a comparison of a reference voltage with a further voltage; a modulator operable to modulate an inductively coupled magnetic field with data to be communicated via the inductive coupling; and an error amplifier controller to inhibit operation of the error amplifier in the event of at least one of a magnetic field amplitude (or strength) below a predetermined level and the presence of modulation. Wilson at 8:17–27

Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	The near field RF transponder 108 has an inductive coupler or antenna circuit 10 and an analogue interface 103 to provide an interface between the antenna circuit and other operational components of the near field RF transponder 108. As Figure 1 is a functional block diagram, the antenna circuit 10 is shown simply by a representation of an antenna coil 104. Any suitable form of series or parallel antenna circuit may be used and one example will be described below with reference to Figure 2. The antenna circuit 10 enables inductive coupling to an alternating magnetic field (H field) of an RF signal (for example a 13.56 Mega Hertz signal) generated or transmitted by, for example, an initiator near field RF communicator such as an RFK) transceiver or an NFC communicator in initiator mode. Wilson at 8:28–9:3 As shown in Figure 1, the other operational components comprise a demodulator 102 coupled to the antenna circuit 10 to extract the modulation (data) from a modulated magnetic field inductively coupled to the antenna circuit 10. The demodulator 102 is also coupled to supply the extracted data to a controller 101 that controls overall operation of the near field RF transponder 108. A data store 100 is coupled to the controller 101. Wilson at 12:3–24 The controller 101 controls communication of data by the near field RF transponder 108 in accordance with at least one of pre-stored instructions or programming and instructions determined by the controller from modulation extracted by the demodulator 102. The controller 101 causes data to be communicated by controlling the modulation element mentioned above to modulate the load ("load modulation") on the inductive coupling between the near field RF transponder and the initiator near field RF communicator. The modulation element may comprise a transistor element in parallel with the antenna coil of the antenna circuit 104. The controller supplies a modulation signal representing the data to be communicated to a control gate of the transistor element, thereby causing an impedance to be switched across the antenna coil of the antenna circuit 104 in accordance with the data to be communicated. The load on the inductive coupling between the antenna circuit 104 of the near field RF transponder and the initiator near field RF communicator is thus varied in accordance with the data to be communicated, so causing modulation of the amplitude of the signal in the antenna circuit of the initiator near field RF communicator, which modulation can then be extracted by a demodulator of the initiator near field RF communicator. The modulation scheme used will depend on the communications protocol being used and program data within controller 101. For example such modulation scheme may be compatible with ISO 14443A and thus enable the near field RF transponder in Figure 1 to communicate with ISO 14443A compatible initiator near field RF communicators.

Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	Wilson at 13:14–27 As discussed above, the analogue interface 103 comprises a switchable impedance element M coupled between respective connection junctions L1 and L2 of the antenna coil 209. In order to communicate data, the controller 101 switches the switchable impedance element M in and out in accordance with the data to be communicated, thereby modulating the load on the inductively coupled antenna circuits of the near field RF transponder (for example 108 from Figure 1) and the initiator near field RF communicator. In the example shown, the switchable impedance element M comprises a transistor element consisting of one or more transistors 213 (as shown an n-channel enhancement mode MOSFET) having a control gate coupled to a data output or modulation signal line 101A of the controller 101. Optionally the switchable impedance element M also comprises a resistor 211 coupling one main electrode of the transistor element 213 to junction L1 and a resistor 212 coupling the other main electrode of the transistor element 213 to junction L2. Wilson at 14:12–21 Although not shown in Figure 2, as will be understood by the person skilled in the art, the demodulator 102 is coupled to the antenna circuit 104 to enable the demodulator 102 to extract data from an RF signal inductively coupled to antenna circuit from an initiator near field RF communicator. Such an initiator near field RF communicator may cause the RF signal to be interrupted in accordance with the data to be transmitted or to be modulated, for example, amplitude modulated, in accordance with the data to be transmitted. The controller 101 may respond by communicating data using load modulation as discussed above. So as to avoid conflict, the controller 101 may disable the demodulator 102 whilst the controller 101 is communicating data. Wilson at 15:20–16:3 Thus, when a signal is received from either the gap detector (equating to a gap or reduction in the magnetic field strength coupled to antenna coil 209) or the controller (equating to modulation by the controller of the received magnetic field), the output from the OR gate 205 turns off switch 204 (its bias current is turned off). This has the effect of disrupting the supply of power to the error amplifier 206 and thereby reducing the overall power required by the near field RF transponder. Also turning off switch 203 prevents the error amplifier 206 from having any effect on the voltage between junctions L1 and L2. The switches 203 and 204 and the controller 101 and gap detector 102A also function to ensure that the error amplifier 206 does not regulate the voltage between L1 and L2 while modulation is occurring. This prevents the error amplifier 206 from changing the modulation level or depth and so avoids the possibility

Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	of the modulation being distorted by the error amplifier 206 which might otherwise result in the modulation being very difficult or impossible to extract. Wilson at 16:15–24 The NFC communicator 313 has an inductive coupler or antenna circuit 30 and an analogue interface 303 to provide an interface between the antenna circuit 30 and other operational components of the NFC communicator 313. As Figure 3 is a functional block diagram the antenna circuit 30 is shown simply by a representation of an antenna coil 304. Any suitable form of series or parallel antenna circuit may be used. The antenna circuit 30 enables inductive coupling to an alternating magnetic field (H field) (for example from a 13.56 Mega Hertz signal) generated or transmitted by, for example, an initiator near field RF communicator such as an RFDD transceiver or an NFC communicator in initiator mode. Wilson at 16:25–30 As shown in Figure 3, the other operational components comprise a demodulator 302 coupled to the antenna circuit 30 to extract the modulation from a modulated signal inductively coupled to the antenna circuit 30. The demodulator 302 is also coupled to a controller 301 provided to control overall operation of the NFC communicator 313. A data store 300 is coupled to the controller 301. Wilson at 19:21–28 Where the NFC communicator is in initiator mode and using active communication, the driver 312 is controlled by the controller 301 to drive the antenna circuit to produce the required RF field and the modulator 311 is controlled by the controller 301 to cause the RF field to be modulated in accordance with the data (information and/or control data) to be communicated. The controller 301 may use its own internal clock as an oscillator from which to derive the oscillating signal to produce the RF field or a separate oscillator may be provided either within the NFC communicator 313 or its host, if it has one. Wilson at 19:29–20:18 Where the NFC communicator is in target mode, then the operation of the NFC communicator will be similar to that described above for the near field RF transponder. For example, when the NFC communicator is in target mode and uses the circuitry shown in Figure 2, then, as described above with respect to Figure 2, the voltage between L1 and L2 is controlled by the error amplifier 206 and operation of the error amplifier is in turned controlled by the switches 203 and 204. Where the NFC communicator is independently powered (i.e. the power supply 310 is available), the error amplifier 206 may or may not be powered down in the event that the external magnetic field droops. Operation of the error amplifier

Claim Element	Exemplary Citations to W.O. 2007/135434 (“Wilson”)
	may be controlled entirely by controller 301, that is only in circumstances where the NFC communicator is modulating a supplied RF field with data. The error amplifier 206 will be disconnected by the controller when the NFC communicator is providing its own RF field. As another possibility, the switches 203 and 204 (Figure 2) may be controlled by a signal from the modulator 311 rather than the controller 301, so that the error amplifier is only disconnected while the modulator is modulating the NFC communicator's own RF field. Even where the additional power supply 310 is available, the ability to re-direct power away from specific areas of the antenna circuitry (namely the error amplifier 206) may still be advantageous, for example where the additional power supply 310 is low or has been disconnected. Wilson at 22:1–9 The components of the near field RF communicators described above, apart from the power supply, if present, and the antenna circuit may be provided by a single semiconductor integrated circuit chip or by several separate chips, for example one or more silicon integrated circuits, or discrete devices mounted on a printed circuit board. Whether particular functions are implemented by analogue or digital circuitry will depend on the design route chosen. Antennas will be constructed in a form suitable for system and circuit requirements and may, as described above be coils. Wilson at Figure 1  FIG. 1 Wilson at Figure 2

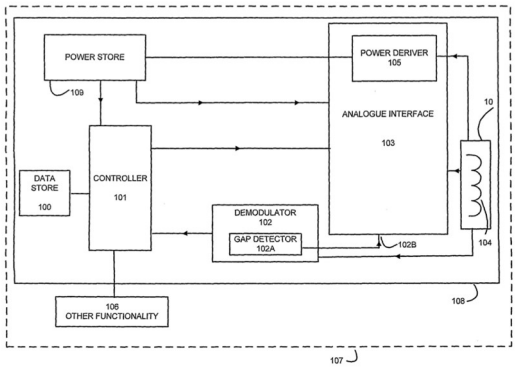
Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	 FIG. 2 2/3 Wilson at Figure 3  FIG. 3 3/3 To the extent this limitation is not disclosed by Wilson, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Wilson, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[1d] an active transmit driver circuit coupled to the power source to receive the power, wherein the active transmit driver circuit affects transmission of data	Wilson discloses or renders obvious "an active transmit driver circuit coupled to the power source to receive the power, wherein the active transmit driver circuit affects transmission of data between the antenna and the NFC reader." For example: Wilson at 1:28–2:14

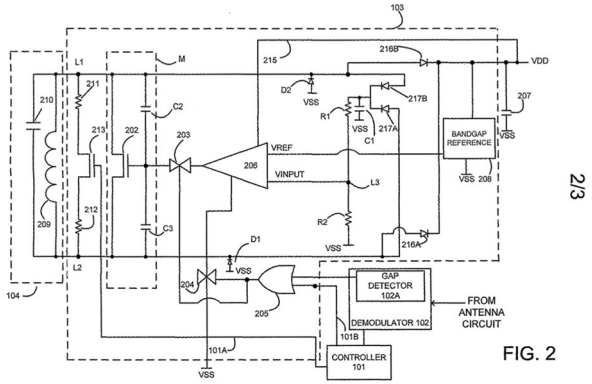
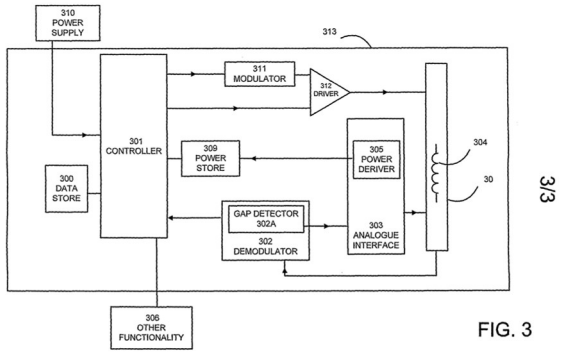
Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
between the antenna and the NFC reader.	Communication of data between NFC communicators may be via an active communication mode in which the NFC communicator transmits or generates an alternating magnetic field modulated with the data to be communicated and the receiving NFC communicator responds by transmitting or generating its own modulated magnetic field. Communication of data between NFC communicators may be via a passive communication mode in which one NFC communicator transmits or generates an alternating magnetic field and maintains that field and the responding NFC communicator modulates the magnetic field to which it is inductively coupled with the data to be communicated, for example by modulating the load on the inductive coupling ("load modulation"). Near field RF communicators may also communicate actively or passively. Active communication is where communication requires the near field RF communicator to have an internal power source available to it. Passive communication is where a near field RF communicator derives a power supply from a received magnetic field. Generally an RF transceiver will use active communication while an RF transponder will use passive communication. An NFC communicator may use either active or passive communication. Wilson at 6:16–7:2 In an embodiment, the present invention provides an antenna apparatus suitable for use in a near field RF communicator, the antenna apparatus comprising an antenna circuit comprising an antenna coil and, in one example, at least one capacitor and at least two resistors, the apparatus further comprising an analogue interface coupled to the antenna circuit, the analogue interface comprising at least one error amplifier, at least one switch for controlling operation of the error amplifier, the switch being controlled by at least one of a demodulator, a gap detector and a modulation indicator, and a capacitor to store power derived from a supplied magnetic field. In one example, the switch is controlled so as not to provide power to the at least one error amplifier during at least one of modulation of the supplied magnetic field by the near field RF communicator and detection of any gap or reduction in level of supplied magnetic field. The modulation indicator may be provided by a controller of the near field RF communicator. Wilson at 7:3–12 An embodiment provides a near field RF communicator having: an inductive coupler to enable inductive coupling with a magnetic field of an RF signal; a demodulator to extract modulation from an inductively coupled magnetic field; an error amplifier operable to control a voltage of the near field RF communicator on the basis of a comparison of a reference voltage with a further voltage; a modulator operable to modulate an inductively coupled magnetic field with data to be communicated via the inductive coupling;

Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	and an error amplifier controller to inhibit operation of the error amplifier in the event of at least one of a magnetic field amplitude (or strength) below a predetermined level and the presence of modulation. Wilson at 9:11–14 The power store 109 is coupled to provide power for those components of the near field RF transponder 108 that require power. However, in the interests of clarity in Figure 1, not all of the couplings to the power store 109 are shown in Figure 1. Wilson at 11:1–24 The controller 101 and the demodulator 102 are coupled to the analogue interface 103. As will be described below, the analogue interface includes a modulation element to enable the controller to modulate a received magnetic field with data and a voltage regulator to enable control of the supply of power within the near field RF transponder in accordance with the received magnetic field strength (amplitude) which, as will be described below with reference to Figure 2, may be affected by environment factors and also by interruption or modulation to enable transmission of data. To this end, the demodulator 102 comprises, in addition to demodulator circuitry (not separately shown) to extract the modulation from the carrier signal, a gap detector 102A or similar functionality for detecting gaps in the received RF field or reductions in the strength of the RF field as a result, for example, of amplitude modulation or environmental conditions. The demodulator circuitry may comprise any suitable form of demodulator, for example a simple diode rectifier circuit, for extracting the modulation from an RF carrier signal. The gap detector 102A may comprise, for example, filtering and rectifying circuitry to extract and rectify the carrier signal and threshold circuitry for providing a gap detection signal when the rectified carrier signal is below a predetermined threshold value. As another possibility, peak detector circuitry may be used to detect when a peak value of the carrier signal falls below a predetermined threshold. It will, however, be appreciated that the gap detector may comprise any circuitry suitable to detect the absence of the carrier signal or a reduction in the amplitude of the carrier signal below a predetermined threshold. Although shown as part of the demodulator 102, the gap detector 102A may be a functional block that is separate from the demodulator. Wilson at 12:3–24 The controller 101 controls communication of data by the near field RF transponder 108 in accordance with at least one of pre-stored instructions or programming and instructions determined by the controller from modulation extracted by the demodulator 102. The controller 101 causes data to be communicated by controlling the modulation element mentioned above to modulate the load ("load modulation") on the

Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	inductive coupling between the near field RF transponder and the initiator near field RF communicator. The modulation element may comprise a transistor element in parallel with the antenna coil of the antenna circuit 104. The controller supplies a modulation signal representing the data to be communicated to a control gate of the transistor element, thereby causing an impedance to be switched across the antenna coil of the antenna circuit 104 in accordance with the data to be communicated. The load on the inductive coupling between the antenna circuit 104 of the near field RF transponder and the initiator near field RF communicator is thus varied in accordance with the data to be communicated, so causing modulation of the amplitude of the signal in the antenna circuit of the initiator near field RF communicator, which modulation can then be extracted by a demodulator of the initiator near field RF communicator. The modulation scheme used will depend on the communications protocol being used and program data within controller 101. For example such modulation scheme may be compatible with ISO 14443A and thus enable the near field RF transponder in Figure 1 to communicate with ISO 14443A compatible initiator near field RF communicators. Wilson at 13:14–27 As discussed above, the analogue interface 103 comprises a switchable impedance element M coupled between respective connection junctions L1 and L2 of the antenna coil 209. In order to communicate data, the controller 101 switches the switchable impedance element M in and out in accordance with the data to be communicated, thereby modulating the load on the inductively coupled antenna circuits of the near field RF transponder (for example 108 from Figure 1) and the initiator near field RF communicator. In the example shown, the switchable impedance element M comprises a transistor element consisting of one or more transistors 213 (as shown an n-channel enhancement mode MOSFET) having a control gate coupled to a data output or modulation signal line 101A of the controller 101. Optionally the switchable impedance element M also comprises a resistor 211 coupling one main electrode of the transistor element 213 to junction L1 and a resistor 212 coupling the other main electrode of the transistor element 213 to junction L2. Wilson at 14:12–21 Although not shown in Figure 2, as will be understood by the person skilled in the art, the demodulator 102 is coupled to the antenna circuit 104 to enable the demodulator 102 to extract data from an RF signal inductively coupled to antenna circuit from an initiator near field RF communicator. Such an initiator near field RF communicator may cause the RF signal to be interrupted in accordance with the data to be transmitted or to be modulated, for example, amplitude modulated, in accordance with the data to be transmitted. The controller 101 may respond by communicating data using load modulation as discussed

Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	above. So as to avoid conflict, the controller 101 may disable the demodulator 102 whilst the controller 101 is communicating data. Wilson at 17:23–18:1 In addition, however, the NFC communicator 313 also has the ability to generate or transmit its own RF field and also to modulate that RF field. In the example shown, this functionality consists of a driver 312 having an output coupled to the antenna circuit 30, one input coupled to the controller 301 and the other input coupled to a modulator 311 coupled to the controller. The NFC communicator 313 also has a power supply 310 which may be part of the NFC communicator or the other functionality, for example the power supply 310 may be provided by a host or. The power supply 310 may be, for example, a battery such as a button cell battery. Wilson at 19:3–16 In the initiator mode, the NFC communicator 313 may initiate communication with any compatible target which may be an NFC communicator 313 in target mode or a near field RF transponder of Figures 1 and 2 such as shown in Figures l and 2. In the target mode, the NFC communicator 313 may respond to initiation of communication by any compatible initiator which may be an RFDD transceiver or an NFC communicator in initiator mode. As used herein, compatible means operable at the same frequency and in accordance with the same protocols, for example in accordance with the protocols set out in various standards such as ISO/IEC 18092, ISO/IEC 21481, ISO/IEC 14443 and ISO/IEC 15693. Communication may be an active communication under which the initiator and target each generate their own RF field when communicating data and then turn off that RF field to await data communication from the other or passive communication under which the initiator transmits and maintains its RF field throughout the entire communication. Wilson at 19:21–28 Where the NFC communicator is in initiator mode and using active communication, the driver 312 is controlled by the controller 301 to drive the antenna circuit to produce the required RF field and the modulator 311 is controlled by the controller 301 to cause the RF field to be modulated in accordance with the data (information and/or control data) to be communicated. The controller 301 may use its own internal clock as an oscillator from which to derive the oscillating signal to produce the RF field or a separate oscillator may be provided either within the NFC communicator 313 or its host, if it has one. Wilson at 19:29–20:18

Claim Element	Exemplary Citations to W.O. 2007/135434 (“Wilson”)
	Where the NFC communicator is in target mode, then the operation of the NFC communicator will be similar to that described above for the near field RF transponder. For example, when the NFC communicator is in target mode and uses the circuitry shown in Figure 2, then, as described above with respect to Figure 2, the voltage between L1 and L2 is controlled by the error amplifier 206 and operation of the error amplifier is in turned controlled by the switches 203 and 204. Where the NFC communicator is independently powered (i.e. the power supply 310 is available), the error amplifier 206 may or may not be powered down in the event that the external magnetic field droops. Operation of the error amplifier may be controlled entirely by controller 301, that is only in circumstances where the NFC communicator is modulating a supplied RF field with data. The error amplifier 206 will be disconnected by the controller when the NFC communicator is providing its own RF field. As another possibility, the switches 203 and 204 (Figure 2) may be controlled by a signal from the modulator 311 rather than the controller 301, so that the error amplifier is only disconnected while the modulator is modulating the NFC communicator's own RF field. Even where the additional power supply 310 is available, the ability to re-direct power away from specific areas of the antenna circuitry (namely the error amplifier 206) may still be advantageous, for example where the additional power supply 310 is low or has been disconnected. Wilson at Figure 1  FIG. 1 Wilson at Figure 2

Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	 FIG. 2 2/3 Wilson at Figure 3  FIG. 3 3/3 To the extent this limitation is not disclosed by Wilson, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Wilson, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
2. The mobile device of claim 1, wherein the transmitted data includes ticketing information for a mass transit system.	Wilson discloses or renders obvious "[t]he mobile device of claim 1, wherein the transmitted data includes ticketing information for a mass transit system." For example: Wilson at 3:5–23

Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	Near field RF communicators may be provided as standalone or discrete devices (for example an RF transponder or tag may be included within a key fob, poster or other media) or may be incorporated within or coupled to or otherwise associated with larger electrical devices or hosts (referred to below as near field RF communications-enabled devices). When incorporated within a larger device or host, a near field RF communicator may be a discrete entity or may be provided partly or wholly by functionality within the larger device or host. Examples of such larger devices or host devices are, for example, cellular telephone devices, portable computing devices (such as personal digital assistants, notebooks, lap-tops), other computing devices such as personal or desk top computers, computer peripherals such as printers, or other electrical devices such as portable audio and/or video players such as MP3 players, IPODs®, CD players, DVD players, consumer products such as domestic appliance or personal care products and other electrical and electronic devices, apparatus or systems. Some areas of application are payment systems, ticketing systems (for example RF transponders may be carried by tickets such as parking tickets, bus tickets, train tickets or entrance permits or entrance tickets) or in ticket checking systems, toys, games, posters, packaging, advertising material, product inventory checking systems and so on. To the extent this limitation is not disclosed by Wilson, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Wilson, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 1 above.
3. The mobile device of claim 1, wherein the transmitted data includes transaction information for a mobile payment.	Wilson discloses or renders obvious "[t]he mobile device of claim 1, wherein the transmitted data includes transaction information for a mobile payment." For example: Wilson at 3:5–23 Near field RF communicators may be provided as standalone or discrete devices (for example an RF transponder or tag may be included within a key fob, poster or other media) or may be incorporated within or coupled to or otherwise associated with larger electrical devices or hosts (referred to below as near field RF communications-enabled devices). When incorporated within a larger device or host, a near field RF communicator may be a discrete entity or may be provided partly or wholly by functionality within the larger device or host. Examples of such larger devices or host devices are, for example, cellular telephone devices, portable computing devices (such as personal digital assistants, notebooks, lap-tops), other computing devices such as personal or desk top computers, computer peripherals such as printers, or other electrical devices such as portable audio and/or video players such as MP3 players, IPODs®, CD players, DVD players, consumer products such as domestic appliance or personal care products and other electrical and electronic devices, apparatus or systems. Some areas of application are payment systems,

Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	ticketing systems (for example RF transponders may be carried by tickets such as parking tickets, bus tickets, train tickets or entrance permits or entrance tickets) or in ticket checking systems, toys, games, posters, packaging, advertising material, product inventory checking systems and so on. Wilson at 20:27–21:8 The functionality of the controller is described above as being entirely within the near field RF transponder or NFC communicator. As other possibilities, the functionality of the controller may be entirely within any host device controller or distributed between the near field RF transponder or NFC communicator and the host device. As a further possibility for an NFC communicator, certain control functionality may reside within a separate unit which is attachable or removable or alternatively only used for certain transactions, for example a security device or ESD device which may only be used for payment transactions. Where the functionality of the controller is within a separate unit or within any host device, then instead of the controller the near field RF transponder or NFC communicator will have a coupling, possibly including an appropriate interface, to that controller. To the extent this limitation is not disclosed by Wilson, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Wilson, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.\ *See also* claim 1 above.
4. The mobile device of claim 1, wherein the NFC reader is a point-of-sale NFC reader.	Wilson discloses or renders obvious "[t]he mobile device of claim 1, wherein the NFC reader is a point-of-sale NFC reader." For example: Wilson at 3:5–23 Near field RF communicators may be provided as standalone or discrete devices (for example an RF transponder or tag may be included within a key fob, poster or other media) or may be incorporated within or coupled to or otherwise associated with larger electrical devices or hosts (referred to below as near field RF communications-enabled devices). When incorporated within a larger device or host, a near field RF communicator may be a discrete entity or may be provided partly or wholly by functionality within the larger device or host. Examples of such larger devices or host devices are, for example, cellular telephone devices, portable computing devices (such as personal digital assistants, notebooks, lap-tops), other computing devices such as personal or desk top computers, computer peripherals such as printers, or other electrical devices such as portable audio and/or video players such as MP3 players, IPODs®, CD players, DVD players, consumer products such as domestic appliance or personal care products and other electrical and electronic devices, apparatus or systems.

Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	Some areas of application are payment systems, ticketing systems (for example RF transponders may be carried by tickets such as parking tickets, bus tickets, train tickets or entrance permits or entrance tickets) or in ticket checking systems, toys, games, posters, packaging, advertising material, product inventory checking systems and so on. To the extent this limitation is not disclosed by Wilson, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Wilson, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 1 above.
5. The mobile device of claim 1, wherein the antenna includes an inductive element.	Wilson discloses or renders obvious "[t]he mobile device of claim 1, wherein the antenna includes an inductive element." For example: Wilson at Abstract A near field RF communicator has an inductive coupler (10) to enable inductive coupling with a magnetic field of an RF signal. A demodulator (102) extracts modulation from an inductively coupled magnetic field. An error amplifier (206) controls a voltage of the near field RF communicator on the basis of a comparison of a reference voltage (VREF) with a voltage (VINPUT) related to a voltage derived by a power deriver (105). A modulator (M) is provided to modulate an inductively coupled magnetic field with data to be communicated via the inductive coupling. An error amplifier controller (102A; 101) is provided to prevent operation of the error amplifier in the event of a magnetic field amplitude below a predetermined level or the presence of modulation. The near field RF communicator may be a near field RF transponder or an NFC communicator in target mode. Wilson at 1:6–13 Near field RF (radio frequency) communication requires an antenna of one near field RF communicator to be present within the alternating magnetic field (H field) generated by the antenna of another near field RF communicator by transmission of an RF signal (for example a 13.56 Mega Hertz signal) to enable the magnetic field (the H field) of the RF signal to be inductively coupled between the communicators. The RF signal may be modulated to enable communication of control and/or other data. Ranges of up to several centimetres (generally a maximum of 1 metre) are common for near field RF communicators. Wilson at 4:4–9 The initiator near field RF communicator may transmit data or instructions by interrupting the RF field or modulating the RF field which may cause RF field amplitude changes. There may also be unintentional

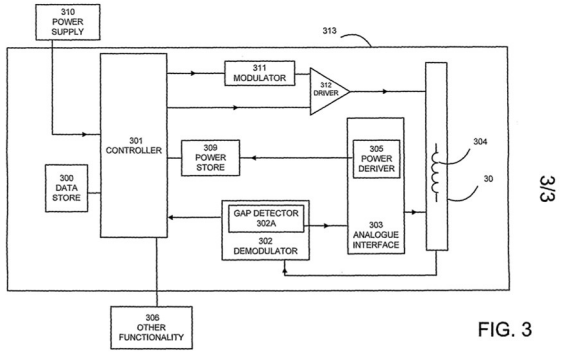
Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	interruptions or reductions in the RF field due to, for example, environmental effects. Any such interruptions or reductions in the RF field may cause a reduction or 'droop' in the internal power supply of the inductively coupled responsive near field RF communicator. Where there is a complete break in the supplied RF field, the magnetic field from which power is derived by the inductively coupled responsive near field RF communicator falls to zero and the responsive near field RF communicator may fail to respond. Where the RF field is weakened (for example during modulation), the available power supply may be insufficient to power the near field RF communicator and again any response may fail or be interrupted. Wilson at 4:16–21 One way of addressing the effects on power derivation caused by a loss or weakening of the magnetic field may be to include a large capacitor to store power. However, such a capacitor would require a commensurately large amount of circuit area which would increase the overall size of the responsive near field RF communicator. Also, the introduction of additional capacitance may detrimentally affect, that is slow down, circuit response times. Wilson at 5:19–24 In an embodiment, the present invention provides a responsive near field RF communicator having an error amplifier to control a voltage within the near field RF communicator, for example within an antenna circuit of the near field RF communicator, and in which power supply to the error amplifier is controlled in accordance with signals dependent upon the strength of a magnetic field inductively coupled to the antenna and/or the presence of modulation. Wilson at 7:3–12 An embodiment provides a near field RF communicator having: an inductive coupler to enable inductive coupling with a magnetic field of an RF signal; a demodulator to extract modulation from an inductively coupled magnetic field; an error amplifier operable to control a voltage of the near field RF communicator on the basis of a comparison of a reference voltage with a further voltage; a modulator operable to modulate an inductively coupled magnetic field with data to be communicated via the inductive coupling; and an error amplifier controller to inhibit operation of the error amplifier in the event of at least one of a magnetic field amplitude (or strength) below a predetermined level and the presence of modulation. Wilson at 8:17–27

Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	The near field RF transponder 108 has an inductive coupler or antenna circuit 10 and an analogue interface 103 to provide an interface between the antenna circuit and other operational components of the near field RF transponder 108. As Figure 1 is a functional block diagram, the antenna circuit 10 is shown simply by a representation of an antenna coil 104. Any suitable form of series or parallel antenna circuit may be used and one example will be described below with reference to Figure 2. The antenna circuit 10 enables inductive coupling to an alternating magnetic field (H field) of an RF signal (for example a 13.56 Mega Hertz signal) generated or transmitted by, for example, an initiator near field RF communicator such as an RFK) transceiver or an NFC communicator in initiator mode. Wilson at 8:28–9:3 As shown in Figure 1, the other operational components comprise a demodulator 102 coupled to the antenna circuit 10 to extract the modulation (data) from a modulated magnetic field inductively coupled to the antenna circuit 10. The demodulator 102 is also coupled to supply the extracted data to a controller 101 that controls overall operation of the near field RF transponder 108. A data store 100 is coupled to the controller 101. Wilson at 12:3–24 The controller 101 controls communication of data by the near field RF transponder 108 in accordance with at least one of pre-stored instructions or programming and instructions determined by the controller from modulation extracted by the demodulator 102. The controller 101 causes data to be communicated by controlling the modulation element mentioned above to modulate the load ("load modulation") on the inductive coupling between the near field RF transponder and the initiator near field RF communicator. The modulation element may comprise a transistor element in parallel with the antenna coil of the antenna circuit 104. The controller supplies a modulation signal representing the data to be communicated to a control gate of the transistor element, thereby causing an impedance to be switched across the antenna coil of the antenna circuit 104 in accordance with the data to be communicated. The load on the inductive coupling between the antenna circuit 104 of the near field RF transponder and the initiator near field RF communicator is thus varied in accordance with the data to be communicated, so causing modulation of the amplitude of the signal in the antenna circuit of the initiator near field RF communicator, which modulation can then be extracted by a demodulator of the initiator near field RF communicator. The modulation scheme used will depend on the communications protocol being used and program data within controller 101. For example such modulation scheme may be compatible with ISO 14443A and thus enable the near field RF transponder in Figure 1 to communicate with ISO 14443A compatible initiator near field RF communicators.

Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	Wilson at 14:12–21 Although not shown in Figure 2, as will be understood by the person skilled in the art, the demodulator 102 is coupled to the antenna circuit 104 to enable the demodulator 102 to extract data from an RF signal inductively coupled to antenna circuit from an initiator near field RF communicator. Such an initiator near field RF communicator may cause the RF signal to be interrupted in accordance with the data to be transmitted or to be modulated, for example, amplitude modulated, in accordance with the data to be transmitted. The controller 101 may respond by communicating data using load modulation as discussed above. So as to avoid conflict, the controller 101 may disable the demodulator 102 whilst the controller 101 is communicating data. Wilson at 15:20–16:3 Thus, when a signal is received from either the gap detector (equating to a gap or reduction in the magnetic field strength coupled to antenna coil 209) or the controller (equating to modulation by the controller of the received magnetic field), the output from the OR gate 205 turns off switch 204 (its bias current is turned off). This has the effect of disrupting the supply of power to the error amplifier 206 and thereby reducing the overall power required by the near field RF transponder. Also turning off switch 203 prevents the error amplifier 206 from having any effect on the voltage between junctions L1 and L2. The switches 203 and 204 and the controller 101 and gap detector 102A also function to ensure that the error amplifier 206 does not regulate the voltage between L1 and L2 while modulation is occurring. This prevents the error amplifier 206 from changing the modulation level or depth and so avoids the possibility of the modulation being distorted by the error amplifier 206 which might otherwise result in the modulation being very difficult or impossible to extract. Wilson at 16:25–30 As shown in Figure 3, the other operational components comprise a demodulator 302 coupled to the antenna circuit 30 to extract the modulation from a modulated signal inductively coupled to the antenna circuit 30. The demodulator 302 is also coupled to a controller 301 provided to control overall operation of the NFC communicator 313. A data store 300 is coupled to the controller 301. *See also* Wilson at 3:24–4:3, 6:16–7:2, 13:14–27, 16:15–24, 19:21–28, and 22:2–9. To the extent this limitation is not disclosed by Wilson, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Wilson, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	See also claim 1 above.
6. The mobile device of claim 1, wherein the active transmit driver circuit includes one or more of an amplifier filter, oscillator, and/or modulator.	Wilson discloses or renders obvious "[t]he mobile device of claim 1, wherein the active transmit driver circuit includes one or more of an amplifier filter, oscillator, and/or modulator." For example: Wilson at Abstract A near field RF communicator has an inductive coupler (10) to enable inductive coupling with a magnetic field of an RF signal. A demodulator (102) extracts modulation from an inductively coupled magnetic field. An error amplifier (206) controls a voltage of the near field RF communicator on the basis of a comparison of a reference voltage (VREF) with a voltage (VINPUT) related to a voltage derived by a power deriver (105). A modulator (M) is provided to modulate an inductively coupled magnetic field with data to be communicated via the inductive coupling. An error amplifier controller (102A; 101) is provided to prevent operation of the error amplifier in the event of a magnetic field amplitude below a predetermined level or the presence of modulation. The near field RF communicator may be a near field RF transponder or an NFC communicator in target mode. Wilson at 7:3–12 An embodiment provides a near field RF communicator having: an inductive coupler to enable inductive coupling with a magnetic field of an RF signal; a demodulator to extract modulation from an inductively coupled magnetic field; an error amplifier operable to control a voltage of the near field RF communicator on the basis of a comparison of a reference voltage with a further voltage; a modulator operable to modulate an inductively coupled magnetic field with data to be communicated via the inductive coupling; and an error amplifier controller to inhibit operation of the error amplifier in the event of at least one of a magnetic field amplitude (or strength) below a predetermined level and the presence of modulation. Wilson at 17:23–18:1 In addition, however, the NFC communicator 313 also has the ability to generate or transmit its own RF field and also to modulate that RF field. In the example shown, this functionality consists of a driver 312 having an output coupled to the antenna circuit 30, one input coupled to the controller 301 and the other input coupled to a modulator 311 coupled to the controller. The NFC communicator 313 also has a power supply 310 which may be part of the NFC communicator or the other functionality, for example the power supply 310 may be provided by a host or. The power supply 310 may be, for example, a battery such as a button cell battery.

Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	Wilson at 19:21–28 Where the NFC communicator is in initiator mode and using active communication, the driver 312 is controlled by the controller 301 to drive the antenna circuit to produce the required RF field and the modulator 311 is controlled by the controller 301 to cause the RF field to be modulated in accordance with the data (information and/or control data) to be communicated. The controller 301 may use its own internal clock as an oscillator from which to derive the oscillating signal to produce the RF field or a separate oscillator may be provided either within the NFC communicator 313 or its host, if it has one. Wilson at 19:29–20:18 Where the NFC communicator is in target mode, then the operation of the NFC communicator will be similar to that described above for the near field RF transponder. For example, when the NFC communicator is in target mode and uses the circuitry shown in Figure 2, then, as described above with respect to Figure 2, the voltage between L1 and L2 is controlled by the error amplifier 206 and operation of the error amplifier is in turned controlled by the switches 203 and 204. Where the NFC communicator is independently powered (i.e. the power supply 310 is available), the error amplifier 206 may or may not be powered down in the event that the external magnetic field droops. Operation of the error amplifier may be controlled entirely by controller 301, that is only in circumstances where the NFC communicator is modulating a supplied RF field with data. The error amplifier 206 will be disconnected by the controller when the NFC communicator is providing its own RF field. As another possibility, the switches 203 and 204 (Figure 2) may be controlled by a signal from the modulator 311 rather than the controller 301, so that the error amplifier is only disconnected while the modulator is modulating the NFC communicator's own RF field. Even where the additional power supply 310 is available, the ability to re-direct power away from specific areas of the antenna circuitry (namely the error amplifier 206) may still be advantageous, for example where the additional power supply 310 is low or has been disconnected. Wilson at Figure 3

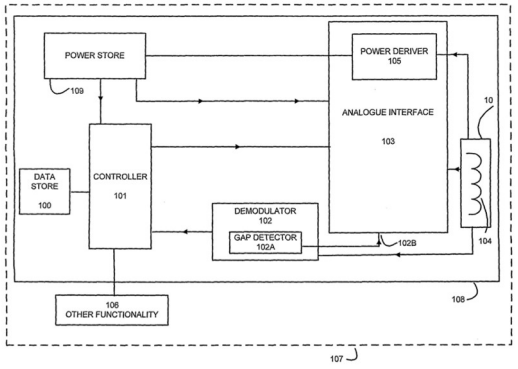
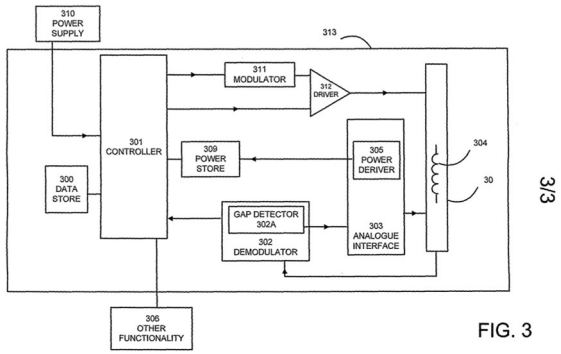
Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	 FIG. 3 To the extent this limitation is not disclosed by Wilson, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Wilson, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 1 above.
7. The mobile device of claim 1 comprising an amplifier coupled to the power source to receive the power, wherein the amplifier is further coupled to the antenna.	Wilson discloses or renders obvious "[t]he mobile device of claim 1 comprising an amplifier coupled to the power source to receive the power, wherein the amplifier is further coupled to the antenna." For example: Wilson at 1:28–2:14 Communication of data between NFC communicators may be via an active communication mode in which the NFC communicator transmits or generates an alternating magnetic field modulated with the data to be communicated and the receiving NFC communicator responds by transmitting or generating its own modulated magnetic field. Communication of data between NFC communicators may be via a passive communication mode in which one NFC communicator transmits or generates an alternating magnetic field and maintains that field and the responding NFC communicator modulates the magnetic field to which it is inductively coupled with the data to be communicated, for example by modulating the load on the inductive coupling ("load modulation"). Near field RF communicators may also communicate actively or passively. Active communication is where communication requires the near field RF communicator to have an internal power source available to it. Passive communication is where a near field RF communicator derives a power supply from a received magnetic field. Generally an RF transceiver will use active communication while an RF transponder will use passive communication. An NFC communicator may use either active or passive communication.

Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	Wilson at 9:11–14 The power store 109 is coupled to provide power for those components of the near field RF transponder 108 that require power. However, in the interests of clarity in Figure 1, not all of the couplings to the power store 109 are shown in Figure 1. Wilson at 19:3–16 In the initiator mode, the NFC communicator 313 may initiate communication with any compatible target which may be an NFC communicator 313 in target mode or a near field RF transponder of Figures 1 and 2 such as shown in Figures l and 2. In the target mode, the NFC communicator 313 may respond to initiation of communication by any compatible initiator which may be an RFDD transceiver or an NFC communicator in initiator mode. As used herein, compatible means operable at the same frequency and in accordance with the same protocols, for example in accordance with the protocols set out in various standards such as ISO/IEC 18092, ISO/IEC 21481, ISO/IEC 14443 and ISO/IEC 15693. Communication may be an active communication under which the initiator and target each generate their own RF field when communicating data and then turn off that RF field to await data communication from the other or passive communication under which the initiator transmits and maintains its RF field throughout the entire communication. Wilson at 19:21–28 Where the NFC communicator is in initiator mode and using active communication, the driver 312 is controlled by the controller 301 to drive the antenna circuit to produce the required RF field and the modulator 311 is controlled by the controller 301 to cause the RF field to be modulated in accordance with the data (information and/or control data) to be communicated. The controller 301 may use its own internal clock as an oscillator from which to derive the oscillating signal to produce the RF field or a separate oscillator may be provided either within the NFC communicator 313 or its host, if it has one. To the extent this limitation is not disclosed by Wilson, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Wilson, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 1 above.

Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
8. The mobile device of claim 7, wherein the amplifier amplifies a signal received at the antenna and generates an amplified signal, and provides the amplified signal to the smartcard controller.	To the extent this limitation is not disclosed by Wilson, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Wilson, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 7 above.
17[pre]. A method of near field communication between a mobile device and an NFC reader, the method comprising:	Wilson discloses or renders obvious "[a] method of near field communication between a mobile device and an NFC reader, the method." For example: *See* [1d] above. Wilson at 1:6–13 Near field RF (radio frequency) communication requires an antenna of one near field RF communicator to be present within the alternating magnetic field (H field) generated by the antenna of another near field RF communicator by transmission of an RF signal (for example a 13.56 Mega Hertz signal) to enable the magnetic field (the H field) of the RF signal to be inductively coupled between the communicators. The RF signal may be modulated to enable communication of control and/or other data. Ranges of up to several centimetres (generally a maximum of 1 metre) are common for near field RF communicators. Wilson at 3:5–23 Near field RF communicators may be provided as standalone or discrete devices (for example an RF transponder or tag may be included within a key fob, poster or other media) or may be incorporated within or coupled to or otherwise associated with larger electrical devices or hosts (referred to below as near field RF communications-enabled devices). When incorporated within a larger device or host, a near field RF communicator may be a discrete entity or may be provided partly or wholly by functionality within the larger device or host. Examples of such larger devices or host devices are, for example, cellular telephone devices, portable computing devices (such as personal digital assistants, notebooks, lap-tops), other computing devices such as personal or desk top computers, computer peripherals such as printers, or other electrical devices such as portable audio and/or video players such as MP3 players, IPODs®, CD players, DVD players, consumer products such as domestic appliance or personal care products and other electrical and electronic devices, apparatus or systems. Some areas of application are payment systems, ticketing systems (for example RF transponders may be carried by tickets such as parking tickets, bus tickets, train tickets or entrance permits or entrance tickets) or in ticket checking systems, toys, games, posters, packaging, advertising material, product inventory checking systems and so on.

Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	Wilson at 9:26–10:19 As another possibility, the other functionality 106 may be an interface to another electrical device or host with which the near field RF transponder 108 may be associated to form a near field RF communications-enabled device. In this case, the near field RF transponder 108 may be associated with the host by, for example, a wired or wireless coupling. In such a case, a housing of the near field RF transponder 108 may be physically separate from or may be attached to the housing of the host; in the later case, the attachment may be permanent once made or the near field RF transponder 108 may be removable. As examples, the near field RF transponder 108 may be housed within: a housing attachable to another device; a housing portion, such as a fascia of the near field RF communications-enabled device or another device; an access card; a key fob; a token; or may have a housing shaped or configured to look like a smart card. As other examples, the near field RF transponder 108 may be coupled to a larger device by way of a communications link such as, for example, a USB link, or may be provided as a card (for example a PCMCIA card or a card that looks like a smart card) which can be received in an appropriate slot of the larger or host device. Examples of hosts are, for example, personal computers, mobile telephones (cell-phones), personal digital assistants, notebooks, other computing devices such as personal or desk top computers, computer peripherals such as printers, or other electrical devices such as portable audio and/or video players such as MP3 players, IPODs®, CD players, DVD players, other electrical or electronic products, for example consumer products such as domestic appliance or personal care products, and other electrical or electronic devices, apparatus or systems. Wilson at 17:23–18:1 In addition, however, the NFC communicator 313 also has the ability to generate or transmit its own RF field and also to modulate that RF field. In the example shown, this functionality consists of a driver 312 having an output coupled to the antenna circuit 30, one input coupled to the controller 301 and the other input coupled to a modulator 311 coupled to the controller. The NFC communicator 313 also has a power supply 310 which may be part of the NFC communicator or the other functionality, for example the power supply 310 may be provided by a host or. The power supply 310 may be, for example, a battery such as a button cell battery. Wilson at 18:9–19 As another possibility, the other functionality 306 may be an interface to another electrical device or host with which the NFC communicator 313 may be associated to form a near field RF communications-

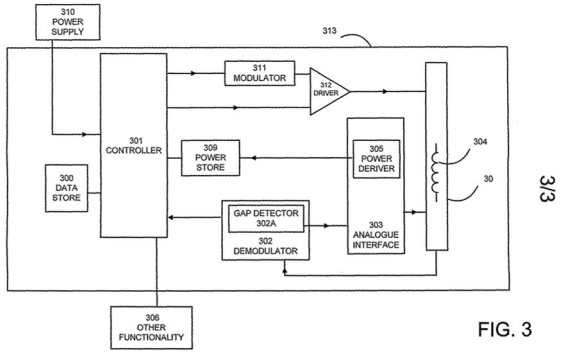
Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	enabled device. The NFC communicator 313 may be associated with the host, for example by a wired or wireless coupling examples being as described above with reference to Figure 1. As another possibility, the other functionality 306 may include, for example, an interface to another electrical device thereby forming a near field RF communications-enabled device. For convenience, the functionality of the remainder of the near field RF communications-enabled device is not shown in Figure 3. Examples of such host devices may be the same as for the examples given above for Figure 1. Wilson at 19:3–16 In the initiator mode, the NFC communicator 313 may initiate communication with any compatible target which may be an NFC communicator 313 in target mode or a near field RF transponder of Figures 1 and 2 such as shown in Figures l and 2. In the target mode, the NFC communicator 313 may respond to initiation of communication by any compatible initiator which may be an RFDD transceiver or an NFC communicator in initiator mode. As used herein, compatible means operable at the same frequency and in accordance with the same protocols, for example in accordance with the protocols set out in various standards such as ISO/IEC 18092, ISO/IEC 21481, ISO/IEC 14443 and ISO/IEC 15693. Communication may be an active communication under which the initiator and target each generate their own RF field when communicating data and then turn off that RF field to await data communication from the other or passive communication under which the initiator transmits and maintains its RF field throughout the entire communication. Wilson at 20:27–21:8 The functionality of the controller is described above as being entirely within the near field RF transponder or NFC communicator. As other possibilities, the functionality of the controller may be entirely within any host device controller or distributed between the near field RF transponder or NFC communicator and the host device. As a further possibility for an NFC communicator, certain control functionality may reside within a separate unit which is attachable or removable or alternatively only used for certain transactions, for example a security device or ESD device which may only be used for payment transactions. Where the functionality of the controller is within a separate unit or within any host device, then instead of the controller the near field RF transponder or NFC communicator will have a coupling, possibly including an appropriate interface, to that controller. Wilson at 22:1–9 The components of the near field RF communicators described above, apart from the power supply, if present, and the antenna circuit may be provided by a single semiconductor integrated circuit chip or by

Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	several separate chips, for example one or more silicon integrated circuits, or discrete devices mounted on a printed circuit board. Whether particular functions are implemented by analogue or digital circuitry will depend on the design route chosen. Antennas will be constructed in a form suitable for system and circuit requirements and may, as described above be coils. Wilson at Figure 1  FIG. 1 Wilson at Figure 3  FIG. 3 To the extent this limitation is not disclosed by Wilson, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Wilson, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

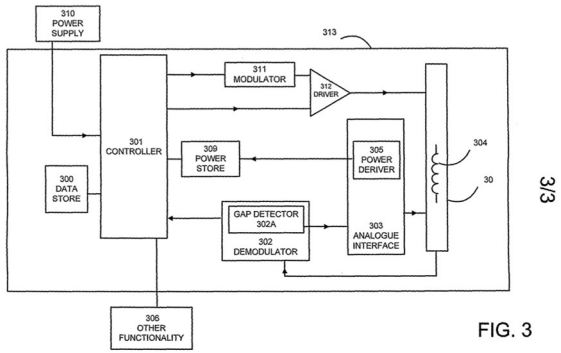
Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
[17a] coupling a smartcard controller and an active transmit driver circuit to a power source of the mobile device;	Wilson discloses or renders obvious "coupling a smartcard controller and an active transmit driver circuit to a power source of the mobile device." For example: Wilson at 1:28–2:14 Communication of data between NFC communicators may be via an active communication mode in which the NFC communicator transmits or generates an alternating magnetic field modulated with the data to be communicated and the receiving NFC communicator responds by transmitting or generating its own modulated magnetic field. Communication of data between NFC communicators may be via a passive communication mode in which one NFC communicator transmits or generates an alternating magnetic field and maintains that field and the responding NFC communicator modulates the magnetic field to which it is inductively coupled with the data to be communicated, for example by modulating the load on the inductive coupling ("load modulation"). Near field RF communicators may also communicate actively or passively. Active communication is where communication requires the near field RF communicator to have an internal power source available to it. Passive communication is where a near field RF communicator derives a power supply from a received magnetic field. Generally an RF transceiver will use active communication while an RF transponder will use passive communication. An NFC communicator may use either active or passive communication. Wilson at 2:15–21 A near field RF communicator may be independently powered, that is it may have its own power source or access to a host power source. Alternatively or additionally a near field RF communicator may be designed to derive at least part of is power from an inductively coupled RF field (as described above for passive communication). Generally RF transceivers have their own power source or access to a host power source while RF transponders will generally derive their power supply from an inductively coupled RF field. Wilson at 4:16–21 One way of addressing the effects on power derivation caused by a loss or weakening of the magnetic field may be to include a large capacitor to store power. However, such a capacitor would require a commensurately large amount of circuit area which would increase the overall size of the responsive near field RF communicator. Also, the introduction of additional capacitance may detrimentally affect, that is slow down, circuit response times. Wilson at 9:4–10

Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	The near field RF transponder 108 has a power deriver 105 coupled to the antenna circuit 10 to derive at least a portion of a power supply for the near field RF transponder 108 from an inductively coupled alternating magnetic field and a power store 109 coupled to store power derived by the power deriver 105. The power store 109 may be a capacitor, or a number of capacitors. Although the power deriver 105 is shown in Figure 1 as being within the analogue interface 103, it may be separate from the analogue interface 103. Wilson at 9:11–14 The power store 109 is coupled to provide power for those components of the near field RF transponder 108 that require power. However, in the interests of clarity in Figure 1, not all of the couplings to the power store 109 are shown in Figure 1. Wilson at 17:23–18:1 In addition, however, the NFC communicator 313 also has the ability to generate or transmit its own RF field and also to modulate that RF field. In the example shown, this functionality consists of a driver 312 having an output coupled to the antenna circuit 30, one input coupled to the controller 301 and the other input coupled to a modulator 311 coupled to the controller. The NFC communicator 313 also has a power supply 310 which may be part of the NFC communicator or the other functionality, for example the power supply 310 may be provided by a host or. The power supply 310 may be, for example, a battery such as a button cell battery. Wilson at 19:3–16 In the initiator mode, the NFC communicator 313 may initiate communication with any compatible target which may be an NFC communicator 313 in target mode or a near field RF transponder of Figures 1 and 2 such as shown in Figures l and 2. In the target mode, the NFC communicator 313 may respond to initiation of communication by any compatible initiator which may be an RFDD transceiver or an NFC communicator in initiator mode. As used herein, compatible means operable at the same frequency and in accordance with the same protocols, for example in accordance with the protocols set out in various standards such as ISO/IEC 18092, ISO/IEC 21481, ISO/IEC 14443 and ISO/IEC 15693. Communication may be an active communication under which the initiator and target each generate their own RF field when communicating data and then turn off that RF field to await data communication from the other or passive communication under which the initiator transmits and maintains its RF field throughout the entire communication.

Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	Wilson at 19:21–28 Where the NFC communicator is in initiator mode and using active communication, the driver 312 is controlled by the controller 301 to drive the antenna circuit to produce the required RF field and the modulator 311 is controlled by the controller 301 to cause the RF field to be modulated in accordance with the data (information and/or control data) to be communicated. The controller 301 may use its own internal clock as an oscillator from which to derive the oscillating signal to produce the RF field or a separate oscillator may be provided either within the NFC communicator 313 or its host, if it has one. Wilson at 19:29–20:18 Where the NFC communicator is in target mode, then the operation of the NFC communicator will be similar to that described above for the near field RF transponder. For example, when the NFC communicator is in target mode and uses the circuitry shown in Figure 2, then, as described above with respect to Figure 2, the voltage between L1 and L2 is controlled by the error amplifier 206 and operation of the error amplifier is in turned controlled by the switches 203 and 204. Where the NFC communicator is independently powered (i.e. the power supply 310 is available), the error amplifier 206 may or may not be powered down in the event that the external magnetic field droops. Operation of the error amplifier may be controlled entirely by controller 301, that is only in circumstances where the NFC communicator is modulating a supplied RF field with data. The error amplifier 206 will be disconnected by the controller when the NFC communicator is providing its own RF field. As another possibility, the switches 203 and 204 (Figure 2) may be controlled by a signal from the modulator 311 rather than the controller 301, so that the error amplifier is only disconnected while the modulator is modulating the NFC communicator's own RF field. Even where the additional power supply 310 is available, the ability to re-direct power away from specific areas of the antenna circuitry (namely the error amplifier 206) may still be advantageous, for example where the additional power supply 310 is low or has been disconnected. Wilson at 22:1–9 The components of the near field RF communicators described above, apart from the power supply, if present, and the antenna circuit may be provided by a single semiconductor integrated circuit chip or by several separate chips, for example one or more silicon integrated circuits, or discrete devices mounted on a printed circuit board. Whether particular functions are implemented by analogue or digital circuitry will depend on the design route chosen. Antennas will be constructed in a form suitable for system and circuit requirements and may, as described above be coils. Wilson at Figure 3

Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	 FIG. 3 To the extent this limitation is not disclosed by Wilson, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Wilson, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[17b] providing power to the smartcard controller and the active transmit driver circuit from the power source of the mobile device;	Wilson discloses or renders obvious "providing power to the smartcard controller and the active transmit driver circuit from the power source of the mobile device." For example: *See* [17a] above. Wilson at 1:28–2:14 Communication of data between NFC communicators may be via an active communication mode in which the NFC communicator transmits or generates an alternating magnetic field modulated with the data to be communicated and the receiving NFC communicator responds by transmitting or generating its own modulated magnetic field. Communication of data between NFC communicators may be via a passive communication mode in which one NFC communicator transmits or generates an alternating magnetic field and maintains that field and the responding NFC communicator modulates the magnetic field to which it is inductively coupled with the data to be communicated, for example by modulating the load on the inductive coupling ("load modulation"). Near field RF communicators may also communicate actively or passively. Active communication is where communication requires the near field RF communicator to have an internal power source available to it. Passive communication is where a near field RF communicator derives a power supply from a received magnetic field. Generally an RF transceiver will use active communication while an RF transponder will use passive communication. An NFC communicator may use either active or passive communication.

Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	Wilson at 9:11–14 The power store 109 is coupled to provide power for those components of the near field RF transponder 108 that require power. However, in the interests of clarity in Figure 1, not all of the couplings to the power store 109 are shown in Figure 1. Wilson at 17:23–18:1 In addition, however, the NFC communicator 313 also has the ability to generate or transmit its own RF field and also to modulate that RF field. In the example shown, this functionality consists of a driver 312 having an output coupled to the antenna circuit 30, one input coupled to the controller 301 and the other input coupled to a modulator 311 coupled to the controller. The NFC communicator 313 also has a power supply 310 which may be part of the NFC communicator or the other functionality, for example the power supply 310 may be provided by a host or. The power supply 310 may be, for example, a battery such as a button cell battery. Wilson at 19:3–16 In the initiator mode, the NFC communicator 313 may initiate communication with any compatible target which may be an NFC communicator 313 in target mode or a near field RF transponder of Figures 1 and 2 such as shown in Figures l and 2. In the target mode, the NFC communicator 313 may respond to initiation of communication by any compatible initiator which may be an RFDD transceiver or an NFC communicator in initiator mode. As used herein, compatible means operable at the same frequency and in accordance with the same protocols, for example in accordance with the protocols set out in various standards such as ISO/IEC 18092, ISO/IEC 21481, ISO/IEC 14443 and ISO/IEC 15693. Communication may be an active communication under which the initiator and target each generate their own RF field when communicating data and then turn off that RF field to await data communication from the other or passive communication under which the initiator transmits and maintains its RF field throughout the entire communication. Wilson at 19:21–28 Where the NFC communicator is in initiator mode and using active communication, the driver 312 is controlled by the controller 301 to drive the antenna circuit to produce the required RF field and the modulator 311 is controlled by the controller 301 to cause the RF field to be modulated in accordance with the data (information and/or control data) to be communicated. The controller 301 may use its own

Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	internal clock as an oscillator from which to derive the oscillating signal to produce the RF field or a separate oscillator may be provided either within the NFC communicator 313 or its host, if it has one. Wilson at 19:29–20:18 Where the NFC communicator is in target mode, then the operation of the NFC communicator will be similar to that described above for the near field RF transponder. For example, when the NFC communicator is in target mode and uses the circuitry shown in Figure 2, then, as described above with respect to Figure 2, the voltage between L1 and L2 is controlled by the error amplifier 206 and operation of the error amplifier is in turned controlled by the switches 203 and 204. Where the NFC communicator is independently powered (i.e. the power supply 310 is available), the error amplifier 206 may or may not be powered down in the event that the external magnetic field droops. Operation of the error amplifier may be controlled entirely by controller 301, that is only in circumstances where the NFC communicator is modulating a supplied RF field with data. The error amplifier 206 will be disconnected by the controller when the NFC communicator is providing its own RF field. As another possibility, the switches 203 and 204 (Figure 2) may be controlled by a signal from the modulator 311 rather than the controller 301, so that the error amplifier is only disconnected while the modulator is modulating the NFC communicator's own RF field. Even where the additional power supply 310 is available, the ability to re-direct power away from specific areas of the antenna circuitry (namely the error amplifier 206) may still be advantageous, for example where the additional power supply 310 is low or has been disconnected. Wilson at Figure 3  FIG. 3

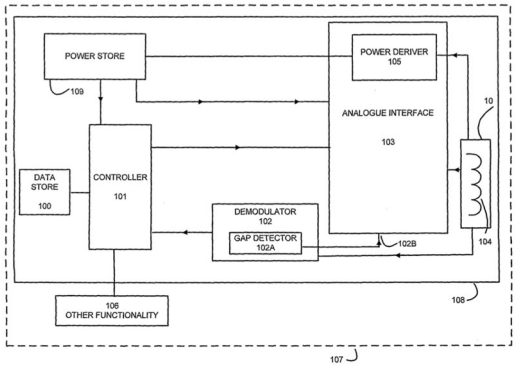
Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	To the extent this limitation is not disclosed by Wilson, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Wilson, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[17c] coupling the active transmit driver circuit to an antenna of the mobile device, wherein the antenna is tuned to operate at substantially 13.56 MHz; and	Wilson discloses or renders obvious "coupling the active transmit driver circuit to an antenna of the mobile device, wherein the antenna is tuned to operate at substantially 13.56 MHz." For example: *See* [1c] above. Wilson at 1:6–13 Near field RF (radio frequency) communication requires an antenna of one near field RF communicator to be present within the alternating magnetic field (H field) generated by the antenna of another near field RF communicator by transmission of an RF signal (for example a 13.56 Mega Hertz signal) to enable the magnetic field (the H field) of the RF signal to be inductively coupled between the communicators. The RF signal may be modulated to enable communication of control and/or other data. Ranges of up to several centimetres (generally a maximum of 1 metre) are common for near field RF communicators. Wilson at 1:28–2:14 Communication of data between NFC communicators may be via an active communication mode in which the NFC communicator transmits or generates an alternating magnetic field modulated with the data to be communicated and the receiving NFC communicator responds by transmitting or generating its own modulated magnetic field. Communication of data between NFC communicators may be via a passive communication mode in which one NFC communicator transmits or generates an alternating magnetic field and maintains that field and the responding NFC communicator modulates the magnetic field to which it is inductively coupled with the data to be communicated, for example by modulating the load on the inductive coupling ("load modulation"). Near field RF communicators may also communicate actively or passively. Active communication is where communication requires the near field RF communicator to have an internal power source available to it. Passive communication is where a near field RF communicator derives a power supply from a received magnetic field. Generally an RF transceiver will use active communication while an RF transponder will use passive communication. An NFC communicator may use either active or passive communication. Wilson at 6:16–7:2 In an embodiment, the present invention provides an antenna apparatus suitable for use in a near field RF communicator, the antenna apparatus comprising an antenna circuit comprising an antenna coil and, in

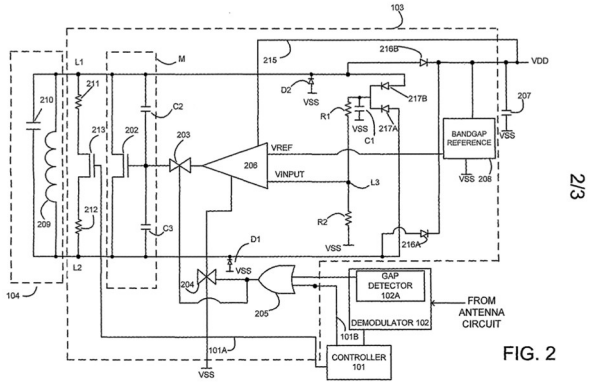
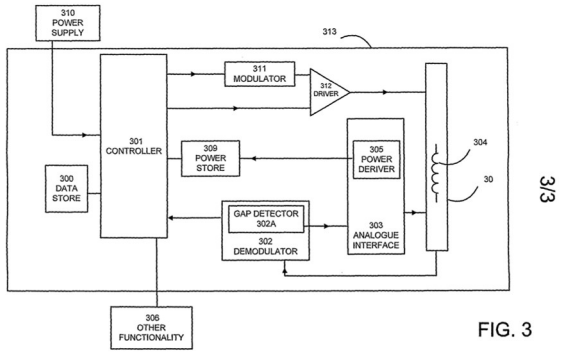
Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	one example, at least one capacitor and at least two resistors, the apparatus further comprising an analogue interface coupled to the antenna circuit, the analogue interface comprising at least one error amplifier, at least one switch for controlling operation of the error amplifier, the switch being controlled by at least one of a demodulator, a gap detector and a modulation indicator, and a capacitor to store power derived from a supplied magnetic field. In one example, the switch is controlled so as not to provide power to the at least one error amplifier during at least one of modulation of the supplied magnetic field by the near field RF communicator and detection of any gap or reduction in level of supplied magnetic field. The modulation indicator may be provided by a controller of the near field RF communicator. Wilson at 7:3–12 An embodiment provides a near field RF communicator having: an inductive coupler to enable inductive coupling with a magnetic field of an RF signal; a demodulator to extract modulation from an inductively coupled magnetic field; an error amplifier operable to control a voltage of the near field RF communicator on the basis of a comparison of a reference voltage with a further voltage; a modulator operable to modulate an inductively coupled magnetic field with data to be communicated via the inductive coupling; and an error amplifier controller to inhibit operation of the error amplifier in the event of at least one of a magnetic field amplitude (or strength) below a predetermined level and the presence of modulation. Wilson at 8:17–27 The near field RF transponder 108 has an inductive coupler or antenna circuit 10 and an analogue interface 103 to provide an interface between the antenna circuit and other operational components of the near field RF transponder 108. As Figure 1 is a functional block diagram, the antenna circuit 10 is shown simply by a representation of an antenna coil 104. Any suitable form of series or parallel antenna circuit may be used and one example will be described below with reference to Figure 2. The antenna circuit 10 enables inductive coupling to an alternating magnetic field (H field) of an RF signal (for example a 13.56 Mega Hertz signal) generated or transmitted by, for example, an initiator near field RF communicator such as an RFK) transceiver or an NFC communicator in initiator mode. Wilson at 11:1–24 The controller 101 and the demodulator 102 are coupled to the analogue interface 103. As will be described below, the analogue interface includes a modulation element to enable the controller to modulate a received magnetic field with data and a voltage regulator to enable control of the supply of power within the near field RF transponder in accordance with the received magnetic field strength

Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	(amplitude) which, as will be described below with reference to Figure 2, may be affected by environment factors and also by interruption or modulation to enable transmission of data. To this end, the demodulator 102 comprises, in addition to demodulator circuitry (not separately shown) to extract the modulation from the carrier signal, a gap detector 102A or similar functionality for detecting gaps in the received RF field or reductions in the strength of the RF field as a result, for example, of amplitude modulation or environmental conditions. The demodulator circuitry may comprise any suitable form of demodulator, for example a simple diode rectifier circuit, for extracting the modulation from an RF carrier signal. The gap detector 102A may comprise, for example, filtering and rectifying circuitry to extract and rectify the carrier signal and threshold circuitry for providing a gap detection signal when the rectified carrier signal is below a predetermined threshold value. As another possibility, peak detector circuitry may be used to detect when a peak value of the carrier signal falls below a predetermined threshold. It will, however, be appreciated that the gap detector may comprise any circuitry suitable to detect the absence of the carrier signal or a reduction in the amplitude of the carrier signal below a predetermined threshold. Although shown as part of the demodulator 102, the gap detector 102A may be a functional block that is separate from the demodulator. Wilson at 12:3–24 The controller 101 controls communication of data by the near field RF transponder 108 in accordance with at least one of pre-stored instructions or programming and instructions determined by the controller from modulation extracted by the demodulator 102. The controller 101 causes data to be communicated by controlling the modulation element mentioned above to modulate the load ("load modulation") on the inductive coupling between the near field RF transponder and the initiator near field RF communicator. The modulation element may comprise a transistor element in parallel with the antenna coil of the antenna circuit 104. The controller supplies a modulation signal representing the data to be communicated to a control gate of the transistor element, thereby causing an impedance to be switched across the antenna coil of the antenna circuit 104 in accordance with the data to be communicated. The load on the inductive coupling between the antenna circuit 104 of the near field RF transponder and the initiator near field RF communicator is thus varied in accordance with the data to be communicated, so causing modulation of the amplitude of the signal in the antenna circuit of the initiator near field RF communicator, which modulation can then be extracted by a demodulator of the initiator near field RF communicator. The modulation scheme used will depend on the communications protocol being used and program data within controller 101. For example such modulation scheme may be compatible with ISO 14443A and thus enable the near field RF transponder in Figure 1 to communicate with ISO 14443A compatible initiator near field RF communicators.

Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	Wilson at 13:14–27 As discussed above, the analogue interface 103 comprises a switchable impedance element M coupled between respective connection junctions L1 and L2 of the antenna coil 209. In order to communicate data, the controller 101 switches the switchable impedance element M in and out in accordance with the data to be communicated, thereby modulating the load on the inductively coupled antenna circuits of the near field RF transponder (for example 108 from Figure 1) and the initiator near field RF communicator. In the example shown, the switchable impedance element M comprises a transistor element consisting of one or more transistors 213 (as shown an n-channel enhancement mode MOSFET) having a control gate coupled to a data output or modulation signal line 101A of the controller 101. Optionally the switchable impedance element M also comprises a resistor 211 coupling one main electrode of the transistor element 213 to junction L1 and a resistor 212 coupling the other main electrode of the transistor element 213 to junction L2. Wilson at 14:12–21 Although not shown in Figure 2, as will be understood by the person skilled in the art, the demodulator 102 is coupled to the antenna circuit 104 to enable the demodulator 102 to extract data from an RF signal inductively coupled to antenna circuit from an initiator near field RF communicator. Such an initiator near field RF communicator may cause the RF signal to be interrupted in accordance with the data to be transmitted or to be modulated, for example, amplitude modulated, in accordance with the data to be transmitted. The controller 101 may respond by communicating data using load modulation as discussed above. So as to avoid conflict, the controller 101 may disable the demodulator 102 whilst the controller 101 is communicating data. Wilson at 16:15–24 The NFC communicator 313 has an inductive coupler or antenna circuit 30 and an analogue interface 303 to provide an interface between the antenna circuit 30 and other operational components of the NFC communicator 313. As Figure 3 is a functional block diagram the antenna circuit 30 is shown simply by a representation of an antenna coil 304. Any suitable form of series or parallel antenna circuit may be used. The antenna circuit 30 enables inductive coupling to an alternating magnetic field (H field) (for example from a 13.56 Mega Hertz signal) generated or transmitted by, for example, an initiator near field RF communicator such as an RFDD transceiver or an NFC communicator in initiator mode. Wilson at 17:23–18:1

Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	In addition, however, the NFC communicator 313 also has the ability to generate or transmit its own RF field and also to modulate that RF field. In the example shown, this functionality consists of a driver 312 having an output coupled to the antenna circuit 30, one input coupled to the controller 301 and the other input coupled to a modulator 311 coupled to the controller. The NFC communicator 313 also has a power supply 310 which may be part of the NFC communicator or the other functionality, for example the power supply 310 may be provided by a host or. The power supply 310 may be, for example, a battery such as a button cell battery. Wilson at 19:3–16 In the initiator mode, the NFC communicator 313 may initiate communication with any compatible target which may be an NFC communicator 313 in target mode or a near field RF transponder of Figures 1 and 2 such as shown in Figures l and 2. In the target mode, the NFC communicator 313 may respond to initiation of communication by any compatible initiator which may be an RFDD transceiver or an NFC communicator in initiator mode. As used herein, compatible means operable at the same frequency and in accordance with the same protocols, for example in accordance with the protocols set out in various standards such as ISO/IEC 18092, ISO/IEC 21481, ISO/IEC 14443 and ISO/IEC 15693. Communication may be an active communication under which the initiator and target each generate their own RF field when communicating data and then turn off that RF field to await data communication from the other or passive communication under which the initiator transmits and maintains its RF field throughout the entire communication. Wilson at 19:21–28 Where the NFC communicator is in initiator mode and using active communication, the driver 312 is controlled by the controller 301 to drive the antenna circuit to produce the required RF field and the modulator 311 is controlled by the controller 301 to cause the RF field to be modulated in accordance with the data (information and/or control data) to be communicated. The controller 301 may use its own internal clock as an oscillator from which to derive the oscillating signal to produce the RF field or a separate oscillator may be provided either within the NFC communicator 313 or its host, if it has one. Wilson at 19:29–20:18 Where the NFC communicator is in target mode, then the operation of the NFC communicator will be similar to that described above for the near field RF transponder. For example, when the NFC communicator is in target mode and uses the circuitry shown in Figure 2, then, as described above with respect to Figure 2, the voltage between L1 and L2 is controlled by the error amplifier 206 and operation

Claim Element	Exemplary Citations to W.O. 2007/135434 (“Wilson”)
	of the error amplifier is in turned controlled by the switches 203 and 204. Where the NFC communicator is independently powered (i.e. the power supply 310 is available), the error amplifier 206 may or may not be powered down in the event that the external magnetic field droops. Operation of the error amplifier may be controlled entirely by controller 301, that is only in circumstances where the NFC communicator is modulating a supplied RF field with data. The error amplifier 206 will be disconnected by the controller when the NFC communicator is providing its own RF field. As another possibility, the switches 203 and 204 (Figure 2) may be controlled by a signal from the modulator 311 rather than the controller 301, so that the error amplifier is only disconnected while the modulator is modulating the NFC communicator's own RF field. Even where the additional power supply 310 is available, the ability to re-direct power away from specific areas of the antenna circuitry (namely the error amplifier 206) may still be advantageous, for example where the additional power supply 310 is low or has been disconnected. Wilson at Figure 1  FIG. 1 Wilson at Figure 2

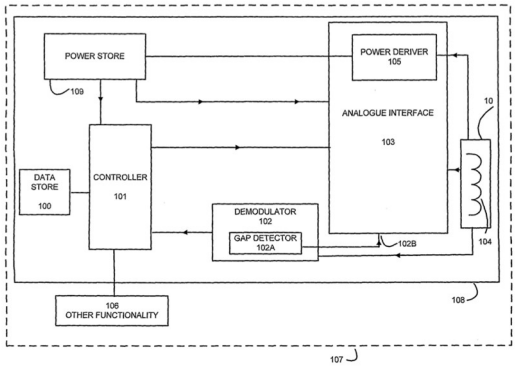
Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	 FIG. 2 2/3 Wilson at Figure 3  FIG. 3 3/3 To the extent this limitation is not disclosed by Wilson, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Wilson, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[17d] driving transmission of data by the active transmit driver circuit from the antenna to the NFC reader.	Wilson discloses or renders obvious "driving transmission of data by the active transmit driver circuit from the antenna to the NFC reader." For example: *See* [1d] above. Wilson at 1:28–2:14

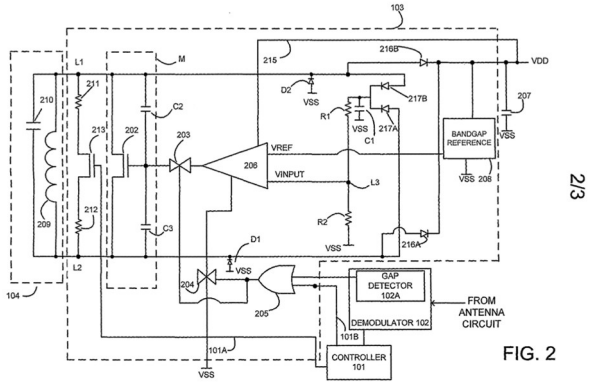
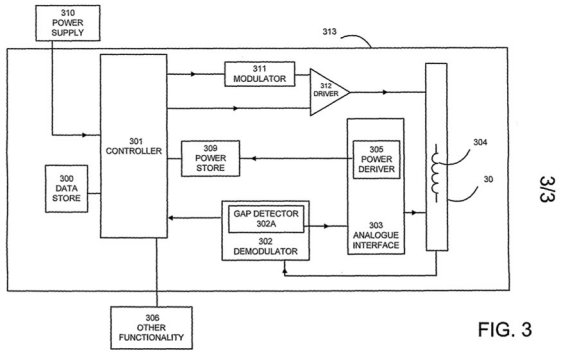
Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	Communication of data between NFC communicators may be via an active communication mode in which the NFC communicator transmits or generates an alternating magnetic field modulated with the data to be communicated and the receiving NFC communicator responds by transmitting or generating its own modulated magnetic field. Communication of data between NFC communicators may be via a passive communication mode in which one NFC communicator transmits or generates an alternating magnetic field and maintains that field and the responding NFC communicator modulates the magnetic field to which it is inductively coupled with the data to be communicated, for example by modulating the load on the inductive coupling ("load modulation"). Near field RF communicators may also communicate actively or passively. Active communication is where communication requires the near field RF communicator to have an internal power source available to it. Passive communication is where a near field RF communicator derives a power supply from a received magnetic field. Generally an RF transceiver will use active communication while an RF transponder will use passive communication. An NFC communicator may use either active or passive communication. Wilson at 6:16–7:2 In an embodiment, the present invention provides an antenna apparatus suitable for use in a near field RF communicator, the antenna apparatus comprising an antenna circuit comprising an antenna coil and, in one example, at least one capacitor and at least two resistors, the apparatus further comprising an analogue interface coupled to the antenna circuit, the analogue interface comprising at least one error amplifier, at least one switch for controlling operation of the error amplifier, the switch being controlled by at least one of a demodulator, a gap detector and a modulation indicator, and a capacitor to store power derived from a supplied magnetic field. In one example, the switch is controlled so as not to provide power to the at least one error amplifier during at least one of modulation of the supplied magnetic field by the near field RF communicator and detection of any gap or reduction in level of supplied magnetic field. The modulation indicator may be provided by a controller of the near field RF communicator. Wilson at 7:3–12 An embodiment provides a near field RF communicator having: an inductive coupler to enable inductive coupling with a magnetic field of an RF signal; a demodulator to extract modulation from an inductively coupled magnetic field; an error amplifier operable to control a voltage of the near field RF communicator on the basis of a comparison of a reference voltage with a further voltage; a modulator operable to modulate an inductively coupled magnetic field with data to be communicated via the inductive coupling;

