

EXHIBIT 9

**IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
TYLER DIVISION**

CELLULAR COMMUNICATIONS
EQUIPMENT LLC,

Plaintiff,

V.

LG ELECTRONICS, INC., ET AL.,

Defendants.

[illegible]

CIVIL ACTION NO. 6:14-cv-982
CONSOLIDATED LEAD CASE

JURY TRIAL DEMANDED

**PLAINTIFF'S PRELIMINARY DISCLOSURE OF
ASSERTED CLAIMS AND INFRINGEMENT CONTENTIONS**

Pursuant to P.R. 3-1 and the Court’s May 4, 2015 Order (Dkt No. 44), Plaintiff Cellular Communications Equipment LLC submits this disclosure of asserted claims and infringement contentions to Defendants Sony Mobile Communications Inc. and Sony Mobile Communications (USA) Inc. (collectively, “Sony”), AT&T Mobility LLC (“AT&T”), Cellco Partnership d/b/a Verizon Wireless (“Verizon”), and T-Mobile USA, Inc., and T-Mobile US, Inc. (collectively, “T-Mobile”).

I. P.R. 3-1 Disclosure of Asserted Claims and Infringement Contentions

(a) Defendants infringe the following claims:

1. Claims 1-7, 9, and 10-16 of U.S. Pat. 8,385,966;
2. Claims 13-15, and 21-23 of U.S. Pat. 8,848,556; and
3. Claims 1, 3, 7, 9, and 15 of U.S. Pat. 8,868,060;

Defendants' infringements are both direct and indirect, as set forth in the claim charts attached as Exhibits A through C. Plaintiff reserves the right to augment or supplement its contentions to

identify additional claims infringed by Defendants after discovery, in response to Defendants' P.R. 3-4 production, or as permitted under the Patent Rules.

(b) Defendants' direct and indirect infringements pertain to the Accused Products identified in Exhibits A through C. Plaintiff expects that this disclosure may be subject to amendment or supplementation to identify and accuse additional products released, developed, or made available by Defendants after the date on which these contentions are served, or of which Plaintiff was not aware at the time of these contentions.

(c) Charts identifying where each element or step of the asserted claims is found within, or performed by, each Accused Product are attached as Exhibits A through C. The charts are based on publicly-available information currently accessible to Plaintiff.

(d) Based on its current understanding of the claim language and publicly-available information pertaining to the Accused Products, and without notice of any non-infringement position from Defendants, Plaintiff asserts that Defendants literally infringe each element or step of the asserted claims. However, any claim element or step not literally present in or performed by the Accused Products is satisfied under the doctrine of equivalents because any difference between such claim element or step and the accused element or step are insubstantial. In other words, the accused element or step performs substantially the same function, in substantially the same way, to achieve substantially the same result.

As discovery has not yet begun and the Court has not construed certain claim terms, it is not yet clear whether Plaintiff will rely on the doctrine of equivalents. Accordingly, Plaintiff reserves the right, in response to discovery, Defendants' P.R. 3-4 production, or as permitted under the Patent Rules, to amend its infringement contentions as necessary.

(e) The asserted claims of U.S. Pat. 8,385,966 claim priority to an earlier application filed May 5, 2008. The asserted claims of U.S. Pat. 8,848,556 claim priority to an earlier

application filed June 21, 2010. The asserted claims of U.S. Pat. 8,868,060 claim priority to an earlier application filed April 2, 2007. Each patent listed in this section (e) is entitled to a priority date no later than the filing date of the earliest application to which it claims priority.

(f) Plaintiff is not aware of any apparatus, product, device, process, method, act, or other instrumentality of its own that practices the claimed inventions.

II. P.R. 3-2 Document Production Accompanying Disclosure

- (a) Plaintiff is not presently aware of documents responsive to P.R. 3-2(a).
- (b) Other than information included in the file histories noted below, Plaintiff is not presently aware of documents responsive to P.R. 3-2(b).
 - (c) Documents responsive to P.R. 3-2(c) have been produced as follows:
 - 1. File History of U.S. Pat. No. 8,385,966: CCE_LG000001-0263
 - 2. File History of U.S. Pat. No. 8,848,556: CCE_LG000263-0824
 - 3. File History of U.S. Pat. No. 8,868,060: CCE_LG000825-01446

Dated: May 15, 2015

Respectfully submitted,

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**ATTORNEYS FOR PLAINTIFF
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EQUIPMENT LLC**

CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the foregoing document was served upon counsel of record via electronic mail, pursuant to the Federal Rules of Civil Procedure and the Local Rules for the Eastern District of Texas, on the 15th day of May, 2015.

/s/ Edward R. Nelson, III

Cellular Communications Equipment LLC v. Sony Electronics Inc., et al.**EXHIBIT C TO PLAINTIFF'S PRELIMINARY INFRINGEMENT CONTENTIONS**

U.S. Pat. No. 8,848,556	'556 SONY ACCUSED PRODUCTS ¹
13. A non-transitory computer readable medium encoded with a computer program that, when executed in hardware, causes the hardware to perform a process, the process comprising:	Sony, T-Mobile, and Verizon make, use, sell, offer to sell, and/or import the '556 Sony Accused Products², each of which is a cellular device that includes and performs the features and capabilities described in this claim. Plaintiff contends that each Defendant infringes this claim because it makes, uses, sells, offers to sell, and/or imports the '556 Sony Accused Products, each of which includes and/or practices each and every element of this claim. Additionally, each Defendant indirectly infringes this claim by (1) inducing, with knowledge of the patent (at least by virtue of disclosure to ETSI), its customers' (e.g., end users, carriers) use of the '556 Sony Accused Products to practice each and every one of the following claim elements with knowledge that such practice infringes this claim and intent to cause such infringement (as evidenced for example, in user guides and other instructional materials provided by each Defendant such as instructions to operate the Accused Product within a provided service area), and/or (2) contributing to direct infringement by customers (e.g., end users, carriers) that use the '556 Sony Accused Products to practice each and every one of the following claim elements, with knowledge that the infringing components of the '556 Sony Accused Products have no substantial non-infringing uses (by their nature as proprietary hardware components and software instructions that work in concert to perform specific, intended functions) and that the combination for which such components were made infringes this claim. Each '556 Sony Accused Product is a terminal (UE) that contains the functionality as set forth in this claim. Specifically, each '556 Sony Accused Product is a cellular device that includes hardware and software (including

¹ Discovery in this case has not begun. Accordingly, Plaintiff expects that these contentions may be subject to supplementation and/or amendment after further discovery and disclosure of Defendant's non-infringement positions in order to focus the issues in this case. For example, Plaintiff may supplement these contentions in response to information learned during discovery to rebut allegations of non-infringement under the doctrine of equivalents. Additionally, Plaintiff expects that these contentions may be subject to amendment or supplementation to identify and accuse additional devices released, developed, or made available after the date on which these contentions are served.

² The '556 Sony Accused Products include the following products: Xperia Z3, Xperia Z1s, Xperia Z3v, Xperia Z3 Compact, Xperia Z1 Compact, Xperia Z1, Xperia Ultra. Evidence supporting the use of relevant technology contained within this chart is listed in Appendix C-1.

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	memory, one or more processors, radios, firmware, and drivers) configured to support and provide wireless communications in an LTE-A network environment. As such, each '556 Sony Accused Product is compliant with and supports technical specifications published by 3GPP and ETSI for LTE-A technology, including TS 36.321 and TS 36.331.³ Indeed, the '556 patent is essential to compliance with LTE-A standards. Each '556 Sony Accused Product comprises a non-transitory computer readable medium encoded with a computer program that, when executed in hardware, such as a baseband processor, causes the hardware to perform a process, the process comprising the steps described below. CCE alternatively contends that this claim element is met under the doctrine of equivalents because above-described features of the Accused Products perform substantially the same function recited in this element, in substantially the same way to achieve substantially the same result. Any alleged differences between the above-described features and the recited element are insubstantial and immaterial to infringement.
preparing a power headroom report control element,	Each '556 Sony Accused Product contains a computer program that, when executed in hardware, causes the hardware to prepare a power headroom report control element. This is described in TS 36.321: 5.4.6 Power Headroom Reporting The Power Headroom reporting procedure is used to provide the serving eNB with information about the difference between the nominal UE maximum transmit power and the estimated power for UL-SCH transmission per activated Serving Cell and also with information about the difference between the nominal UE maximum power and the estimated power for UL-SCH and PUCCH transmission on PCell. The reporting period, delay and mapping of Power Headroom are defined in subclause 9.1.8 of [9]. RRC controls Power Headroom reporting by configuring the two timers <i>periodicPHR-Timer</i> and <i>prohibitPHR-Timer</i>, and by signalling <i>dl-PathlossChange</i> which sets the change in measured downlink pathloss and the required power backoff due to power management (as allowed by P-MPR_c [10]) to trigger a PHR [8].

³ See, e.g., TS 36.321 V11.0.0 http://www.etsi.org/deliver/etsi_ts/136300_136399/136321/11.00.00_60/ts_136321v110000p.pdf, TS 36.331V10.7.0 http://www.etsi.org/deliver/etsi_ts/136300_136399/136331/10.07.00_60/ts_136331v100700p.pdf.

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U.S. Pat. No. 8,848,556	'556 SONY ACCUSED PRODUCTS ¹
	If the UE has UL resources allocated for new transmission for this TTI: - if it is the first UL resource allocated for a new transmission since the last MAC reset, start <i>periodicPHR-Timer</i>; - if the Power Headroom reporting procedure determines that at least one PHR has been triggered and not cancelled, and; - if the allocated UL resources can accommodate a PHR MAC control element plus its subheader if <i>extendedPHR</i> is not configured, or the Extended PHR MAC control element plus its subheader if <i>extendedPHR</i> is configured, as a result of logical channel prioritization: - if <i>extendedPHR</i> is configured: - for each activated Serving Cell with configured uplink: - obtain the value of the Type 1 power headroom; - if the UE has UL resources allocated for transmission on this Serving Cell for this TTI: - obtain the value for the corresponding $P_{\text{CMAX},e}$ field from the physical layer; - if <i>simultaneousPUCCH-PUSCH</i> is configured: - obtain the value of the Type 2 power headroom for the PCell; - if the UE has a PUCCH transmission in this TTI: - obtain the value for the corresponding $P_{\text{CMAX},e}$ field from the physical layer; - instruct the Multiplexing and Assembly procedure to generate and transmit an Extended PHR MAC control element as defined in subclause 6.1.3.6a based on the values reported by the physical layer; CCE alternatively contends that this claim element is met under the doctrine of equivalents because above-described features of the Accused Products perform substantially the same function recited in this element, in substantially the same way to achieve substantially the same result. Any alleged differences between the above-described features and the recited element are insubstantial and immaterial to infringement.
based on a trigger configured by a base station,	In each '556 Sony Accused Product, the power headroom report control element is based on a trigger configured by a base station, as evidenced by TS 36.321 and TS 36.331. TS 36.321 states:

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	5.4.6 Power Headroom Reporting The Power Headroom reporting procedure is used to provide the serving eNB with information about the difference between the nominal UE maximum transmit power and the estimated power for UL-SCH transmission per activated Serving Cell and also with information about the difference between the nominal UE maximum power and the estimated power for UL-SCH and PUCCH transmission on PCell. The reporting period, delay and mapping of Power Headroom are defined in subclause 9.1.8 of [9]. RRC controls Power Headroom reporting by configuring the two timers <i>periodicPHR-Timer</i> and <i>prohibitPHR-Timer</i>, and by signalling <i>dl-PathlossChange</i> which sets the change in measured downlink pathloss and the required power backoff due to power management (as allowed by P-MPR_c [10]) to trigger a PHR [8]. TS 36.331 states: 5.3.10 Radio resource configuration 5.3.10.0 General The UE shall: 1> if the received <i>radioResourceConfigDedicated</i> includes the <i>srb-ToAddModList</i>: 2> perform the SRB addition or reconfiguration as specified in 5.3.10.1; 1> if the received <i>radioResourceConfigDedicated</i> includes the <i>drb-ToReleaseList</i>: 2> perform DRB release as specified in 5.3.10.2; 1> if the received <i>radioResourceConfigDedicated</i> includes the <i>drb-ToAddModList</i>: 2> perform DRB addition or reconfiguration as specified in 5.3.10.3; 1> if the received <i>radioResourceConfigDedicated</i> includes the <i>mac-MainConfig</i>: 2> perform MAC main reconfiguration as specified in 5.3.10.4; Mac-MainConfig is further defined in TS 36.331: – MAC-MainConfig The IE <i>MAC-MainConfig</i> is used to specify the MAC main configuration for signalling and data radio bearers. And Mac-MainConfig field descriptions in TS36.311 provide:

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	MAC-MainConfig field descriptions dl-PathlossChange DL Pathloss Change and the change of the required power backoff due to power management (as allowed by P-MPRc [42]) for PHR reporting in TS 36.321 [6]. Value in dB. Value dB1 corresponds to 1 dB, dB3 corresponds to 3 dB and so on. The same value applies for each serving cell (although the associated functionality is performed independently for each cell). extendedPHR Indicates if power headroom shall be reported using the Extended Power Headroom Report MAC control element defined in TS 36.321 [6] (value <i>setup</i>). Otherwise the power headroom shall be reported using the Power Headroom Report MAC control element defined in TS 36.321 [6]. E-UTRAN always configures the value <i>setup</i> if more than one Serving Cell with uplink is configured. periodicPHR-Timer Timer for PHR reporting in TS 36.321 [6]. Value in number of sub-frames. Value sf10 corresponds to 10 subframes, sf20 corresponds to 20 subframes and so on. prohibitPHR-Timer Timer for PHR reporting in TS 36.321 [6]. Value in number of sub-frames. Value sf0 corresponds to 0 subframes, sf100 corresponds to 100 subframes and so on. CCE alternatively contends that this claim element is met under the doctrine of equivalents because above-described features of the Accused Products perform substantially the same function recited in this element, in substantially the same way to achieve substantially the same result. Any alleged differences between the above-described features and the recited element are insubstantial and immaterial to infringement.
the trigger determining when the power headroom report control element is to be sent in an uplink,	Further, in each '556 Sony Accused Product, the trigger determines when the power headroom report control element is to be sent in an uplink. This is described in TS 36.321:

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	5.4.6 Power Headroom Reporting The Power Headroom reporting procedure is used to provide the serving eNB with information about the difference between the nominal UE maximum transmit power and the estimated power for UL-SCH transmission per activated Serving Cell and also with information about the difference between the nominal UE maximum power and the estimated power for UL-SCH and PUCCH transmission on PCell. The reporting period, delay and mapping of Power Headroom are defined in subclause 9.1.8 of [9]. RRC controls Power Headroom reporting by configuring the two timers <i>periodicPHR-Timer</i> and <i>prohibitPHR-Timer</i>, and by signalling <i>dl-PathlossChange</i> which sets the change in measured downlink pathloss and the required power backoff due to power management (as allowed by P-MPR_e [10]) to trigger a PHR [8]. A Power Headroom Report (PHR) shall be triggered if any of the following events occur: - <i>prohibitPHR-Timer</i> expires or has expired and the path loss has changed more than <i>dl-PathlossChange</i> dB for at least one activated Serving Cell which is used as a pathloss reference since the last transmission of a PHR when the UE has UL resources for new transmission; - <i>periodicPHR-Timer</i> expires; CCE alternatively contends that this claim element is met under the doctrine of equivalents because above-described features of the Accused Products perform substantially the same function recited in this element, in substantially the same way to achieve substantially the same result. Any alleged differences between the above-described features and the recited element are insubstantial and immaterial to infringement.
the preparing of the power headroom report control element includes incorporating a bitmap indicating which power headroom reports are being reported,	In each '556 Sony Accused Product, the preparing of the power headroom report control element includes incorporating a bitmap indicating which power headroom reports are being indicated. This is described in TS 36.321:

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	6.1.3.6a Extended Power Headroom MAC Control Element The Extended Power Headroom MAC control element is identified by a MAC PDU subheader with LCID as specified in table 6.2.1-2. It has a variable size and is defined in Figure 6.1.3.6a-2. When Type 2 PH is reported, the octet containing the Type 2 PH field is included first after the octet indicating the presence of PH per SCell and followed by an octet containing the associated $P_{\text{CMAX},c}$ field (if reported). Then follows in ascending order based on the <i>ServCellIndex</i> [8] an octet with the Type 1 PH field and an octet with the associated $P_{\text{CMAX},c}$ field (if reported), for the PCell and for each SCell indicated in the bitmap. The Extended Power Headroom MAC Control Element is defined as follows: - C_i: this field indicates the presence of a PH field for the SCell with <i>SCellIndex</i> i as specified in [8]. The C_i field set to "1" indicates that a PH field for the SCell with <i>SCellIndex</i> i is reported. The C_i field set to "0" indicates that a PH field for the SCell with <i>SCellIndex</i> i is not reported; - R: reserved bit, set to "0"; - V: this field indicates if the PH value is based on a real transmission or a reference format. For Type 1 PH, V=0 indicates real transmission on PUSCH and V=1 indicates that a PUSCH reference format is used. For Type 2 PH, V=0 indicates real transmission on PUCCH and V=1 indicates that a PUCCH reference format is used. Furthermore, for both Type 1 and Type 2 PH, V=0 indicates the presence of the associated $P_{\text{CMAX},c}$ field, and V=1 indicates that the associated $P_{\text{CMAX},c}$ field is omitted; - Power Headroom (PH): this field indicates the power headroom level. The length of the field is 6 bits. The reported PH and the corresponding power headroom levels are shown in Table 6.1.3.6-1 (the corresponding measured values in dB can be found in subclause 9.1.8.4 of [9]); - P: this field indicates whether the UE applies power backoff due to power management (as allowed by P-MPR_c [10]). The UE shall set P=1 if the corresponding $P_{\text{CMAX},c}$ field would have had a different value if no power backoff due to power management had been applied; - $P_{\text{CMAX},c}$: if present, this field indicates the $P_{\text{CMAX},c}$ or $\tilde{P}_{\text{CMAX},c}$ [2] used for calculation of the preceding PH field. The reported $P_{\text{CMAX},c}$ and the corresponding nominal UE transmit power levels are shown in Table 6.1.3.6a-1 (the corresponding measured values in dBm can be found in subclause 9.6.1 of [9]). Figure 6.1.3.6a-1: Void

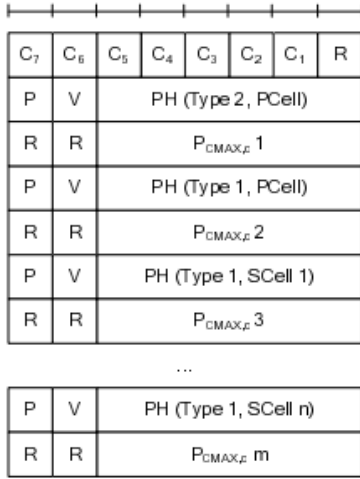
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	C₇ C₆ C₅ C₄ C₃ C₂ C₁ R P V PH (Type 2, PCell) R R P_{C_{MAX,c} 1} P V PH (Type 1, PCell) R R P_{C_{MAX,c} 2} P V PH (Type 1, SCell 1) R R P_{C_{MAX,c} 3} ... P V PH (Type 1, SCell n) R R P_{C_{MAX,c} m} Figure 6.1.3.6a-2: Extended Power Headroom MAC Control Element CCE alternatively contends that this claim element is met under the doctrine of equivalents because above-described features of the Accused Products perform substantially the same function recited in this element, in substantially the same way to achieve substantially the same result. Any alleged differences between the above-described features and the recited element are insubstantial and immaterial to infringement.
the preparing of the power headroom report control element further includes preparing the bitmap to include bits for power headroom reports for a plurality of secondary cells; and sending the prepared power headroom report control element to the base station.	In each '556 Sony Accused Product, the preparing of the power headroom report control element further includes preparing the bitmap to include bits for power headroom reports to a plurality of secondary cells; and sending the prepared power headroom report control element to the base station. This is detailed in TS 36.321. In certain conditions, for example, TS 36.321 requires: instruct the Multiplexing and Assembly procedure to generate and transmit an Extended PHR MAC control element as defined in subclause 6.1.3.6a based on the values reported by the physical layer; Where 6.1.3.6a informs that:

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	6.1.3.6a Extended Power Headroom MAC Control Element The Extended Power Headroom MAC control element is identified by a MAC PDU subheader with LCID as specified in table 6.2.1-2. It has a variable size and is defined in Figure 6.1.3.6a-2. When Type 2 PH is reported, the octet containing the Type 2 PH field is included first after the octet indicating the presence of PH per SCell and followed by an octet containing the associated $P_{\text{CMAX},e}$ field (if reported). Then follows in ascending order based on the <i>ServCellIndex</i> [8] an octet with the Type 1 PH field and an octet with the associated $P_{\text{CMAX},e}$ field (if reported), for the PCell and for each SCell indicated in the bitmap. The Extended Power Headroom MAC Control Element is defined as follows: - C_i: this field indicates the presence of a PH field for the SCell with <i>SCellIndex</i> i as specified in [8]. The C_i field set to "1" indicates that a PH field for the SCell with <i>SCellIndex</i> i is reported. The C_i field set to "0" indicates that a PH field for the SCell with <i>SCellIndex</i> i is not reported; - R: reserved bit, set to "0"; - V: this field indicates if the PH value is based on a real transmission or a reference format. For Type 1 PH, V=0 indicates real transmission on PUSCH and V=1 indicates that a PUSCH reference format is used. For Type 2 PH, V=0 indicates real transmission on PUCCH and V=1 indicates that a PUCCH reference format is used. Furthermore, for both Type 1 and Type 2 PH, V=0 indicates the presence of the associated $P_{\text{CMAX},e}$ field, and V=1 indicates that the associated $P_{\text{CMAX},e}$ field is omitted; - Power Headroom (PH): this field indicates the power headroom level. The length of the field is 6 bits. The reported PH and the corresponding power headroom levels are shown in Table 6.1.3.6-1 (the corresponding measured values in dB can be found in subclause 9.1.8.4 of [9]); Figure 6.1.3.6a-1: Void