Claim Element	Exemplary Citations to W.O. 2007/135434 (“Wilson”)
	and an error amplifier controller to inhibit operation of the error amplifier in the event of at least one of a magnetic field amplitude (or strength) below a predetermined level and the presence of modulation. Wilson at 11:1–24 The controller 101 and the demodulator 102 are coupled to the analogue interface 103. As will be described below, the analogue interface includes a modulation element to enable the controller to modulate a received magnetic field with data and a voltage regulator to enable control of the supply of power within the near field RF transponder in accordance with the received magnetic field strength (amplitude) which, as will be described below with reference to Figure 2, may be affected by environment factors and also by interruption or modulation to enable transmission of data. To this end, the demodulator 102 comprises, in addition to demodulator circuitry (not separately shown) to extract the modulation from the carrier signal, a gap detector 102A or similar functionality for detecting gaps in the received RF field or reductions in the strength of the RF field as a result, for example, of amplitude modulation or environmental conditions. The demodulator circuitry may comprise any suitable form of demodulator, for example a simple diode rectifier circuit, for extracting the modulation from an RF carrier signal. The gap detector 102A may comprise, for example, filtering and rectifying circuitry to extract and rectify the carrier signal and threshold circuitry for providing a gap detection signal when the rectified carrier signal is below a predetermined threshold value. As another possibility, peak detector circuitry may be used to detect when a peak value of the carrier signal falls below a predetermined threshold. It will, however, be appreciated that the gap detector may comprise any circuitry suitable to detect the absence of the carrier signal or a reduction in the amplitude of the carrier signal below a predetermined threshold. Although shown as part of the demodulator 102, the gap detector 102A may be a functional block that is separate from the demodulator. Wilson at 12:3–24 The controller 101 controls communication of data by the near field RF transponder 108 in accordance with at least one of pre-stored instructions or programming and instructions determined by the controller from modulation extracted by the demodulator 102. The controller 101 causes data to be communicated by controlling the modulation element mentioned above to modulate the load ("load modulation") on the inductive coupling between the near field RF transponder and the initiator near field RF communicator. The modulation element may comprise a transistor element in parallel with the antenna coil of the antenna circuit 104. The controller supplies a modulation signal representing the data to be communicated to a control gate of the transistor element, thereby causing an impedance to be switched across the antenna coil of the antenna circuit 104 in accordance with the data to be communicated. The load on the inductive

Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	coupling between the antenna circuit 104 of the near field RF transponder and the initiator near field RF communicator is thus varied in accordance with the data to be communicated, so causing modulation of the amplitude of the signal in the antenna circuit of the initiator near field RF communicator, which modulation can then be extracted by a demodulator of the initiator near field RF communicator. The modulation scheme used will depend on the communications protocol being used and program data within controller 101. For example such modulation scheme may be compatible with ISO 14443A and thus enable the near field RF transponder in Figure 1 to communicate with ISO 14443A compatible initiator near field RF communicators. Wilson at 13:14–27 As discussed above, the analogue interface 103 comprises a switchable impedance element M coupled between respective connection junctions L1 and L2 of the antenna coil 209. In order to communicate data, the controller 101 switches the switchable impedance element M in and out in accordance with the data to be communicated, thereby modulating the load on the inductively coupled antenna circuits of the near field RF transponder (for example 108 from Figure 1) and the initiator near field RF communicator. In the example shown, the switchable impedance element M comprises a transistor element consisting of one or more transistors 213 (as shown an n-channel enhancement mode MOSFET) having a control gate coupled to a data output or modulation signal line 101A of the controller 101. Optionally the switchable impedance element M also comprises a resistor 211 coupling one main electrode of the transistor element 213 to junction L1 and a resistor 212 coupling the other main electrode of the transistor element 213 to junction L2. Wilson at 14:12–21 Although not shown in Figure 2, as will be understood by the person skilled in the art, the demodulator 102 is coupled to the antenna circuit 104 to enable the demodulator 102 to extract data from an RF signal inductively coupled to antenna circuit from an initiator near field RF communicator. Such an initiator near field RF communicator may cause the RF signal to be interrupted in accordance with the data to be transmitted or to be modulated, for example, amplitude modulated, in accordance with the data to be transmitted. The controller 101 may respond by communicating data using load modulation as discussed above. So as to avoid conflict, the controller 101 may disable the demodulator 102 whilst the controller 101 is communicating data. Wilson at 17:23–18:1

Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	In addition, however, the NFC communicator 313 also has the ability to generate or transmit its own RF field and also to modulate that RF field. In the example shown, this functionality consists of a driver 312 having an output coupled to the antenna circuit 30, one input coupled to the controller 301 and the other input coupled to a modulator 311 coupled to the controller. The NFC communicator 313 also has a power supply 310 which may be part of the NFC communicator or the other functionality, for example the power supply 310 may be provided by a host or. The power supply 310 may be, for example, a battery such as a button cell battery. Wilson at 19:3–16 In the initiator mode, the NFC communicator 313 may initiate communication with any compatible target which may be an NFC communicator 313 in target mode or a near field RF transponder of Figures 1 and 2 such as shown in Figures l and 2. In the target mode, the NFC communicator 313 may respond to initiation of communication by any compatible initiator which may be an RFDD transceiver or an NFC communicator in initiator mode. As used herein, compatible means operable at the same frequency and in accordance with the same protocols, for example in accordance with the protocols set out in various standards such as ISO/IEC 18092, ISO/IEC 21481, ISO/IEC 14443 and ISO/IEC 15693. Communication may be an active communication under which the initiator and target each generate their own RF field when communicating data and then turn off that RF field to await data communication from the other or passive communication under which the initiator transmits and maintains its RF field throughout the entire communication. Wilson at 19:21–28 Where the NFC communicator is in initiator mode and using active communication, the driver 312 is controlled by the controller 301 to drive the antenna circuit to produce the required RF field and the modulator 311 is controlled by the controller 301 to cause the RF field to be modulated in accordance with the data (information and/or control data) to be communicated. The controller 301 may use its own internal clock as an oscillator from which to derive the oscillating signal to produce the RF field or a separate oscillator may be provided either within the NFC communicator 313 or its host, if it has one. Wilson at 19:29–20:18 Where the NFC communicator is in target mode, then the operation of the NFC communicator will be similar to that described above for the near field RF transponder. For example, when the NFC communicator is in target mode and uses the circuitry shown in Figure 2, then, as described above with respect to Figure 2, the voltage between L1 and L2 is controlled by the error amplifier 206 and operation

Claim Element	Exemplary Citations to W.O. 2007/135434 (“Wilson”)
	of the error amplifier is in turned controlled by the switches 203 and 204. Where the NFC communicator is independently powered (i.e. the power supply 310 is available), the error amplifier 206 may or may not be powered down in the event that the external magnetic field droops. Operation of the error amplifier may be controlled entirely by controller 301, that is only in circumstances where the NFC communicator is modulating a supplied RF field with data. The error amplifier 206 will be disconnected by the controller when the NFC communicator is providing its own RF field. As another possibility, the switches 203 and 204 (Figure 2) may be controlled by a signal from the modulator 311 rather than the controller 301, so that the error amplifier is only disconnected while the modulator is modulating the NFC communicator's own RF field. Even where the additional power supply 310 is available, the ability to re-direct power away from specific areas of the antenna circuitry (namely the error amplifier 206) may still be advantageous, for example where the additional power supply 310 is low or has been disconnected. Wilson at Figure 1  FIG. 1 Wilson at Figure 2

Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
	 FIG. 2 2/3 Wilson at Figure 3  FIG. 3 3/3 To the extent this limitation is not disclosed by Wilson, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Wilson, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
18[pre]. The method of claim 17 further comprising:	Wilson discloses or renders obvious "[t]he method of claim 17 further comprising." *See* claim 17 above.

Claim Element	Exemplary Citations to W.O. 2007/135434 ("Wilson")
[18a] amplifying a signal received from the antenna to generate an amplified signal; and	To the extent this limitation is not disclosed by Wilson, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Wilson, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 8 and claim 17 above.
[18b] providing the amplified signal to the smartcard controller.	To the extent this limitation is not disclosed by Wilson, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Wilson, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 8 and claim 17 above.
19. The method of claim 10 or 17, wherein the transmitted data includes ticketing information for a mass transit system.	Wilson discloses or renders obvious "[t]he method of claim 10 or 17, wherein the transmitted data includes ticketing information for a mass transit system." *See* claim 2 above. *See also* claims 10 and 17 above.
20. The method of claim 10 or 17, wherein the transmitted data includes transaction information for a mobile payment.	Wilson discloses or renders obvious "[t]he method of claim 10 or 17, wherein the transmitted data includes transaction information for a mobile payment." *See* claim 3 above. *See also* claims 10 and 17 above.

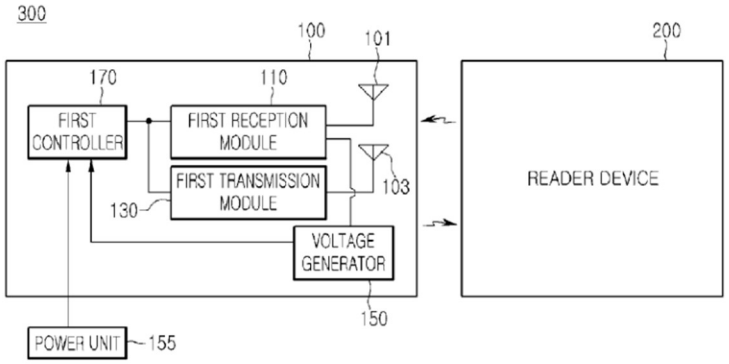
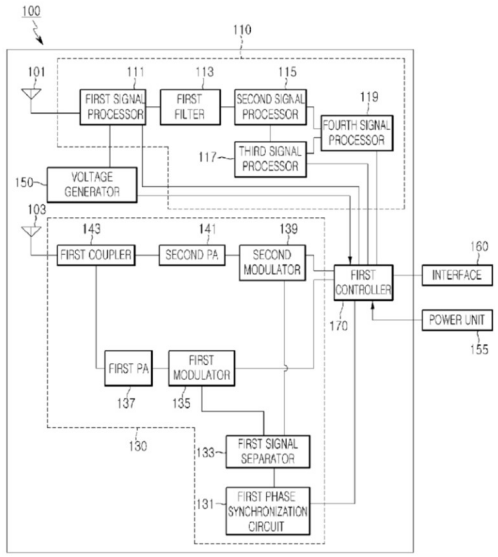
DEFENDANTS' INVALIDITY CONTENTIONS FOR U.S. PAT. 11,694,053

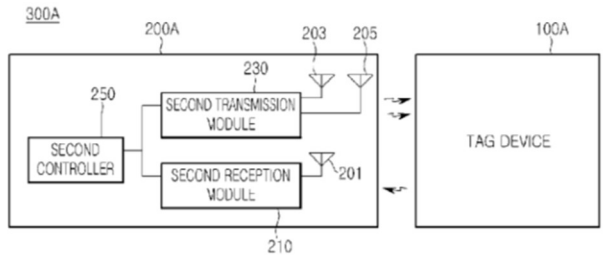
EXHIBIT C08: U.S. Patent Pub. No. 2010/0072277 ("Kim–277")

As demonstrated in the claim charts below, the claims of U.S. Patent No. 11,694,053 ("the '053 patent") are invalid (a) under one or more sections of 35 U.S.C. § 102 as anticipated by Kim–277 and (b) under 35 U.S.C. § 103(a) as obvious over Kim–277 standing alone and as set forth herein, and/or combined with the knowledge of a person of ordinary skill in the art, Applicant's Admitted Prior Art, and/or the additional prior art references discussed in Exhibit C and Exhibits C01–C09, the contents of which are hereby incorporated by reference into this chart. One of ordinary skill in the art, as of the priority date of the '053 patent, would have known to combine the prior art elements disclosed by the foregoing references using known methods, and to use these elements according to their established functions in order to achieve a known and predictable result.

Defendants have conducted the invalidity analysis herein based at least in part and in some instance entirely upon Plaintiff's apparent application of the claims of the '053 patent. By charting the prior art against the claims and limitations herein, Defendants are not admitting or agreeing to Plaintiff's application of the claims at issue in this case, and these charts should not be interpreted as an admission or concession by Defendants that any particular construction or application of any claim limitation by Plaintiff is correct or proper. Additionally, these charts provide representative examples of portions of the charted references that disclose the indicated limitations of the claims; additional portions of these references other than the representative examples provided herein may also disclose the indicated limitation(s) and Defendants contend that the asserted claims are invalid in light of the charted reference(s) as a whole in its or their entirety. Where a particular figure is cited, the citation should be understood to encompass the caption and description of the figure as well as any text relating to or describing the figure. Conversely, where particular text referring to a figure is cited, the citation should be understood to include the figure as well.

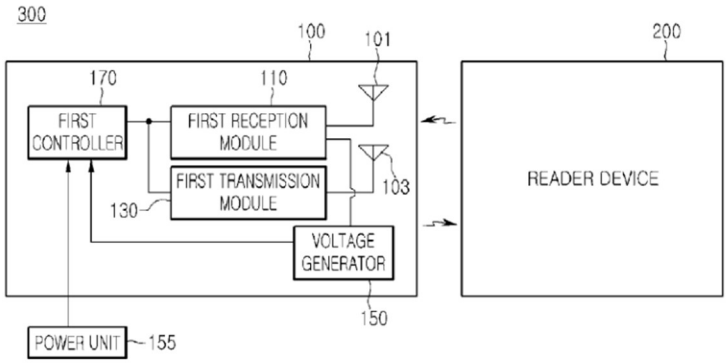
Claim Element	**Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")**
1[pre]. A mobile device comprising:	By providing this disclosure, Defendants do not take a position on whether the preamble is a claim limitation. Kim–277 discloses or renders obvious "[a] mobile device." For example: Kim–277 at Abstract Embodiments relate to a tag device, a reader device, and a radio frequency identification (RFID) system. The Q embodiment provides a tag device comprising: a reception module converting a received high frequency signal into a scale level, and Q converting the converted scale level into a digital signal to output the same; a transmission module modulating a transmission signal M to output the same; and a controller controlling the reception module and the transmission module. The tag device communicates o with the reader device through wireless short distance communication. Kim–277 at Figure 1

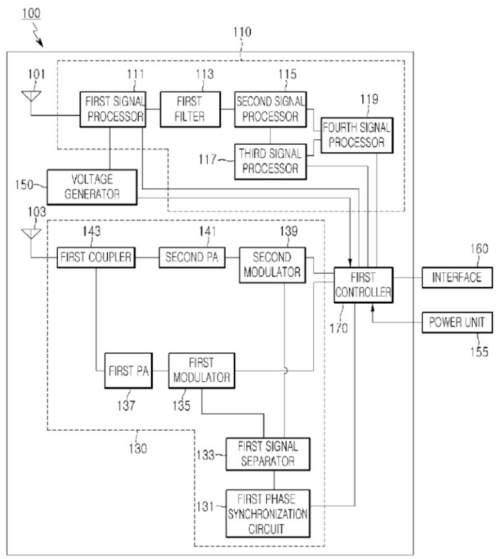
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	[Fig. 1]  Kim–277 at Figure 2 [Fig. 2]  Kim–277 at Figure 7

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	[Fig. 7]  Kim–277 at [0003] Generally, the RFID technology comprises a tag device and a reader device. The tag device is attached on an object such as goods to record detail information of the object. The reader device performs RF communication with the tag device to obtain the information of the object from the tag device. This RFID technology provides an infrastructure on which distribution/circulation management such as distribution, assembly, price change, and selling can be efficiently processed. Kim–277 at [0005] Embodiments provide a tag device that can efficiently use power by providing various modulation methods and operating in a passive mode modulation method or an active mode modulation method depending on the kind of power. Kim–277 at [0010] An embodiment provides a tag device comprising: a reception module converting a received high frequency signal into a scale level, and converting the converted scale level into a digital signal to output the same; a transmission module modulating a transmission signal to output the same; and a controller controlling the reception module and the transmission module. Kim–277 at [0012] An embodiment provides a radio frequency identification system comprising: a tag device comprising: a first reception module converting a received high frequency signal into a scale level, and outputting the converted scale level reception signal as a digital signal; a first transmission module modulating an information request signal to output the same; and a first controller controlling the first reception module and the first transmission module; and a reader device comprising: a second reception module converting a high frequency signal received from the tag device into a scale level, and outputting the converted scale level reception signal as a digital signal; a second transmission module modulating an information request

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	signal, and transmitting the signal to the tag device; and a second controller controlling the second reception module and the second transmission module. Kim–277 at [0020] FIG. 2 is a construction view of the tag device of FIG. 1. Kim–277 at [0031] Referring to FIG. 1, the RFID system 300 comprises a tag (or transponder) device 100 and a reader (or interrogator) device 200. Kim–277 at [0033] The tag device 100 has various shapes and sizes, and is classified into an active tag and a passive tag depending on whether power is supplied, classified into a low frequency system and a high frequency system depending on a frequency in use. The tag device 100 is attached to persons, automobiles, goods, livestock, and buildings, and contains detailed information of a corresponding object. Also, the tag device 100 can be mounted on a smart card to perform user authentication and electronic payment. The tag device 100 can be attached or function in cooperation with another device to provide various services. Kim–277 at [0034] The RF frequency tag of the RFID system 300 can be classified into a low frequency (LF) tag of 124-134 kHz used for access control and animal management, a high frequency (HF) tag of 13.56 MHz used for an integrated circuit (IC) card and an identification card, an ultra HF (UHF) tag of 400-915 MHz used for identification of containers in distribution and circulation, and a microwave tag of 2.45 GHz. Also, a 5.8 GHz tag can be used for telematics. These communication bands are provided for an exemplary purpose, and can change within the technical spirit and the scope of the embodiments. Kim–277 at [0035] Here, the tag device 100 can operate in an active mode driven by power supplied from a power unit 155, and a passive mode not requiring power. That is, the tag device 100 can operate in a semi-active mode. Here, when the tag device 100 is mounted on a terminal such as a mobile terminal, the tag device 100 can use the battery power of the mobile terminal as the power unit 155. Kim–277 at [0043] Referring to FIG. 2, the tag device 100 comprises the first reception module 110, the first transmission module 130, and the voltage generator 150. The first reception module 110 comprises a first signal

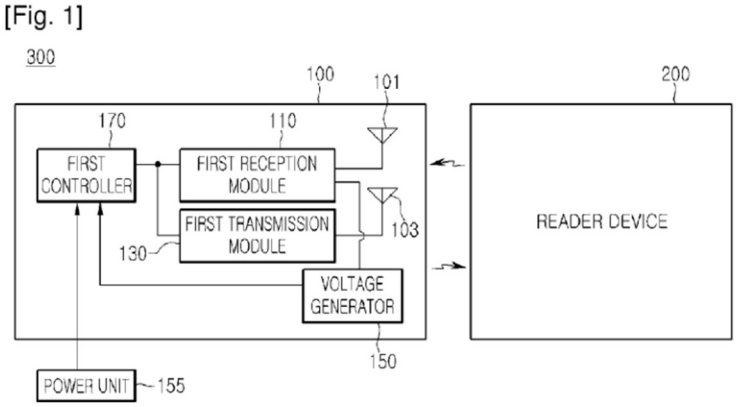
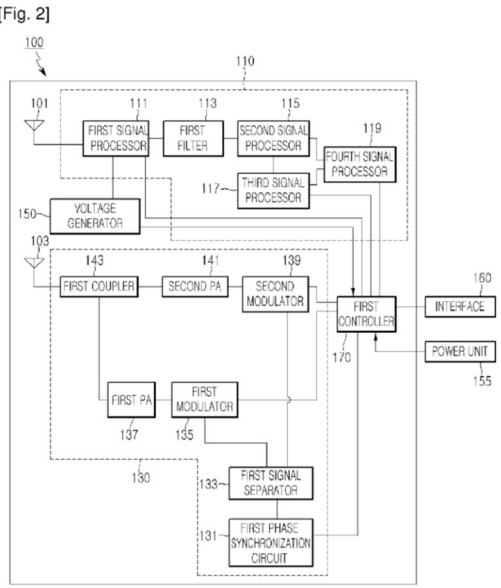
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	processor 111, a first filter 113, a second signal processor 115, a third signal processor 117, and a fourth signal processor 119. Kim–277 at [0056] Also, an interface 160 is connected to a mobile terminal, for example, to receive manipulation signals of the active mode and the passive mode and deliver the signals to the first controller 170. The first controller 170 can select the active mode or the passive mode depending on the manipulation signal. That is, during the passive mode, the first controller 170 can output a digital transmission signal to the first modulator 135, and during the active mode, the first controller 170 can output a digital transmission signal to the second modulator 139. Embodiments may not use the power unit 155 and the interface 160. Since the construction of the tag device may change depending on an installation environment or application service, the embodiments are not limited to using the power unit 155 and the interface 160. Kim–277 at [0084] Referring to FIG. 6, the tag device 100 comprises an IC chip 100B and a single antenna 105. The IC chip can comprise the first reception module 110, the first transmission module 130, the first controller 170, and the voltage generator 150 of FIG. 1. The antenna 105 is a transmission/reception antenna, and is formed in a closed loop type, for example, and has a structure in which the IC chip 100B has been mounted between two sides facing each other. The IC chip 100B can transmit or receive a signal through the antenna 105, there is no limitation in the structure of the antenna. Kim–277 at [0087] Referring to FIG. 7, the RFID system 300A comprises a tag device 100A and a reader device 200A. The reader device 200A communicates with the tag device 100A through wireless short distance communication in order to collect information of the tag device 100A. For example, the reader device 200A can collect data of the tag device 100A by transmitting an information request signal to the tag device 100A, and receiving object detailed information from the tag device 100A. The reader device 200A transmits/receives the collected information to/from a middle ware or other nodes. Kim–277 at [0133] Meanwhile, in the embodiments, the tag device 100 of FIG. 1 described in the first embodiment can be applied as the tag device 100A of FIG. 7 described in the second embodiment, and the reader device 200A of FIG. 7 described in the second embodiment can be applied as the reader device 200 of FIG. 1 described in the first embodiment. The elements and the descriptions of the first embodiment, and the elements and

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	the descriptions of the second embodiment are not limited to the relevant embodiment but can be applied to the other embodiment. Kim–277 at [0137] Since embodiments provide various modulation methods to the tag device and/or the reader device, the system can stably maintain communication according to an electromagnetic wave environment. *See also* Kim–277 at [0004], [0009], [0015], [0016], [0017], [0024], [0032], [0036], [0037], [0038], [0052], [0057], [0066], [0067], [0083], [0089], [0093], [0094], [0103], [0117], [0118], [0132], [0136], [0138], and [0139]. To the extent this limitation is not disclosed by Kim–277, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Kim–277, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[1a] a power source;	Kim–277 discloses or renders obvious "a power source." For example: Kim–277 at Figure 1 [Fig. 1]  Kim–277 at Figure 2

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	[Fig. 2]  Kim–277 at [0005] Embodiments provide a tag device that can efficiently use power by providing various modulation methods and operating in a passive mode modulation method or an active mode modulation method depending on the kind of power. Kim–277 at [0015] Embodiments can efficiently use power of a tag device. Kim–277 at [0033] The tag device 100 has various shapes and sizes, and is classified into an active tag and a passive tag depending on whether power is supplied, classified into a low frequency system and a high frequency system depending on a frequency in use. The tag device 100 is attached to persons, automobiles, goods, livestock, and buildings, and contains detailed information of a corresponding object. Also, the tag device 100 can be mounted on a smart card to perform user authentication and electronic payment. The tag device 100 can be attached or function in cooperation with another device to provide various services. Kim–277 at [0035]

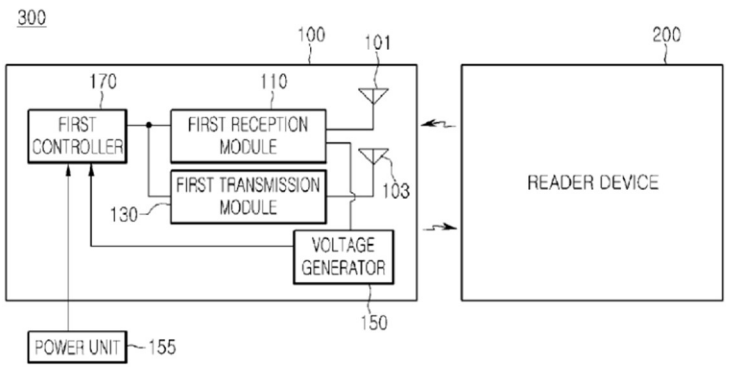
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	Here, the tag device 100 can operate in an active mode driven by power supplied from a power unit 155, and a passive mode not requiring power. That is, the tag device 100 can operate in a semi-active mode. Here, when the tag device 100 is mounted on a terminal such as a mobile terminal, the tag device 100 can use the battery power of the mobile terminal as the power unit 155. Kim–277 at [0037] The controller 170 controls a drive in the active mode or a passive mode depending on whether power is supplied. For example, the tag device 100 is driven by the power unit 155 during the active mode, and driven by a voltage generated by the voltage generator 150 during the passive mode. Also, the active mode and the passive mode can be changed depending on whether power is supplied from the power unit 155, or can be switched from the passive mode to the active mode when power is supplied to the power unit 155. One of the active mode and the passive mode can be changed to the other according to a manipulation signal of an operator. Kim–277 at [0041] Here, during the passive mode and the active mode, the first transmission module 130 can use different modulation methods. For example, the first transmission module 130 can use amplitude shift keying (ASK) during the passive mode, and can selectively use frequency shift keying (FSK), quadrature phase shift keying (QPSK), and phase shift keying (PSK) during the active mode. Kim–277 at [0055] Here, the first controller 170 delivers a digital transmission signal to the first modulator 135 and/or the second modulator 139 of the first transmission module 130. At this point, when the first transmission module is in the passive mode, the first modulator 135 operates. When the first transmission module is in the active mode, the second modulator 139 operates. Kim–277 at [0056] Also, an interface 160 is connected to a mobile terminal, for example, to receive manipulation signals of the active mode and the passive mode and deliver the signals to the first controller 170. The first controller 170 can select the active mode or the passive mode depending on the manipulation signal. That is, during the passive mode, the first controller 170 can output a digital transmission signal to the first modulator 135, and during the active mode, the first controller 170 can output a digital transmission signal to the second modulator 139. Embodiments may not use the power unit 155 and the interface 160. Since the construction of the tag device may change depending on an installation environment or application service, the embodiments are not limited to using the power unit 155 and the interface 160.

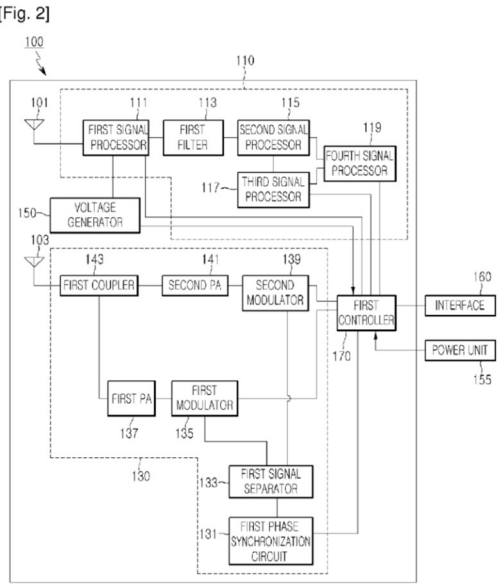
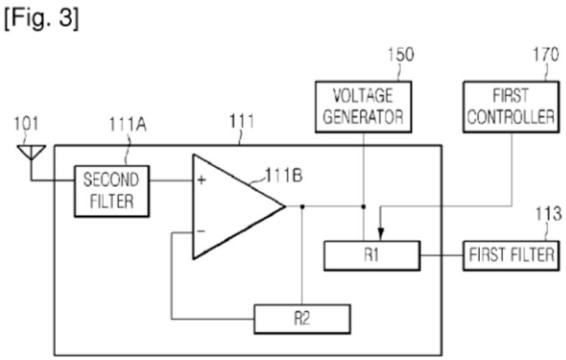
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	Kim–277 at [0058] The power unit 155 can be realized in a battery and a voltage control circuit and supplies power to each part through the first controller 170. Here, through the powers of the voltage generator 150 and the power unit 155 have been described to be supplied through the first controller 170, this is only one example, the powers can be supplied through a logic board of the device. Kim–277 at [0064] The above-described first transmission module 130 can operate in the active mode and the passive mode by the power of the voltage generator 150 and the power unit 155. Also, the first transmission module 130 can be set to switch to the active mode when power is supplied through the power unit 155 with the passive mode set as a default. The setting of the passive mode and the active mode can change and is not limited thereto. Kim–277 at [0089] The tag device 100A can operate in at least one of a passive mode, an active mode, and a semi-active mode. The tag device 100A can operate in the semi-active mode, that is, in the passive mode and the active mode depending on whether power is supplied as in the tag device of the first embodiment. Kim–277 at [0118] The reader device 200A according to the second embodiment can remove a phase change by movement of a tag device and remove recognition reduction by an energy delivery position. Also, the second embodiment improves a signal recognition distance, improves an energy supply to the tag device, and improves the reception sensitivity of the tag device by removing a reason why the intensity of a signal reduces as a distance between the reader device 200A and the tag device increases. The reader device can stably communicate with the tag device on the whole. Kim–277 at [0136] Embodiments can efficiently use the power of the tag device. To the extent this limitation is not disclosed by Kim–277, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Kim–277, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

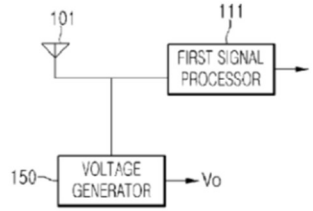
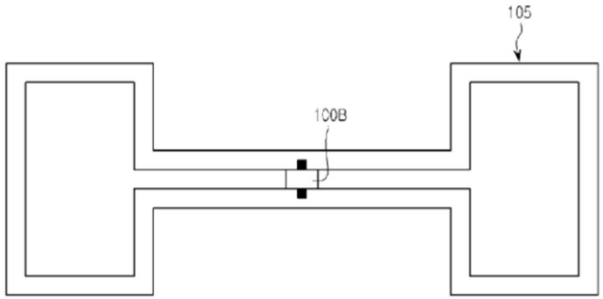
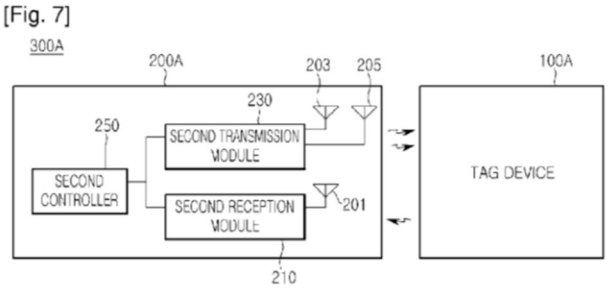
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
[1b] a smartcard controller coupled to the power source to receive power;	Kim–277 discloses or renders obvious "a smartcard controller coupled to the power source to receive power." For example: Kim–277 at Figure 1  Kim–277 at Figure 2 

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	Kim–277 at [0005] Embodiments provide a tag device that can efficiently use power by providing various modulation methods and operating in a passive mode modulation method or an active mode modulation method depending on the kind of power. Kim–277 at [0015] Embodiments can efficiently use power of a tag device. Kim–277 at [0033] The tag device 100 has various shapes and sizes, and is classified into an active tag and a passive tag depending on whether power is supplied, classified into a low frequency system and a high frequency system depending on a frequency in use. The tag device 100 is attached to persons, automobiles, goods, livestock, and buildings, and contains detailed information of a corresponding object. Also, the tag device 100 can be mounted on a smart card to perform user authentication and electronic payment. The tag device 100 can be attached or function in cooperation with another device to provide various services. Kim–277 at [0035] Here, the tag device 100 can operate in an active mode driven by power supplied from a power unit 155, and a passive mode not requiring power. That is, the tag device 100 can operate in a semi-active mode. Here, when the tag device 100 is mounted on a terminal such as a mobile terminal, the tag device 100 can use the battery power of the mobile terminal as the power unit 155. Kim–277 at [0037] The controller 170 controls a drive in the active mode or a passive mode depending on whether power is supplied. For example, the tag device 100 is driven by the power unit 155 during the active mode, and driven by a voltage generated by the voltage generator 150 during the passive mode. Also, the active mode and the passive mode can be changed depending on whether power is supplied from the power unit 155, or can be switched from the passive mode to the active mode when power is supplied to the power unit 155. One of the active mode and the passive mode can be changed to the other according to a manipulation signal of an operator. Kim–277 at [0041] Here, during the passive mode and the active mode, the first transmission module 130 can use different modulation methods. For example, the first transmission module 130 can use amplitude shift keying

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	(ASK) during the passive mode, and can selectively use frequency shift keying (FSK), quadrature phase shift keying (QPSK), and phase shift keying (PSK) during the active mode. Kim–277 at [0055] Here, the first controller 170 delivers a digital transmission signal to the first modulator 135 and/or the second modulator 139 of the first transmission module 130. At this point, when the first transmission module is in the passive mode, the first modulator 135 operates. When the first transmission module is in the active mode, the second modulator 139 operates. Kim–277 at [0056] Also, an interface 160 is connected to a mobile terminal, for example, to receive manipulation signals of the active mode and the passive mode and deliver the signals to the first controller 170. The first controller 170 can select the active mode or the passive mode depending on the manipulation signal. That is, during the passive mode, the first controller 170 can output a digital transmission signal to the first modulator 135, and during the active mode, the first controller 170 can output a digital transmission signal to the second modulator 139. Embodiments may not use the power unit 155 and the interface 160. Since the construction of the tag device may change depending on an installation environment or application service, the embodiments are not limited to using the power unit 155 and the interface 160. Kim–277 at [0058] The power unit 155 can be realized in a battery and a voltage control circuit and supplies power to each part through the first controller 170. Here, through the powers of the voltage generator 150 and the power unit 155 have been described to be supplied through the first controller 170, this is only one example, the powers can be supplied through a logic board of the device. Kim–277 at [0064] The above-described first transmission module 130 can operate in the active mode and the passive mode by the power of the voltage generator 150 and the power unit 155. Also, the first transmission module 130 can be set to switch to the active mode when power is supplied through the power unit 155 with the passive mode set as a default. The setting of the passive mode and the active mode can change and is not limited thereto. Kim–277 at [0089]

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	The tag device 100A can operate in at least one of a passive mode, an active mode, and a semi-active mode. The tag device 100A can operate in the semi-active mode, that is, in the passive mode and the active mode depending on whether power is supplied as in the tag device of the first embodiment. Kim–277 at [0136] Embodiments can efficiently use the power of the tag device. To the extent this limitation is not disclosed by Kim–277, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Kim–277, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[1c] an antenna tuned to operate at substantially 13.56 MHz, wherein the antenna interacts with a Near Field Communication (NFC) reader external to the mobile device; and	Kim–277 discloses or renders obvious "an antenna tuned to operate at substantially 13.56 MHz, wherein the antenna interacts with a Near Field Communication (NFC) reader external to the mobile device." For example: Kim–277 at Abstract Embodiments relate to a tag device, a reader device, and a radio frequency identification (RFID) system. The Q embodiment provides a tag device comprising: a reception module converting a received high frequency signal into a scale level, and Q converting the converted scale level into a digital signal to output the same; a transmission module modulating a transmission signal M to output the same; and a controller controlling the reception module and the transmission module. The tag device communicates o with the reader device through wireless short distance communication. Kim–277 at Figure 1 [Fig. 1] 

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	Kim–277 at Figure 2  Kim–277 at Figure 3  Kim–277 at Figure 4

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	[Fig. 4]  Kim–277 at Figure 6 [Fig. 6]  Kim–277 at Figure 7 [Fig. 7]  Kim–277 at [0003] Generally, the RFID technology comprises a tag device and a reader device. The tag device is attached on an object such as goods to record detail information of the object. The reader device performs RF communication with the tag device to obtain the information of the object from the tag device. This RFID

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	technology provides an infrastructure on which distribution/circulation management such as distribution, assembly, price change, and selling can be efficiently processed. Kim–277 at [0004] Embodiments provide a tag device, a reader device, and an RFID system that can decode a received high frequency signal without using an intermediate frequency. Kim–277 at [0006] Embodiments provide a reader device and an RFID system that can separate transmission signals modulated in various methods into signals of the same phase and orthogonal signals to transmit the signals in the form of circularly polarized waves. Kim–277 at [0009] Embodiments provide a reader device and an RFID system that can stably supply tag energy and improving a signal recognition rate by using various modulation methods and differently processing a signal with consideration of a reception angle. Kim–277 at [0011] An embodiment provides a reader device comprising: a reception module converting a received high frequency signal into a scale level, and outputting the converted scale level as a digital signal; a transmission module modulating an information request signal to output the same; and a controller controlling the reception module and the transmission module. Kim–277 at [0012] An embodiment provides a radio frequency identification system comprising: a tag device comprising: a first reception module converting a received high frequency signal into a scale level, and outputting the converted scale level reception signal as a digital signal; a first transmission module modulating an information request signal to output the same; and a first controller controlling the first reception module and the first transmission module; and a reader device comprising: a second reception module converting a high frequency signal received from the tag device into a scale level, and outputting the converted scale level reception signal as a digital signal; a second transmission module modulating an information request signal, and transmitting the signal to the tag device; and a second controller controlling the second reception module and the second transmission module. Kim–277 at [0016]