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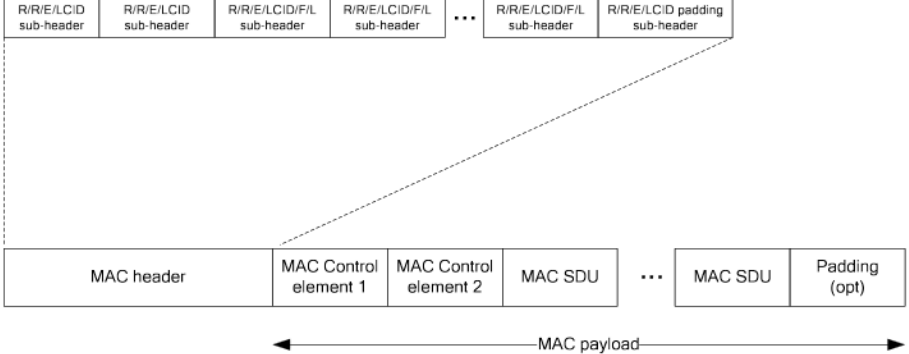
U.S. Pat. No. 8,848,556	'556 SONY ACCUSED PRODUCTS ¹
	 Figure 6.1.3.6a-2: Extended Power Headroom MAC Control Element CCE alternatively contends that this claim element is met under the doctrine of equivalents because above-described features of the Accused Products perform substantially the same function recited in this element, in substantially the same way to achieve substantially the same result. Any alleged differences between the above-described features and the recited element are insubstantial and immaterial to infringement.
14. The non-transitory computer readable medium of claim 13, wherein the preparing of the power headroom report control element includes preparing the bitmap in one of: a MAC subheader and a payload.	Sony, T-Mobile, and Verizon make, use, sell, offer to sell, and/or import the '556 Sony Accused Products, each of which is a cellular device that includes and performs the features and capabilities described in this claim. Plaintiff contends that each Defendant infringes this claim because it makes, uses, sells, offers to sell, and/or imports the '556 Sony Accused Products, each of which includes and/or practices each and every element of this claim. Additionally, each Defendant indirectly infringes this claim by (1) inducing, with knowledge of the patent (at least by virtue of disclosure to ETSI), its customers'

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	(e.g., end users, carriers) use of the '556 Sony Accused Products to practice each and every one of the following claim elements with knowledge that such practice infringes this claim and intent to cause such infringement (as evidenced for example, in user guides and other instructional materials provided by each Defendant such as instructions to operate the Accused Product within a provided service area), and/or (2) contributing to direct infringement by customers (e.g., end users, carriers) that use the '556 Sony Accused Products to practice each and every one of the following claim elements, with knowledge that the infringing components of the '556 Sony Accused Products have no substantial non-infringing uses (by their nature as proprietary hardware components and software instructions that work in concert to perform specific, intended functions) and that the combination for which such components were made infringes this claim. See analysis of claim 13, which is incorporated herein by reference. The non-transitory computer readable medium of each '556 Sony Accused Product described in claim 13 above includes computer software that executes on hardware which, when executed causes the hardware to prepare the power headroom report control element including preparing the bitmap in one of a MAC subheader and a payload. This is detailed in TS 36.321: 6.1.2 MAC PDU (DL-SCH and UL-SCH except transparent MAC and Random Access Response, MCH) A MAC PDU consists of a MAC header, zero or more MAC Service Data Units (MAC SDU), zero, or more MAC control elements, and optionally padding; as described in Figure 6.1.2-3. Both the MAC header and the MAC SDUs are of variable sizes. A MAC PDU header consists of one or more MAC PDU subheaders; each subheader corresponds to either a MAC SDU, a MAC control element or padding.

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	6.1.3.6a Extended Power Headroom MAC Control Element The Extended Power Headroom MAC control element is identified by a MAC PDU subheader with LCID as specified in table 6.2.1-2. It has a variable size and is defined in Figure 6.1.3.6a-2. When Type 2 PH is reported, the octet containing the Type 2 PH field is included first after the octet indicating the presence of PH per SCell and followed by an octet containing the associated $P_{\text{CMAX},c}$ field (if reported). Then follows in ascending order based on the <i>ServCellIndex</i> [8] an octet with the Type 1 PH field and an octet with the associated $P_{\text{CMAX},c}$ field (if reported), for the PCell and for each SCell indicated in the bitmap. The Extended Power Headroom MAC Control Element is defined as follows: - C_i: this field indicates the presence of a PH field for the SCell with <i>SCellIndex</i> i as specified in [8]. The C_i field set to "1" indicates that a PH field for the SCell with <i>SCellIndex</i> i is reported. The C_i field set to "0" indicates that a PH field for the SCell with <i>SCellIndex</i> i is not reported;  Figure 6.1.2-3: Example of MAC PDU consisting of MAC header, MAC control elements, MAC SDUs and padding CCE alternatively contends that this claim element is met under the doctrine of equivalents because above-described features of the Accused Products perform substantially the same function recited in this element, in substantially the same way to achieve substantially the same result. Any alleged differences between the above-described features and the recited element are insubstantial and immaterial to infringement.
15. The non-transitory computer readable medium of claim 13, wherein the power headroom report control element includes	Sony, T-Mobile, and Verizon make, use, sell, offer to sell, and/or import the '556 Sony Accused Products, each of which is a cellular device that includes and

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at least one of: a type 1 power headroom report for a primary serving cell and a type 2 power headroom report for the primary serving cell.	performs the features and capabilities described in this claim. Plaintiff contends that each Defendant infringes this claim because it makes, uses, sells, offers to sell, and/or imports the '556 Sony Accused Products, each of which includes and/or practices each and every element of this claim. Additionally, each Defendant indirectly infringes this claim by (1) inducing, with knowledge of the patent (at least by virtue of disclosure to ETSI), its customers' (e.g., end users, carriers) use of the '556 Sony Accused Products to practice each and every one of the following claim elements with knowledge that such practice infringes this claim and intent to cause such infringement (as evidenced for example, in user guides and other instructional materials provided by each Defendant such as instructions to operate the Accused Product within a provided service area), and/or (2) contributing to direct infringement by customers (e.g., end users, carriers) that use the '556 Sony Accused Products to practice each and every one of the following claim elements, with knowledge that the infringing components of the '556 Sony Accused Products have no substantial non-infringing uses (by their nature as proprietary hardware components and software instructions that work in concert to perform specific, intended functions) and that the combination for which such components were made infringes this claim. See analysis of claim 13, which is incorporated herein by reference. The non-transitory computer readable medium of each '556 Sony Accused Product described in claim 13 above includes computer software that executes on hardware which, when executed causes the hardware to perform the steps of claim 13. Further, the power headroom report control element includes at least one of a type 1 power headroom report for a primary serving cell and a type 2 power headroom report for the primary serving cell. This is detailed in TS 36.321:

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	5.4.6 Power Headroom Reporting The Power Headroom reporting procedure is used to provide the serving eNB with information about the difference between the nominal UE maximum transmit power and the estimated power for UL-SCH transmission per activated Serving Cell and also with information about the difference between the nominal UE maximum power and the estimated power for UL-SCH and PUCCH transmission on PCell. The reporting period, delay and mapping of Power Headroom are defined in subclause 9.1.8 of [9]. RRC controls Power Headroom reporting by configuring the two timers <i>periodicPHR-Timer</i> and <i>prohibitPHR-Timer</i>, and by signalling <i>dl-PathlossChange</i> which sets the change in measured downlink pathloss and the required power backoff due to power management (as allowed by P-MPR_c [10]) to trigger a PHR [8]. If the UE has UL resources allocated for new transmission for this TTI: - if it is the first UL resource allocated for a new transmission since the last MAC reset, start <i>periodicPHR-Timer</i>; - if the Power Headroom reporting procedure determines that at least one PHR has been triggered and not cancelled, and; - if the allocated UL resources can accommodate a PHR MAC control element plus its subheader if <i>extendedPHR</i> is not configured, or the Extended PHR MAC control element plus its subheader if <i>extendedPHR</i> is configured, as a result of logical channel prioritization: - if <i>extendedPHR</i> is configured: - for each activated Serving Cell with configured uplink: - obtain the value of the Type 1 power headroom; - if the UE has UL resources allocated for transmission on this Serving Cell for this TTI: - obtain the value for the corresponding P_{C_{MAX,c}} field from the physical layer; - if <i>simultaneousPUCCH-PUSCH</i> is configured: - obtain the value of the Type 2 power headroom for the PCell; - if the UE has a PUCCH transmission in this TTI: - obtain the value for the corresponding P_{C_{MAX,c}} field from the physical layer; - instruct the Multiplexing and Assembly procedure to generate and transmit an Extended PHR MAC control element as defined in subclause 6.1.3.6a based on the values reported by the physical layer; And section 4.2.1 explains:

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	4.2.1 MAC Entities E-UTRA defines two MAC entities; one in the UE and one in the E-UTRAN. These MAC entities handle the following transport channels: - Broadcast Channel (BCH); - Downlink Shared Channel(s) (DL-SCH); - Paging Channel (PCH); - Uplink Shared Channel(s) (UL-SCH); - Random Access Channel(s) (RACH); - Multicast Channel(s) (MCH). The exact functions performed by the MAC entities are different in the UE from those performed in the E-UTRAN. The RN includes both MAC entities; one for communication with UEs and one for communication with the E-UTRAN. If the UE is configured with one or more SCells, there are multiple DL-SCH and there may be multiple UL-SCH per UE; one DL-SCH and UL-SCH on the PCell, one DL-SCH and zero or one UL-SCH for each SCell. CCE alternatively contends that this claim element is met under the doctrine of equivalents because above-described features of the Accused Products perform substantially the same function recited in this element, in substantially the same way to achieve substantially the same result. Any alleged differences between the above-described features and the recited element are insubstantial and immaterial to infringement.
21. An apparatus, comprising: at least one processor; and at least one memory including computer program code, the at least one memory and the computer program code being configured to, with the at least one processor, cause the apparatus at least to:	Sony, T-Mobile, and Verizon make, use, sell, offer to sell, and/or import the '556 Sony Accused Products, each of which is a cellular device that includes and performs the features and capabilities described in this claim. Plaintiff contends that each Defendant infringes this claim because it makes, uses, sells, offers to sell, and/or imports the '556 Sony Accused Products, each of which includes and/or practices each and every element of this claim. Additionally, each Defendant indirectly infringes this claim by (1) inducing, with knowledge of the patent (at least by virtue of disclosure to ETSI), its customers' (e.g., end users, carriers) use of the '872 Samsung Accused Products to practice