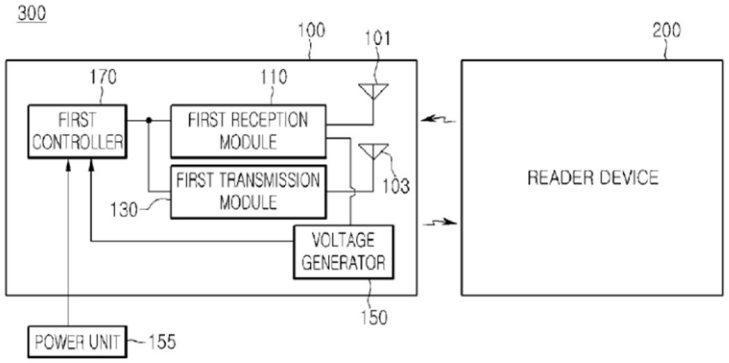
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	Embodiments can provide various modulation methods to a tag device and/or a reader device to maintain stabile communication according to an electromagnetic wave environment. Kim–277 at [0017] Embodiments can improve the signal recognition rates of a tag device and a reader device, and improve reception sensitivity and a signal recognition distance. Kim–277 at [0024] FIG. 6 is a view illustrating an example of an antenna of a tag device according to the first embodiment. Kim–277 at [0026] FIG. 8 is a construction view of the reader device of FIG. 7. Kim–277 at [0031] Referring to FIG. 1, the RFID system 300 comprises a tag (or transponder) device 100 and a reader (or interrogator) device 200. Kim–277 at [0032] The reader device 200 communicates with the tag device 100 through wireless short distance communication in order to collect information of the tag device 100. For example, the reader device 200 can collect the information of the tag device 100 by transmitting an information request signal to the tag device 100, and receiving object detailed information from the tag device 100. The reader device 200 transmits/receives the collected information to/from a middle ware or other nodes. Kim–277 at [0034] The RF frequency tag of the RFID system 300 can be classified into a low frequency (LF) tag of 124-134 kHz used for access control and animal management, a high frequency (HF) tag of 13.56 MHz used for an integrated circuit (IC) card and an identification card, an ultra HF (UHF) tag of 400-915 MHz used for identification of containers in distribution and circulation, and a microwave tag of 2.45 GHz. Also, a 5.8 GHz tag can be used for telematics. These communication bands are provided for an exemplary purpose, and can change within the technical spirit and the scope of the embodiments. Kim–277 at [0036] The tag device 100 comprises a first reception module 110, a first transmission module 130, a voltage generator 150, and a first controller 170. The first reception module 110 can decode high frequency

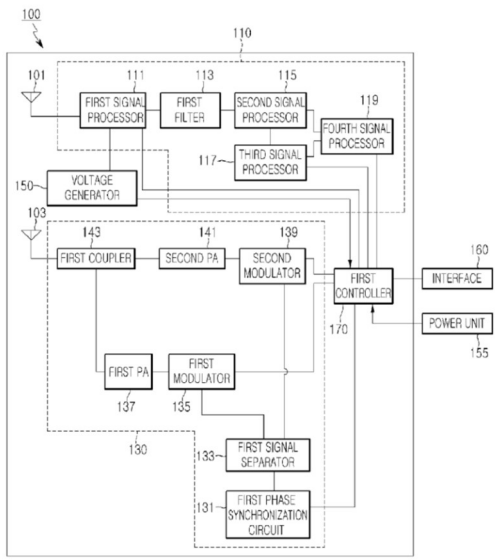
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	signals received through a reception antenna 101, and the decoded signals are delivered to the first controller 170. Here, the first reception module 110 converts high frequency signals into digital signals using a log amplifier and a comparator. Since the first reception module 110 does not use general a superheterodyne method, a sequential low frequency method, an intermediate frequency synthesis method, the number of parts can be reduced and a circuit size can be minimized. Kim–277 at [0040] During the passive mode, the first transmission module 130 transmits a transmission signal through a transmission antenna 103 in a backscatter method. Kim–277 at [0045] The first signal processor 111 filters RF signals in a predetermined frequency band from RF signals received through an reception antenna 101, amplifies a gain of the RF signals, and processes the RF signals into DC level analog signals. For example, the first signal processor 111 can output the high frequency signals into baseband signals using a log amplifier, or the high frequency signals into baseband signals using an RF pin diode. Here, the log amplifier can be applied to a system requiring long distance communication and high sensitivity. The RF pin diode can be used for low price and short distance communication. An embodiment is described to use the log amplifier. Kim–277 at [0052] The first controller 170 can store tag information. For example, the first controller 170 can comprise a memory (not shown), or the tag information can be separately stored. The first controller 170 has a communication protocol to control radio communication with the reader device 200, and provides tag information when an information request signal is received from the reader device 200. Also, the first controller 170 analyzes codes of signals decoded by the first to fourth signal processors 113, 115, 117, and 119, and generates transmission data. Kim–277 at [0063] A signal modulated by the second modulator 139 is amplified by the second power amplifier 141, and the amplified signal is coupled to the first coupler 143 and transmitted through the transmission antenna 103. Here, elements on the transmission path using the first modulator 135 and the transmission path using the second modulator 139 can change depending on a transmission frequency. For example, the power amplifier on one of the paths can be removed. Kim–277 at [0065]

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	The transmission antenna 103 is connected to the first power amplifier 137 or the second power amplifier 141 through the first coupler 143. Kim–277 at [0066] The tag device 100 can comprise a reception antenna 101 and the transmission antenna 103, or transmit/receive signals using one antenna and a duplexer. There is no limitation in the structure and the number of the antennas. Kim–277 at [0067] Since the tag device 100 according to the first embodiment transmits signals modulated in various modulation methods, it can stably maintain communication according to an electromagnetic wave environment. Also, the tag device 100 can improve the signal recognition rate of the reader device, and improve reception sensitivity and signal recognition distance. Kim–277 at [0069] Referring to FIG. 3, the first signal processor 111 comprises a second filter 111A, a first log amplifier 111B, resistors R1 and R2. The second filter 111A is connected to the reception antenna 101. The positive terminal (+) of the first log amplifier 111B is connected to the second filter 111A, and the negative terminal (−) of the log amplifier 111B is connected to the second resistor R2 of a negative feedback circuit. The output terminal of the first log amplifier 111B is connected to the first filter 113 through the first resistor R1. Kim–277 at [0076] Referring to FIG. 4, the voltage generator 150 can generate a voltage Vo using the electromagnetic energy of a high frequency signal received from the reception antenna 101. That is, the voltage generator 150 is a voltage oscillation circuit or a voltage multiplier circuit, and can be realized using a plurality of detection diodes and capacitors connected in multiple steps. The voltage generator 150 sequentially repeatedly rectifies an RF signal received through the reception antenna 101 into a DC voltage to increase the rectified DC voltage. The voltage generated by the voltage generator 150 is supplied to each part through a logic board. Kim–277 at [0083] FIG. 6 is a view illustrating a modified example of an antenna of a tag device 100 according to the first embodiment.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	Kim–277 at [0084] Referring to FIG. 6, the tag device 100 comprises an IC chip 100B and a single antenna 105. The IC chip can comprise the first reception module 110, the first transmission module 130, the first controller 170, and the voltage generator 150 of FIG. 1. The antenna 105 is a transmission/reception antenna, and is formed in a closed loop type, for example, and has a structure in which the IC chip 100B has been mounted between two sides facing each other. The IC chip 100B can transmit or receive a signal through the antenna 105, there is no limitation in the structure of the antenna. Kim–277 at [0087] Referring to FIG. 7, the RFID system 300A comprises a tag device 100A and a reader device 200A. The reader device 200A communicates with the tag device 100A through wireless short distance communication in order to collect information of the tag device 100A. For example, the reader device 200A can collect data of the tag device 100A by transmitting an information request signal to the tag device 100A, and receiving object detailed information from the tag device 100A. The reader device 200A transmits/receives the collected information to/from a middle ware or other nodes. Kim–277 at [0088] The RFID system 300A performs communication through at least one RF frequency of an LF of 124-134 kHz, 13.56 MHz, 400-915 MHz, 2.45 GHz, and 5.8 GHz. Kim–277 at [0093] The reader device 200A can transmit a signal modulated in at least one modulation method in the form of the LHCP and the RHCP, or transmit a signal modulated in different modulation methods in the form of the LHCP and the RHCP. The modulated signal transmitted from the reader device 200A is received in the tag device 100A. At this point, since the tag device 100A can receive signals having various reception angles, a signal recognition rate can be improved in comparison with the case of receiving one signal. Kim–277 at [0103] The second controller 250 collects and stores tag information from the tag device 100A. Also, the second controller 250 can analyze a reception signal decoded by the fifth to eighth signal processors 211, 215, 217, and 219, and communicate with an external interface or other nodes. Kim–277 at [0117]

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	The reader device 200A can transmit a signal modulated in at least one modulation method in the form of the LHCP and the RHCP, or transmit I and Q signals modulated in different methods in the form of the LHCP and the RHCP. A modulation signal transmitted from the reader device 200A is received in the tag device. At this point, since the tag device can receive signals having various reception angles, a signal recognition rate can be improved in comparison with the case of receiving one signal. Kim–277 at [0118] The reader device 200A according to the second embodiment can remove a phase change by movement of a tag device and remove recognition reduction by an energy delivery position. Also, the second embodiment improves a signal recognition distance, improves an energy supply to the tag device, and improves the reception sensitivity of the tag device by removing a reason why the intensity of a signal reduces as a distance between the reader device 200A and the tag device increases. The reader device can stably communicate with the tag device on the whole. Kim–277 at [0132] According to the second embodiment, the reader device decodes a high frequency signal, and can improve the recognition rate of the tag device by transmitting signals in different modulation methods when modulating a tag request signal. Kim–277 at [0133] Meanwhile, in the embodiments, the tag device 100 of FIG. 1 described in the first embodiment can be applied as the tag device 100A of FIG. 7 described in the second embodiment, and the reader device 200A of FIG. 7 described in the second embodiment can be applied as the reader device 200 of FIG. 1 described in the first embodiment. The elements and the descriptions of the first embodiment, and the elements and the descriptions of the second embodiment are not limited to the relevant embodiment but can be applied to the other embodiment. Kim–277 at [0137] Since embodiments provide various modulation methods to the tag device and/or the reader device, the system can stably maintain communication according to an electromagnetic wave environment. Kim–277 at [0138] Embodiments can improve the signal recognition rates of the tag device and the reader device, and improve reception sensitivity and signal recognition distance.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	Kim–277 at [0139] Embodiments can modulate transmission signals in various modulation methods, and transmit the signals in a circularly polarized component to provide the reader device that can stably communicate with the tag device. *See also* Kim–277 at [0060]. To the extent this limitation is not disclosed by Kim–277, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Kim–277, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[1d] an active transmit driver circuit coupled to the power source to receive the power, wherein the active transmit driver circuit affects transmission of data between the antenna and the NFC reader.	Kim–277 discloses or renders obvious "an active transmit driver circuit coupled to the power source to receive the power, wherein the active transmit driver circuit affects transmission of data between the antenna and the NFC reader." For example: Kim–277 at Figure 1 [Fig. 1]  Kim–277 at Figure 2

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	[Fig. 2]  Kim–277 at [0005] Embodiments provide a tag device that can efficiently use power by providing various modulation methods and operating in a passive mode modulation method or an active mode modulation method depending on the kind of power. Kim–277 at [0010] An embodiment provides a tag device comprising: a reception module converting a received high frequency signal into a scale level, and converting the converted scale level into a digital signal to output the same; a transmission module modulating a transmission signal to output the same; and a controller controlling the reception module and the transmission module. Kim–277 at [0012] An embodiment provides a radio frequency identification system comprising: a tag device comprising: a first reception module converting a received high frequency signal into a scale level, and outputting the converted scale level reception signal as a digital signal; a first transmission module modulating an information request signal to output the same; and a first controller controlling the first reception module and the first transmission module; and a reader device comprising: a second reception module converting

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	a high frequency signal received from the tag device into a scale level, and outputting the converted scale level reception signal as a digital signal; a second transmission module modulating an information request signal, and transmitting the signal to the tag device; and a second controller controlling the second reception module and the second transmission module. Kim–277 at [0015] Embodiments can efficiently use power of a tag device. Kim–277 at [0033] The tag device 100 has various shapes and sizes, and is classified into an active tag and a passive tag depending on whether power is supplied, classified into a low frequency system and a high frequency system depending on a frequency in use. The tag device 100 is attached to persons, automobiles, goods, livestock, and buildings, and contains detailed information of a corresponding object. Also, the tag device 100 can be mounted on a smart card to perform user authentication and electronic payment. The tag device 100 can be attached or function in cooperation with another device to provide various services. Kim–277 at [0035] Here, the tag device 100 can operate in an active mode driven by power supplied from a power unit 155, and a passive mode not requiring power. That is, the tag device 100 can operate in a semi-active mode. Here, when the tag device 100 is mounted on a terminal such as a mobile terminal, the tag device 100 can use the battery power of the mobile terminal as the power unit 155. Kim–277 at [0037] The controller 170 controls a drive in the active mode or a passive mode depending on whether power is supplied. For example, the tag device 100 is driven by the power unit 155 during the active mode, and driven by a voltage generated by the voltage generator 150 during the passive mode. Also, the active mode and the passive mode can be changed depending on whether power is supplied from the power unit 155, or can be switched from the passive mode to the active mode when power is supplied to the power unit 155. One of the active mode and the passive mode can be changed to the other according to a manipulation signal of an operator. Kim–277 at [0040] During the passive mode, the first transmission module 130 transmits a transmission signal through a transmission antenna 103 in a backscatter method.

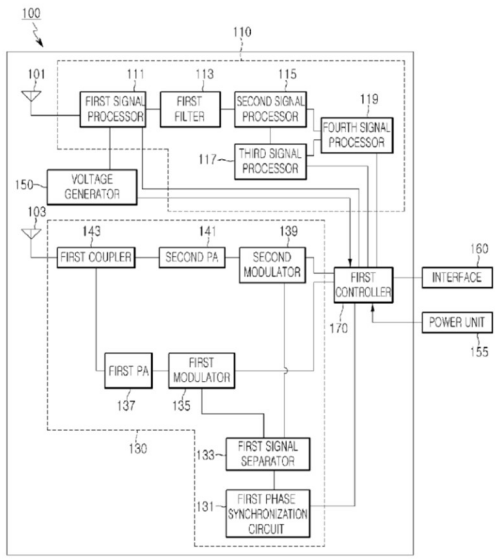
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	Kim–277 at [0041] Here, during the passive mode and the active mode, the first transmission module 130 can use different modulation methods. For example, the first transmission module 130 can use amplitude shift keying (ASK) during the passive mode, and can selectively use frequency shift keying (FSK), quadrature phase shift keying (QPSK), and phase shift keying (PSK) during the active mode. Kim–277 at [0043] Referring to FIG. 2, the tag device 100 comprises the first reception module 110, the first transmission module 130, and the voltage generator 150. The first reception module 110 comprises a first signal processor 111, a first filter 113, a second signal processor 115, a third signal processor 117, and a fourth signal processor 119. Kim–277 at [0052] The first controller 170 can store tag information. For example, the first controller 170 can comprise a memory (not shown), or the tag information can be separately stored. The first controller 170 has a communication protocol to control radio communication with the reader device 200, and provides tag information when an information request signal is received from the reader device 200. Also, the first controller 170 analyzes codes of signals decoded by the first to fourth signal processors 113, 115, 117, and 119, and generates transmission data. Kim–277 at [0055] Here, the first controller 170 delivers a digital transmission signal to the first modulator 135 and/or the second modulator 139 of the first transmission module 130. At this point, when the first transmission module is in the passive mode, the first modulator 135 operates. When the first transmission module is in the active mode, the second modulator 139 operates. Kim–277 at [0056] Also, an interface 160 is connected to a mobile terminal, for example, to receive manipulation signals of the active mode and the passive mode and deliver the signals to the first controller 170. The first controller 170 can select the active mode or the passive mode depending on the manipulation signal. That is, during the passive mode, the first controller 170 can output a digital transmission signal to the first modulator 135, and during the active mode, the first controller 170 can output a digital transmission signal to the second modulator 139. Embodiments may not use the power unit 155 and the interface 160. Since

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	the construction of the tag device may change depending on an installation environment or application service, the embodiments are not limited to using the power unit 155 and the interface 160. Kim–277 at [0061] The second modulator 139 modulates a digital transmission signal into a second analog signal. The second modulator 139 can modulate a signal using FSK or QPSK for example. The second modulator 139 can comprise a plurality of mixers, adders, and orthogonal signal conversion circuits. The second modulator 139 can change the phase of a transmission signal by 90° to convert a signal in the form in which four signals I^+, I^-, Q^+ and Q^- are added. Kim–277 at [0062] Here, though the first modulator 135 exemplarily uses ASK modulation, and the second modulator 139 exemplarily uses QPSK modulation, the first modulator 135 and the second modulator 139 can use one of ASK, FSK, and QPSK modulations. The first and second modulators 135 and 139 can use the same modulation or a different modulation. Kim–277 at [0063] A signal modulated by the second modulator 139 is amplified by the second power amplifier 141, and the amplified signal is coupled to the first coupler 143 and transmitted through the transmission antenna 103. Here, elements on the transmission path using the first modulator 135 and the transmission path using the second modulator 139 can change depending on a transmission frequency. For example, the power amplifier on one of the paths can be removed. Kim–277 at [0064] The above-described first transmission module 130 can operate in the active mode and the passive mode by the power of the voltage generator 150 and the power unit 155. Also, the first transmission module 130 can be set to switch to the active mode when power is supplied through the power unit 155 with the passive mode set as a default. The setting of the passive mode and the active mode can change and is not limited thereto. Kim–277 at [0089] The tag device 100A can operate in at least one of a passive mode, an active mode, and a semi-active mode. The tag device 100A can operate in the semi-active mode, that is, in the passive mode and the active mode depending on whether power is supplied as in the tag device of the first embodiment.

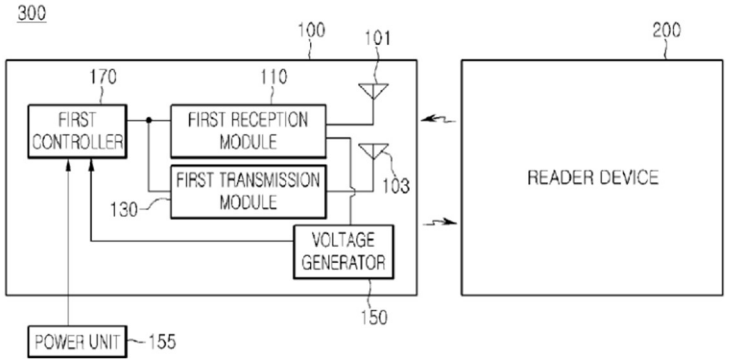
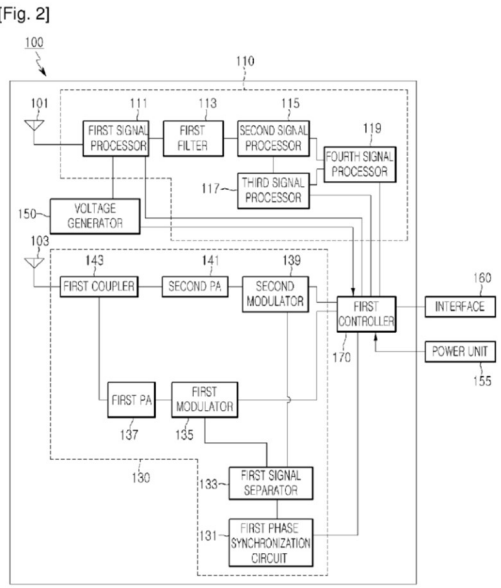
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	Kim–277 at [0136] Embodiments can efficiently use the power of the tag device. To the extent this limitation is not disclosed by Kim–277, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Kim–277, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
2. The mobile device of claim 1, wherein the transmitted data includes ticketing information for a mass transit system.	To the extent this limitation is not disclosed by Kim–277, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Kim–277, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 1 above.
3. The mobile device of claim 1, wherein the transmitted data includes transaction information for a mobile payment.	Kim–277 discloses or renders obvious "[t]he mobile device of claim 1, wherein the transmitted data includes transaction information for a mobile payment." For example: Kim–277 at [0033] The tag device 100 has various shapes and sizes, and is classified into an active tag and a passive tag depending on whether power is supplied, classified into a low frequency system and a high frequency system depending on a frequency in use. The tag device 100 is attached to persons, automobiles, goods, livestock, and buildings, and contains detailed information of a corresponding object. Also, the tag device 100 can be mounted on a smart card to perform user authentication and electronic payment. The tag device 100 can be attached or function in cooperation with another device to provide various services. To the extent this limitation is not disclosed by Kim–277, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Kim–277, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.\ *See also* claim 1 above.
4. The mobile device of claim 1, wherein the NFC reader is a point-of-sale NFC reader.	Kim–277 discloses or renders obvious "[t]he mobile device of claim 1, wherein the NFC reader is a point-of-sale NFC reader." For example: Kim–277 at [0033] The tag device 100 has various shapes and sizes, and is classified into an active tag and a passive tag depending on whether power is supplied, classified into a low frequency system and a high frequency

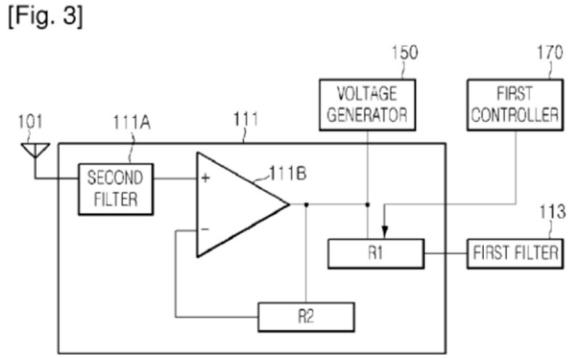
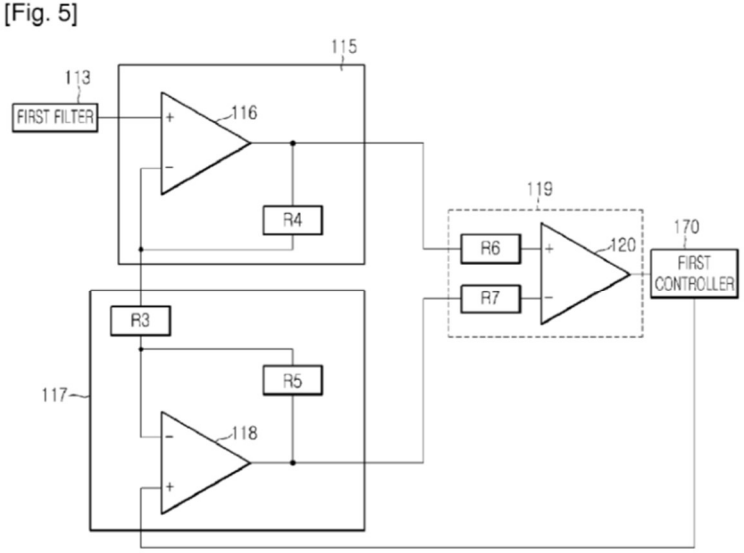
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	system depending on a frequency in use. The tag device 100 is attached to persons, automobiles, goods, livestock, and buildings, and contains detailed information of a corresponding object. Also, the tag device 100 can be mounted on a smart card to perform user authentication and electronic payment. The tag device 100 can be attached or function in cooperation with another device to provide various services. To the extent this limitation is not disclosed by Kim–277, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Kim–277, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 1 above.
5. The mobile device of claim 1, wherein the antenna includes an inductive element.	Kim–277 discloses or renders obvious "[t]he mobile device of claim 1, wherein the antenna includes an inductive element." For example: Kim–277 at [0045] The first signal processor 111 filters RF signals in a predetermined frequency band from RF signals received through an reception antenna 101, amplifies a gain of the RF signals, and processes the RF signals into DC level analog signals. For example, the first signal processor 111 can output the high frequency signals into baseband signals using a log amplifier, or the high frequency signals into baseband signals using an RF pin diode. Here, the log amplifier can be applied to a system requiring long distance communication and high sensitivity. The RF pin diode can be used for low price and short distance communication. An embodiment is described to use the log amplifier. Kim–277 at [0066] The tag device 100 can comprise a reception antenna 101 and the transmission antenna 103, or transmit/receive signals using one antenna and a duplexer. There is no limitation in the structure and the number of the antennas. Kim–277 at [0084] Referring to FIG. 6, the tag device 100 comprises an IC chip 100B and a single antenna 105. The IC chip can comprise the first reception module 110, the first transmission module 130, the first controller 170, and the voltage generator 150 of FIG. 1. The antenna 105 is a transmission/reception antenna, and is formed in a closed loop type, for example, and has a structure in which the IC chip 100B has been mounted between two sides facing each other. The IC chip 100B can transmit or receive a signal through the antenna 105, there is no limitation in the structure of the antenna.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	Kim–277 at [0118] > The reader device 200A according to the second embodiment can remove a phase change by movement of a tag device and remove recognition reduction by an energy delivery position. Also, the second embodiment improves a signal recognition distance, improves an energy supply to the tag device, and improves the reception sensitivity of the tag device by removing a reason why the intensity of a signal reduces as a distance between the reader device 200A and the tag device increases. The reader device can stably communicate with the tag device on the whole. Kim–277 at [0137] > Since embodiments provide various modulation methods to the tag device and/or the reader device, the system can stably maintain communication according to an electromagnetic wave environment. *See also* Kim–277 at [0017], [0036], [0040], [0060], [0067], and [0138]. To the extent this limitation is not disclosed by Kim–277, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Kim–277, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 1 above.
6. The mobile device of claim 1, wherein the active transmit driver circuit includes one or more of an amplifier filter, oscillator, and/or modulator.	Kim–277 discloses or renders obvious "[t]he mobile device of claim 1, wherein the active transmit driver circuit includes one or more of an amplifier filter, oscillator, and/or modulator." For example: Kim–277 at Figure 2

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	[Fig. 2]  Kim–277 at [0053] The first transmission module 130 comprises a first phase synchronization circuit 131, a first signal separator 133, a first modulator 135, a first power amplifier 137, a second modulator 139, a second power amplifier 141, and a first coupler 143. Kim–277 at [0054] The first phase synchronization circuit 131 generates a reference signal under control of the first controller 170. The first signal separator 133 outputs the reference signal to the first modulator 135 and the second modulator 139. Here, the first signal separator 133 can be realized using a switch device such as a single pole double throw (SPDT) or a coupler, but is not limited thereto. Kim–277 at [0055] Here, the first controller 170 delivers a digital transmission signal to the first modulator 135 and/or the second modulator 139 of the first transmission module 130. At this point, when the first transmission module is in the passive mode, the first modulator 135 operates. When the first transmission module is in the active mode, the second modulator 139 operates.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	Kim–277 at [0059] The first modulator 135 modulates a digital transmission signal into a first analog signal using ASK. The first modulator 135 can comprise a rectifying filter, a low pass filter, and a level detector, and is not limited to thereto. Kim–277 at [0060] The first power amplifier 137 amplifies a signal modulated by the first modulator 135 to a transmission level, and the amplified signal passes through the first coupler 143 and is transmitted through the transmission antenna 103. Kim–277 at [0061] The second modulator 139 modulates a digital transmission signal into a second analog signal. The second modulator 139 can modulate a signal using FSK or QPSK for example. The second modulator 139 can comprise a plurality of mixers, adders, and orthogonal signal conversion circuits. The second modulator 139 can change the phase of a transmission signal by 90° to convert a signal in the form in which four signals I^+, I^-, Q^+ and Q^- are added. Kim–277 at [0062] Here, though the first modulator 135 exemplarily uses ASK modulation, and the second modulator 139 exemplarily uses QPSK modulation, the first modulator 135 and the second modulator 139 can use one of ASK, FSK, and QPSK modulations. The first and second modulators 135 and 139 can use the same modulation or a different modulation. Kim–277 at [0063] A signal modulated by the second modulator 139 is amplified by the second power amplifier 141, and the amplified signal is coupled to the first coupler 143 and transmitted through the transmission antenna 103. Here, elements on the transmission path using the first modulator 135 and the transmission path using the second modulator 139 can change depending on a transmission frequency. For example, the power amplifier on one of the paths can be removed. To the extent this limitation is not disclosed by Kim–277, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Kim–277, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 1 above.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
7. The mobile device of claim 1 comprising an amplifier coupled to the power source to receive the power, wherein the amplifier is further coupled to the antenna.	Kim–277 discloses or renders obvious "[t]he mobile device of claim 1 comprising an amplifier coupled to the power source to receive the power, wherein the amplifier is further coupled to the antenna." For example: Kim–277 at Figure 1 [Fig. 1]  Kim–277 at Figure 2 [Fig. 2] 

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	Kim–277 at Figure 3  Kim–277 at Figure 5  Kim–277 at [0005]

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	Embodiments provide a tag device that can efficiently use power by providing various modulation methods and operating in a passive mode modulation method or an active mode modulation method depending on the kind of power. Kim–277 at [0015] Embodiments can efficiently use power of a tag device. Kim–277 at [0033] The tag device 100 has various shapes and sizes, and is classified into an active tag and a passive tag depending on whether power is supplied, classified into a low frequency system and a high frequency system depending on a frequency in use. The tag device 100 is attached to persons, automobiles, goods, livestock, and buildings, and contains detailed information of a corresponding object. Also, the tag device 100 can be mounted on a smart card to perform user authentication and electronic payment. The tag device 100 can be attached or function in cooperation with another device to provide various services. Kim–277 at [0035] Here, the tag device 100 can operate in an active mode driven by power supplied from a power unit 155, and a passive mode not requiring power. That is, the tag device 100 can operate in a semi-active mode. Here, when the tag device 100 is mounted on a terminal such as a mobile terminal, the tag device 100 can use the battery power of the mobile terminal as the power unit 155. Kim–277 at [0036] The tag device 100 comprises a first reception module 110, a first transmission module 130, a voltage generator 150, and a first controller 170. The first reception module 110 can decode high frequency signals received through a reception antenna 101, and the decoded signals are delivered to the first controller 170. Here, the first reception module 110 converts high frequency signals into digital signals using a log amplifier and a comparator. Since the first reception module 110 does not use general a superheterodyne method, a sequential low frequency method, an intermediate frequency synthesis method, the number of parts can be reduced and a circuit size can be minimized. Kim–277 at [0037] The controller 170 controls a drive in the active mode or a passive mode depending on whether power is supplied. For example, the tag device 100 is driven by the power unit 155 during the active mode, and driven by a voltage generated by the voltage generator 150 during the passive mode. Also, the active mode and the passive mode can be changed depending on whether power is supplied from the power unit

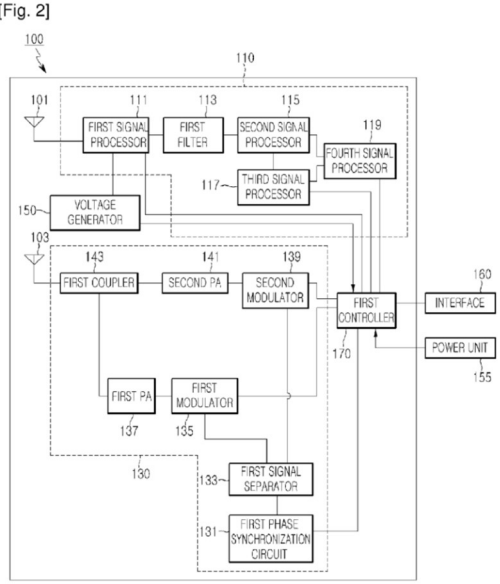
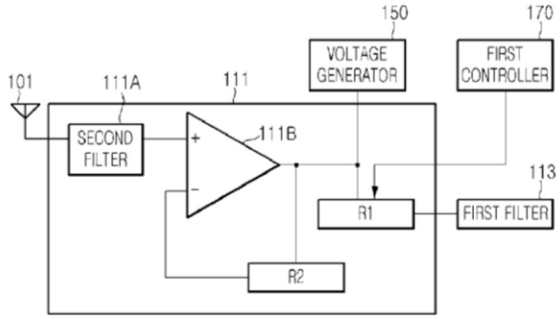
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	155, or can be switched from the passive mode to the active mode when power is supplied to the power unit 155. One of the active mode and the passive mode can be changed to the other according to a manipulation signal of an operator. Kim–277 at [0041] Here, during the passive mode and the active mode, the first transmission module 130 can use different modulation methods. For example, the first transmission module 130 can use amplitude shift keying (ASK) during the passive mode, and can selectively use frequency shift keying (FSK), quadrature phase shift keying (QPSK), and phase shift keying (PSK) during the active mode. Kim–277 at [0045] The first signal processor 111 filters RF signals in a predetermined frequency band from RF signals received through an reception antenna 101, amplifies a gain of the RF signals, and processes the RF signals into DC level analog signals. For example, the first signal processor 111 can output the high frequency signals into baseband signals using a log amplifier, or the high frequency signals into baseband signals using an RF pin diode. Here, the log amplifier can be applied to a system requiring long distance communication and high sensitivity. The RF pin diode can be used for low price and short distance communication. An embodiment is described to use the log amplifier. Kim–277 at [0048] The second signal processor 115 controls the gain of the first filter 113 and amplifies a signal, and the amplified signal is input to the fourth signal processor 119. Kim–277 at [0049] The output of the third signal processor 117 changes depending on a reference voltage of the first controller 170, and the changed output is output to the fourth signal processor 119. Here, the second signal processor 115 controls a signal output from the first signal processor 111 using a signal fed back from the third signal processor 117. At this point, the amplification gain of the second signal processor 115 is compensated for according to various reference voltages of the first controller 170. Kim–277 at [0050] The fourth signal processor 119 compares an amplified signal of the second signal processor 115 with an output signal of the third signal processor 117 to output a digital signal as a result of the comparison. That is, the fourth signal processor 119 serves as an analog-to-digital converter. A digital signal of the fourth

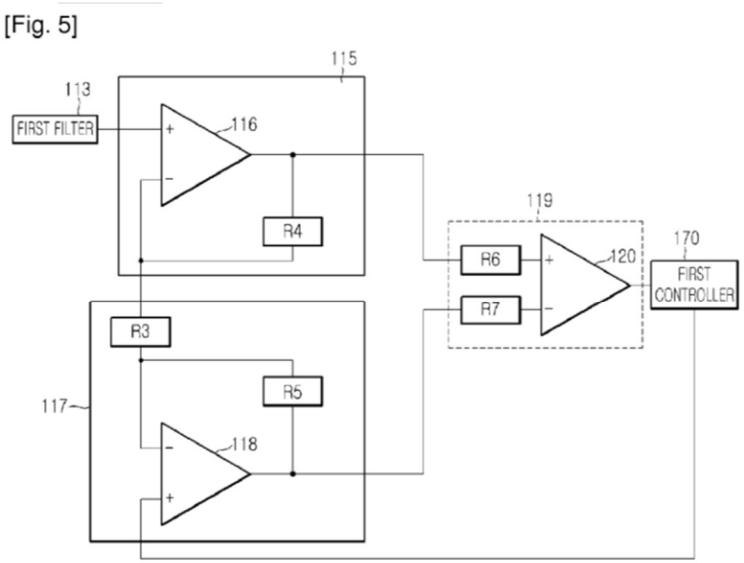
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	signal processor 119 changes depending on the output level of the third signal processor 117, and is input to the first controller 170. Kim–277 at [0051] The first controller 170 controls the gain of the first signal processor 111 depending on a received signal state, and controls the reference voltage of the third signal processor 117. Accordingly, the first controller 170 can control the sensitivity of a digital signal output to the fourth signal processor 119. Also, the first controller 170 delivers synchronization information to the fourth signal processor 119 to control a comparison operation. Kim–277 at [0053] The first transmission module 130 comprises a first phase synchronization circuit 131, a first signal separator 133, a first modulator 135, a first power amplifier 137, a second modulator 139, a second power amplifier 141, and a first coupler 143. Kim–277 at [0055] Here, the first controller 170 delivers a digital transmission signal to the first modulator 135 and/or the second modulator 139 of the first transmission module 130. At this point, when the first transmission module is in the passive mode, the first modulator 135 operates. When the first transmission module is in the active mode, the second modulator 139 operates. Kim–277 at [0056] Also, an interface 160 is connected to a mobile terminal, for example, to receive manipulation signals of the active mode and the passive mode and deliver the signals to the first controller 170. The first controller 170 can select the active mode or the passive mode depending on the manipulation signal. That is, during the passive mode, the first controller 170 can output a digital transmission signal to the first modulator 135, and during the active mode, the first controller 170 can output a digital transmission signal to the second modulator 139. Embodiments may not use the power unit 155 and the interface 160. Since the construction of the tag device may change depending on an installation environment or application service, the embodiments are not limited to using the power unit 155 and the interface 160. Kim–277 at [0060] The first power amplifier 137 amplifies a signal modulated by the first modulator 135 to a transmission level, and the amplified signal passes through the first coupler 143 and is transmitted through the transmission antenna 103.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	Kim–277 at [0063] A signal modulated by the second modulator 139 is amplified by the second power amplifier 141, and the amplified signal is coupled to the first coupler 143 and transmitted through the transmission antenna 103. Here, elements on the transmission path using the first modulator 135 and the transmission path using the second modulator 139 can change depending on a transmission frequency. For example, the power amplifier on one of the paths can be removed. Kim–277 at [0064] The above-described first transmission module 130 can operate in the active mode and the passive mode by the power of the voltage generator 150 and the power unit 155. Also, the first transmission module 130 can be set to switch to the active mode when power is supplied through the power unit 155 with the passive mode set as a default. The setting of the passive mode and the active mode can change and is not limited thereto. Kim–277 at [0065] The transmission antenna 103 is connected to the first power amplifier 137 or the second power amplifier 141 through the first coupler 143. Kim–277 at [0069] Referring to FIG. 3, the first signal processor 111 comprises a second filter 111A, a first log amplifier 111B, resistors R1 and R2. The second filter 111A is connected to the reception antenna 101. The positive terminal (+) of the first log amplifier 111B is connected to the second filter 111A, and the negative terminal (−) of the log amplifier 111B is connected to the second resistor R2 of a negative feedback circuit. The output terminal of the first log amplifier 111B is connected to the first filter 113 through the first resistor R1. Kim–277 at [0071] Also, the first log amplifier 111B can comprise at least one of a gain amplification circuit, a power amplification circuit, and a signal conversion circuit. The gain amplification circuit amplifies a signal according to a voltage gain to output an unstable high frequency signal in a state easy to recover. A reception signal whose gain has been amplified by the gain amplification circuit has a reduced bit error rate and has a high recognition rate even under a fading environment. Such a reception signal can be recovered to a stable signal even in a section where a reception level is about −90 dBm. The power amplification circuit secondarily amplifies and outputs the power of a signal whose gain has been

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	amplified by the gain amplification circuit. The signal conversion circuit converts an RF signal amplified by the power amplification circuit, for example, a signal in a band of 900 MHz into a DC level analog signal proportional to a decibel value. Kim–277 at [0072] The amplification gain of the first log amplifier 111B can be controlled by the first resistor R1 and the second resistor R2. The second resistor R2 has fixed resistance, and the first resistor R1 is a variable resistor whose resistance is varied by the first controller 170. The second resistor R2 can be connected between the output terminal of the first log amplifier 111B and a connection point of the negative feedback circuit, or between the first resistor R1 and the first filter 113. Here, the first resistor R1 and the second resistor R2 connected to the first log amplifier 111B can serve as a gain control circuit of the first log amplifier 111B. Kim–277 at [0073] The amplification gain of the first log amplifier 111B can be controlled by math FIG. 1 below. For example, the amplification gain of the first log amplifier 111B is controlled within the range of about 0 dB-20 dB according to a numerical value of the first resistor R1. Kim–277 at [0079] The first filter 113 is connected to the positive terminal (+) of the first operation amplifier 116, and the fourth resistor R4 and the third resistor R3 of the negative feedback circuit are connected to the negative terminal (−) of the first operation amplifier 116 in parallel. A reference voltage of the first controller 170 is input to the positive terminal (+) of the second operation amplifier 118, and a fifth resistor R5 of the negative feedback circuit is connected to the negative terminal (−) of the second operation amplifier 118. The third resistor R3 is connected between the negative terminal (−) of the first operation amplifier 116 and the negative terminal (−) of the second operation amplifier 118. The output terminal of the first operation amplifier 116 is connected to the positive terminal (+) of the first comparator 120 through the sixth resistor R6, and connected to the fourth resistor R4 in parallel. The output terminal of the second operation amplifier 118 is connected to the negative terminal (−) of the first comparator 120 through the seventh resistor R7. The positive terminal (+) and negative terminal (−) of the first comparator 120 can be mutually changed and is not limited thereto. Kim–277 at [0080] The first operation amplifier 116 amplifies the gain of a signal that has passed through the first filter 113 to output the same. At this point, the gain is controlled by the fourth resistor R4 of a first feedback circuit

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	of the first operation amplifier 116. The second operation amplifier 118 amplifies the reference voltage of the first controller 170 input to the positive terminal (+) of the second operation amplifier 118 to output the same. An output signal of the second operation amplifier 118 controls the level of a signal input to the negative terminal (−) of the first operation amplifier 116 through the fifth resistor R5 of a second feedback circuit, the third resistor R3, which is a feedback circuit, and the fourth resistor R4 of the first feedback circuit. Accordingly, the output signal of the second operation amplifier 118 changes according to the reference voltage of the first controller 170. The amplification gain of the first operation amplifier 116 is controlled by a change in the output signal of the second operation amplifier 118. That is, the amplification gains of the second operation amplifier 118 and the first operation amplifier 116 are controlled using the reference voltage of the first controller 170, so that the sensitivity of a reception signal output to the first operation amplifier 116 can be controlled. Kim–277 at [0082] The first comparator 120 of the fourth signal processor 119 compares the output signal of the first operation amplifier 116 with the output signal of the second operation amplifier 118, and outputs a digital signal to the first controller 170 according to the comparison result. Here, the first controller 170 can recover a digital signal more completely by delivering synchronization information to the fourth signal processor 119. Here, the digital signal of the fourth signal processor 119 is input to the first controller 170 as a transistor-transistor logic (TTL)/complementary metal oxide semiconductor (CMOS) signal. Kim–277 at [0089] The tag device 100A can operate in at least one of a passive mode, an active mode, and a semi-active mode. The tag device 100A can operate in the semi-active mode, that is, in the passive mode and the active mode depending on whether power is supplied as in the tag device of the first embodiment. Kim–277 at [0136] Embodiments can efficiently use the power of the tag device. To the extent this limitation is not disclosed by Kim–277, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Kim–277, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 1 above.

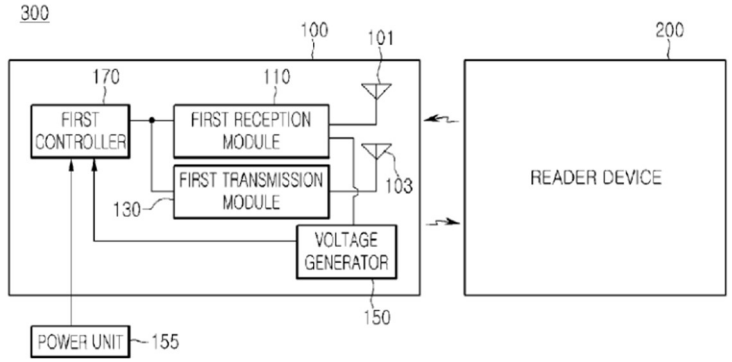
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
8. The mobile device of claim 7, wherein the amplifier amplifies a signal received at the antenna and generates an amplified signal, and provides the amplified signal to the smartcard controller.	Kim–277 discloses or renders obvious "[t]he mobile device of claim 7, wherein the amplifier amplifies a signal received at the antenna and generates an amplified signal, and provides the amplified signal to the smartcard controller." For example: Kim–277 at Figure 2  Kim–277 at Figure 3 

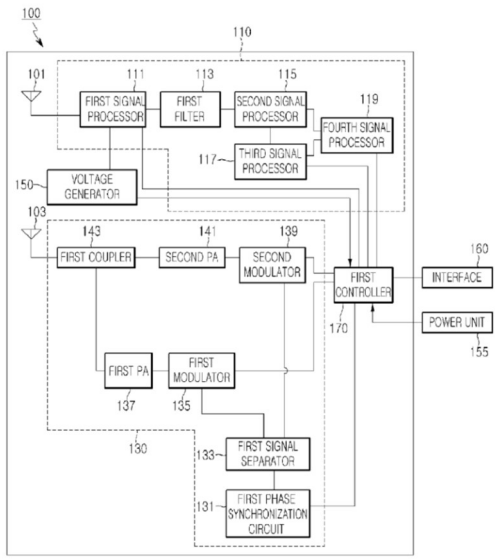
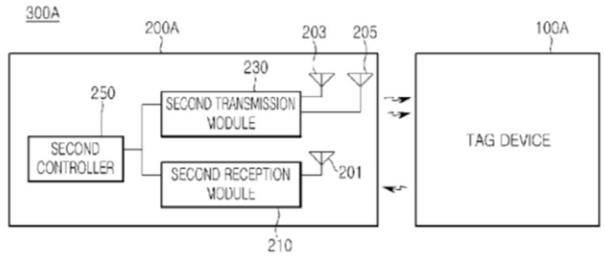
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	Kim–277 at Figure 5  Kim–277 at [0036] The tag device 100 comprises a first reception module 110, a first transmission module 130, a voltage generator 150, and a first controller 170. The first reception module 110 can decode high frequency signals received through a reception antenna 101, and the decoded signals are delivered to the first controller 170. Here, the first reception module 110 converts high frequency signals into digital signals using a log amplifier and a comparator. Since the first reception module 110 does not use general a superheterodyne method, a sequential low frequency method, an intermediate frequency synthesis method, the number of parts can be reduced and a circuit size can be minimized. Kim–277 at [0045] The first signal processor 111 filters RF signals in a predetermined frequency band from RF signals received through an reception antenna 101, amplifies a gain of the RF signals, and processes the RF signals into DC level analog signals. For example, the first signal processor 111 can output the high frequency signals into baseband signals using a log amplifier, or the high frequency signals into baseband signals using an RF pin diode. Here, the log amplifier can be applied to a system requiring long distance

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	communication and high sensitivity. The RF pin diode can be used for low price and short distance communication. An embodiment is described to use the log amplifier. Kim–277 at [0048] The second signal processor 115 controls the gain of the first filter 113 and amplifies a signal, and the amplified signal is input to the fourth signal processor 119. Kim–277 at [0049] The output of the third signal processor 117 changes depending on a reference voltage of the first controller 170, and the changed output is output to the fourth signal processor 119. Here, the second signal processor 115 controls a signal output from the first signal processor 111 using a signal fed back from the third signal processor 117. At this point, the amplification gain of the second signal processor 115 is compensated for according to various reference voltages of the first controller 170. Kim–277 at [0051] The first controller 170 controls the gain of the first signal processor 111 depending on a received signal state, and controls the reference voltage of the third signal processor 117. Accordingly, the first controller 170 can control the sensitivity of a digital signal output to the fourth signal processor 119. Also, the first controller 170 delivers synchronization information to the fourth signal processor 119 to control a comparison operation. Kim–277 at [0069] Referring to FIG. 3, the first signal processor 111 comprises a second filter 111A, a first log amplifier 111B, resistors R1 and R2. The second filter 111A is connected to the reception antenna 101. The positive terminal (+) of the first log amplifier 111B is connected to the second filter 111A, and the negative terminal (−) of the log amplifier 111B is connected to the second resistor R2 of a negative feedback circuit. The output terminal of the first log amplifier 111B is connected to the first filter 113 through the first resistor R1. Kim–277 at [0071] Also, the first log amplifier 111B can comprise at least one of a gain amplification circuit, a power amplification circuit, and a signal conversion circuit. The gain amplification circuit amplifies a signal according to a voltage gain to output an unstable high frequency signal in a state easy to recover. A reception signal whose gain has been amplified by the gain amplification circuit has a reduced bit error rate and has a high recognition rate even under a fading environment. Such a reception signal can be

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	recovered to a stable signal even in a section where a reception level is about −90 dBm. The power amplification circuit secondarily amplifies and outputs the power of a signal whose gain has been amplified by the gain amplification circuit. The signal conversion circuit converts an RF signal amplified by the power amplification circuit, for example, a signal in a band of 900 MHz into a DC level analog signal proportional to a decibel value. Kim–277 at [0072] The amplification gain of the first log amplifier 111B can be controlled by the first resistor R1 and the second resistor R2. The second resistor R2 has fixed resistance, and the first resistor R1 is a variable resistor whose resistance is varied by the first controller 170. The second resistor R2 can be connected between the output terminal of the first log amplifier 111B and a connection point of the negative feedback circuit, or between the first resistor R1 and the first filter 113. Here, the first resistor R1 and the second resistor R2 connected to the first log amplifier 111B can serve as a gain control circuit of the first log amplifier 111B. Kim–277 at [0073] The amplification gain of the first log amplifier 111B can be controlled by math FIG. 1 below. For example, the amplification gain of the first log amplifier 111B is controlled within the range of about 0 dB-20 dB according to a numerical value of the first resistor R1. Kim–277 at [0079] The first filter 113 is connected to the positive terminal (+) of the first operation amplifier 116, and the fourth resistor R4 and the third resistor R3 of the negative feedback circuit are connected to the negative terminal (−) of the first operation amplifier 116 in parallel. A reference voltage of the first controller 170 is input to the positive terminal (+) of the second operation amplifier 118, and a fifth resistor R5 of the negative feedback circuit is connected to the negative terminal (−) of the second operation amplifier 118. The third resistor R3 is connected between the negative terminal (−) of the first operation amplifier 116 and the negative terminal (−) of the second operation amplifier 118. The output terminal of the first operation amplifier 116 is connected to the positive terminal (+) of the first comparator 120 through the sixth resistor R6, and connected to the fourth resistor R4 in parallel. The output terminal of the second operation amplifier 118 is connected to the negative terminal (−) of the first comparator 120 through the seventh resistor R7. The positive terminal (+) and negative terminal (−) of the first comparator 120 can be mutually changed and is not limited thereto. Kim–277 at [0080]

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	The first operation amplifier 116 amplifies the gain of a signal that has passed through the first filter 113 to output the same. At this point, the gain is controlled by the fourth resistor R4 of a first feedback circuit of the first operation amplifier 116. The second operation amplifier 118 amplifies the reference voltage of the first controller 170 input to the positive terminal (+) of the second operation amplifier 118 to output the same. An output signal of the second operation amplifier 118 controls the level of a signal input to the negative terminal (−) of the first operation amplifier 116 through the fifth resistor R5 of a second feedback circuit, the third resistor R3, which is a feedback circuit, and the fourth resistor R4 of the first feedback circuit. Accordingly, the output signal of the second operation amplifier 118 changes according to the reference voltage of the first controller 170. The amplification gain of the first operation amplifier 116 is controlled by a change in the output signal of the second operation amplifier 118. That is, the amplification gains of the second operation amplifier 118 and the first operation amplifier 116 are controlled using the reference voltage of the first controller 170, so that the sensitivity of a reception signal output to the first operation amplifier 116 can be controlled. Kim–277 at [0082] The first comparator 120 of the fourth signal processor 119 compares the output signal of the first operation amplifier 116 with the output signal of the second operation amplifier 118, and outputs a digital signal to the first controller 170 according to the comparison result. Here, the first controller 170 can recover a digital signal more completely by delivering synchronization information to the fourth signal processor 119. Here, the digital signal of the fourth signal processor 119 is input to the first controller 170 as a transistor-transistor logic (TTL)/complementary metal oxide semiconductor (CMOS) signal. To the extent this limitation is not disclosed by Kim–277, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Kim–277, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 7 above.
17[pre]. A method of near field communication between a mobile device and an NFC reader, the method comprising:	Kim–277 discloses or renders obvious "[a] method of near field communication between a mobile device and an NFC reader, the method." For example: *See* [1d] above. Kim–277 at Abstract Embodiments relate to a tag device, a reader device, and a radio frequency identification (RFID) system. The Q embodiment provides a tag device comprising: a reception module converting a received high

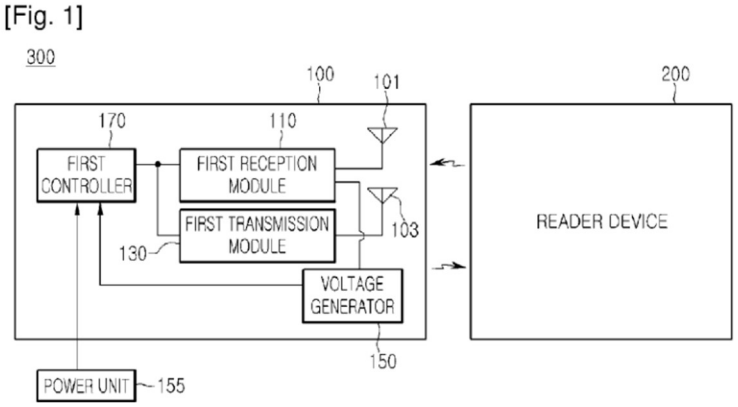
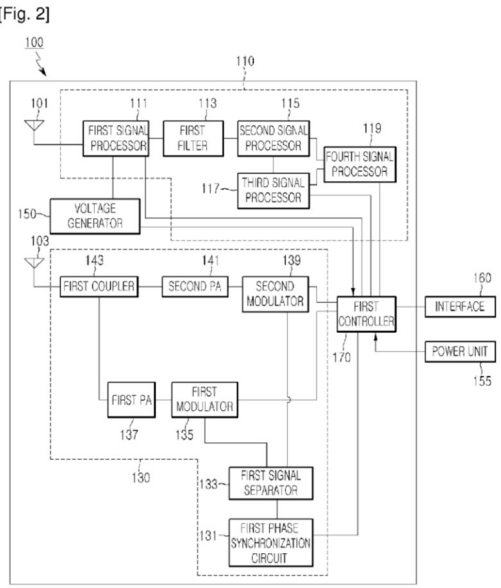
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	frequency signal into a scale level, and Q converting the converted scale level into a digital signal to output the same; a transmission module modulating a transmission signal M to output the same; and a controller controlling the reception module and the transmission module. The tag device communicates o with the reader device through wireless short distance communication. Kim–277 at Figure 1 [Fig. 1]  Kim–277 at Figure 2

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	[Fig. 2]  Kim–277 at Figure 7 [Fig. 7]  Kim–277 at [0003] Generally, the RFID technology comprises a tag device and a reader device. The tag device is attached on an object such as goods to record detail information of the object. The reader device performs RF communication with the tag device to obtain the information of the object from the tag device. This RFID technology provides an infrastructure on which distribution/circulation management such as distribution, assembly, price change, and selling can be efficiently processed.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	Kim–277 at [0005] Embodiments provide a tag device that can efficiently use power by providing various modulation methods and operating in a passive mode modulation method or an active mode modulation method depending on the kind of power. Kim–277 at [0010] An embodiment provides a tag device comprising: a reception module converting a received high frequency signal into a scale level, and converting the converted scale level into a digital signal to output the same; a transmission module modulating a transmission signal to output the same; and a controller controlling the reception module and the transmission module. Kim–277 at [0012] An embodiment provides a radio frequency identification system comprising: a tag device comprising: a first reception module converting a received high frequency signal into a scale level, and outputting the converted scale level reception signal as a digital signal; a first transmission module modulating an information request signal to output the same; and a first controller controlling the first reception module and the first transmission module; and a reader device comprising: a second reception module converting a high frequency signal received from the tag device into a scale level, and outputting the converted scale level reception signal as a digital signal; a second transmission module modulating an information request signal, and transmitting the signal to the tag device; and a second controller controlling the second reception module and the second transmission module. Kim–277 at [0020] FIG. 2 is a construction view of the tag device of FIG. 1. Kim–277 at [0031] Referring to FIG. 1, the RFID system 300 comprises a tag (or transponder) device 100 and a reader (or interrogator) device 200. Kim–277 at [0033] The tag device 100 has various shapes and sizes, and is classified into an active tag and a passive tag depending on whether power is supplied, classified into a low frequency system and a high frequency system depending on a frequency in use. The tag device 100 is attached to persons, automobiles, goods, livestock, and buildings, and contains detailed information of a corresponding object. Also, the tag device

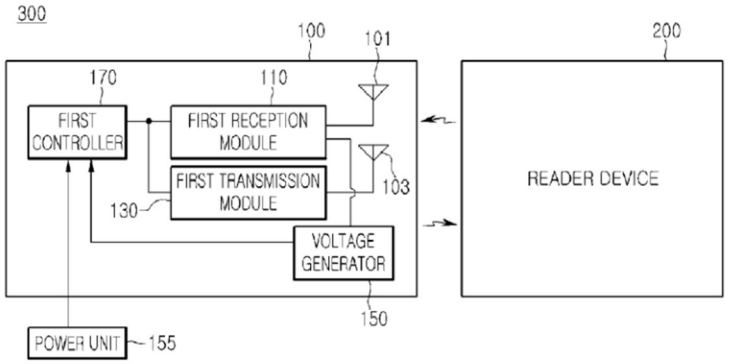
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	100 can be mounted on a smart card to perform user authentication and electronic payment. The tag device 100 can be attached or function in cooperation with another device to provide various services. Kim–277 at [0034] The RF frequency tag of the RFID system 300 can be classified into a low frequency (LF) tag of 124-134 kHz used for access control and animal management, a high frequency (HF) tag of 13.56 MHz used for an integrated circuit (IC) card and an identification card, an ultra HF (UHF) tag of 400-915 MHz used for identification of containers in distribution and circulation, and a microwave tag of 2.45 GHz. Also, a 5.8 GHz tag can be used for telematics. These communication bands are provided for an exemplary purpose, and can change within the technical spirit and the scope of the embodiments. Kim–277 at [0035] Here, the tag device 100 can operate in an active mode driven by power supplied from a power unit 155, and a passive mode not requiring power. That is, the tag device 100 can operate in a semi-active mode. Here, when the tag device 100 is mounted on a terminal such as a mobile terminal, the tag device 100 can use the battery power of the mobile terminal as the power unit 155. Kim–277 at [0043] Referring to FIG. 2, the tag device 100 comprises the first reception module 110, the first transmission module 130, and the voltage generator 150. The first reception module 110 comprises a first signal processor 111, a first filter 113, a second signal processor 115, a third signal processor 117, and a fourth signal processor 119. Kim–277 at [0056] Also, an interface 160 is connected to a mobile terminal, for example, to receive manipulation signals of the active mode and the passive mode and deliver the signals to the first controller 170. The first controller 170 can select the active mode or the passive mode depending on the manipulation signal. That is, during the passive mode, the first controller 170 can output a digital transmission signal to the first modulator 135, and during the active mode, the first controller 170 can output a digital transmission signal to the second modulator 139. Embodiments may not use the power unit 155 and the interface 160. Since the construction of the tag device may change depending on an installation environment or application service, the embodiments are not limited to using the power unit 155 and the interface 160. Kim–277 at [0084]

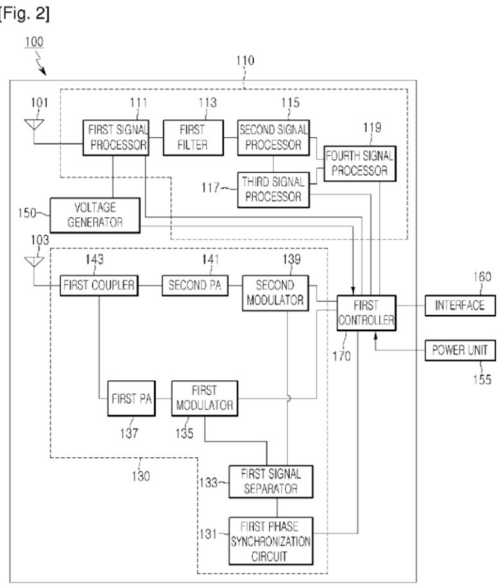
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	Referring to FIG. 6, the tag device 100 comprises an IC chip 100B and a single antenna 105. The IC chip can comprise the first reception module 110, the first transmission module 130, the first controller 170, and the voltage generator 150 of FIG. 1. The antenna 105 is a transmission/reception antenna, and is formed in a closed loop type, for example, and has a structure in which the IC chip 100B has been mounted between two sides facing each other. The IC chip 100B can transmit or receive a signal through the antenna 105, there is no limitation in the structure of the antenna. Kim–277 at [0087] Referring to FIG. 7, the RFID system 300A comprises a tag device 100A and a reader device 200A. The reader device 200A communicates with the tag device 100A through wireless short distance communication in order to collect information of the tag device 100A. For example, the reader device 200A can collect data of the tag device 100A by transmitting an information request signal to the tag device 100A, and receiving object detailed information from the tag device 100A. The reader device 200A transmits/receives the collected information to/from a middle ware or other nodes. Kim–277 at [0133] Meanwhile, in the embodiments, the tag device 100 of FIG. 1 described in the first embodiment can be applied as the tag device 100A of FIG. 7 described in the second embodiment, and the reader device 200A of FIG. 7 described in the second embodiment can be applied as the reader device 200 of FIG. 1 described in the first embodiment. The elements and the descriptions of the first embodiment, and the elements and the descriptions of the second embodiment are not limited to the relevant embodiment but can be applied to the other embodiment. Kim–277 at [0137] Since embodiments provide various modulation methods to the tag device and/or the reader device, the system can stably maintain communication according to an electromagnetic wave environment. *See also* Kim–277 at [0004], [0009], [0015], [0016], [0017], [0024], [0032], [0036], [0037], [0038], [0052], [0057], [0066], [0067], [0083], [0089], [0093], [0094], [0103], [0117], [0118], [0132], [0136], [0138], and [0139]. To the extent this limitation is not disclosed by Kim–277, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Kim–277, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
[17a] coupling a smartcard controller and an active transmit driver circuit to a power source of the mobile device;	Kim–277 discloses or renders obvious "coupling a smartcard controller and an active transmit driver circuit to a power source of the mobile device." For example: Kim–277 at Figure 1  Kim–277 at Figure 2 

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	Kim–277 at [0005] Embodiments provide a tag device that can efficiently use power by providing various modulation methods and operating in a passive mode modulation method or an active mode modulation method depending on the kind of power. Kim–277 at [0015] Embodiments can efficiently use power of a tag device. Kim–277 at [0033] The tag device 100 has various shapes and sizes, and is classified into an active tag and a passive tag depending on whether power is supplied, classified into a low frequency system and a high frequency system depending on a frequency in use. The tag device 100 is attached to persons, automobiles, goods, livestock, and buildings, and contains detailed information of a corresponding object. Also, the tag device 100 can be mounted on a smart card to perform user authentication and electronic payment. The tag device 100 can be attached or function in cooperation with another device to provide various services. Kim–277 at [0035] Here, the tag device 100 can operate in an active mode driven by power supplied from a power unit 155, and a passive mode not requiring power. That is, the tag device 100 can operate in a semi-active mode. Here, when the tag device 100 is mounted on a terminal such as a mobile terminal, the tag device 100 can use the battery power of the mobile terminal as the power unit 155. Kim–277 at [0037] The controller 170 controls a drive in the active mode or a passive mode depending on whether power is supplied. For example, the tag device 100 is driven by the power unit 155 during the active mode, and driven by a voltage generated by the voltage generator 150 during the passive mode. Also, the active mode and the passive mode can be changed depending on whether power is supplied from the power unit 155, or can be switched from the passive mode to the active mode when power is supplied to the power unit 155. One of the active mode and the passive mode can be changed to the other according to a manipulation signal of an operator. Kim–277 at [0041] Here, during the passive mode and the active mode, the first transmission module 130 can use different modulation methods. For example, the first transmission module 130 can use amplitude shift keying

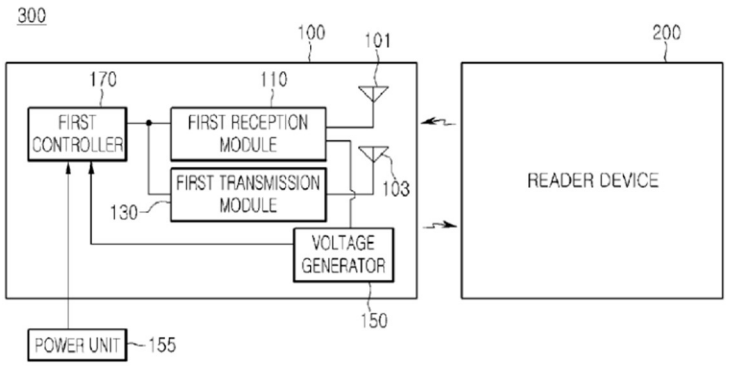
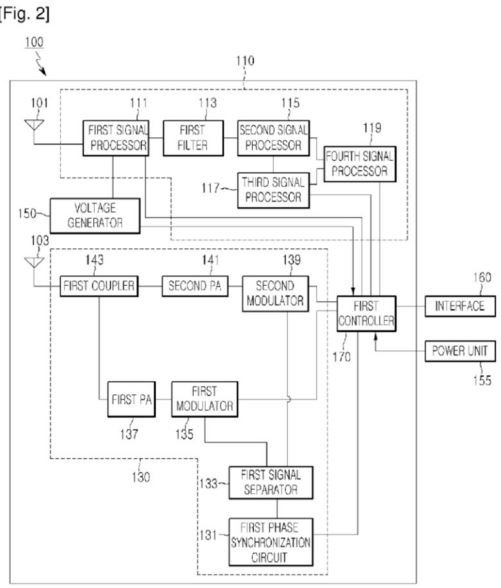
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	(ASK) during the passive mode, and can selectively use frequency shift keying (FSK), quadrature phase shift keying (QPSK), and phase shift keying (PSK) during the active mode. Kim–277 at [0055] Here, the first controller 170 delivers a digital transmission signal to the first modulator 135 and/or the second modulator 139 of the first transmission module 130. At this point, when the first transmission module is in the passive mode, the first modulator 135 operates. When the first transmission module is in the active mode, the second modulator 139 operates. Kim–277 at [0056] Also, an interface 160 is connected to a mobile terminal, for example, to receive manipulation signals of the active mode and the passive mode and deliver the signals to the first controller 170. The first controller 170 can select the active mode or the passive mode depending on the manipulation signal. That is, during the passive mode, the first controller 170 can output a digital transmission signal to the first modulator 135, and during the active mode, the first controller 170 can output a digital transmission signal to the second modulator 139. Embodiments may not use the power unit 155 and the interface 160. Since the construction of the tag device may change depending on an installation environment or application service, the embodiments are not limited to using the power unit 155 and the interface 160. Kim–277 at [0058] The power unit 155 can be realized in a battery and a voltage control circuit and supplies power to each part through the first controller 170. Here, through the powers of the voltage generator 150 and the power unit 155 have been described to be supplied through the first controller 170, this is only one example, the powers can be supplied through a logic board of the device. Kim–277 at [0064] The above-described first transmission module 130 can operate in the active mode and the passive mode by the power of the voltage generator 150 and the power unit 155. Also, the first transmission module 130 can be set to switch to the active mode when power is supplied through the power unit 155 with the passive mode set as a default. The setting of the passive mode and the active mode can change and is not limited thereto. Kim–277 at [0089]

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	The tag device 100A can operate in at least one of a passive mode, an active mode, and a semi-active mode. The tag device 100A can operate in the semi-active mode, that is, in the passive mode and the active mode depending on whether power is supplied as in the tag device of the first embodiment. Kim–277 at [0118] The reader device 200A according to the second embodiment can remove a phase change by movement of a tag device and remove recognition reduction by an energy delivery position. Also, the second embodiment improves a signal recognition distance, improves an energy supply to the tag device, and improves the reception sensitivity of the tag device by removing a reason why the intensity of a signal reduces as a distance between the reader device 200A and the tag device increases. The reader device can stably communicate with the tag device on the whole. Kim–277 at [0136] Embodiments can efficiently use the power of the tag device. To the extent this limitation is not disclosed by Kim–277, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Kim–277, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[17b] providing power to the smartcard controller and the active transmit driver circuit from the power source of the mobile device;	Kim–277 discloses or renders obvious "providing power to the smartcard controller and the active transmit driver circuit from the power source of the mobile device." For example: *See* [17a] above. Kim–277 at Figure 1 [Fig. 1] 

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	Kim–277 at Figure 2  Kim–277 at [0005] Embodiments provide a tag device that can efficiently use power by providing various modulation methods and operating in a passive mode modulation method or an active mode modulation method depending on the kind of power. Kim–277 at [0015] Embodiments can efficiently use power of a tag device. Kim–277 at [0033] The tag device 100 has various shapes and sizes, and is classified into an active tag and a passive tag depending on whether power is supplied, classified into a low frequency system and a high frequency system depending on a frequency in use. The tag device 100 is attached to persons, automobiles, goods, livestock, and buildings, and contains detailed information of a corresponding object. Also, the tag device 100 can be mounted on a smart card to perform user authentication and electronic payment. The tag device 100 can be attached or function in cooperation with another device to provide various services.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	Kim–277 at [0035] Here, the tag device 100 can operate in an active mode driven by power supplied from a power unit 155, and a passive mode not requiring power. That is, the tag device 100 can operate in a semi-active mode. Here, when the tag device 100 is mounted on a terminal such as a mobile terminal, the tag device 100 can use the battery power of the mobile terminal as the power unit 155. Kim–277 at [0037] The controller 170 controls a drive in the active mode or a passive mode depending on whether power is supplied. For example, the tag device 100 is driven by the power unit 155 during the active mode, and driven by a voltage generated by the voltage generator 150 during the passive mode. Also, the active mode and the passive mode can be changed depending on whether power is supplied from the power unit 155, or can be switched from the passive mode to the active mode when power is supplied to the power unit 155. One of the active mode and the passive mode can be changed to the other according to a manipulation signal of an operator. Kim–277 at [0041] Here, during the passive mode and the active mode, the first transmission module 130 can use different modulation methods. For example, the first transmission module 130 can use amplitude shift keying (ASK) during the passive mode, and can selectively use frequency shift keying (FSK), quadrature phase shift keying (QPSK), and phase shift keying (PSK) during the active mode. Kim–277 at [0055] Here, the first controller 170 delivers a digital transmission signal to the first modulator 135 and/or the second modulator 139 of the first transmission module 130. At this point, when the first transmission module is in the passive mode, the first modulator 135 operates. When the first transmission module is in the active mode, the second modulator 139 operates. Kim–277 at [0056] Also, an interface 160 is connected to a mobile terminal, for example, to receive manipulation signals of the active mode and the passive mode and deliver the signals to the first controller 170. The first controller 170 can select the active mode or the passive mode depending on the manipulation signal. That is, during the passive mode, the first controller 170 can output a digital transmission signal to the first modulator 135, and during the active mode, the first controller 170 can output a digital transmission signal to the second modulator 139. Embodiments may not use the power unit 155 and the interface 160. Since

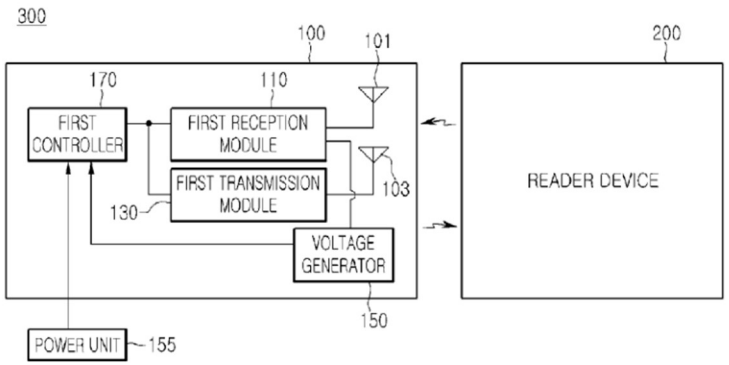
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	the construction of the tag device may change depending on an installation environment or application service, the embodiments are not limited to using the power unit 155 and the interface 160. Kim–277 at [0058] The power unit 155 can be realized in a battery and a voltage control circuit and supplies power to each part through the first controller 170. Here, through the powers of the voltage generator 150 and the power unit 155 have been described to be supplied through the first controller 170, this is only one example, the powers can be supplied through a logic board of the device. Kim–277 at [0064] The above-described first transmission module 130 can operate in the active mode and the passive mode by the power of the voltage generator 150 and the power unit 155. Also, the first transmission module 130 can be set to switch to the active mode when power is supplied through the power unit 155 with the passive mode set as a default. The setting of the passive mode and the active mode can change and is not limited thereto. Kim–277 at [0089] The tag device 100A can operate in at least one of a passive mode, an active mode, and a semi-active mode. The tag device 100A can operate in the semi-active mode, that is, in the passive mode and the active mode depending on whether power is supplied as in the tag device of the first embodiment. Kim–277 at [0136] Embodiments can efficiently use the power of the tag device. To the extent this limitation is not disclosed by Kim–277, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Kim–277, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[17c] coupling the active transmit driver circuit to an antenna of the mobile device, wherein the antenna is tuned to operate at substantially 13.56 MHz; and	Kim–277 discloses or renders obvious "coupling the active transmit driver circuit to an antenna of the mobile device, wherein the antenna is tuned to operate at substantially 13.56 MHz." For example: *See* [1c] above. Kim–277 at Figure 1

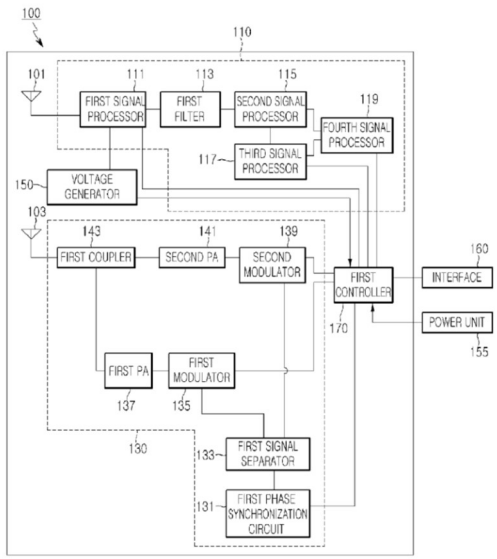
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	[Fig. 1]  Kim–277 at Figure 2 [Fig. 2]  Kim–277 at [0005] Embodiments provide a tag device that can efficiently use power by providing various modulation methods and operating in a passive mode modulation method or an active mode modulation method depending on the kind of power.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	Kim–277 at [0010] An embodiment provides a tag device comprising: a reception module converting a received high frequency signal into a scale level, and converting the converted scale level into a digital signal to output the same; a transmission module modulating a transmission signal to output the same; and a controller controlling the reception module and the transmission module. Kim–277 at [0012] An embodiment provides a radio frequency identification system comprising: a tag device comprising: a first reception module converting a received high frequency signal into a scale level, and outputting the converted scale level reception signal as a digital signal; a first transmission module modulating an information request signal to output the same; and a first controller controlling the first reception module and the first transmission module; and a reader device comprising: a second reception module converting a high frequency signal received from the tag device into a scale level, and outputting the converted scale level reception signal as a digital signal; a second transmission module modulating an information request signal, and transmitting the signal to the tag device; and a second controller controlling the second reception module and the second transmission module. Kim–277 at [0034] The RF frequency tag of the RFID system 300 can be classified into a low frequency (LF) tag of 124-134 kHz used for access control and animal management, a high frequency (HF) tag of 13.56 MHz used for an integrated circuit (IC) card and an identification card, an ultra HF (UHF) tag of 400-915 MHz used for identification of containers in distribution and circulation, and a microwave tag of 2.45 GHz. Also, a 5.8 GHz tag can be used for telematics. These communication bands are provided for an exemplary purpose, and can change within the technical spirit and the scope of the embodiments. Kim–277 at [0035] Here, the tag device 100 can operate in an active mode driven by power supplied from a power unit 155, and a passive mode not requiring power. That is, the tag device 100 can operate in a semi-active mode. Here, when the tag device 100 is mounted on a terminal such as a mobile terminal, the tag device 100 can use the battery power of the mobile terminal as the power unit 155. Kim–277 at [0037] The controller 170 controls a drive in the active mode or a passive mode depending on whether power is supplied. For example, the tag device 100 is driven by the power unit 155 during the active mode, and