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	each and every one of the following claim elements with knowledge that such practice infringes this claim and intent to cause such infringement (as evidenced for example, in user guides and other instructional materials provided by each Defendant such as instructions to operate the Accused Product within a provided service area), and/or (2) contributing to direct infringement by customers (e.g., end users, carriers) that use the '872 Samsung Accused Products to practice each and every one of the following claim elements, with knowledge that the infringing components of the '872 Samsung Accused Products have no substantial non-infringing uses (by their nature as proprietary hardware components and software instructions that work in concert to perform specific, intended functions) and that the combination for which such components were made infringes this claim. Each '556 Sony Accused Product is a terminal (UE) that contains the functionality as set forth in this claim. Specifically, each '556 Sony Accused Product is a cellular device that includes hardware and software (including memory, one or more processors, radios, firmware, and drivers) configured to support and provide wireless communications in an LTE-A network environment. As such, each '556 Sony Accused Product is compliant with and supports technical specifications published by 3GPP and ETSI for LTE-A technology, including TS 36.321 and TS 36.331. Indeed, the '556 patent is essential to compliance with LTE-A standards. Each '556 Sony Accused Product comprises a processor (such as a baseband processor) and at least one memory including computer program code, the memory and the computer program code being configured to, with the at least one processor, cause the '556 Sony Accused Product at least to perform the steps below.
prepare a power headroom report control element,	Each '556 Sony Accused Product contains a processor with software and memory that causes the processor to prepare a power headroom report control element. This is described in TS 36.321:

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	5.4.6 Power Headroom Reporting The Power Headroom reporting procedure is used to provide the serving eNB with information about the difference between the nominal UE maximum transmit power and the estimated power for UL-SCH transmission per activated Serving Cell and also with information about the difference between the nominal UE maximum power and the estimated power for UL-SCH and PUCCH transmission on PCell. The reporting period, delay and mapping of Power Headroom are defined in subclause 9.1.8 of [9]. RRC controls Power Headroom reporting by configuring the two timers <i>periodicPHR-Timer</i> and <i>prohibitPHR-Timer</i>, and by signalling <i>dl-PathlossChange</i> which sets the change in measured downlink pathloss and the required power backoff due to power management (as allowed by P-MPR_c [10]) to trigger a PHR [8]. If the UE has UL resources allocated for new transmission for this TTI: - if it is the first UL resource allocated for a new transmission since the last MAC reset, start <i>periodicPHR-Timer</i>; - if the Power Headroom reporting procedure determines that at least one PHR has been triggered and not cancelled, and; - if the allocated UL resources can accommodate a PHR MAC control element plus its subheader if <i>extendedPHR</i> is not configured, or the Extended PHR MAC control element plus its subheader if <i>extendedPHR</i> is configured, as a result of logical channel prioritization: - if <i>extendedPHR</i> is configured: - for each activated Serving Cell with configured uplink: - obtain the value of the Type 1 power headroom; - if the UE has UL resources allocated for transmission on this Serving Cell for this TTI: - obtain the value for the corresponding P_{C_{MAX,e}} field from the physical layer; - if <i>simultaneousPUCCH-PUSCH</i> is configured: - obtain the value of the Type 2 power headroom for the PCell; - if the UE has a PUCCH transmission in this TTI: - obtain the value for the corresponding P_{C_{MAX,e}} field from the physical layer; - instruct the Multiplexing and Assembly procedure to generate and transmit an Extended PHR MAC control element as defined in subclause 6.1.3.6a based on the values reported by the physical layer; CCE alternatively contends that this claim element is met under the doctrine of equivalents because above-described features of the Accused Products perform substantially the same function recited in this element, in substantially the same way to achieve substantially the same result. Any alleged differences between the above-described features and the recited element are insubstantial and immaterial to infringement.
based on a trigger configured by a base	In each '556 Sony Accused Product, the power headroom report control element is based on a trigger configured by a base station, as evidenced by TS 36.321 and

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station,	TS 36.331. TS 36.321 states: 5.4.6 Power Headroom Reporting The Power Headroom reporting procedure is used to provide the serving eNB with information about the difference between the nominal UE maximum transmit power and the estimated power for UL-SCH transmission per activated Serving Cell and also with information about the difference between the nominal UE maximum power and the estimated power for UL-SCH and PUCCH transmission on PCell. The reporting period, delay and mapping of Power Headroom are defined in subclause 9.1.8 of [9]. RRC controls Power Headroom reporting by configuring the two timers <i>periodicPHR-Timer</i> and <i>prohibitPHR-Timer</i>, and by signalling <i>dl-PathlossChange</i> which sets the change in measured downlink pathloss and the required power backoff due to power management (as allowed by $P\text{-MPR}_c$ [10]) to trigger a PHR [8]. TS 36.331 states: 5.3.10 Radio resource configuration 5.3.10.0 General The UE shall: 1> if the received <i>radioResourceConfigDedicated</i> includes the <i>srb-ToAddModList</i>: 2> perform the SRB addition or reconfiguration as specified in 5.3.10.1; 1> if the received <i>radioResourceConfigDedicated</i> includes the <i>drb-ToReleaseList</i>: 2> perform DRB release as specified in 5.3.10.2; 1> if the received <i>radioResourceConfigDedicated</i> includes the <i>drb-ToAddModList</i>: 2> perform DRB addition or reconfiguration as specified in 5.3.10.3; 1> if the received <i>radioResourceConfigDedicated</i> includes the <i>mac-MainConfig</i>: 2> perform MAC main reconfiguration as specified in 5.3.10.4; Mac-MainConfig is further defined in TS 36.331: — MAC-MainConfig The IE <i>MAC-MainConfig</i> is used to specify the MAC main configuration for signalling and data radio bearers.

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	And Mac-MainConfig field descriptions in TS36.311 provide: <table><tr><th>MAC-MainConfig field descriptions</th></tr><tr><td><i>dl-PathlossChange</i> DL Pathloss Change and the change of the required power backoff due to power management (as allowed by P-MPRc [42]) for PHR reporting in TS 36.321 [6]. Value in dB. Value dB1 corresponds to 1 dB, dB3 corresponds to 3 dB and so on. The same value applies for each serving cell (although the associated functionality is performed independently for each cell).</td></tr><tr><td><i>extendedPHR</i> Indicates if power headroom shall be reported using the Extended Power Headroom Report MAC control element defined in TS 36.321 [6] (value <i>setup</i>). Otherwise the power headroom shall be reported using the Power Headroom Report MAC control element defined in TS 36.321 [6]. E-UTRAN always configures the value <i>setup</i> if more than one Serving Cell with uplink is configured.</td></tr><tr><td><i>periodicPHR-Timer</i> Timer for PHR reporting in TS 36.321 [6]. Value in number of sub-frames. Value sf10 corresponds to 10 subframes, sf20 corresponds to 20 subframes and so on.</td></tr><tr><td><i>prohibitPHR-Timer</i> Timer for PHR reporting in TS 36.321 [6]. Value in number of sub-frames. Value sf0 corresponds to 0 subframes, sf100 corresponds to 100 subframes and so on.</td></tr></table> CCE alternatively contends that this claim element is met under the doctrine of equivalents because above-described features of the Accused Products perform substantially the same function recited in this element, in substantially the same way to achieve substantially the same result. Any alleged differences between the above-described features and the recited element are insubstantial and immaterial to infringement.	MAC-MainConfig field descriptions	<i>dl-PathlossChange</i> DL Pathloss Change and the change of the required power backoff due to power management (as allowed by P-MPRc [42]) for PHR reporting in TS 36.321 [6]. Value in dB. Value dB1 corresponds to 1 dB, dB3 corresponds to 3 dB and so on. The same value applies for each serving cell (although the associated functionality is performed independently for each cell).	<i>extendedPHR</i> Indicates if power headroom shall be reported using the Extended Power Headroom Report MAC control element defined in TS 36.321 [6] (value <i>setup</i>). Otherwise the power headroom shall be reported using the Power Headroom Report MAC control element defined in TS 36.321 [6]. E-UTRAN always configures the value <i>setup</i> if more than one Serving Cell with uplink is configured.	<i>periodicPHR-Timer</i> Timer for PHR reporting in TS 36.321 [6]. Value in number of sub-frames. Value sf10 corresponds to 10 subframes, sf20 corresponds to 20 subframes and so on.	<i>prohibitPHR-Timer</i> Timer for PHR reporting in TS 36.321 [6]. Value in number of sub-frames. Value sf0 corresponds to 0 subframes, sf100 corresponds to 100 subframes and so on.
MAC-MainConfig field descriptions						
<i>dl-PathlossChange</i> DL Pathloss Change and the change of the required power backoff due to power management (as allowed by P-MPRc [42]) for PHR reporting in TS 36.321 [6]. Value in dB. Value dB1 corresponds to 1 dB, dB3 corresponds to 3 dB and so on. The same value applies for each serving cell (although the associated functionality is performed independently for each cell).						
<i>extendedPHR</i> Indicates if power headroom shall be reported using the Extended Power Headroom Report MAC control element defined in TS 36.321 [6] (value <i>setup</i>). Otherwise the power headroom shall be reported using the Power Headroom Report MAC control element defined in TS 36.321 [6]. E-UTRAN always configures the value <i>setup</i> if more than one Serving Cell with uplink is configured.						
<i>periodicPHR-Timer</i> Timer for PHR reporting in TS 36.321 [6]. Value in number of sub-frames. Value sf10 corresponds to 10 subframes, sf20 corresponds to 20 subframes and so on.						
<i>prohibitPHR-Timer</i> Timer for PHR reporting in TS 36.321 [6]. Value in number of sub-frames. Value sf0 corresponds to 0 subframes, sf100 corresponds to 100 subframes and so on.						
the trigger determines when the power headroom report control element is to be sent in an uplink;	Further, in each '556 Sony Accused Product, the trigger determines when the power headroom report control element is to be sent in an uplink.					

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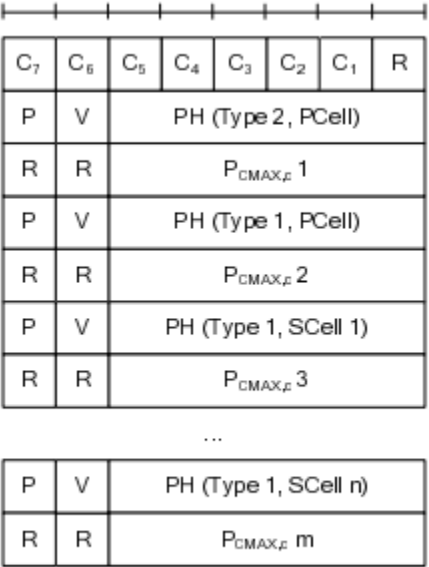
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	5.4.6 Power Headroom Reporting The Power Headroom reporting procedure is used to provide the serving eNB with information about the difference between the nominal UE maximum transmit power and the estimated power for UL-SCH transmission per activated Serving Cell and also with information about the difference between the nominal UE maximum power and the estimated power for UL-SCH and PUCCH transmission on PCell. The reporting period, delay and mapping of Power Headroom are defined in subclause 9.1.8 of [9]. RRC controls Power Headroom reporting by configuring the two timers <i>periodicPHR-Timer</i> and <i>prohibitPHR-Timer</i>, and by signalling <i>dl-PathlossChange</i> which sets the change in measured downlink pathloss and the required power backoff due to power management (as allowed by P-MPR_c [10]) to trigger a PHR [8]. A Power Headroom Report (PHR) shall be triggered if any of the following events occur: - <i>prohibitPHR-Timer</i> expires or has expired and the path loss has changed more than <i>dl-PathlossChange</i> dB for at least one activated Serving Cell which is used as a pathloss reference since the last transmission of a PHR when the UE has UL resources for new transmission; - <i>periodicPHR-Timer</i> expires; CCE alternatively contends that this claim element is met under the doctrine of equivalents because above-described features of the Accused Products perform substantially the same function recited in this element, in substantially the same way to achieve substantially the same result. Any alleged differences between the above-described features and the recited element are insubstantial and immaterial to infringement.
preparation of the power headroom report control element includes incorporating a bitmap indicating which power headroom reports are being reported,	In each '556 Sony Accused Product, the preparing of the power headroom report control element includes incorporating a bitmap indicating which power headroom reports are being indicated. This is described in TS 36.321:

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	6.1.3.6a Extended Power Headroom MAC Control Element The Extended Power Headroom MAC control element is identified by a MAC PDU subheader with LCID as specified in table 6.2.1-2. It has a variable size and is defined in Figure 6.1.3.6a-2. When Type 2 PH is reported, the octet containing the Type 2 PH field is included first after the octet indicating the presence of PH per SCell and followed by an octet containing the associated $P_{\text{CMAX},c}$ field (if reported). Then follows in ascending order based on the <i>ServCellIndex</i> [8] an octet with the Type 1 PH field and an octet with the associated $P_{\text{CMAX},c}$ field (if reported), for the PCell and for each SCell indicated in the bitmap. The Extended Power Headroom MAC Control Element is defined as follows: - C_i: this field indicates the presence of a PH field for the SCell with <i>SCellIndex</i> i as specified in [8]. The C_i field set to "1" indicates that a PH field for the SCell with <i>SCellIndex</i> i is reported. The C_i field set to "0" indicates that a PH field for the SCell with <i>SCellIndex</i> i is not reported; - R: reserved bit, set to "0"; - V: this field indicates if the PH value is based on a real transmission or a reference format. For Type 1 PH, V=0 indicates real transmission on PUSCH and V=1 indicates that a PUSCH reference format is used. For Type 2 PH, V=0 indicates real transmission on PUCCH and V=1 indicates that a PUCCH reference format is used. Furthermore, for both Type 1 and Type 2 PH, V=0 indicates the presence of the associated $P_{\text{CMAX},c}$ field, and V=1 indicates that the associated $P_{\text{CMAX},c}$ field is omitted; - Power Headroom (PH): this field indicates the power headroom level. The length of the field is 6 bits. The reported PH and the corresponding power headroom levels are shown in Table 6.1.3.6-1 (the corresponding measured values in dB can be found in subclause 9.1.8.4 of [9]); - P: this field indicates whether the UE applies power backoff due to power management (as allowed by P-MPR_c [10]). The UE shall set P=1 if the corresponding $P_{\text{CMAX},c}$ field would have had a different value if no power backoff due to power management had been applied; - $P_{\text{CMAX},c}$: if present, this field indicates the $P_{\text{CMAX},c}$ or $\tilde{P}_{\text{CMAX},c}$ [2] used for calculation of the preceding PH field. The reported $P_{\text{CMAX},c}$ and the corresponding nominal UE transmit power levels are shown in Table 6.1.3.6a-1 (the corresponding measured values in dBm can be found in subclause 9.6.1 of [9]). Figure 6.1.3.6a-1: Void

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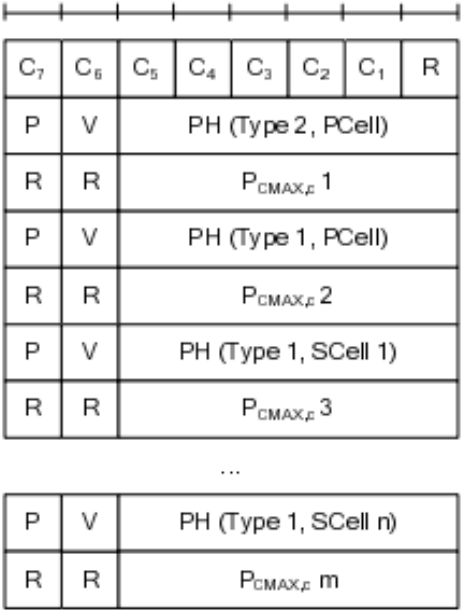
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	 Figure 6.1.3.6a-2: Extended Power Headroom MAC Control Element CCE alternatively contends that this claim element is met under the doctrine of equivalents because above-described features of the Accused Products perform substantially the same function recited in this element, in substantially the same way to achieve substantially the same result. Any alleged differences between the above-described features and the recited element are insubstantial and immaterial to infringement.
the preparation of the power headroom report control element further includes preparing the bitmap to include bits for power headroom reports for a plurality of the secondary cells; and send the power headroom report control element to the	In each '556 Sony Accused Product, the preparation of the power headroom report control element further includes preparing the bitmap to include bits for power headroom reports to a plurality of secondary cells; and sending the prepared power headroom report control element to the base station. This is detailed in TS 36.321.

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base station.	In certain conditions, for example, TS 36.321 requires: - instruct the Multiplexing and Assembly procedure to generate and transmit an Extended PHR MAC control element as defined in subclause 6.1.3.6a based on the values reported by the physical layer; Where 6.1.3.6a informs that: 6.1.3.6a Extended Power Headroom MAC Control Element The Extended Power Headroom MAC control element is identified by a MAC PDU subheader with LCID as specified in table 6.2.1-2. It has a variable size and is defined in Figure 6.1.3.6a-2. When Type 2 PH is reported, the octet containing the Type 2 PH field is included first after the octet indicating the presence of PH per SCell and followed by an octet containing the associated $P_{\text{CMAX},e}$ field (if reported). Then follows in ascending order based on the <i>ServCellIndex</i> [8] an octet with the Type 1 PH field and an octet with the associated $P_{\text{CMAX},e}$ field (if reported), for the PCell and for each SCell indicated in the bitmap. The Extended Power Headroom MAC Control Element is defined as follows: - C_i: this field indicates the presence of a PH field for the SCell with <i>SCellIndex</i> i as specified in [8]. The C_i field set to "1" indicates that a PH field for the SCell with <i>SCellIndex</i> i is reported. The C_i field set to "0" indicates that a PH field for the SCell with <i>SCellIndex</i> i is not reported; - R: reserved bit, set to "0"; - V: this field indicates if the PH value is based on a real transmission or a reference format. For Type 1 PH, V=0 indicates real transmission on PUSCH and V=1 indicates that a PUSCH reference format is used. For Type 2 PH, V=0 indicates real transmission on PUCCH and V=1 indicates that a PUCCH reference format is used. Furthermore, for both Type 1 and Type 2 PH, V=0 indicates the presence of the associated $P_{\text{CMAX},e}$ field, and V=1 indicates that the associated $P_{\text{CMAX},e}$ field is omitted; - Power Headroom (PH): this field indicates the power headroom level. The length of the field is 6 bits. The reported PH and the corresponding power headroom levels are shown in Table 6.1.3.6-1 (the corresponding measured values in dB can be found in subclause 9.1.8.4 of [9]); Figure 6.1.3.6a-1: Void

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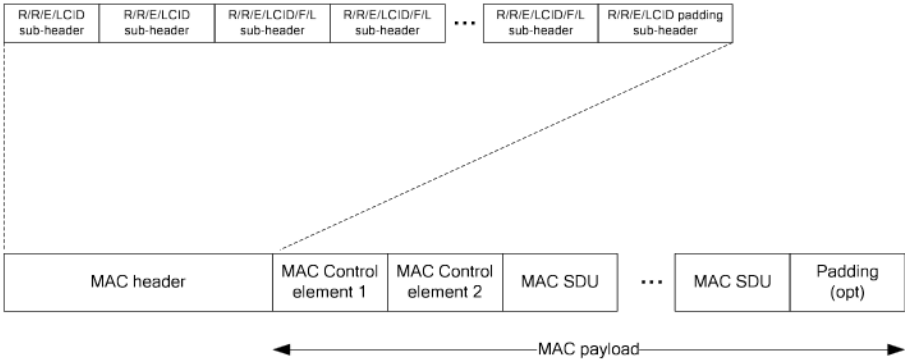
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	 Figure 6.1.3.6a-2: Extended Power Headroom MAC Control Element CCE alternatively contends that this claim element is met under the doctrine of equivalents because above-described features of the Accused Products perform substantially the same function recited in this element, in substantially the same way to achieve substantially the same result. Any alleged differences between the above-described features and the recited element are insubstantial and immaterial to infringement.
22. The apparatus of claim 21, wherein the at least one memory and the computer program code are configured to, with the at least one processor, cause the apparatus at least to prepare the power headroom	Sony, T-Mobile, and Verizon make, use, sell, offer to sell, and/or import the '556 Sony Accused Products, each of which is a cellular device that includes and performs the features and capabilities described in this claim. Plaintiff contends that each Defendant infringes this claim because it makes, uses,

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report control element by preparing the bitmap in one of: a MAC subheader and a payload.	sells, offers to sell, and/or imports the '556 Sony Accused Products, each of which includes and/or practices each and every element of this claim. Additionally, each Defendant indirectly infringes this claim by (1) inducing, with knowledge of the patent (at least by virtue of disclosure to ETSI), its customers' (e.g., end users, carriers) use of the '556 Sony Accused Products to practice each and every one of the following claim elements with knowledge that such practice infringes this claim and intent to cause such infringement (as evidenced for example, in user guides and other instructional materials provided by each Defendant such as instructions to operate the Accused Product within a provided service area), and/or (2) contributing to direct infringement by customers (e.g., end users, carriers) that use the '556 Sony Accused Products to practice each and every one of the following claim elements, with knowledge that the infringing components of the '556 Sony Accused Products have no substantial non-infringing uses (by their nature as proprietary hardware components and software instructions that work in concert to perform specific, intended functions) and that the combination for which such components were made infringes this claim. See analysis of claim 21, which is incorporated herein by reference. The processor of each '556 Sony Accused Product discussed above with claim 21, with associated memory and computer program code, is configured to cause the '556 Sony Accused Product to prepare the power headroom report control element including preparing the bitmap in one of a MAC subheader and a payload. This is detailed in TS 36.321:

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	6.1.2 MAC PDU (DL-SCH and UL-SCH except transparent MAC and Random Access Response, MCH) A MAC PDU consists of a MAC header, zero or more MAC Service Data Units (MAC SDU), zero, or more MAC control elements, and optionally padding; as described in Figure 6.1.2-3. Both the MAC header and the MAC SDUs are of variable sizes. A MAC PDU header consists of one or more MAC PDU subheaders; each subheader corresponds to either a MAC SDU, a MAC control element or padding. 6.1.3.6a Extended Power Headroom MAC Control Element The Extended Power Headroom MAC control element is identified by a MAC PDU subheader with LCID as specified in table 6.2.1-2. It has a variable size and is defined in Figure 6.1.3.6a-2. When Type 2 PH is reported, the octet containing the Type 2 PH field is included first after the octet indicating the presence of PH per SCell and followed by an octet containing the associated $P_{\text{CMAX},e}$ field (if reported). Then follows in ascending order based on the <i>ServCellIndex</i> [8] an octet with the Type 1 PH field and an octet with the associated $P_{\text{CMAX},e}$ field (if reported), for the PCell and for each SCell indicated in the bitmap. The Extended Power Headroom MAC Control Element is defined as follows: - C_i: this field indicates the presence of a PH field for the SCell with <i>SCellIndex</i> i as specified in [8]. The C_i field set to "1" indicates that a PH field for the SCell with <i>SCellIndex</i> i is reported. The C_i field set to "0" indicates that a PH field for the SCell with <i>SCellIndex</i> i is not reported;  Figure 6.1.2-3: Example of MAC PDU consisting of MAC header, MAC control elements, MAC SDUs and padding

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	CCE alternatively contends that this claim element is met under the doctrine of equivalents because above-described features of the Accused Products perform substantially the same function recited in this element, in substantially the same way to achieve substantially the same result. Any alleged differences between the above-described features and the recited element are insubstantial and immaterial to infringement.
23. The apparatus of claim 21, wherein the at least one memory and the computer program code are configured to, with the at least one processor, cause the apparatus at least to prepare the power headroom report control element by including at least one of: a type 1 power headroom report for a primary serving cell or a type 2 power headroom report for the primary serving cell.	Sony, T-Mobile, and Verizon make, use, sell, offer to sell, and/or import the '556 Sony Accused Products, each of which is a cellular device that includes and performs the features and capabilities described in this claim. Plaintiff contends that each Defendant infringes this claim because it makes, uses, sells, offers to sell, and/or imports the '556 Sony Accused Products, each of which includes and/or practices each and every element of this claim. Additionally, each Defendant indirectly infringes this claim by (1) inducing, with knowledge of the patent (at least by virtue of disclosure to ETSI), its customers' (e.g., end users, carriers) use of the '556 Sony Accused Products to practice each and every one of the following claim elements with knowledge that such practice infringes this claim and intent to cause such infringement (as evidenced for example, in user guides and other instructional materials provided by each Defendant such as instructions to operate the Accused Product within a provided service area), and/or (2) contributing to direct infringement by customers (e.g., end users, carriers) that use the '556 Sony Accused Products to practice each and every one of the following claim elements, with knowledge that the infringing components of the '556 Sony Accused Products have no substantial non-infringing uses (by their nature as proprietary hardware components and software instructions that work in concert to perform specific, intended functions) and that the combination for which such components were made infringes this claim. See analysis of claim 21, which is incorporated herein by reference. The processor of each '556 Sony Accused Product discussed above with claim 21, with associated memory and computer program code, are configured to

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	prepare the power headroom report control element by including at least one of: a type 1 power headroom report for a primary serving cell or a type 2 power headroom report for the primary serving cell. This is detailed in TS 36.321: 4.2.1 MAC Entities E-UTRA defines two MAC entities; one in the UE and one in the E-UTRAN. These MAC entities handle the following transport channels: - Broadcast Channel (BCH); - Downlink Shared Channel(s) (DL-SCH); - Paging Channel (PCH); - Uplink Shared Channel(s) (UL-SCH); - Random Access Channel(s) (RACH); - Multicast Channel(s) (MCH). The exact functions performed by the MAC entities are different in the UE from those performed in the E-UTRAN. The RN includes both MAC entities; one for communication with UEs and one for communication with the E-UTRAN. If the UE is configured with one or more SCells, there are multiple DL-SCH and there may be multiple UL-SCH per UE; one DL-SCH and UL-SCH on the PCell, one DL-SCH and zero or one UL-SCH for each SCell. CCE alternatively contends that this claim element is met under the doctrine of equivalents because above-described features of the Accused Products perform substantially the same function recited in this element, in substantially the same way to achieve substantially the same result. Any alleged differences between the above-described features and the recited element are insubstantial and immaterial to infringement.

APPENDIX A-1

Each of the below devices has been accused of infringement of U.S. Pat. No. 8,868,060. Devices are listed according to the parties accused of infringement and, when applicable, provide a web address demonstrating evidence of their use of the features and functions relevant to the patent.

PARTIES ACCUSED OF INFRINGEMENT: Sony and T-Mobile

Device Name	Source	Accessed
Xperia Z1S	http://www.phonescoop.com/phones/phone.php?p=4224	5/15/15
Xperia Z3	http://www.phonescoop.com/phones/phone.php?p=4570	5/15/15

PARTIES ACCUSED OF INFRINGEMENT: Sony and Verizon

Device Name	Source	Accessed
Xperia Z2 Tablet	http://www.verizonwireless.com/tablets/xperia-z2/#specs	5/15/15
Xperia Z3v	http://www.phonescoop.com/phones/phone.php?p=4546	5/15/15

PARTIES ACCUSED OF INFRINGEMENT: Sony

Device Name	Source	Accessed
Xperia T2 Ultra	http://www.sonymobile.com/global-en/products/phones/xperia-t2-ultra/specifications/#tabs	5/15/15
Xperia T3	http://www.sonymobile.com/global-en/products/phones/xperia-t3/specifications/#tabs	5/15/15
Xperia Z1 Compact	http://www.sonymobile.com/global-en/products/phones/xperia-z1-compact/specifications/#tabs	5/15/15
Xperia Z3 Compact	http://www.sonymobile.com/global-en/products/phones/xperia-z3-compact/specifications/#tabs	5/15/15

APPENDIX B-1

Each of the below devices has been accused of infringement of U.S. Pat. No. 8,385,966. Devices are listed according to the parties accused of infringement and, when applicable, provide a web address demonstrating evidence of their use of the features and functions relevant to the patent.

PARTIES ACCUSED OF INFRINGEMENT: Sony and AT&T

Device Name	Source	Accessed
Xperia TL	http://www.phonescoop.com/phones/phone.php?p=3921	5/15/15

PARTIES ACCUSED OF INFRINGEMENT: Sony and T-Mobile

Device Name	Source	Accessed
Xperia Z	http://www.phonescoop.com/phones/phone.php?p=4010	5/15/15
Xperia Z1s	http://www.phonescoop.com/phones/phone.php?p=4224	5/15/15
Xperia Z3	http://www.phonescoop.com/phones/phone.php?p=4570	5/15/15

PARTIES ACCUSED OF INFRINGEMENT: Sony and Verizon

Device Name	Source	Accessed
Xperia Z2 Tablet	http://www.verizonwireless.com/tablets/xperia-z2/#specs	5/15/15
Xperia Z3v	http://www.phonescoop.com/phones/phone.php?p=4546	5/15/15

PARTIES ACCUSED OF INFRINGEMENT: Sony

Device Name	Source	Accessed
Xperia T2 Ultra	http://www.sonymobile.com/global-en/products/phones/xperia-t2-ultra/specifications/#tabs	5/15/15
Xperia T3	http://www.sonymobile.com/global-en/products/phones/xperia-t3/specifications/#tabs	5/15/15

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Xperia Z1 Compact	http://www.sonymobile.com/global-en/products/phones/xperia-z1-compact/specifications/#tabs	5/15/15
Xperia Z3 Compact	http://www.sonymobile.com/global-en/products/phones/xperia-z3-compact/specifications/#tabs	5/15/15
Xperia M2	http://www.sonymobile.com/global-en/products/phones/xperia-m2/specifications/	5/15/15
Xperia Z Ultra	http://www.sonymobile.com/global-en/products/phones/xperia-z-ultra/specifications/	5/15/15
Xperia ZL	http://www.sonymobile.com/global-en/products/phones/xperia-zl/specifications/	5/15/15
Xperia SP	http://www.sonymobile.com/global-en/products/phones/xperia-sp/specifications/	5/15/15

APPENDIX C-1

Each of the below devices has been accused of infringement of U.S. Pat. No. 8,848,556. Devices are listed according to the parties accused of infringement and, when applicable, provide a web address demonstrating evidence of their use of the features and functions relevant to the patent.

PARTIES ACCUSED OF INFRINGEMENT: Sony and T-Mobile

Device Name	Source	Accessed
Xperia Z3	http://www.phonescoop.com/phones/phone.php?p=4570	5/15/15
Xperia Z1s	http://www.phonescoop.com/phones/phone.php?p=4224	5/15/15

PARTIES ACCUSED OF INFRINGEMENT: Sony and Verizon

Device Name	Source	Accessed
Xperia Z3v	http://www.phonescoop.com/phones/phone.php?p=4546	5/15/15

PARTIES ACCUSED OF INFRINGEMENT: Sony

Device Name	Source	Accessed
Xperia Z3 Compact	http://www.phonescoop.com/phones/phone.php?p=4585	5/15/15
Xperia Z1 Compact	http://www.gsmarena.com/sony_xperia_z1_compact-5753.php	5/15/15
Xperia Z1	http://www.gsmarena.com/sony_xperia_z1-5596.php	5/15/15
Xperia Z Ultra	http://www.gsmarena.com/sony_xperia_z_ultra-5540.php	5/15/15

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13. A non-transitory computer readable medium encoded with a computer program that, when executed in hardware, causes the hardware to perform a process, the process comprising:	LG, AT&T, Sprint, and Verizon make, use, sell, offer to sell, and/or import the '556 LG Accused Products², each of which is a cellular device that includes and performs the features and capabilities described in this claim. Plaintiff contends that each Defendant infringes this claim because it makes, uses, sells, offers to sell, and/or imports the '556 LG Accused Products, each of which includes and/or practices each and every element of this claim. Additionally, each Defendant indirectly infringes this claim by (1) inducing, with knowledge of the patent (at least by virtue of disclosure to ETSI), its customers' (e.g., end users, carriers) use of the '556 LG Accused Products to practice each and every one of the following claim elements with knowledge that such practice infringes this claim and intent to cause such infringement (as evidenced for example, in user guides and other instructional materials provided by each Defendant such as instructions to operate the Accused Product within a provided service area), and/or (2) contributing to direct infringement by customers (e.g., end users, carriers) that use the '556 LG Accused Products to practice each and every one of the following claim elements, with knowledge that the infringing components of the '556 LG Accused Products have no substantial non-infringing uses (by their nature as proprietary hardware components and software instructions that work in concert to perform specific, intended functions) and that the combination for which such components were made infringes this claim. Each '556 LG Accused Product is a terminal (UE) that contains the functionality as set forth in this claim. Specifically, each '556 LG Accused Product is a cellular device that includes hardware and software (including memory, one or

¹ Discovery in this case has not begun. Accordingly, Plaintiff expects that these contentions may be subject to supplementation and/or amendment after further discovery and disclosure of Defendant's non-infringement positions in order to focus the issues in this case. For example, Plaintiff may supplement these contentions in response to information learned during discovery to rebut allegations of non-infringement under the doctrine of equivalents. Additionally, Plaintiff expects that these contentions may be subject to amendment or supplementation to identify and accuse additional devices released, developed, or made available after the date on which these contentions are served.