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	driven by a voltage generated by the voltage generator 150 during the passive mode. Also, the active mode and the passive mode can be changed depending on whether power is supplied from the power unit 155, or can be switched from the passive mode to the active mode when power is supplied to the power unit 155. One of the active mode and the passive mode can be changed to the other according to a manipulation signal of an operator. Kim–277 at [0040] During the passive mode, the first transmission module 130 transmits a transmission signal through a transmission antenna 103 in a backscatter method. Kim–277 at [0041] Here, during the passive mode and the active mode, the first transmission module 130 can use different modulation methods. For example, the first transmission module 130 can use amplitude shift keying (ASK) during the passive mode, and can selectively use frequency shift keying (FSK), quadrature phase shift keying (QPSK), and phase shift keying (PSK) during the active mode. Kim–277 at [0043] Referring to FIG. 2, the tag device 100 comprises the first reception module 110, the first transmission module 130, and the voltage generator 150. The first reception module 110 comprises a first signal processor 111, a first filter 113, a second signal processor 115, a third signal processor 117, and a fourth signal processor 119. Kim–277 at [0052] The first controller 170 can store tag information. For example, the first controller 170 can comprise a memory (not shown), or the tag information can be separately stored. The first controller 170 has a communication protocol to control radio communication with the reader device 200, and provides tag information when an information request signal is received from the reader device 200. Also, the first controller 170 analyzes codes of signals decoded by the first to fourth signal processors 113, 115, 117, and 119, and generates transmission data. Kim–277 at [0055] Here, the first controller 170 delivers a digital transmission signal to the first modulator 135 and/or the second modulator 139 of the first transmission module 130. At this point, when the first transmission module is in the passive mode, the first modulator 135 operates. When the first transmission module is in the active mode, the second modulator 139 operates.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	Kim–277 at [0056] Also, an interface 160 is connected to a mobile terminal, for example, to receive manipulation signals of the active mode and the passive mode and deliver the signals to the first controller 170. The first controller 170 can select the active mode or the passive mode depending on the manipulation signal. That is, during the passive mode, the first controller 170 can output a digital transmission signal to the first modulator 135, and during the active mode, the first controller 170 can output a digital transmission signal to the second modulator 139. Embodiments may not use the power unit 155 and the interface 160. Since the construction of the tag device may change depending on an installation environment or application service, the embodiments are not limited to using the power unit 155 and the interface 160. Kim–277 at [0061] The second modulator 139 modulates a digital transmission signal into a second analog signal. The second modulator 139 can modulate a signal using FSK or QPSK for example. The second modulator 139 can comprise a plurality of mixers, adders, and orthogonal signal conversion circuits. The second modulator 139 can change the phase of a transmission signal by 90° to convert a signal in the form in which four signals I^+, I^-, Q^+ and Q^- are added. Kim–277 at [0062] Here, though the first modulator 135 exemplarily uses ASK modulation, and the second modulator 139 exemplarily uses QPSK modulation, the first modulator 135 and the second modulator 139 can use one of ASK, FSK, and QPSK modulations. The first and second modulators 135 and 139 can use the same modulation or a different modulation. Kim–277 at [0063] A signal modulated by the second modulator 139 is amplified by the second power amplifier 141, and the amplified signal is coupled to the first coupler 143 and transmitted through the transmission antenna 103. Here, elements on the transmission path using the first modulator 135 and the transmission path using the second modulator 139 can change depending on a transmission frequency. For example, the power amplifier on one of the paths can be removed. Kim–277 at [0064] The above-described first transmission module 130 can operate in the active mode and the passive mode by the power of the voltage generator 150 and the power unit 155. Also, the first transmission module 130 can be set to switch to the active mode when power is supplied through the power unit 155 with the

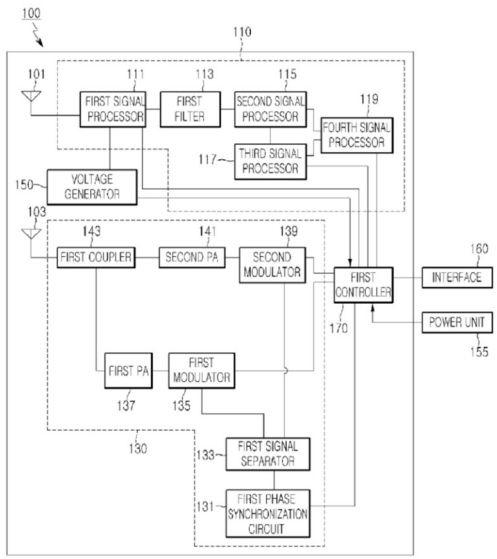
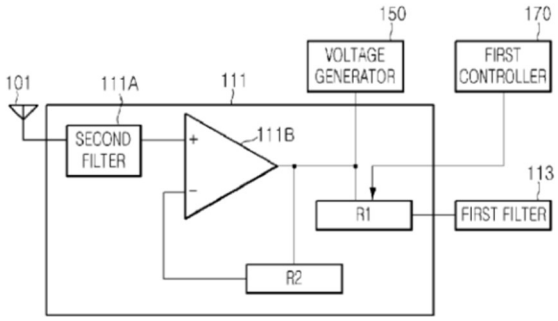
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	passive mode set as a default. The setting of the passive mode and the active mode can change and is not limited thereto. Kim–277 at [0088] The RFID system 300A performs communication through at least one RF frequency of an LF of 124-134 kHz, 13.56 MHz, 400-915 MHz, 2.45 GHz, and 5.8 GHz. Kim–277 at [0089] The tag device 100A can operate in at least one of a passive mode, an active mode, and a semi-active mode. The tag device 100A can operate in the semi-active mode, that is, in the passive mode and the active mode depending on whether power is supplied as in the tag device of the first embodiment. To the extent this limitation is not disclosed by Kim–277, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Kim–277, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[17d] driving transmission of data by the active transmit driver circuit from the antenna to the NFC reader.	Kim–277 discloses or renders obvious "driving transmission of data by the active transmit driver circuit from the antenna to the NFC reader." For example: *See* [1d] above. Kim–277 at Figure 1 [Fig. 1]  Kim–277 at Figure 2

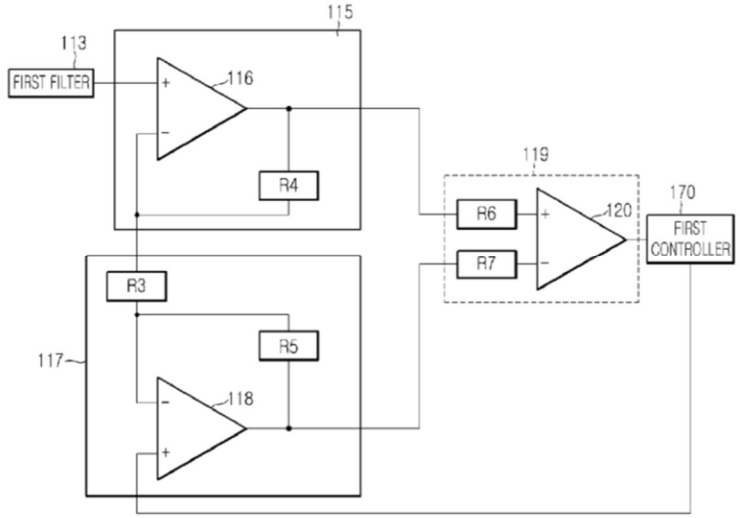
Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	[Fig. 2]  Kim–277 at [0005] Embodiments provide a tag device that can efficiently use power by providing various modulation methods and operating in a passive mode modulation method or an active mode modulation method depending on the kind of power. Kim–277 at [0010] An embodiment provides a tag device comprising: a reception module converting a received high frequency signal into a scale level, and converting the converted scale level into a digital signal to output the same; a transmission module modulating a transmission signal to output the same; and a controller controlling the reception module and the transmission module. Kim–277 at [0012] An embodiment provides a radio frequency identification system comprising: a tag device comprising: a first reception module converting a received high frequency signal into a scale level, and outputting the converted scale level reception signal as a digital signal; a first transmission module modulating an information request signal to output the same; and a first controller controlling the first reception module and the first transmission module; and a reader device comprising: a second reception module converting

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	a high frequency signal received from the tag device into a scale level, and outputting the converted scale level reception signal as a digital signal; a second transmission module modulating an information request signal, and transmitting the signal to the tag device; and a second controller controlling the second reception module and the second transmission module. Kim–277 at [0035] Here, the tag device 100 can operate in an active mode driven by power supplied from a power unit 155, and a passive mode not requiring power. That is, the tag device 100 can operate in a semi-active mode. Here, when the tag device 100 is mounted on a terminal such as a mobile terminal, the tag device 100 can use the battery power of the mobile terminal as the power unit 155. Kim–277 at [0037] The controller 170 controls a drive in the active mode or a passive mode depending on whether power is supplied. For example, the tag device 100 is driven by the power unit 155 during the active mode, and driven by a voltage generated by the voltage generator 150 during the passive mode. Also, the active mode and the passive mode can be changed depending on whether power is supplied from the power unit 155, or can be switched from the passive mode to the active mode when power is supplied to the power unit 155. One of the active mode and the passive mode can be changed to the other according to a manipulation signal of an operator. Kim–277 at [0040] During the passive mode, the first transmission module 130 transmits a transmission signal through a transmission antenna 103 in a backscatter method. Kim–277 at [0041] Here, during the passive mode and the active mode, the first transmission module 130 can use different modulation methods. For example, the first transmission module 130 can use amplitude shift keying (ASK) during the passive mode, and can selectively use frequency shift keying (FSK), quadrature phase shift keying (QPSK), and phase shift keying (PSK) during the active mode. Kim–277 at [0043] Referring to FIG. 2, the tag device 100 comprises the first reception module 110, the first transmission module 130, and the voltage generator 150. The first reception module 110 comprises a first signal processor 111, a first filter 113, a second signal processor 115, a third signal processor 117, and a fourth signal processor 119.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	Kim–277 at [0052] The first controller 170 can store tag information. For example, the first controller 170 can comprise a memory (not shown), or the tag information can be separately stored. The first controller 170 has a communication protocol to control radio communication with the reader device 200, and provides tag information when an information request signal is received from the reader device 200. Also, the first controller 170 analyzes codes of signals decoded by the first to fourth signal processors 113, 115, 117, and 119, and generates transmission data. Kim–277 at [0055] Here, the first controller 170 delivers a digital transmission signal to the first modulator 135 and/or the second modulator 139 of the first transmission module 130. At this point, when the first transmission module is in the passive mode, the first modulator 135 operates. When the first transmission module is in the active mode, the second modulator 139 operates. Kim–277 at [0056] Also, an interface 160 is connected to a mobile terminal, for example, to receive manipulation signals of the active mode and the passive mode and deliver the signals to the first controller 170. The first controller 170 can select the active mode or the passive mode depending on the manipulation signal. That is, during the passive mode, the first controller 170 can output a digital transmission signal to the first modulator 135, and during the active mode, the first controller 170 can output a digital transmission signal to the second modulator 139. Embodiments may not use the power unit 155 and the interface 160. Since the construction of the tag device may change depending on an installation environment or application service, the embodiments are not limited to using the power unit 155 and the interface 160. Kim–277 at [0061] The second modulator 139 modulates a digital transmission signal into a second analog signal. The second modulator 139 can modulate a signal using FSK or QPSK for example. The second modulator 139 can comprise a plurality of mixers, adders, and orthogonal signal conversion circuits. The second modulator 139 can change the phase of a transmission signal by 90° to convert a signal in the form in which four signals I^+, I^-, Q^+ and Q^- are added. Kim–277 at [0062] Here, though the first modulator 135 exemplarily uses ASK modulation, and the second modulator 139 exemplarily uses QPSK modulation, the first modulator 135 and the second modulator 139 can use one of

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	ASK, FSK, and QPSK modulations. The first and second modulators 135 and 139 can use the same modulation or a different modulation. Kim–277 at [0063] A signal modulated by the second modulator 139 is amplified by the second power amplifier 141, and the amplified signal is coupled to the first coupler 143 and transmitted through the transmission antenna 103. Here, elements on the transmission path using the first modulator 135 and the transmission path using the second modulator 139 can change depending on a transmission frequency. For example, the power amplifier on one of the paths can be removed. Kim–277 at [0064] The above-described first transmission module 130 can operate in the active mode and the passive mode by the power of the voltage generator 150 and the power unit 155. Also, the first transmission module 130 can be set to switch to the active mode when power is supplied through the power unit 155 with the passive mode set as a default. The setting of the passive mode and the active mode can change and is not limited thereto. Kim–277 at [0089] The tag device 100A can operate in at least one of a passive mode, an active mode, and a semi-active mode. The tag device 100A can operate in the semi-active mode, that is, in the passive mode and the active mode depending on whether power is supplied as in the tag device of the first embodiment. To the extent this limitation is not disclosed by Kim–277, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Kim–277, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
18[pre]. The method of claim 17 further comprising:	Kim–277 discloses or renders obvious "[t]he method of claim 17 further comprising." *See* claim 17 above.
[18a] amplifying a signal received from the antenna to generate an amplified signal; and	Kim–277 discloses or renders obvious "amplifying a signal received from the antenna to generate an amplified signal." For example: Kim–277 at Figure 2

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	[Fig. 2]  Kim–277 at Figure 3 [Fig. 3]  Kim–277 at Figure 5

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	[Fig. 5]  Kim–277 at [0036] The tag device 100 comprises a first reception module 110, a first transmission module 130, a voltage generator 150, and a first controller 170. The first reception module 110 can decode high frequency signals received through a reception antenna 101, and the decoded signals are delivered to the first controller 170. Here, the first reception module 110 converts high frequency signals into digital signals using a log amplifier and a comparator. Since the first reception module 110 does not use general a superheterodyne method, a sequential low frequency method, an intermediate frequency synthesis method, the number of parts can be reduced and a circuit size can be minimized. Kim–277 at [0045] The first signal processor 111 filters RF signals in a predetermined frequency band from RF signals received through an reception antenna 101, amplifies a gain of the RF signals, and processes the RF signals into DC level analog signals. For example, the first signal processor 111 can output the high frequency signals into baseband signals using a log amplifier, or the high frequency signals into baseband signals using an RF pin diode. Here, the log amplifier can be applied to a system requiring long distance communication and high sensitivity. The RF pin diode can be used for low price and short distance communication. An embodiment is described to use the log amplifier.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	Kim–277 at [0048] The second signal processor 115 controls the gain of the first filter 113 and amplifies a signal, and the amplified signal is input to the fourth signal processor 119. Kim–277 at [0049] The output of the third signal processor 117 changes depending on a reference voltage of the first controller 170, and the changed output is output to the fourth signal processor 119. Here, the second signal processor 115 controls a signal output from the first signal processor 111 using a signal fed back from the third signal processor 117. At this point, the amplification gain of the second signal processor 115 is compensated for according to various reference voltages of the first controller 170. Kim–277 at [0050] The fourth signal processor 119 compares an amplified signal of the second signal processor 115 with an output signal of the third signal processor 117 to output a digital signal as a result of the comparison. That is, the fourth signal processor 119 serves as an analog-to-digital converter. A digital signal of the fourth signal processor 119 changes depending on the output level of the third signal processor 117, and is input to the first controller 170. Kim–277 at [0051] The first controller 170 controls the gain of the first signal processor 111 depending on a received signal state, and controls the reference voltage of the third signal processor 117. Accordingly, the first controller 170 can control the sensitivity of a digital signal output to the fourth signal processor 119. Also, the first controller 170 delivers synchronization information to the fourth signal processor 119 to control a comparison operation. Kim–277 at [0053] The first transmission module 130 comprises a first phase synchronization circuit 131, a first signal separator 133, a first modulator 135, a first power amplifier 137, a second modulator 139, a second power amplifier 141, and a first coupler 143. Kim–277 at [0060] The first power amplifier 137 amplifies a signal modulated by the first modulator 135 to a transmission level, and the amplified signal passes through the first coupler 143 and is transmitted through the transmission antenna 103.

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	Kim–277 at [0063] A signal modulated by the second modulator 139 is amplified by the second power amplifier 141, and the amplified signal is coupled to the first coupler 143 and transmitted through the transmission antenna 103. Here, elements on the transmission path using the first modulator 135 and the transmission path using the second modulator 139 can change depending on a transmission frequency. For example, the power amplifier on one of the paths can be removed. Kim–277 at [0065] The transmission antenna 103 is connected to the first power amplifier 137 or the second power amplifier 141 through the first coupler 143. Kim–277 at [0069] Referring to FIG. 3, the first signal processor 111 comprises a second filter 111A, a first log amplifier 111B, resistors R1 and R2. The second filter 111A is connected to the reception antenna 101. The positive terminal (+) of the first log amplifier 111B is connected to the second filter 111A, and the negative terminal (−) of the log amplifier 111B is connected to the second resistor R2 of a negative feedback circuit. The output terminal of the first log amplifier 111B is connected to the first filter 113 through the first resistor R1. Kim–277 at [0071] Also, the first log amplifier 111B can comprise at least one of a gain amplification circuit, a power amplification circuit, and a signal conversion circuit. The gain amplification circuit amplifies a signal according to a voltage gain to output an unstable high frequency signal in a state easy to recover. A reception signal whose gain has been amplified by the gain amplification circuit has a reduced bit error rate and has a high recognition rate even under a fading environment. Such a reception signal can be recovered to a stable signal even in a section where a reception level is about −90 dBm. The power amplification circuit secondarily amplifies and outputs the power of a signal whose gain has been amplified by the gain amplification circuit. The signal conversion circuit converts an RF signal amplified by the power amplification circuit, for example, a signal in a band of 900 MHz into a DC level analog signal proportional to a decibel value. Kim–277 at [0072] The amplification gain of the first log amplifier 111B can be controlled by the first resistor R1 and the second resistor R2. The second resistor R2 has fixed resistance, and the first resistor R1 is a variable

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	resistor whose resistance is varied by the first controller 170. The second resistor R2 can be connected between the output terminal of the first log amplifier 111B and a connection point of the negative feedback circuit, or between the first resistor R1 and the first filter 113. Here, the first resistor R1 and the second resistor R2 connected to the first log amplifier 111B can serve as a gain control circuit of the first log amplifier 111B. Kim–277 at [0073] The amplification gain of the first log amplifier 111B can be controlled by math FIG. 1 below. For example, the amplification gain of the first log amplifier 111B is controlled within the range of about 0 dB-20 dB according to a numerical value of the first resistor R1. Kim–277 at [0078] Referring to FIG. 5, the second signal processor 115 comprises a first operation amplifier 116 and a fourth resistor R4. The third signal processor 117 comprises a second operation amplifier 118, a fifth resistor R5, and a third resistor R3. The fourth signal processor 119 comprises a first comparator 120, a sixth resistor R6, and a seventh resistor R7. Kim–277 at [0079] The first filter 113 is connected to the positive terminal (+) of the first operation amplifier 116, and the fourth resistor R4 and the third resistor R3 of the negative feedback circuit are connected to the negative terminal (−) of the first operation amplifier 116 in parallel. A reference voltage of the first controller 170 is input to the positive terminal (+) of the second operation amplifier 118, and a fifth resistor R5 of the negative feedback circuit is connected to the negative terminal (−) of the second operation amplifier 118. The third resistor R3 is connected between the negative terminal (−) of the first operation amplifier 116 and the negative terminal (−) of the second operation amplifier 118. The output terminal of the first operation amplifier 116 is connected to the positive terminal (+) of the first comparator 120 through the sixth resistor R6, and connected to the fourth resistor R4 in parallel. The output terminal of the second operation amplifier 118 is connected to the negative terminal (−) of the first comparator 120 through the seventh resistor R7. The positive terminal (+) and negative terminal (−) of the first comparator 120 can be mutually changed and is not limited thereto. Kim–277 at [0080] The first operation amplifier 116 amplifies the gain of a signal that has passed through the first filter 113 to output the same. At this point, the gain is controlled by the fourth resistor R4 of a first feedback circuit of the first operation amplifier 116. The second operation amplifier 118 amplifies the reference voltage of

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	the first controller 170 input to the positive terminal (+) of the second operation amplifier 118 to output the same. An output signal of the second operation amplifier 118 controls the level of a signal input to the negative terminal (−) of the first operation amplifier 116 through the fifth resistor R5 of a second feedback circuit, the third resistor R3, which is a feedback circuit, and the fourth resistor R4 of the first feedback circuit. Accordingly, the output signal of the second operation amplifier 118 changes according to the reference voltage of the first controller 170. The amplification gain of the first operation amplifier 116 is controlled by a change in the output signal of the second operation amplifier 118. That is, the amplification gains of the second operation amplifier 118 and the first operation amplifier 116 are controlled using the reference voltage of the first controller 170, so that the sensitivity of a reception signal output to the first operation amplifier 116 can be controlled. Kim–277 at [0081] Also, since the negative terminals (−) of the first operation amplifier 116 and the second operation amplifier 118 are connected to each other, the output signals of them can have an inverted phase. For example, a signal processed by the first and second operation amplifiers 116 and 118 is a DC level analog signal. When the output signal of the first operation amplifier 116 is a high level, the output signal of the second operation amplifier 118 becomes a low level. Kim–277 at [0082] The first comparator 120 of the fourth signal processor 119 compares the output signal of the first operation amplifier 116 with the output signal of the second operation amplifier 118, and outputs a digital signal to the first controller 170 according to the comparison result. Here, the first controller 170 can recover a digital signal more completely by delivering synchronization information to the fourth signal processor 119. Here, the digital signal of the fourth signal processor 119 is input to the first controller 170 as a transistor-transistor logic (TTL)/complementary metal oxide semiconductor (CMOS) signal. *See also* Kim–277 at [0054]. To the extent this limitation is not disclosed by Kim–277, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Kim–277, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 8 and claim 17 above.
[18b] providing the amplified signal to the smartcard controller.	Kim–277 discloses or renders obvious "providing the amplified signal to the smartcard controller."

Claim Element	Exemplary Citations to U.S. Patent Pub. No. 2010/0072277 ("Kim–277")
	See [18a] above. To the extent this limitation is not disclosed by Kim–277, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Kim–277, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 8 and claim 17 above.
19. The method of claim 10 or 17, wherein the transmitted data includes ticketing information for a mass transit system.	Kim–277 discloses or renders obvious "[t]he method of claim 10 or 17, wherein the transmitted data includes ticketing information for a mass transit system." *See* claim 2 above. *See also* claims 10 and 17 above.
20. The method of claim 10 or 17, wherein the transmitted data includes transaction information for a mobile payment.	Kim–277 discloses or renders obvious "[t]he method of claim 10 or 17, wherein the transmitted data includes transaction information for a mobile payment." *See* claim 3 above. *See also* claims 10 and 17 above.

DEFENDANTS' INVALIDITY CONTENTIONS FOR U.S. PAT. 11,694,053

EXHIBIT C09: C. Dachs, NFC — the intuitive contactless technology becomes reality, 122 e & i Elektrotechnik und Informationstechnik 466 (2005) ("Dachs")

As demonstrated in the claim charts below, the claims of U.S. Patent No. 11,694,053 ("the '053 patent") are invalid (a) under one or more sections of 35 U.S.C. § 102 as anticipated by Dachs and (b) under 35 U.S.C. § 103(a) as obvious over Dachs standing alone and as set forth herein, and/or combined with the knowledge of a person of ordinary skill in the art, Applicant's Admitted Prior Art, and/or the additional prior art references discussed in Exhibit C and Exhibits C01–C09, the contents of which are hereby incorporated by reference into this chart. One of ordinary skill in the art, as of the priority date of the '053 patent, would have known to combine the prior art elements disclosed by the foregoing references using known methods, and to use these elements according to their established functions in order to achieve a known and predictable result.

Defendants have conducted the invalidity analysis herein based at least in part and in some instance entirely upon Plaintiff's apparent application of the claims of the '053 patent. By charting the prior art against the claims and limitations herein, Defendants are not admitting or agreeing to Plaintiff's application of the claims at issue in this case, and these charts should not be interpreted as an admission or concession by Defendants that any particular construction or application of any claim limitation by Plaintiff is correct or proper. Additionally, these charts provide representative examples of portions of the charted references that disclose the indicated limitations of the claims; additional portions of these references other than the representative examples provided herein may also disclose the indicated limitation(s) and Defendants contend that the asserted claims are invalid in light of the charted reference(s) as a whole in its or their entirety. Where a particular figure is cited, the citation should be understood to encompass the caption and description of the figure as well as any text relating to or describing the figure. Conversely, where particular text referring to a figure is cited, the citation should be understood to include the figure as well.

Claim Element	**Exemplary Citations to C. Dachs, NFC — the intuitive contactless technology becomes reality, 122 e & i Elektrotechnik und Informationstechnik 466 (2005) ("Dachs")**
1[pre]. A mobile device comprising:	By providing this disclosure, Defendants do not take a position on whether the preamble is a claim limitation. Dachs discloses or renders obvious "[a] mobile device." For example: Dachs at Abstract Near Field Communication (NFC) is opening-up completely new perspectives for the mobile communication industry, it enables contactless peer-to-peer communication, reading/writing of contactless cards and, when combined with a smart card IC, emulation of a contactless card. NFC has taken major steps towards market acceptance: ISO standards are in place for the interface and communication protocols, many leading companies in the field are promoting it within the NFC Forum, and numerous field trials are being deployed around the world. Different architectures are being considered for NFC and security mobile phone architectures. The first Philips cellular system solution integrating NFC hardware and software illustrates a successful implementation of one of these architectures.

Patent Owner's Ex. 2018
Page 651

Claim Element	Exemplary Citations to C. Dachs, NFC — the intuitive contactless technology becomes reality, 122 e & i Elektrotechnik und Informationstechnik 466 (2005) ("Dachs")
	Dachs at Figure 1

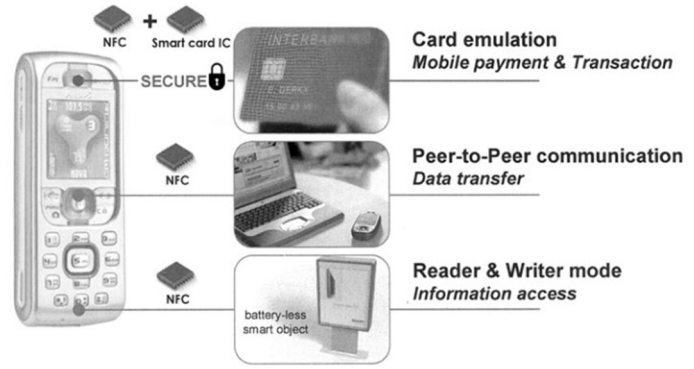
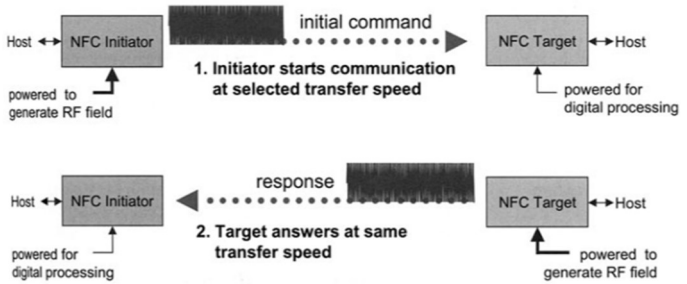


Fig. 1. Overview of possible NFC and security modes

Dachs at Figure 2



Dachs at 467

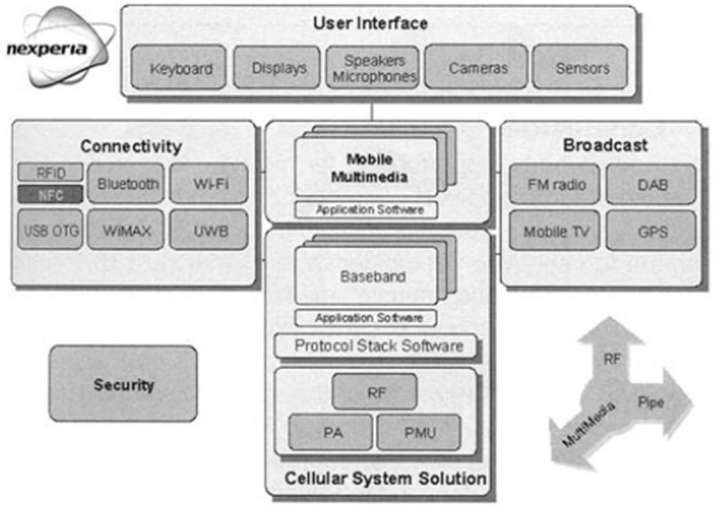
> As illustrated in Fig. 1 NFC devices enable these numerous applications because they can read and write contact-less cards, communicate with peer devices and, when combined with a smart card device, emulate contact-less card behaviour. NFC is backward compatible with the proximity contact-less interface standard ISO 14443 and can thus leverage the contact-less infrastructure being currently rollout by major players in the field (e.g., point of sales in banks, restaurants, gas stations, stadiums, public transport, etc.).

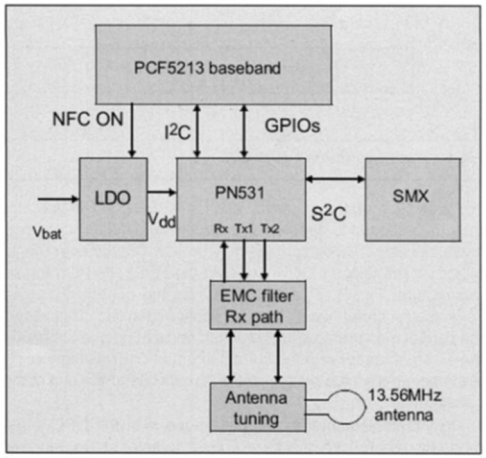
Dachs at 467

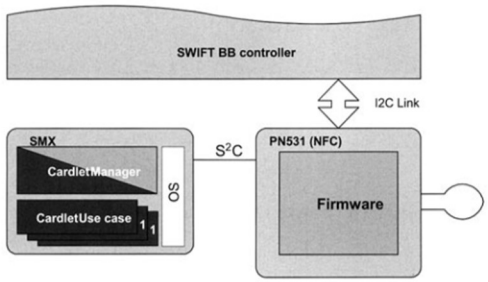
Claim Element	Exemplary Citations to C. Dachs, NFC — the intuitive contactless technology becomes reality, 122 e & i Elektrotechnik und Informationstechnik 466 (2005) ("Dachs")
	The standard outlines an active and a passive communication mode. Figure 2 and 3 outline these different communication modes. In passive communication mode the Initiator generates the RF field, starts the communication and the target is answering using load modulation for the data transfer. The active communication mode shares the power between both initiator and target (allowing thus lower power consumption). The device that is sending data is also the device that is generating the RF field. Dachs at 467 Passive and active modes should support three different communication speeds: 106, 212 and 424 kbit/s. The RF communication at 106 kbit/s and the initialization (single device detection) is compliant to the ISO/IEC 14443A / Philips' MIFARE® communication. The RF communication and initialization at 212 kbit/s is compliant to Sony's FeliCa™ communication scheme. Furthermore, ISO 21481 (NFCIP-2, derived from ECMA 356) specifies the communication mode selection mechanism, designed not to disturb any ongoing communication at 13.56MHhz for devices implementing ISO/IEC18092 (see above), 14443 ("proximity" contact-less interface) and 15693 ("vicinity" contact-less interface). Dachs at 468 Mobile phones enabled with NFC are set to spur consumer usage and open up revenue opportunities for wireless operators, merchants and handset manufacturers (Balaban, 2005). Delivering an intuitive connected consumer experience NFC equipped phones will change the way information and services are distributed paid for and accessed. Enabling secure mobile payments and transaction they can also allow easy peer-to-peer communication and simple access to information on the move. Dachs at 468 Mobile payment and transactions with NFC exploits two basic principles of modern society: everyone needs to pay for products and everyday services and just about everyone carries a phone. Results from worldwide implementations demonstrate that consumers everywhere like the convenience of mobile payment (www.smartcardalliance.org). Dachs at 468 More and more consumers are using mobile phones to download paid content such as ring tones to their phones (currently, 10 to 15 % of mobile operators' revenues come from the downloading of ring tones or small Java-based games). NFC offers a standardized next generation connection that will enable consumers to access digital content (ring tone, song, game, web link, address, discount coupon, etc.) from

Claim Element	Exemplary Citations to C. Dachs, NFC — the intuitive contactless technology becomes reality, 122 e & i Elektrotechnik und Informationstechnik 466 (2005) ("Dachs")
	items such as posters, magazines, kiosks and also enables device to device transfer among NFC equipped cellular phones. NFC offers pull versus push opportunities for location-based services that eliminates unnecessary spamming. The one to one marketing comes from consumer's ability to access content and information from trusted friends in a secure peer based environment. With the majority of handsets equipped with Bluetooth today (and WiFi tomorrow), NFC can act as an enabler to facilitate data exchange transfer among phones. NFC could also enable multi-player gaming in more handsets. In today's market device interfaces are anything but intuitive and make it difficult to embrace the technology (e.g., scrolling through menu to select the specific Bluetooth device). NFC allows people to interact with their environment without needing to navigate complicated menus or perform complex set-up procedures. Dachs at 468 Various architectures are being considered for NFC integration in mobile phones. These are a few examples of existing or ongoing implementations: • The NFC device can be integrated in a phone functional cover. This corresponds for instance to the solution developed by Nokia for their phone model 3220 (www.nokia.com/link?cid=EDITORIAL_2026). • The NFC device can be integrated on the phone main printed circuit board. • The NFC device can be integrated in a Secure Digital (SD) card as recently announced by wireless dynamics (Pilato, 2005). In order to enable secure applications (e.g. payment) the NFC device is coupled to a secure smart card device (smart card emulation mode described in the introduction). Here also different options are being considered by major players in the field (Balaban, 2005): • NFC + security via the SIM (subscriber identifying module): One or more wires connect the SIM card to a contactless chip complying with NFC technology standards. In this case the SIM would host mobile commerce applications and security keys. The antenna connection is done directly to the NFC chip. NFC and smart card IC currently manufactured by Philips support a two wire digital interface. This interface (S^2C) between a NFC IC and Smart Card IC provides full compatibility with existing contactless standards and has been submitted to ECMA for standardization. • Secure NFC bypassing the SIM: In this case a specific smart card device is mounted either in the phone functional cover, on the phone main PCB or even in the SD card. The payment/ticketing applications and related security keys are to be stored on the smart card IC. Area/cost attractive

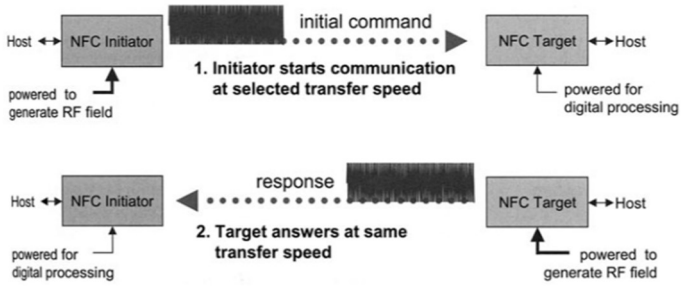
Claim Element	Exemplary Citations to C. Dachs, NFC — the intuitive contactless technology becomes reality, 122 e & i Elektrotechnik und Informationstechnik 466 (2005) ("Dachs")
	solutions combining both the NFC and smart card IC in a single package or chip are also possible candidates. • Combinations of NFC and security through both the SIM card and a dedicated smart card IC might eventually also be considered. Final choice of the actual NFC and security implementation will be affected by many factors. Ownership of the secured applications, business partnerships formed between the different players (mobile operators, financial service providers, handset manufacturers, etc.) and the actual personalization process of these secured applications will play an important role in the definition of the optimal implementation. Dachs at 468–469 Many new NFC enabled contactless services are being tested in the field around the world. A few examples involving the use of NFC enabled mobile phones with Philips NFC technology are listed below: • In Germany, the Rhein-Main Verkehrsbund (RMV), the public transport authority for Frankfurt is testing an NFC ticketing solution. The trial uses NFC enabled phones to gain access to the local bus network. The system will allow RMV's customers to use a Nokia 3220 phone equipped with a Nokia NFC shell to purchase, store and use electronic travel tickets, (Telecom news). • In the Netherlands a trial will be run during the forth coming football season. Supporters will use their phones (Nokia 3220 with the NFC functional shell) to access the ParkStad Limburg Stadium of the Roda JC club as well as to make purchases at food stands and in supporters shop. • In France, Caen, multiple trials using NFC enabled phones from Samsung (D500) have been announced. These trials will involve car parking access/payment in the city, payment and fidelity applications using a private card in retail stores and finally audio guides for pedestrian visiting city monuments (Caen trial was launched on October 18, 2005). • In Taiwan the Proximity Mobile Transaction Service Alliance (PMTSA) is demonstrating a prototype mobile phone capable of making secure payments using NFC phones developed by BenQ. Residents of Tapei can use NFC enabled phones to access the city's mass transit rail as well as other public transport in Taiwan. The network already has an existing contactless smart card infrastructure based on MIFARE technology, which is compatible with NFC (www.semiconductors.philips.com/news/content/file_ 1115.html). • In the United States Motorola is conducting a field trial of mobile phones enabled with MasterCard®; PayPass™, a new „contactless" payment option and Near Field Communication technology. Consumers will enjoy the benefits of simpler and faster transactions conducted with their mobile phones (www.motorola.com/mediacenter/news/detail/0,,4762_4058_23,00.html).