² The '556 LG Accused Products include the following products: G2, G3, and G Flex 2. Evidence supporting the use of relevant technology contained within this chart is listed in Appendix C-1.

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	more processors, radios, firmware, and drivers) configured to support and provide wireless communications in an LTE-A network environment. As such, each '556 LG Accused Product is compliant with and supports technical specifications published by 3GPP and ETSI for LTE-A technology, including TS 36.321 and TS 36.331.³ Indeed, the '556 patent is essential to compliance with LTE-A standards. Each '556 LG Accused Product comprises a non-transitory computer readable medium encoded with a computer program that, when executed in hardware, such as a baseband processor, causes the hardware to perform a process, the process comprising the steps described below. CCE alternatively contends that this claim element is met under the doctrine of equivalents because above-described features of the Accused Products perform substantially the same function recited in this element, in substantially the same way to achieve substantially the same result. Any alleged differences between the above-described features and the recited element are insubstantial and immaterial to infringement.
preparing a power headroom report control element,	Each '556 LG Accused Product contains a computer program that, when executed in hardware, causes the hardware to prepare a power headroom report control element. This is described in TS 36.321: 5.4.6 Power Headroom Reporting The Power Headroom reporting procedure is used to provide the serving eNB with information about the difference between the nominal UE maximum transmit power and the estimated power for UL-SCH transmission per activated Serving Cell and also with information about the difference between the nominal UE maximum power and the estimated power for UL-SCH and PUCCH transmission on PCell. The reporting period, delay and mapping of Power Headroom are defined in subclause 9.1.8 of [9]. RRC controls Power Headroom reporting by configuring the two timers <i>periodicPHR-Timer</i> and <i>prohibitPHR-Timer</i>, and by signalling <i>dl-PathlossChange</i> which sets the change in measured downlink pathloss and the required power backoff due to power management (as allowed by P-MPR_c [10]) to trigger a PHR [8].

³ See, e.g., TS 36.321 V11.0.0 http://www.etsi.org/deliver/etsi_ts/136300_136399/136321/11.00.00_60/ts_136321v110000p.pdf, TS 36.331V10.7.0 http://www.etsi.org/deliver/etsi_ts/136300_136399/136331/10.07.00_60/ts_136331v100700p.pdf.

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	If the UE has UL resources allocated for new transmission for this TTI: - if it is the first UL resource allocated for a new transmission since the last MAC reset, start <i>periodicPHR-Timer</i>; - if the Power Headroom reporting procedure determines that at least one PHR has been triggered and not cancelled, and; - if the allocated UL resources can accommodate a PHR MAC control element plus its subheader if <i>extendedPHR</i> is not configured, or the Extended PHR MAC control element plus its subheader if <i>extendedPHR</i> is configured, as a result of logical channel prioritization: - if <i>extendedPHR</i> is configured: - for each activated Serving Cell with configured uplink: - obtain the value of the Type 1 power headroom; - if the UE has UL resources allocated for transmission on this Serving Cell for this TTI: - obtain the value for the corresponding $P_{\text{CMAX},e}$ field from the physical layer; - if <i>simultaneousPUCCH-PUSCH</i> is configured: - obtain the value of the Type 2 power headroom for the PCell; - if the UE has a PUCCH transmission in this TTI: - obtain the value for the corresponding $P_{\text{CMAX},e}$ field from the physical layer; - instruct the Multiplexing and Assembly procedure to generate and transmit an Extended PHR MAC control element as defined in subclause 6.1.3.6a based on the values reported by the physical layer; CCE alternatively contends that this claim element is met under the doctrine of equivalents because above-described features of the Accused Products perform substantially the same function recited in this element, in substantially the same way to achieve substantially the same result. Any alleged differences between the above-described features and the recited element are insubstantial and immaterial to infringement.
based on a trigger configured by a base station,	In each '556 LG Accused Product, the power headroom report control element is based on a trigger configured by a base station, as evidenced by TS 36.321 and TS 36.331. TS 36.321 states:

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	5.4.6 Power Headroom Reporting The Power Headroom reporting procedure is used to provide the serving eNB with information about the difference between the nominal UE maximum transmit power and the estimated power for UL-SCH transmission per activated Serving Cell and also with information about the difference between the nominal UE maximum power and the estimated power for UL-SCH and PUCCH transmission on PCell. The reporting period, delay and mapping of Power Headroom are defined in subclause 9.1.8 of [9]. RRC controls Power Headroom reporting by configuring the two timers <i>periodicPHR-Timer</i> and <i>prohibitPHR-Timer</i>, and by signalling <i>dl-PathlossChange</i> which sets the change in measured downlink pathloss and the required power backoff due to power management (as allowed by P-MPR_c [10]) to trigger a PHR [8]. TS 36.331 states: 5.3.10 Radio resource configuration 5.3.10.0 General The UE shall: 1> if the received <i>radioResourceConfigDedicated</i> includes the <i>srb-ToAddModList</i>: 2> perform the SRB addition or reconfiguration as specified in 5.3.10.1; 1> if the received <i>radioResourceConfigDedicated</i> includes the <i>drb-ToReleaseList</i>: 2> perform DRB release as specified in 5.3.10.2; 1> if the received <i>radioResourceConfigDedicated</i> includes the <i>drb-ToAddModList</i>: 2> perform DRB addition or reconfiguration as specified in 5.3.10.3; 1> if the received <i>radioResourceConfigDedicated</i> includes the <i>mac-MainConfig</i>: 2> perform MAC main reconfiguration as specified in 5.3.10.4; Mac-MainConfig is further defined in TS 36.331: – MAC-MainConfig The IE <i>MAC-MainConfig</i> is used to specify the MAC main configuration for signalling and data radio bearers. And Mac-MainConfig field descriptions in TS36.311 provide:

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	MAC-MainConfig field descriptions <i>dl-PathlossChange</i> DL Pathloss Change and the change of the required power backoff due to power management (as allowed by P-MPRc [42]) for PHR reporting in TS 36.321 [6]. Value in dB. Value dB1 corresponds to 1 dB, dB3 corresponds to 3 dB and so on. The same value applies for each serving cell (although the associated functionality is performed independently for each cell). <i>extendedPHR</i> Indicates if power headroom shall be reported using the Extended Power Headroom Report MAC control element defined in TS 36.321 [6] (value <i>setup</i>). Otherwise the power headroom shall be reported using the Power Headroom Report MAC control element defined in TS 36.321 [6]. E-UTRAN always configures the value <i>setup</i> if more than one Serving Cell with uplink is configured. <i>periodicPHR-Timer</i> Timer for PHR reporting in TS 36.321 [6]. Value in number of sub-frames. Value sf10 corresponds to 10 subframes, sf20 corresponds to 20 subframes and so on. <i>prohibitPHR-Timer</i> Timer for PHR reporting in TS 36.321 [6]. Value in number of sub-frames. Value sf0 corresponds to 0 subframes, sf100 corresponds to 100 subframes and so on. CCE alternatively contends that this claim element is met under the doctrine of equivalents because above-described features of the Accused Products perform substantially the same function recited in this element, in substantially the same way to achieve substantially the same result. Any alleged differences between the above-described features and the recited element are insubstantial and immaterial to infringement.
the trigger determining when the power headroom report control element is to be sent in an uplink,	Further, in each '556 LG Accused Product, the trigger determines when the power headroom report control element is to be sent in an uplink. This is described in TS 36.321:

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	5.4.6 Power Headroom Reporting The Power Headroom reporting procedure is used to provide the serving eNB with information about the difference between the nominal UE maximum transmit power and the estimated power for UL-SCH transmission per activated Serving Cell and also with information about the difference between the nominal UE maximum power and the estimated power for UL-SCH and PUCCH transmission on PCell. The reporting period, delay and mapping of Power Headroom are defined in subclause 9.1.8 of [9]. RRC controls Power Headroom reporting by configuring the two timers <i>periodicPHR-Timer</i> and <i>prohibitPHR-Timer</i>, and by signalling <i>dl-PathlossChange</i> which sets the change in measured downlink pathloss and the required power backoff due to power management (as allowed by P-MPR_e [10]) to trigger a PHR [8]. A Power Headroom Report (PHR) shall be triggered if any of the following events occur: - <i>prohibitPHR-Timer</i> expires or has expired and the path loss has changed more than <i>dl-PathlossChange</i> dB for at least one activated Serving Cell which is used as a pathloss reference since the last transmission of a PHR when the UE has UL resources for new transmission; - <i>periodicPHR-Timer</i> expires; CCE alternatively contends that this claim element is met under the doctrine of equivalents because above-described features of the Accused Products perform substantially the same function recited in this element, in substantially the same way to achieve substantially the same result. Any alleged differences between the above-described features and the recited element are insubstantial and immaterial to infringement.
the preparing of the power headroom report control element includes incorporating a bitmap indicating which power headroom reports are being reported,	In each '556 LG Accused Product, the preparing of the power headroom report control element includes incorporating a bitmap indicating which power headroom reports are being indicated. This is described in TS 36.321:

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	6.1.3.6a Extended Power Headroom MAC Control Element The Extended Power Headroom MAC control element is identified by a MAC PDU subheader with LCID as specified in table 6.2.1-2. It has a variable size and is defined in Figure 6.1.3.6a-2. When Type 2 PH is reported, the octet containing the Type 2 PH field is included first after the octet indicating the presence of PH per SCell and followed by an octet containing the associated $P_{\text{CMAX},c}$ field (if reported). Then follows in ascending order based on the <i>ServCellIndex</i> [8] an octet with the Type 1 PH field and an octet with the associated $P_{\text{CMAX},c}$ field (if reported), for the PCell and for each SCell indicated in the bitmap. The Extended Power Headroom MAC Control Element is defined as follows: - C_i: this field indicates the presence of a PH field for the SCell with <i>SCellIndex</i> i as specified in [8]. The C_i field set to "1" indicates that a PH field for the SCell with <i>SCellIndex</i> i is reported. The C_i field set to "0" indicates that a PH field for the SCell with <i>SCellIndex</i> i is not reported; - R: reserved bit, set to "0"; - V: this field indicates if the PH value is based on a real transmission or a reference format. For Type 1 PH, V=0 indicates real transmission on PUSCH and V=1 indicates that a PUSCH reference format is used. For Type 2 PH, V=0 indicates real transmission on PUCCH and V=1 indicates that a PUCCH reference format is used. Furthermore, for both Type 1 and Type 2 PH, V=0 indicates the presence of the associated $P_{\text{CMAX},c}$ field, and V=1 indicates that the associated $P_{\text{CMAX},c}$ field is omitted; - Power Headroom (PH): this field indicates the power headroom level. The length of the field is 6 bits. The reported PH and the corresponding power headroom levels are shown in Table 6.1.3.6-1 (the corresponding measured values in dB can be found in subclause 9.1.8.4 of [9]); - P: this field indicates whether the UE applies power backoff due to power management (as allowed by P-MPR_c [10]). The UE shall set P=1 if the corresponding $P_{\text{CMAX},c}$ field would have had a different value if no power backoff due to power management had been applied; - $P_{\text{CMAX},c}$: if present, this field indicates the $P_{\text{CMAX},c}$ or $\tilde{P}_{\text{CMAX},c}$ [2] used for calculation of the preceding PH field. The reported $P_{\text{CMAX},c}$ and the corresponding nominal UE transmit power levels are shown in Table 6.1.3.6a-1 (the corresponding measured values in dBm can be found in subclause 9.6.1 of [9]). Figure 6.1.3.6a-1: Void