Claim Element	Exemplary Citations to C. Dachs, NFC — the intuitive contactless technology becomes reality, 122 e & i Elektrotechnik und Informationstechnik 466 (2005) ("Dachs")
	Dachs at 469 An illustration of how NFC and security can be embedded in a mobile phone platform is the first NFC-enabled Philips Nexperia Cellular System Solution for high-end cell phones (Nexperia Sy.Sol 6100). NFC and security hardware functionality is realized by combining two devices: the PN531 NFC controller with embedded firmware and the SmartMX a High Security Smart Card IC.  **Fig. 4.** Nexperia cellular system solutions – a total approach to integrating new features The PN531 is a highly integrated transmission module for contactless communication at 13.56 MHz including controller functionality based on an 80C51 core. The embedded firmware supports all the RF communication layers, ISO 14443-A cards (Mifare, T = CL), Felica cards and the NFCIP-1 protocol. The SmartMX is based on a secure MX51 CPU with Crypto Co-Processors (3DES, AES & PKI algorithms) and compliant to numerous international standards (EMV96&2000, EUROPAY CQM, ETSI TS 102 221,3GPP TS 51.011, GSM 11.1x). This IC is already widely used for applications such as banking, ID cards, health card, citizen cards, access cards, smart passports, etc. In the NFC and security implementation described in Fig. 5 the SmartMX is supplied and controlled by the PN531 via a 2-wire S^2C interface. The PN531 is controlled by the baseband processor via the I^2C-bus and two general purpose I/Os (GPIOs) for the handshaking mechanisms. The antenna circuitry is split into two parts: 1) the EMC filtering and the RX path, 2) the antenna tuning. This gives extra freedom in the

Claim Element	Exemplary Citations to C. Dachs, NFC — the intuitive contactless technology becomes reality, 122 e & i Elektrotechnik und Informationstechnik 466 (2005) ("Dachs")
	choice of the RFID antenna location (e.g., in the battery pack). Another GPIO controls the dedicated LDO (low dropout linear regulator) for the NFC power supply. In smart card emulation mode, the RF transceiver is under the control of the SmartMX and the PN531 is not aware of the data exchange. This guarantees the required security level for transport or payment applications. The SmartMX sends a signal when the transaction with the external reader is completed, and then PN531 can read the result (OK or not) in the SmartMX. Dachs at Figure 5  **Fig. 5.** NFC and security integration in Nexperia system solution 6100 Dachs at 470 In this implementation the cell phone is in the NFC target mode by default, with only the RF level detector active, ready to answer an external reader request. In this mode, the power consumption is very low. Other modes can be initiated by Java actions at any time. Dachs at 470–471 NFC creates new opportunities for mobile commerce and has the potential to change consumer behavior and spending habits. Its unique intuitive operation makes it particularly easy for consumers to use. When combined with a smartcard IC it is also ideal for payment and financial applications. The interface and communication protocols of NFC have been standardized in ISO. A large non-profit organization (NFC

Claim Element	Exemplary Citations to C. Dachs, NFC — the intuitive contactless technology becomes reality, 122 e & i Elektrotechnik und Informationstechnik 466 (2005) ("Dachs")
	Forum) with representatives from all segments of the mobile communication industry promotes implementation and further standardization of NFC technology to ensure interoperability between devices and services. The many field trials around the world with NFC enabled mobile phones are an essential step for bringing NFC into everyone's mobile phone. Depending on target applications and business partnerships different NFC and security implementations could be adopted in mobile phones. Philips has developed the first NFC-enabled cellular system solution for high-end cell phones (Nexperia Sy.Sol 6100). This NFC solution allows to read and write contact-less cards, communicate with peer devices and, when combined with a smart card device, emulate contact-less card behavior. Dachs at Figure 7  Fig. 7. Smart Card IC To the extent this limitation is not disclosed by Dachs, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Dachs, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[1a] a power source;	Dachs discloses or renders obvious "a power source." For example: Dachs at Figure 2

Claim Element	Exemplary Citations to C. Dachs, NFC — the intuitive contactless technology becomes reality, 122 e & i Elektrotechnik und Informationstechnik 466 (2005) ("Dachs")



Dachs at 469

An illustration of how NFC and security can be embedded in a mobile phone platform is the first NFC-enabled Philips Nexperia Cellular System Solution for high-end cell phones (Nexperia Sy.Sol 6100). NFC and security hardware functionality is realized by combining two devices: the PN531 NFC controller with embedded firmware and the SmartMX a High Security Smart Card IC.

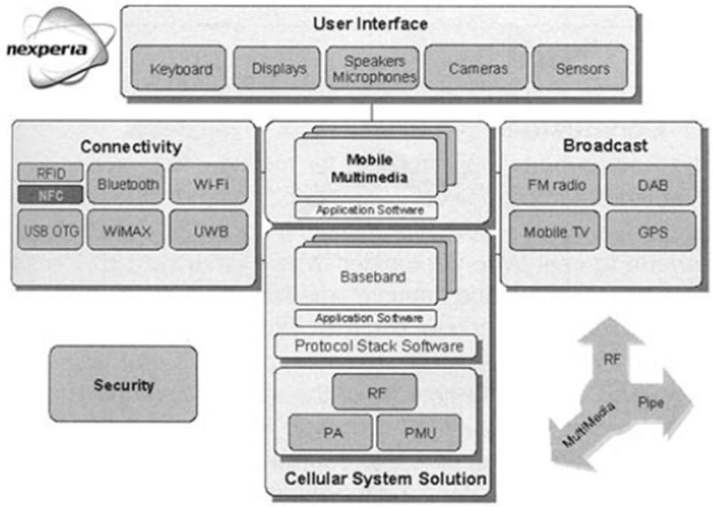
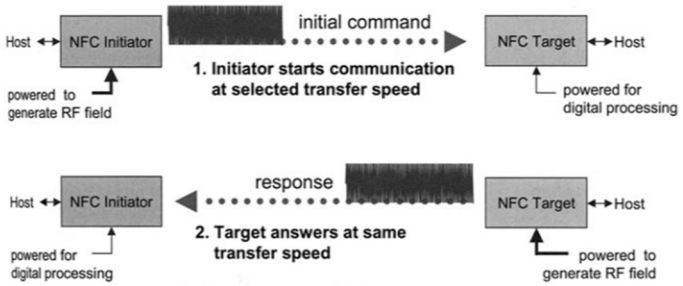
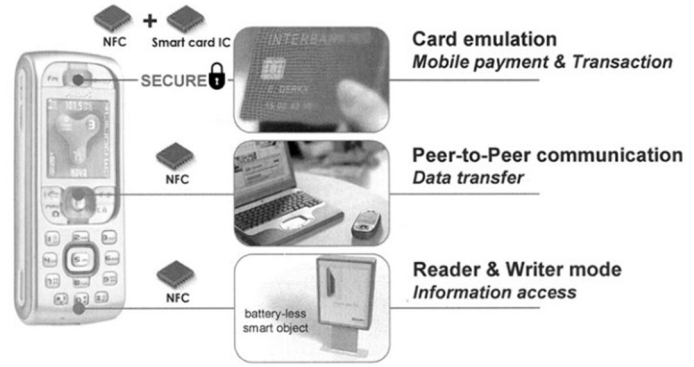
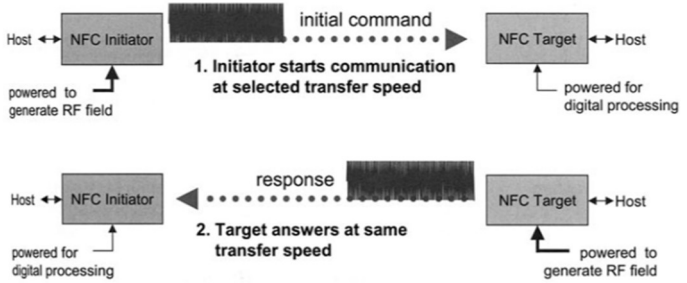


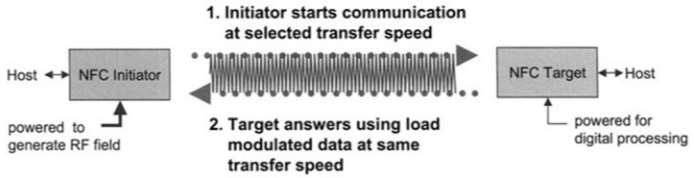
Fig. 4. Nexperia cellular system solutions – a total approach to integrating new features

The PN531 is a highly integrated transmission module for contactless communication at 13.56 MHz including controller functionality based on an 80C51 core. The embedded firmware supports all the RF communication layers, ISO 14443-A cards (Mifare, T = CL), Felica cards and the NFCIP-1 protocol.

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	The SmartMX is based on a secure MX51 CPU with Crypto Co-Processors (3DES, AES & PKI algorithms) and compliant to numerous international standards (EMV96&2000, EUROPAY CQM, ETSI TS 102 221,3GPP TS 51.011, GSM 11.1x). This IC is already widely used for applications such as banking, ID cards, health card, citizen cards, access cards, smart passports, etc. In the NFC and security implementation described in Fig. 5 the SmartMX is supplied and controlled by the PN531 via a 2-wire S^2C interface. The PN531 is controlled by the baseband processor via the I^2C-bus and two general purpose I/Os (GPIOs) for the handshaking mechanisms. The antenna circuitry is split into two parts: 1) the EMC filtering and the RX path, 2) the antenna tuning. This gives extra freedom in the choice of the RFID antenna location (e.g., in the battery pack). Another GPIO controls the dedicated LDO (low dropout linear regulator) for the NFC power supply. In smart card emulation mode, the RF transceiver is under the control of the SmartMX and the PN531 is not aware of the data exchange. This guarantees the required security level for transport or payment applications. The SmartMX sends a signal when the transaction with the external reader is completed, and then PN531 can read the result (OK or not) in the SmartMX. To the extent this limitation is not disclosed by Dachs, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Dachs, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[1b] a smartcard controller coupled to the power source to receive power;	Dachs discloses or renders obvious "a smartcard controller coupled to the power source to receive power." For example: Dachs at Figure 2  To the extent this limitation is not disclosed by Dachs, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Dachs, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

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[1c] an antenna tuned to operate at substantially 13.56 MHz, wherein the antenna interacts with a Near Field Communication (NFC) reader external to the mobile device; and	Dachs discloses or renders obvious "an antenna tuned to operate at substantially 13.56 MHz, wherein the antenna interacts with a Near Field Communication (NFC) reader external to the mobile device." For example: Dachs at Abstract Near Field Communication (NFC) is opening-up completely new perspectives for the mobile communication industry, it enables contactless peer-to-peer communication, reading/writing of contactless cards and, when combined with a smart card IC, emulation of a contactless card. NFC has taken major steps towards market acceptance: ISO standards are in place for the interface and communication protocols, many leading companies in the field are promoting it within the NFC Forum, and numerous field trials are being deployed around the world. Different architectures are being considered for NFC and security mobile phone architectures. The first Philips cellular system solution integrating NFC hardware and software illustrates a successful implementation of one of these architectures. Dachs at 466 NFC related applications could be split into four basic categories: • Touch and go: applications such as access control or transport/event ticketing, where the user only needs to bring the device storing the ticket or access code close to the reader. • Touch and confirm: applications such as mobile payment, where the user has to confirm the interaction by entering a password or just accepting the transaction. • Touch and connect: linking two NFC-enabled devices to enable peer-to-peer transfer of data such as music, pictures or synchronizing address books. • Touch and explore: NFC devices may offer more than one possible function. The consumer will be able to explore a device's capabilities to find out which functions and services are offered. Dachs at Figure 1

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	 **Fig. 1.** Overview of possible NFC and security modes Dachs at Figure 2  Dachs at 467 As illustrated in Fig. 1 NFC devices enable these numerous applications because they can read and write contact-less cards, communicate with peer devices and, when combined with a smart card device, emulate contact-less card behaviour. NFC is backward compatible with the proximity contact-less interface standard ISO 14443 and can thus leverage the contact-less infrastructure being currently rollout by major players in the field (e.g., point of sales in banks, restaurants, gas stations, stadiums, public transport, etc.). Dachs at 467 Passive and active modes should support three different communication speeds: 106, 212 and 424 kbit/s. The RF communication at 106 kbit/s and the initialization (single device detection) is compliant to the

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	ISO/IEC 14443A / Philips' MIFARE® communication. The RF communication and initialization at 212 kbit/s is compliant to Sony's FeliCa™ communication scheme. Furthermore, ISO 21481 (NFCIP-2, derived from ECMA 356) specifies the communication mode selection mechanism, designed not to disturb any ongoing communication at 13.56MHhz for devices implementing ISO/IEC18092 (see above), 14443 ("proximity" contact-less interface) and 15693 ("vicinity" contact-less interface). Dachs at Figure 3  Dachs at 468 More and more consumers are using mobile phones to download paid content such as ring tones to their phones (currently, 10 to 15 % of mobile operators' revenues come from the downloading of ring tones or small Java-based games). NFC offers a standardized next generation connection that will enable consumers to access digital content (ring tone, song, game, web link, address, discount coupon, etc.) from items such as posters, magazines, kiosks and also enables device to device transfer among NFC equipped cellular phones. NFC offers pull versus push opportunities for location-based services that eliminates unnecessary spamming. The one to one marketing comes from consumer's ability to access content and information from trusted friends in a secure peer based environment. With the majority of handsets equipped with Bluetooth today (and WiFi tomorrow), NFC can act as an enabler to facilitate data exchange transfer among phones. NFC could also enable multi-player gaming in more handsets. In today's market device interfaces are anything but intuitive and make it difficult to embrace the technology (e.g., scrolling through menu to select the specific Bluetooth device). NFC allows people to interact with their environment without needing to navigate complicated menus or perform complex set-up procedures. Dachs at 468 Various architectures are being considered for NFC integration in mobile phones. These are a few examples of existing or ongoing implementations:

Claim Element	Exemplary Citations to C. Dachs, NFC — the intuitive contactless technology becomes reality, 122 e & i Elektrotechnik und Informationstechnik 466 (2005) ("Dachs")
	• The NFC device can be integrated in a phone functional cover. This corresponds for instance to the solution developed by Nokia for their phone model 3220 (www.nokia.com/link?cid=EDITORIAL_2026). • The NFC device can be integrated on the phone main printed circuit board. • The NFC device can be integrated in a Secure Digital (SD) card as recently announced by wireless dynamics (Pilato, 2005). In order to enable secure applications (e.g. payment) the NFC device is coupled to a secure smart card device (smart card emulation mode described in the introduction). Here also different options are being considered by major players in the field (Balaban, 2005): • NFC + security via the SIM (subscriber identifying module): One or more wires connect the SIM card to a contactless chip complying with NFC technology standards. In this case the SIM would host mobile commerce applications and security keys. The antenna connection is done directly to the NFC chip. NFC and smart card IC currently manufactured by Philips support a two wire digital interface. This interface (S^2C) between a NFC IC and Smart Card IC provides full compatibility with existing contactless standards and has been submitted to ECMA for standardization. • Secure NFC bypassing the SIM: In this case a specific smart card device is mounted either in the phone functional cover, on the phone main PCB or even in the SD card. The payment/ticketing applications and related security keys are to be stored on the smart card IC. Area/cost attractive solutions combining both the NFC and smart card IC in a single package or chip are also possible candidates. • Combinations of NFC and security through both the SIM card and a dedicated smart card IC might eventually also be considered. Final choice of the actual NFC and security implementation will be affected by many factors. Ownership of the secured applications, business partnerships formed between the different players (mobile operators, financial service providers, handset manufacturers, etc.) and the actual personalization process of these secured applications will play an important role in the definition of the optimal implementation. Dachs at 468–469 Many new NFC enabled contactless services are being tested in the field around the world. A few examples involving the use of NFC enabled mobile phones with Philips NFC technology are listed below: • In Germany, the Rhein-Main Verkehrsbund (RMV), the public transport authority for Frankfurt is testing an NFC ticketing solution. The trial uses NFC enabled phones to gain access to the local bus

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	network. The system will allow RMV's customers to use a Nokia 3220 phone equipped with a Nokia NFC shell to purchase, store and use electronic travel tickets, (Telecom news). • In the Netherlands a trial will be run during the forth coming football season. Supporters will use their phones (Nokia 3220 with the NFC functional shell) to access the ParkStad Limburg Stadium of the Roda JC club as well as to make purchases at food stands and in supporters shop. • In France, Caen, multiple trials using NFC enabled phones from Samsung (D500) have been announced. These trials will involve car parking access/payment in the city, payment and fidelity applications using a private card in retail stores and finally audio guides for pedestrian visiting city monuments (Caen trial was launched on October 18, 2005). • In Taiwan the Proximity Mobile Transaction Service Alliance (PMTSA) is demonstrating a prototype mobile phone capable of making secure payments using NFC phones developed by BenQ. Residents of Tapei can use NFC enabled phones to access the city's mass transit rail as well as other public transport in Taiwan. The network already has an existing contactless smart card infrastructure based on MIFARE technology, which is compatible with NFC (www.semiconductors.philips.com/news/content/file_ 1115.html). • In the United States Motorola is conducting a field trial of mobile phones enabled with MasterCard®; PayPass™, a new „contactless" payment option and Near Field Communication technology. Consumers will enjoy the benefits of simpler and faster transactions conducted with their mobile phones (www.motorola.com/mediacenter/news/detail/0,,4762_4058_23,00.html). Dachs at 469 An illustration of how NFC and security can be embedded in a mobile phone platform is the first NFC-enabled Philips Nexperia Cellular System Solution for high-end cell phones (Nexperia Sy.Sol 6100). NFC and security hardware functionality is realized by combining two devices: the PN531 NFC controller with embedded firmware and the SmartMX a High Security Smart Card IC.

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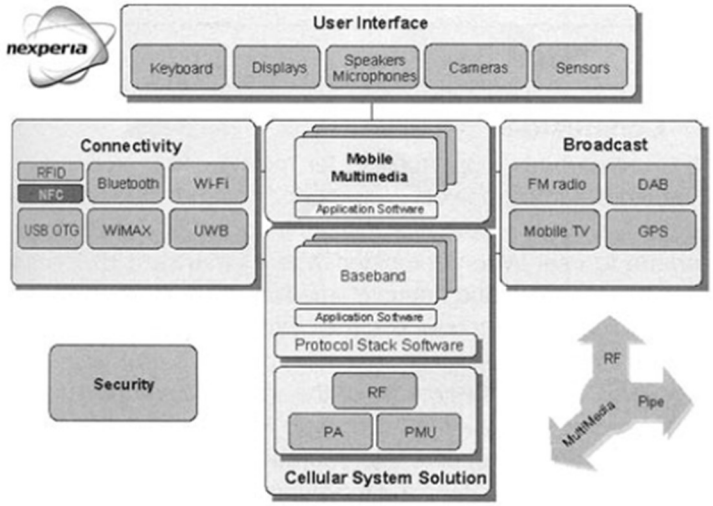
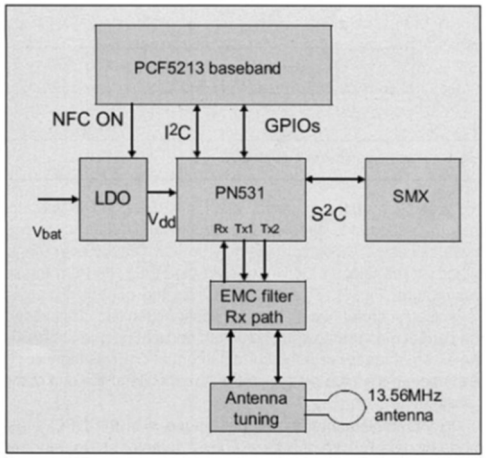
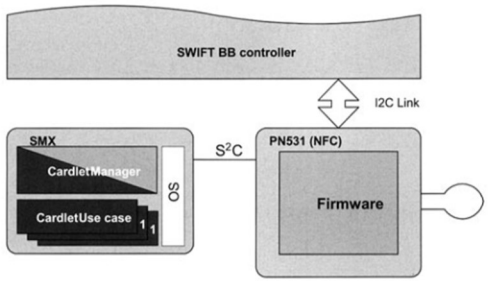
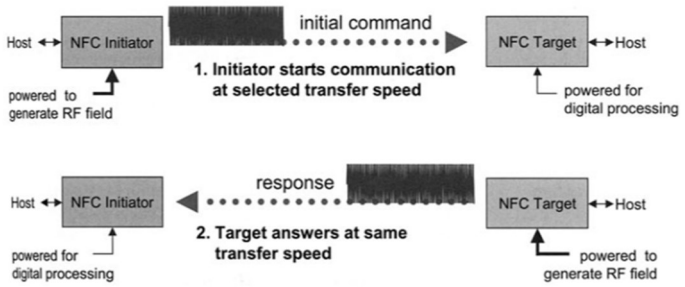


Fig. 4. Nexperia cellular system solutions – a total approach to integrating new features

The PN531 is a highly integrated transmission module for contactless communication at 13.56 MHz including controller functionality based on an 80C51 core. The embedded firmware supports all the RF communication layers, ISO 14443-A cards (Mifare, T = CL), Felica cards and the NFCIP-1 protocol.
The SmartMX is based on a secure MX51 CPU with Crypto Co-Processors (3DES, AES & PKI algorithms) and compliant to numerous international standards (EMV96&2000, EUROPAY CQM, ETSI TS 102 221,3GPP TS 51.011, GSM 11.1x). This IC is already widely used for applications such as banking, ID cards, health card, citizen cards, access cards, smart passports, etc.
In the NFC and security implementation described in Fig. 5 the SmartMX is supplied and controlled by the PN531 via a 2-wire S^2C interface. The PN531 is controlled by the baseband processor via the I^2C-bus and two general purpose I/Os (GPIOs) for the handshaking mechanisms. The antenna circuitry is split into two parts: 1) the EMC filtering and the RX path, 2) the antenna tuning. This gives extra freedom in the choice of the RFID antenna location (e.g., in the battery pack). Another GPIO controls the dedicated LDO (low dropout linear regulator) for the NFC power supply.
In smart card emulation mode, the RF transceiver is under the control of the SmartMX and the PN531 is not aware of the data exchange. This guarantees the required security level for transport or payment applications. The SmartMX sends a signal when the transaction with the external reader is completed, and then PN531 can read the result (OK or not) in the SmartMX.

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	Dachs at Figure 5  **Fig. 5.** NFC and security integration in Nexperia system solution 6100 Dachs at 470 In this implementation the cell phone is in the NFC target mode by default, with only the RF level detector active, ready to answer an external reader request. In this mode, the power consumption is very low. Other modes can be initiated by Java actions at any time. Dachs at Figure 7  **Fig. 7.** Smart Card IC

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[1d] an active transmit driver circuit coupled to the power source to receive the power, wherein the active transmit driver circuit affects transmission of data between the antenna and the NFC reader.	Dachs discloses or renders obvious "an active transmit driver circuit coupled to the power source to receive the power, wherein the active transmit driver circuit affects transmission of data between the antenna and the NFC reader." For example: Dachs at Figure 2  Dachs at 467 The standard outlines an active and a passive communication mode. Figure 2 and 3 outline these different communication modes. In passive communication mode the Initiator generates the RF field, starts the communication and the target is answering using load modulation for the data transfer. The active communication mode shares the power between both initiator and target (allowing thus lower power consumption). The device that is sending data is also the device that is generating the RF field. To the extent this limitation is not disclosed by Dachs, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Dachs, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
2. The mobile device of claim 1, wherein the transmitted data includes ticketing information for a mass transit system.	Dachs discloses or renders obvious "[t]he mobile device of claim 1, wherein the transmitted data includes ticketing information for a mass transit system." For example: Dachs at 466 NFC related applications could be split into four basic categories:

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	This interface (S^2C) between a NFC IC and Smart Card IC provides full compatibility with existing contactless standards and has been submitted to ECMA for standardization. • Secure NFC bypassing the SIM: In this case a specific smart card device is mounted either in the phone functional cover, on the phone main PCB or even in the SD card. The payment/ticketing applications and related security keys are to be stored on the smart card IC. Area/cost attractive solutions combining both the NFC and smart card IC in a single package or chip are also possible candidates. • Combinations of NFC and security through both the SIM card and a dedicated smart card IC might eventually also be considered. Final choice of the actual NFC and security implementation will be affected by many factors. Ownership of the secured applications, business partnerships formed between the different players (mobile operators, financial service providers, handset manufacturers, etc.) and the actual personalization process of these secured applications will play an important role in the definition of the optimal implementation. Dachs at 468–469 Many new NFC enabled contactless services are being tested in the field around the world. A few examples involving the use of NFC enabled mobile phones with Philips NFC technology are listed below: • In Germany, the Rhein-Main Verkehrsbund (RMV), the public transport authority for Frankfurt is testing an NFC ticketing solution. The trial uses NFC enabled phones to gain access to the local bus network. The system will allow RMV's customers to use a Nokia 3220 phone equipped with a Nokia NFC shell to purchase, store and use electronic travel tickets, (Telecom news). • In the Netherlands a trial will be run during the forth coming football season. Supporters will use their phones (Nokia 3220 with the NFC functional shell) to access the ParkStad Limburg Stadium of the Roda JC club as well as to make purchases at food stands and in supporters shop. • In France, Caen, multiple trials using NFC enabled phones from Samsung (D500) have been announced. These trials will involve car parking access/payment in the city, payment and fidelity applications using a private card in retail stores and finally audio guides for pedestrian visiting city monuments (Caen trial was launched on October 18, 2005). • In Taiwan the Proximity Mobile Transaction Service Alliance (PMTSA) is demonstrating a prototype mobile phone capable of making secure payments using NFC phones developed by BenQ. Residents of Tapei can use NFC enabled phones to access the city's mass transit rail as well as other public transport in Taiwan. The network already has an existing contactless smart card infrastructure

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Dachs at 469

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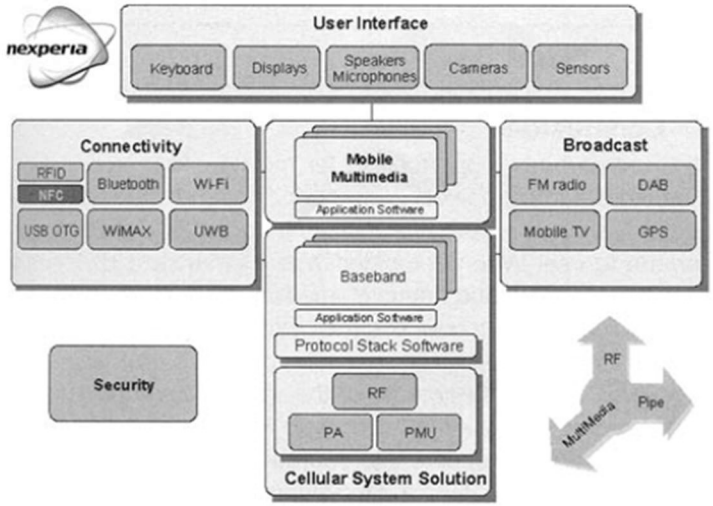
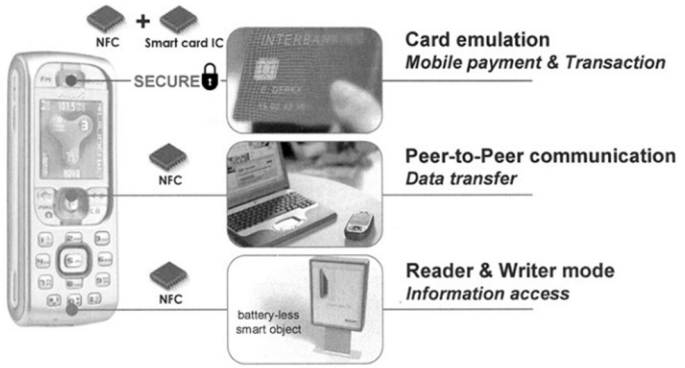


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3. The mobile device of claim 1, wherein the transmitted data includes transaction information for a mobile payment.	Dachs discloses or renders obvious "[t]he mobile device of claim 1, wherein the transmitted data includes transaction information for a mobile payment." For example: Dachs at 466 Enabling rapid and easy communication, NFC is the perfect solution for exchanging data in our increasingly complex and connected world. Secure mobile payments and transactions, easy peer-to-peer communication and simple access to information on the move become possible with NFC. Its intuitive touch-based operation makes it particularly easy for consumers to use. Dachs at 466 NFC related applications could be split into four basic categories: • Touch and go: applications such as access control or transport/event ticketing, where the user only needs to bring the device storing the ticket or access code close to the reader. • Touch and confirm: applications such as mobile payment, where the user has to confirm the interaction by entering a password or just accepting the transaction.

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	Mobile payment and transactions with NFC exploits two basic principles of modern society: everyone needs to pay for products and everyday services and just about everyone carries a phone. Results from worldwide implementations demonstrate that consumers everywhere like the convenience of mobile payment (www.smartcardalliance.org). Dachs at 468 More and more consumers are using mobile phones to download paid content such as ring tones to their phones (currently, 10 to 15 % of mobile operators' revenues come from the downloading of ring tones or small Java-based games). NFC offers a standardized next generation connection that will enable consumers to access digital content (ring tone, song, game, web link, address, discount coupon, etc.) from items such as posters, magazines, kiosks and also enables device to device transfer among NFC equipped cellular phones. NFC offers pull versus push opportunities for location-based services that eliminates unnecessary spamming. The one to one marketing comes from consumer's ability to access content and information from trusted friends in a secure peer based environment. With the majority of handsets equipped with Bluetooth today (and WiFi tomorrow), NFC can act as an enabler to facilitate data exchange transfer among phones. NFC could also enable multi-player gaming in more handsets. In today's market device interfaces are anything but intuitive and make it difficult to embrace the technology (e.g., scrolling through menu to select the specific Bluetooth device). NFC allows people to interact with their environment without needing to navigate complicated menus or perform complex set-up procedures. Dachs at 468 Various architectures are being considered for NFC integration in mobile phones. These are a few examples of existing or ongoing implementations: • The NFC device can be integrated in a phone functional cover. This corresponds for instance to the solution developed by Nokia for their phone model 3220 (www.nokia.com/link?cid=EDITORIAL_2026). • The NFC device can be integrated on the phone main printed circuit board. • The NFC device can be integrated in a Secure Digital (SD) card as recently announced by wireless dynamics (Pilato, 2005). In order to enable secure applications (e.g. payment) the NFC device is coupled to a secure smart card device (smart card emulation mode described in the introduction). Here also different options are being considered by major players in the field (Balaban, 2005):

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	• NFC + security via the SIM (subscriber identifying module): One or more wires connect the SIM card to a contactless chip complying with NFC technology standards. In this case the SIM would host mobile commerce applications and security keys. The antenna connection is done directly to the NFC chip. NFC and smart card IC currently manufactured by Philips support a two wire digital interface. This interface (S^2C) between a NFC IC and Smart Card IC provides full compatibility with existing contactless standards and has been submitted to ECMA for standardization. • Secure NFC bypassing the SIM: In this case a specific smart card device is mounted either in the phone functional cover, on the phone main PCB or even in the SD card. The payment/ticketing applications and related security keys are to be stored on the smart card IC. Area/cost attractive solutions combining both the NFC and smart card IC in a single package or chip are also possible candidates. • Combinations of NFC and security through both the SIM card and a dedicated smart card IC might eventually also be considered. Final choice of the actual NFC and security implementation will be affected by many factors. Ownership of the secured applications, business partnerships formed between the different players (mobile operators, financial service providers, handset manufacturers, etc.) and the actual personalization process of these secured applications will play an important role in the definition of the optimal implementation. Dachs at 468–469 Many new NFC enabled contactless services are being tested in the field around the world. A few examples involving the use of NFC enabled mobile phones with Philips NFC technology are listed below: • In Germany, the Rhein-Main Verkehrsbund (RMV), the public transport authority for Frankfurt is testing an NFC ticketing solution. The trial uses NFC enabled phones to gain access to the local bus network. The system will allow RMV's customers to use a Nokia 3220 phone equipped with a Nokia NFC shell to purchase, store and use electronic travel tickets, (Telecom news). • In the Netherlands a trial will be run during the forth coming football season. Supporters will use their phones (Nokia 3220 with the NFC functional shell) to access the ParkStad Limburg Stadium of the Roda JC club as well as to make purchases at food stands and in supporters shop. • In France, Caen, multiple trials using NFC enabled phones from Samsung (D500) have been announced. These trials will involve car parking access/payment in the city, payment and fidelity applications using a private card in retail stores and finally audio guides for pedestrian visiting city monuments (Caen trial was launched on October 18, 2005).

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• In Taiwan the Proximity Mobile Transaction Service Alliance (PMTSA) is demonstrating a prototype mobile phone capable of making secure payments using NFC phones developed by BenQ. Residents of Tapei can use NFC enabled phones to access the city's mass transit rail as well as other public transport in Taiwan. The network already has an existing contactless smart card infrastructure based on MIFARE technology, which is compatible with NFC (www.semiconductors.philips.com/news/content/file_ 1115.html).
• In the United States Motorola is conducting a field trial of mobile phones enabled with MasterCard®; PayPass™, a new „contactless" payment option and Near Field Communication technology. Consumers will enjoy the benefits of simpler and faster transactions conducted with their mobile phones (www.motorola.com/mediacenter/news/detail/0,,4762_4058_23,00.html).

Dachs at 469

An illustration of how NFC and security can be embedded in a mobile phone platform is the first NFC-enabled Philips Nexperia Cellular System Solution for high-end cell phones (Nexperia Sy.Sol 6100). NFC and security hardware functionality is realized by combining two devices: the PN531 NFC controller with embedded firmware and the SmartMX a High Security Smart Card IC.

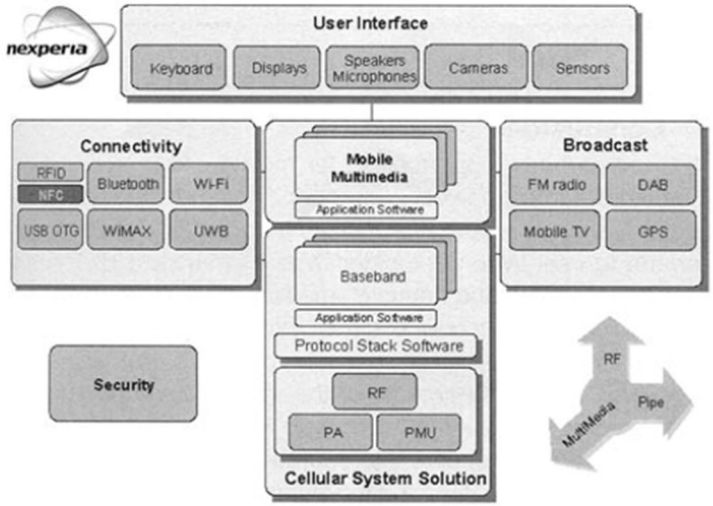


Fig. 4. Nexperia cellular system solutions – a total approach to integrating new features

Claim Element	Exemplary Citations to C. Dachs, NFC — the intuitive contactless technology becomes reality, 122 e & i Elektrotechnik und Informationstechnik 466 (2005) ("Dachs")
	The PN531 is a highly integrated transmission module for contactless communication at 13.56 MHz including controller functionality based on an 80C51 core. The embedded firmware supports all the RF communication layers, ISO 14443-A cards (Mifare, T = CL), Felica cards and the NFCIP-1 protocol. The SmartMX is based on a secure MX51 CPU with Crypto Co-Processors (3DES, AES & PKI algorithms) and compliant to numerous international standards (EMV96&2000, EUROPAY CQM, ETSI TS 102 221,3GPP TS 51.011, GSM 11.1x). This IC is already widely used for applications such as banking, ID cards, health card, citizen cards, access cards, smart passports, etc. In the NFC and security implementation described in Fig. 5 the SmartMX is supplied and controlled by the PN531 via a 2-wire S^2C interface. The PN531 is controlled by the baseband processor via the I^2C-bus and two general purpose I/Os (GPIOs) for the handshaking mechanisms. The antenna circuitry is split into two parts: 1) the EMC filtering and the RX path, 2) the antenna tuning. This gives extra freedom in the choice of the RFID antenna location (e.g., in the battery pack). Another GPIO controls the dedicated LDO (low dropout linear regulator) for the NFC power supply. In smart card emulation mode, the RF transceiver is under the control of the SmartMX and the PN531 is not aware of the data exchange. This guarantees the required security level for transport or payment applications. The SmartMX sends a signal when the transaction with the external reader is completed, and then PN531 can read the result (OK or not) in the SmartMX. Dachs at 470–471 NFC creates new opportunities for mobile commerce and has the potential to change consumer behavior and spending habits. Its unique intuitive operation makes it particularly easy for consumers to use. When combined with a smartcard IC it is also ideal for payment and financial applications. The interface and communication protocols of NFC have been standardized in ISO. A large non-profit organization (NFC Forum) with representatives from all segments of the mobile communication industry promotes implementation and further standardization of NFC technology to ensure interoperability between devices and services. The many field trials around the world with NFC enabled mobile phones are an essential step for bringing NFC into everyone's mobile phone. Depending on target applications and business partnerships different NFC and security implementations could be adopted in mobile phones. Philips has developed the first NFC-enabled cellular system solution for high-end cell phones (Nexperia Sy.Sol 6100). This NFC solution allows to read and write contact-less cards, communicate with peer devices and, when combined with a smart card device, emulate contact-less card behavior.

Claim Element	Exemplary Citations to C. Dachs, NFC — the intuitive contactless technology becomes reality, 122 e & i Elektrotechnik und Informationstechnik 466 (2005) ("Dachs")
	To the extent this limitation is not disclosed by Dachs, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Dachs, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 1 above.
4. The mobile device of claim 1, wherein the NFC reader is a point-of-sale NFC reader.	Dachs discloses or renders obvious "[t]he mobile device of claim 1, wherein the NFC reader is a point-of-sale NFC reader." For example: Dachs at 466 > Enabling rapid and easy communication, NFC is the perfect solution for exchanging data in our increasingly complex and connected world. Secure mobile payments and transactions, easy peer-to-peer communication and simple access to information on the move become possible with NFC. Its intuitive touch-based operation makes it particularly easy for consumers to use. Dachs at 467 > As illustrated in Fig. 1 NFC devices enable these numerous applications because they can read and write contact-less cards, communicate with peer devices and, when combined with a smart card device, emulate contact-less card behaviour. NFC is backward compatible with the proximity contact-less interface standard ISO 14443 and can thus leverage the contact-less infrastructure being currently rollout by major players in the field (e.g., point of sales in banks, restaurants, gas stations, stadiums, public transport, etc.). Dachs at 468–469 > Many new NFC enabled contactless services are being tested in the field around the world. A few examples involving the use of NFC enabled mobile phones with Philips NFC technology are listed below: > • In Germany, the Rhein-Main Verkehrsbund (RMV), the public transport authority for Frankfurt is testing an NFC ticketing solution. The trial uses NFC enabled phones to gain access to the local bus network. The system will allow RMV's customers to use a Nokia 3220 phone equipped with a Nokia NFC shell to purchase, store and use electronic travel tickets, (Telecom news). > • In the Netherlands a trial will be run during the forth coming football season. Supporters will use their phones (Nokia 3220 with the NFC functional shell) to access the ParkStad Limburg Stadium of the Roda JC club as well as to make purchases at food stands and in supporters shop.

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	• In France, Caen, multiple trials using NFC enabled phones from Samsung (D500) have been announced. These trials will involve car parking access/payment in the city, payment and fidelity applications using a private card in retail stores and finally audio guides for pedestrian visiting city monuments (Caen trial was launched on October 18, 2005). • In Taiwan the Proximity Mobile Transaction Service Alliance (PMTSA) is demonstrating a prototype mobile phone capable of making secure payments using NFC phones developed by BenQ. Residents of Tapei can use NFC enabled phones to access the city's mass transit rail as well as other public transport in Taiwan. The network already has an existing contactless smart card infrastructure based on MIFARE technology, which is compatible with NFC (www.semiconductors.philips.com/news/content/file_ 1115.html). • In the United States Motorola is conducting a field trial of mobile phones enabled with MasterCard®; PayPass™, a new „contactless" payment option and Near Field Communication technology. Consumers will enjoy the benefits of simpler and faster transactions conducted with their mobile phones (www.motorola.com/mediacenter/news/detail/0,,4762_4058_23,00.html). To the extent this limitation is not disclosed by Dachs, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Dachs, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 1 above.
5. The mobile device of claim 1, wherein the antenna includes an inductive element.	Dachs discloses or renders obvious "[t]he mobile device of claim 1, wherein the antenna includes an inductive element." For example: Dachs at 469 An illustration of how NFC and security can be embedded in a mobile phone platform is the first NFC-enabled Philips Nexperia Cellular System Solution for high-end cell phones (Nexperia Sy.Sol 6100). NFC and security hardware functionality is realized by combining two devices: the PN531 NFC controller with embedded firmware and the SmartMX a High Security Smart Card IC.

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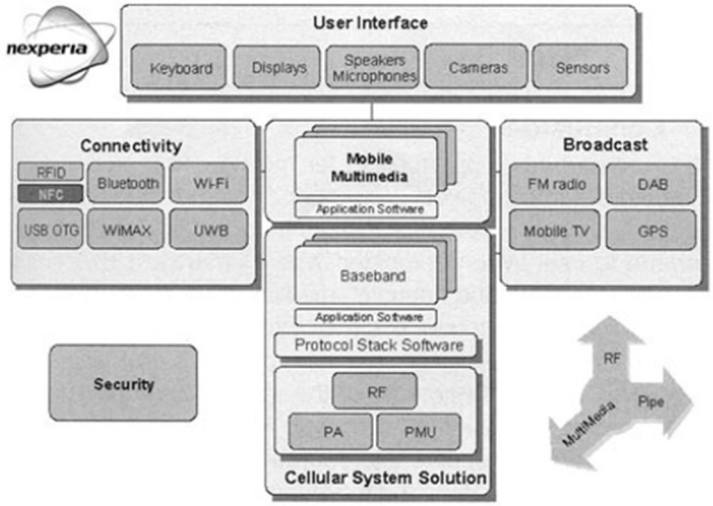
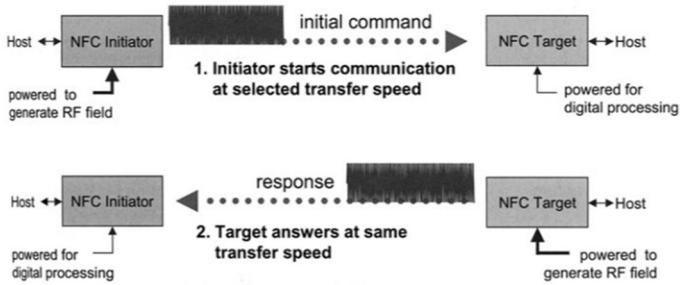
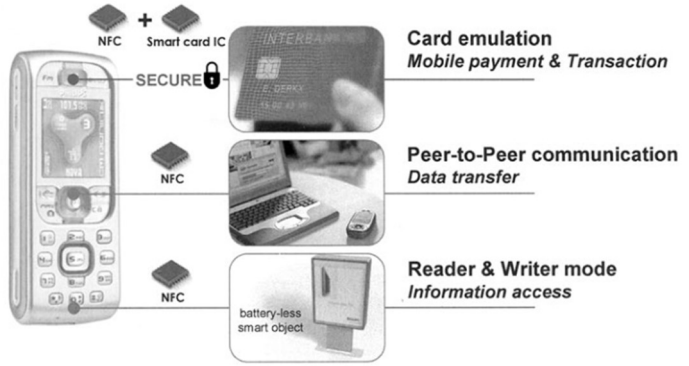
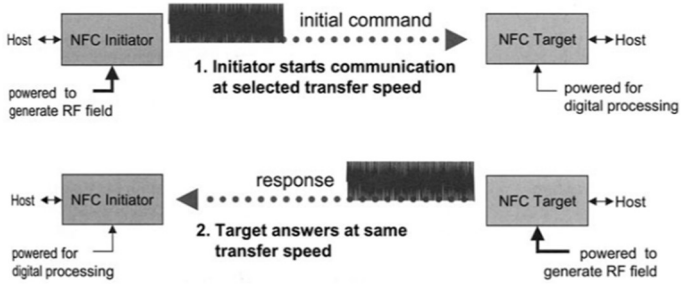


Fig. 4. Nexperia cellular system solutions – a total approach to integrating new features

The PN531 is a highly integrated transmission module for contactless communication at 13.56 MHz including controller functionality based on an 80C51 core. The embedded firmware supports all the RF communication layers, ISO 14443-A cards (Mifare, T = CL), Felica cards and the NFCIP-1 protocol.
The SmartMX is based on a secure MX51 CPU with Crypto Co-Processors (3DES, AES & PKI algorithms) and compliant to numerous international standards (EMV96&2000, EUROPAY CQM, ETSI TS 102 221,3GPP TS 51.011, GSM 11.1x). This IC is already widely used for applications such as banking, ID cards, health card, citizen cards, access cards, smart passports, etc.
In the NFC and security implementation described in Fig. 5 the SmartMX is supplied and controlled by the PN531 via a 2-wire S^2C interface. The PN531 is controlled by the baseband processor via the I^2C-bus and two general purpose I/Os (GPIOs) for the handshaking mechanisms. The antenna circuitry is split into two parts: 1) the EMC filtering and the RX path, 2) the antenna tuning. This gives extra freedom in the choice of the RFID antenna location (e.g., in the battery pack). Another GPIO controls the dedicated LDO (low dropout linear regulator) for the NFC power supply.
In smart card emulation mode, the RF transceiver is under the control of the SmartMX and the PN531 is not aware of the data exchange. This guarantees the required security level for transport or payment applications. The SmartMX sends a signal when the transaction with the external reader is completed, and then PN531 can read the result (OK or not) in the SmartMX.

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	To the extent this limitation is not disclosed by Dachs, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Dachs, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 1 above.
6. The mobile device of claim 1, wherein the active transmit driver circuit includes one or more of an amplifier filter, oscillator, and/or modulator.	To the extent this limitation is not disclosed by Dachs, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Dachs, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 1 above.
7. The mobile device of claim 1 comprising an amplifier coupled to the power source to receive the power, wherein the amplifier is further coupled to the antenna.	Dachs discloses or renders obvious "[t]he mobile device of claim 1 comprising an amplifier coupled to the power source to receive the power, wherein the amplifier is further coupled to the antenna." For example: Dachs at Figure 2  To the extent this limitation is not disclosed by Dachs, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Dachs, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 1 above.
8. The mobile device of claim 7, wherein the amplifier amplifies a signal received at the antenna and generates an amplified signal, and	To the extent this limitation is not disclosed by Dachs, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Dachs, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.

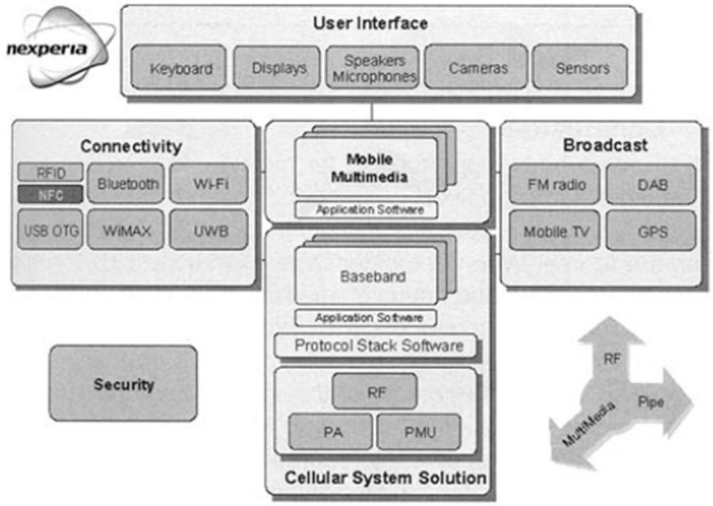
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provides the amplified signal to the smartcard controller.	*See also* claim 7 above.
17[pre]. A method of near field communication between a mobile device and an NFC reader, the method comprising:	Dachs discloses or renders obvious "[a] method of near field communication between a mobile device and an NFC reader, the method." For example: *See* [1d] above. Dachs at Abstract Near Field Communication (NFC) is opening-up completely new perspectives for the mobile communication industry, it enables contactless peer-to-peer communication, reading/writing of contactless cards and, when combined with a smart card IC, emulation of a contactless card. NFC has taken major steps towards market acceptance: ISO standards are in place for the interface and communication protocols, many leading companies in the field are promoting it within the NFC Forum, and numerous field trials are being deployed around the world. Different architectures are being considered for NFC and security mobile phone architectures. The first Philips cellular system solution integrating NFC hardware and software illustrates a successful implementation of one of these architectures. Dachs at 466 Enabling rapid and easy communication, NFC is the perfect solution for exchanging data in our increasingly complex and connected world. Secure mobile payments and transactions, easy peer-to-peer communication and simple access to information on the move become possible with NFC. Its intuitive touch-based operation makes it particularly easy for consumers to use. Dachs at 466 NFC related applications could be split into four basic categories: • Touch and go: applications such as access control or transport/event ticketing, where the user only needs to bring the device storing the ticket or access code close to the reader. • Touch and confirm: applications such as mobile payment, where the user has to confirm the interaction by entering a password or just accepting the transaction. • Touch and connect: linking two NFC-enabled devices to enable peer-to-peer transfer of data such as music, pictures or synchronizing address books.

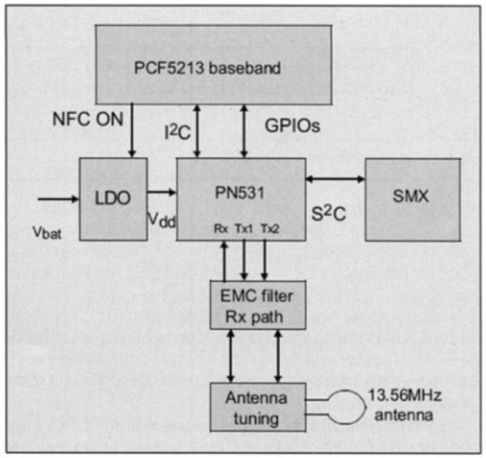
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	• Touch and explore: NFC devices may offer more than one possible function. The consumer will be able to explore a device's capabilities to find out which functions and services are offered. Dachs at Figure 1  **Fig. 1.** Overview of possible NFC and security modes Dachs at Figure 2  Dachs at 467 As illustrated in Fig. 1 NFC devices enable these numerous applications because they can read and write contact-less cards, communicate with peer devices and, when combined with a smart card device, emulate contact-less card behaviour. NFC is backward compatible with the proximity contact-less interface standard ISO 14443 and can thus leverage the contact-less infrastructure being currently rollout by major players in the field (e.g., point of sales in banks, restaurants, gas stations, stadiums, public transport, etc.).

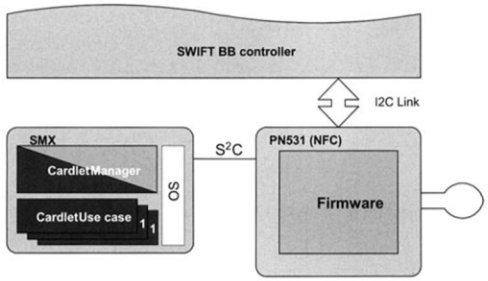
Claim Element	Exemplary Citations to C. Dachs, NFC — the intuitive contactless technology becomes reality, 122 e & i Elektrotechnik und Informationstechnik 466 (2005) ("Dachs")
	Dachs at 467 The standard outlines an active and a passive communication mode. Figure 2 and 3 outline these different communication modes. In passive communication mode the Initiator generates the RF field, starts the communication and the target is answering using load modulation for the data transfer. The active communication mode shares the power between both initiator and target (allowing thus lower power consumption). The device that is sending data is also the device that is generating the RF field. Dachs at 467 Passive and active modes should support three different communication speeds: 106, 212 and 424 kbit/s. The RF communication at 106 kbit/s and the initialization (single device detection) is compliant to the ISO/IEC 14443A / Philips' MIFARE® communication. The RF communication and initialization at 212 kbit/s is compliant to Sony's FeliCa™ communication scheme. Furthermore, ISO 21481 (NFCIP-2, derived from ECMA 356) specifies the communication mode selection mechanism, designed not to disturb any ongoing communication at 13.56MHhz for devices implementing ISO/IEC18092 (see above), 14443 ("proximity" contact-less interface) and 15693 ("vicinity" contact-less interface). Dachs at 468 Mobile phones enabled with NFC are set to spur consumer usage and open up revenue opportunities for wireless operators, merchants and handset manufacturers (Balaban, 2005). Delivering an intuitive connected consumer experience NFC equipped phones will change the way information and services are distributed paid for and accessed. Enabling secure mobile payments and transaction they can also allow easy peer-to-peer communication and simple access to information on the move. Dachs at 468 Mobile payment and transactions with NFC exploits two basic principles of modern society: everyone needs to pay for products and everyday services and just about everyone carries a phone. Results from worldwide implementations demonstrate that consumers everywhere like the convenience of mobile payment (www.smartcardalliance.org). Dachs at 468 More and more consumers are using mobile phones to download paid content such as ring tones to their phones (currently, 10 to 15 % of mobile operators' revenues come from the downloading of ring tones or

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	small Java-based games). NFC offers a standardized next generation connection that will enable consumers to access digital content (ring tone, song, game, web link, address, discount coupon, etc.) from items such as posters, magazines, kiosks and also enables device to device transfer among NFC equipped cellular phones. NFC offers pull versus push opportunities for location-based services that eliminates unnecessary spamming. The one to one marketing comes from consumer's ability to access content and information from trusted friends in a secure peer based environment. With the majority of handsets equipped with Bluetooth today (and WiFi tomorrow), NFC can act as an enabler to facilitate data exchange transfer among phones. NFC could also enable multi-player gaming in more handsets. In today's market device interfaces are anything but intuitive and make it difficult to embrace the technology (e.g., scrolling through menu to select the specific Bluetooth device). NFC allows people to interact with their environment without needing to navigate complicated menus or perform complex set-up procedures. Dachs at 468 Various architectures are being considered for NFC integration in mobile phones. These are a few examples of existing or ongoing implementations: • The NFC device can be integrated in a phone functional cover. This corresponds for instance to the solution developed by Nokia for their phone model 3220 (www.nokia.com/link?cid=EDITORIAL_2026). • The NFC device can be integrated on the phone main printed circuit board. • The NFC device can be integrated in a Secure Digital (SD) card as recently announced by wireless dynamics (Pilato, 2005). In order to enable secure applications (e.g. payment) the NFC device is coupled to a secure smart card device (smart card emulation mode described in the introduction). Here also different options are being considered by major players in the field (Balaban, 2005): • NFC + security via the SIM (subscriber identifying module): One or more wires connect the SIM card to a contactless chip complying with NFC technology standards. In this case the SIM would host mobile commerce applications and security keys. The antenna connection is done directly to the NFC chip. NFC and smart card IC currently manufactured by Philips support a two wire digital interface. This interface (S^2C) between a NFC IC and Smart Card IC provides full compatibility with existing contactless standards and has been submitted to ECMA for standardization. • Secure NFC bypassing the SIM: In this case a specific smart card device is mounted either in the phone functional cover, on the phone main PCB or even in the SD card. The payment/ticketing

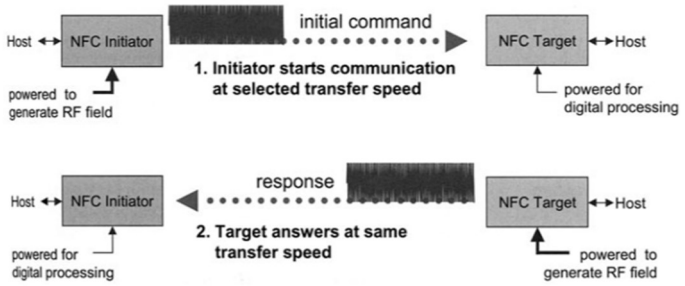
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	applications and related security keys are to be stored on the smart card IC. Area/cost attractive solutions combining both the NFC and smart card IC in a single package or chip are also possible candidates. • Combinations of NFC and security through both the SIM card and a dedicated smart card IC might eventually also be considered. Final choice of the actual NFC and security implementation will be affected by many factors. Ownership of the secured applications, business partnerships formed between the different players (mobile operators, financial service providers, handset manufacturers, etc.) and the actual personalization process of these secured applications will play an important role in the definition of the optimal implementation. Dachs at 468–469 Many new NFC enabled contactless services are being tested in the field around the world. A few examples involving the use of NFC enabled mobile phones with Philips NFC technology are listed below: • In Germany, the Rhein-Main Verkehrsbund (RMV), the public transport authority for Frankfurt is testing an NFC ticketing solution. The trial uses NFC enabled phones to gain access to the local bus network. The system will allow RMV's customers to use a Nokia 3220 phone equipped with a Nokia NFC shell to purchase, store and use electronic travel tickets, (Telecom news). • In the Netherlands a trial will be run during the forth coming football season. Supporters will use their phones (Nokia 3220 with the NFC functional shell) to access the ParkStad Limburg Stadium of the Roda JC club as well as to make purchases at food stands and in supporters shop. • In France, Caen, multiple trials using NFC enabled phones from Samsung (D500) have been announced. These trials will involve car parking access/payment in the city, payment and fidelity applications using a private card in retail stores and finally audio guides for pedestrian visiting city monuments (Caen trial was launched on October 18, 2005). • In Taiwan the Proximity Mobile Transaction Service Alliance (PMTSA) is demonstrating a prototype mobile phone capable of making secure payments using NFC phones developed by BenQ. Residents of Tapei can use NFC enabled phones to access the city's mass transit rail as well as other public transport in Taiwan. The network already has an existing contactless smart card infrastructure based on MIFARE technology, which is compatible with NFC (www.semiconductors.philips.com/news/content/file_ 1115.html). • In the United States Motorola is conducting a field trial of mobile phones enabled with MasterCard®; PayPass™, a new „contactless" payment option and Near Field Communication

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	technology. Consumers will enjoy the benefits of simpler and faster transactions conducted with their mobile phones (www.motorola.com/mediacenter/news/detail/0,,4762_4058_23,00.html). Dachs at 469 An illustration of how NFC and security can be embedded in a mobile phone platform is the first NFC-enabled Philips Nexperia Cellular System Solution for high-end cell phones (Nexperia Sy.Sol 6100). NFC and security hardware functionality is realized by combining two devices: the PN531 NFC controller with embedded firmware and the SmartMX a High Security Smart Card IC.  **Fig. 4.** Nexperia cellular system solutions – a total approach to integrating new features The PN531 is a highly integrated transmission module for contactless communication at 13.56 MHz including controller functionality based on an 80C51 core. The embedded firmware supports all the RF communication layers, ISO 14443-A cards (Mifare, T = CL), Felica cards and the NFCIP-1 protocol. The SmartMX is based on a secure MX51 CPU with Crypto Co-Processors (3DES, AES & PKI algorithms) and compliant to numerous international standards (EMV96&2000, EUROPAY CQM, ETSI TS 102 221,3GPP TS 51.011, GSM 11.1x). This IC is already widely used for applications such as banking, ID cards, health card, citizen cards, access cards, smart passports, etc. In the NFC and security implementation described in Fig. 5 the SmartMX is supplied and controlled by the PN531 via a 2-wire S^2C interface. The PN531 is controlled by the baseband processor via the I^2C-bus

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	and two general purpose I/Os (GPIOs) for the handshaking mechanisms. The antenna circuitry is split into two parts: 1) the EMC filtering and the RX path, 2) the antenna tuning. This gives extra freedom in the choice of the RFID antenna location (e.g., in the battery pack). Another GPIO controls the dedicated LDO (low dropout linear regulator) for the NFC power supply. In smart card emulation mode, the RF transceiver is under the control of the SmartMX and the PN531 is not aware of the data exchange. This guarantees the required security level for transport or payment applications. The SmartMX sends a signal when the transaction with the external reader is completed, and then PN531 can read the result (OK or not) in the SmartMX. Dachs at Figure 5  **Fig. 5.** NFC and security integration in Nexperia system solution 6100 Dachs at 470 In this implementation the cell phone is in the NFC target mode by default, with only the RF level detector active, ready to answer an external reader request. In this mode, the power consumption is very low. Other modes can be initiated by Java actions at any time. Dachs at 470–471 NFC creates new opportunities for mobile commerce and has the potential to change consumer behavior and spending habits. Its unique intuitive operation makes it particularly easy for consumers to use. When

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	combined with a smartcard IC it is also ideal for payment and financial applications. The interface and communication protocols of NFC have been standardized in ISO. A large non-profit organization (NFC Forum) with representatives from all segments of the mobile communication industry promotes implementation and further standardization of NFC technology to ensure interoperability between devices and services. The many field trials around the world with NFC enabled mobile phones are an essential step for bringing NFC into everyone's mobile phone. Depending on target applications and business partnerships different NFC and security implementations could be adopted in mobile phones. Philips has developed the first NFC-enabled cellular system solution for high-end cell phones (Nexperia Sy.Sol 6100). This NFC solution allows to read and write contact-less cards, communicate with peer devices and, when combined with a smart card device, emulate contact-less card behavior. Dachs at Figure 7  Fig. 7. Smart Card IC To the extent this limitation is not disclosed by Dachs, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Dachs, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[17a] coupling a smartcard controller and an active transmit driver circuit to a power source of the mobile device;	Dachs discloses or renders obvious "coupling a smartcard controller and an active transmit driver circuit to a power source of the mobile device." For example: Dachs at Figure 2

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Dachs at 469

An illustration of how NFC and security can be embedded in a mobile phone platform is the first NFC-enabled Philips Nexperia Cellular System Solution for high-end cell phones (Nexperia Sy.Sol 6100). NFC and security hardware functionality is realized by combining two devices: the PN531 NFC controller with embedded firmware and the SmartMX a High Security Smart Card IC.

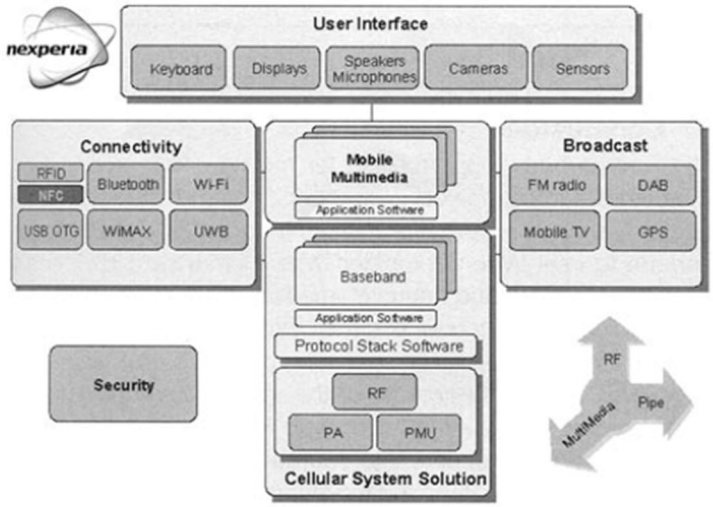
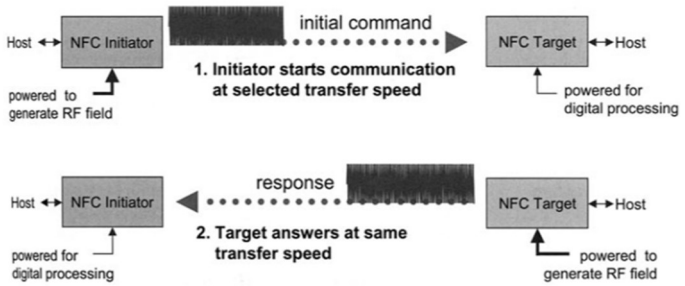
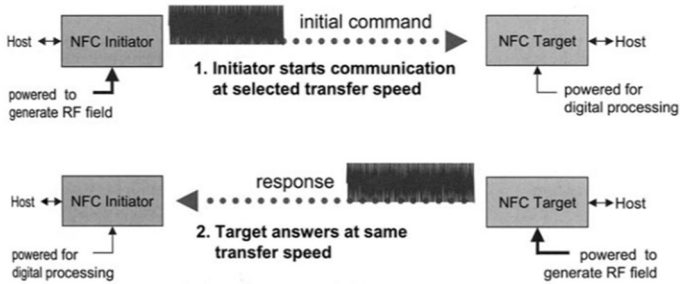
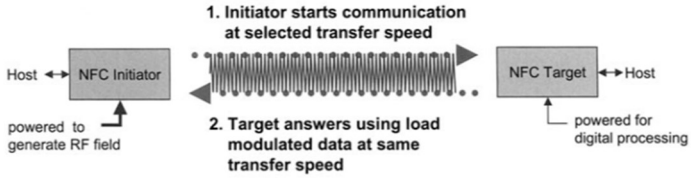


Fig. 4. Nexperia cellular system solutions – a total approach to integrating new features

The PN531 is a highly integrated transmission module for contactless communication at 13.56 MHz including controller functionality based on an 80C51 core. The embedded firmware supports all the RF communication layers, ISO 14443-A cards (Mifare, T = CL), Felica cards and the NFCIP-1 protocol.

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	The SmartMX is based on a secure MX51 CPU with Crypto Co-Processors (3DES, AES & PKI algorithms) and compliant to numerous international standards (EMV96&2000, EUROPAY CQM, ETSI TS 102 221,3GPP TS 51.011, GSM 11.1x). This IC is already widely used for applications such as banking, ID cards, health card, citizen cards, access cards, smart passports, etc. In the NFC and security implementation described in Fig. 5 the SmartMX is supplied and controlled by the PN531 via a 2-wire S^2C interface. The PN531 is controlled by the baseband processor via the I^2C-bus and two general purpose I/Os (GPIOs) for the handshaking mechanisms. The antenna circuitry is split into two parts: 1) the EMC filtering and the RX path, 2) the antenna tuning. This gives extra freedom in the choice of the RFID antenna location (e.g., in the battery pack). Another GPIO controls the dedicated LDO (low dropout linear regulator) for the NFC power supply. In smart card emulation mode, the RF transceiver is under the control of the SmartMX and the PN531 is not aware of the data exchange. This guarantees the required security level for transport or payment applications. The SmartMX sends a signal when the transaction with the external reader is completed, and then PN531 can read the result (OK or not) in the SmartMX. To the extent this limitation is not disclosed by Dachs, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Dachs, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[17b] providing power to the smartcard controller and the active transmit driver circuit from the power source of the mobile device;	Dachs discloses or renders obvious "providing power to the smartcard controller and the active transmit driver circuit from the power source of the mobile device." For example: *See* [17a] above. Dachs at Figure 2 

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	To the extent this limitation is not disclosed by Dachs, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Dachs, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[17c] coupling the active transmit driver circuit to an antenna of the mobile device, wherein the antenna is tuned to operate at substantially 13.56 MHz; and	Dachs discloses or renders obvious "coupling the active transmit driver circuit to an antenna of the mobile device, wherein the antenna is tuned to operate at substantially 13.56 MHz." For example: *See* [1c] above. Dachs at Abstract Near Field Communication (NFC) is opening-up completely new perspectives for the mobile communication industry, it enables contactless peer-to-peer communication, reading/writing of contactless cards and, when combined with a smart card IC, emulation of a contactless card. NFC has taken major steps towards market acceptance: ISO standards are in place for the interface and communication protocols, many leading companies in the field are promoting it within the NFC Forum, and numerous field trials are being deployed around the world. Different architectures are being considered for NFC and security mobile phone architectures. The first Philips cellular system solution integrating NFC hardware and software illustrates a successful implementation of one of these architectures. Dachs at Figure 2  Dachs at 467 As illustrated in Fig. 1 NFC devices enable these numerous applications because they can read and write contact-less cards, communicate with peer devices and, when combined with a smart card device, emulate contact-less card behaviour. NFC is backward compatible with the proximity contact-less interface

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	standard ISO 14443 and can thus leverage the contact-less infrastructure being currently rollout by major players in the field (e.g., point of sales in banks, restaurants, gas stations, stadiums, public transport, etc.). Dachs at 467 The standard outlines an active and a passive communication mode. Figure 2 and 3 outline these different communication modes. In passive communication mode the Initiator generates the RF field, starts the communication and the target is answering using load modulation for the data transfer. The active communication mode shares the power between both initiator and target (allowing thus lower power consumption). The device that is sending data is also the device that is generating the RF field. Dachs at 467 Passive and active modes should support three different communication speeds: 106, 212 and 424 kbit/s. The RF communication at 106 kbit/s and the initialization (single device detection) is compliant to the ISO/IEC 14443A / Philips' MIFARE® communication. The RF communication and initialization at 212 kbit/s is compliant to Sony's FeliCa™ communication scheme. Furthermore, ISO 21481 (NFCIP-2, derived from ECMA 356) specifies the communication mode selection mechanism, designed not to disturb any ongoing communication at 13.56MHhz for devices implementing ISO/IEC18092 (see above), 14443 ("proximity" contact-less interface) and 15693 ("vicinity" contact-less interface). Dachs at Figure 3  Dachs at 468 Various architectures are being considered for NFC integration in mobile phones. These are a few examples of existing or ongoing implementations: • The NFC device can be integrated in a phone functional cover. This corresponds for instance to the solution developed by Nokia for their phone model 3220 (www.nokia.com/link?cid=EDITORIAL_2026).

Claim Element	Exemplary Citations to C. Dachs, NFC — the intuitive contactless technology becomes reality, 122 e & i Elektrotechnik und Informationstechnik 466 (2005) ("Dachs")
	• The NFC device can be integrated on the phone main printed circuit board. • The NFC device can be integrated in a Secure Digital (SD) card as recently announced by wireless dynamics (Pilato, 2005). In order to enable secure applications (e.g. payment) the NFC device is coupled to a secure smart card device (smart card emulation mode described in the introduction). Here also different options are being considered by major players in the field (Balaban, 2005): • NFC + security via the SIM (subscriber identifying module): One or more wires connect the SIM card to a contactless chip complying with NFC technology standards. In this case the SIM would host mobile commerce applications and security keys. The antenna connection is done directly to the NFC chip. NFC and smart card IC currently manufactured by Philips support a two wire digital interface. This interface (S^2C) between a NFC IC and Smart Card IC provides full compatibility with existing contactless standards and has been submitted to ECMA for standardization. • Secure NFC bypassing the SIM: In this case a specific smart card device is mounted either in the phone functional cover, on the phone main PCB or even in the SD card. The payment/ticketing applications and related security keys are to be stored on the smart card IC. Area/cost attractive solutions combining both the NFC and smart card IC in a single package or chip are also possible candidates. • Combinations of NFC and security through both the SIM card and a dedicated smart card IC might eventually also be considered. Final choice of the actual NFC and security implementation will be affected by many factors. Ownership of the secured applications, business partnerships formed between the different players (mobile operators, financial service providers, handset manufacturers, etc.) and the actual personalization process of these secured applications will play an important role in the definition of the optimal implementation. Dachs at 469 An illustration of how NFC and security can be embedded in a mobile phone platform is the first NFC-enabled Philips Nexperia Cellular System Solution for high-end cell phones (Nexperia Sy.Sol 6100). NFC and security hardware functionality is realized by combining two devices: the PN531 NFC controller with embedded firmware and the SmartMX a High Security Smart Card IC.

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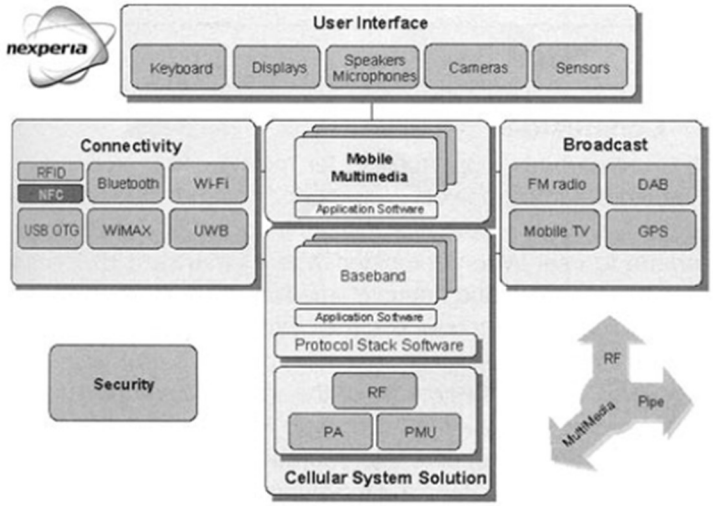
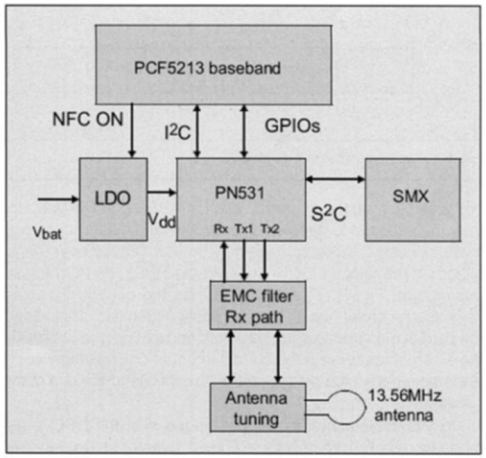


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In the NFC and security implementation described in Fig. 5 the SmartMX is supplied and controlled by the PN531 via a 2-wire S^2C interface. The PN531 is controlled by the baseband processor via the I^2C-bus and two general purpose I/Os (GPIOs) for the handshaking mechanisms. The antenna circuitry is split into two parts: 1) the EMC filtering and the RX path, 2) the antenna tuning. This gives extra freedom in the choice of the RFID antenna location (e.g., in the battery pack). Another GPIO controls the dedicated LDO (low dropout linear regulator) for the NFC power supply.
In smart card emulation mode, the RF transceiver is under the control of the SmartMX and the PN531 is not aware of the data exchange. This guarantees the required security level for transport or payment applications. The SmartMX sends a signal when the transaction with the external reader is completed, and then PN531 can read the result (OK or not) in the SmartMX.

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	Dachs at Figure 5  **Fig. 5.** NFC and security integration in Nexperia system solution 6100 *See also* Dachs at Figure 1, 468, 468–469, and 470. To the extent this limitation is not disclosed by Dachs, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Dachs, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
[17d] driving transmission of data by the active transmit driver circuit from the antenna to the NFC reader.	Dachs discloses or renders obvious "driving transmission of data by the active transmit driver circuit from the antenna to the NFC reader." For example: *See* [1d] above. Dachs at 467 > The standard outlines an active and a passive communication mode. Figure 2 and 3 outline these different communication modes. In passive communication mode the Initiator generates the RF field, starts the communication and the target is answering using load modulation for the data transfer. The active communication mode shares the power between both initiator and target (allowing thus lower power consumption). The device that is sending data is also the device that is generating the RF field.

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	To the extent this limitation is not disclosed by Dachs, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Dachs, those elements, as known to them or as disclosed by other prior art identified in the cover pleading.
18[pre]. The method of claim 17 further comprising:	Dachs discloses or renders obvious "[t]he method of claim 17 further." *See* claim 17 above.
[18a] amplifying a signal received from the antenna to generate an amplified signal; and	Dachs discloses or renders obvious "amplifying a signal received from the antenna to generate an amplified signal." For example: To the extent this limitation is not disclosed by Dachs, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Dachs, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 8 and claim 17 above.
[18b] providing the amplified signal to the smartcard controller.	Dachs discloses or renders obvious "providing the amplified signal to the smartcard controller." For example: To the extent this limitation is not disclosed by Dachs, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Dachs, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claim 8 and claim 17 above.
19. The method of claim 10 or 17, wherein the transmitted data includes ticketing information for a mass transit system.	Dachs discloses or renders obvious "[t]he method of claim 10 or 17, wherein the transmitted data includes ticketing information for a mass transit system." *See* claim 2 above. *See also* claims 10 and 17 above.
20. The method of claim 10 or 17, wherein the transmitted data includes transaction information for a mobile payment.	Dachs discloses or renders obvious "[t]he method of claim 10 or 17, wherein the transmitted data includes transaction information for a mobile payment." *See* claim 3 above.

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	To the extent this limitation is not disclosed by Dachs, it would have been obvious to one of ordinary skill in the art to combine, with the teachings of Dachs, those elements, as known to them or as disclosed by other prior art identified in the cover pleading. *See also* claims 10 and 17 above.