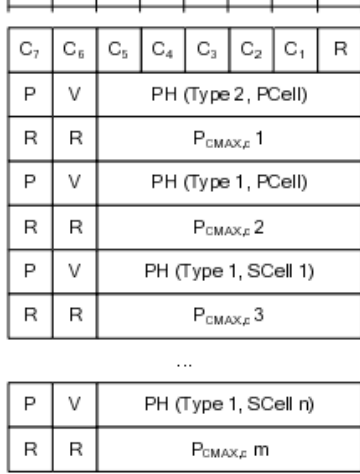
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	C₇ C₆ C₅ C₄ C₃ C₂ C₁ R P V PH (Type 2, PCell) R R P_{C_{MAX,c} 1} P V PH (Type 1, PCell) R R P_{C_{MAX,c} 2} P V PH (Type 1, SCell 1) R R P_{C_{MAX,c} 3} ... P V PH (Type 1, SCell n) R R P_{C_{MAX,c} m} Figure 6.1.3.6a-2: Extended Power Headroom MAC Control Element CCE alternatively contends that this claim element is met under the doctrine of equivalents because above-described features of the Accused Products perform substantially the same function recited in this element, in substantially the same way to achieve substantially the same result. Any alleged differences between the above-described features and the recited element are insubstantial and immaterial to infringement.
the preparing of the power headroom report control element further includes preparing the bitmap to include bits for power headroom reports for a plurality of secondary cells; and sending the prepared power headroom report control element to the base station.	In each '556 LG Accused Product, the preparing of the power headroom report control element further includes preparing the bitmap to include bits for power headroom reports to a plurality of secondary cells; and sending the prepared power headroom report control element to the base station. This is detailed in TS 36.321. In certain conditions, for example, TS 36.321 requires: - instruct the Multiplexing and Assembly procedure to generate and transmit an Extended PHR MAC control element as defined in subclause 6.1.3.6a based on the values reported by the physical layer; Where 6.1.3.6a informs that:

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	6.1.3.6a Extended Power Headroom MAC Control Element The Extended Power Headroom MAC control element is identified by a MAC PDU subheader with LCID as specified in table 6.2.1-2. It has a variable size and is defined in Figure 6.1.3.6a-2. When Type 2 PH is reported, the octet containing the Type 2 PH field is included first after the octet indicating the presence of PH per SCell and followed by an octet containing the associated $P_{\text{CMAX},e}$ field (if reported). Then follows in ascending order based on the <i>ServCellIndex</i> [8] an octet with the Type 1 PH field and an octet with the associated $P_{\text{CMAX},e}$ field (if reported), for the PCell and for each SCell indicated in the bitmap. The Extended Power Headroom MAC Control Element is defined as follows: - C_i: this field indicates the presence of a PH field for the SCell with <i>SCellIndex</i> i as specified in [8]. The C_i field set to "1" indicates that a PH field for the SCell with <i>SCellIndex</i> i is reported. The C_i field set to "0" indicates that a PH field for the SCell with <i>SCellIndex</i> i is not reported; - R: reserved bit, set to "0"; - V: this field indicates if the PH value is based on a real transmission or a reference format. For Type 1 PH, V=0 indicates real transmission on PUSCH and V=1 indicates that a PUSCH reference format is used. For Type 2 PH, V=0 indicates real transmission on PUCCH and V=1 indicates that a PUCCH reference format is used. Furthermore, for both Type 1 and Type 2 PH, V=0 indicates the presence of the associated $P_{\text{CMAX},e}$ field, and V=1 indicates that the associated $P_{\text{CMAX},e}$ field is omitted; - Power Headroom (PH): this field indicates the power headroom level. The length of the field is 6 bits. The reported PH and the corresponding power headroom levels are shown in Table 6.1.3.6-1 (the corresponding measured values in dB can be found in subclause 9.1.8.4 of [9]); Figure 6.1.3.6a-1: Void

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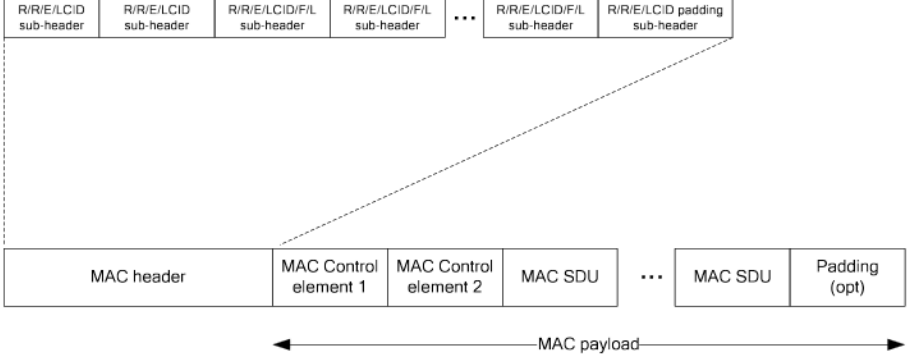
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	 Figure 6.1.3.6a-2: Extended Power Headroom MAC Control Element CCE alternatively contends that this claim element is met under the doctrine of equivalents because above-described features of the Accused Products perform substantially the same function recited in this element, in substantially the same way to achieve substantially the same result. Any alleged differences between the above-described features and the recited element are insubstantial and immaterial to infringement.
14. The non-transitory computer readable medium of claim 13, wherein the preparing of the power headroom report control element includes preparing the bitmap in one of: a MAC subheader and a payload.	LG, AT&T, Sprint, and Verizon make, use, sell, offer to sell, and/or import the '556 LG Accused Products, each of which is a cellular device that includes and performs the features and capabilities described in this claim. Plaintiff contends that each Defendant infringes this claim because it makes, uses, sells, offers to sell, and/or imports the '556 LG Accused Products, each of which includes and/or practices each and every element of this claim. Additionally, each Defendant indirectly infringes this claim by (1) inducing, with knowledge of the patent (at least by virtue of disclosure to ETSI), its customers' (e.g., end users,

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	carriers) use of the '556 LG Accused Products to practice each and every one of the following claim elements with knowledge that such practice infringes this claim and intent to cause such infringement (as evidenced for example, in user guides and other instructional materials provided by each Defendant such as instructions to operate the Accused Product within a provided service area), and/or (2) contributing to direct infringement by customers (e.g., end users, carriers) that use the '556 LG Accused Products to practice each and every one of the following claim elements, with knowledge that the infringing components of the '556 LG Accused Products have no substantial non-infringing uses (by their nature as proprietary hardware components and software instructions that work in concert to perform specific, intended functions) and that the combination for which such components were made infringes this claim. See analysis of claim 13, which is incorporated herein by reference. The non-transitory computer readable medium of each '556 LG Accused Product described in claim 13 above includes computer software that executes on hardware which, when executed causes the hardware to prepare the power headroom report control element including preparing the bitmap in one of a MAC subheader and a payload. This is detailed in TS 36.321: 6.1.2 MAC PDU (DL-SCH and UL-SCH except transparent MAC and Random Access Response, MCH) A MAC PDU consists of a MAC header, zero or more MAC Service Data Units (MAC SDU), zero, or more MAC control elements, and optionally padding; as described in Figure 6.1.2-3. Both the MAC header and the MAC SDUs are of variable sizes. A MAC PDU header consists of one or more MAC PDU subheaders; each subheader corresponds to either a MAC SDU, a MAC control element or padding.

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	6.1.3.6a Extended Power Headroom MAC Control Element The Extended Power Headroom MAC control element is identified by a MAC PDU subheader with LCID as specified in table 6.2.1-2. It has a variable size and is defined in Figure 6.1.3.6a-2. When Type 2 PH is reported, the octet containing the Type 2 PH field is included first after the octet indicating the presence of PH per SCell and followed by an octet containing the associated $P_{\text{CMAX},c}$ field (if reported). Then follows in ascending order based on the <i>ServCellIndex</i> [8] an octet with the Type 1 PH field and an octet with the associated $P_{\text{CMAX},c}$ field (if reported), for the PCell and for each SCell indicated in the bitmap. The Extended Power Headroom MAC Control Element is defined as follows: - C_i: this field indicates the presence of a PH field for the SCell with <i>SCellIndex</i> i as specified in [8]. The C_i field set to "1" indicates that a PH field for the SCell with <i>SCellIndex</i> i is reported. The C_i field set to "0" indicates that a PH field for the SCell with <i>SCellIndex</i> i is not reported;  Figure 6.1.2-3: Example of MAC PDU consisting of MAC header, MAC control elements, MAC SDUs and padding CCE alternatively contends that this claim element is met under the doctrine of equivalents because above-described features of the Accused Products perform substantially the same function recited in this element, in substantially the same way to achieve substantially the same result. Any alleged differences between the above-described features and the recited element are insubstantial and immaterial to infringement.
15. The non-transitory computer readable medium of claim 13, wherein the power headroom report control element includes	LG, AT&T, Sprint, and Verizon make, use, sell, offer to sell, and/or import the '556 LG Accused Products, each of which is a cellular device that includes and

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at least one of: a type 1 power headroom report for a primary serving cell and a type 2 power headroom report for the primary serving cell.	performs the features and capabilities described in this claim. Plaintiff contends that each Defendant infringes this claim because it makes, uses, sells, offers to sell, and/or imports the '556 LG Accused Products, each of which includes and/or practices each and every element of this claim. Additionally, each Defendant indirectly infringes this claim by (1) inducing, with knowledge of the patent (at least by virtue of disclosure to ETSI), its customers' (e.g., end users, carriers) use of the '556 LG Accused Products to practice each and every one of the following claim elements with knowledge that such practice infringes this claim and intent to cause such infringement (as evidenced for example, in user guides and other instructional materials provided by each Defendant such as instructions to operate the Accused Product within a provided service area), and/or (2) contributing to direct infringement by customers (e.g., end users, carriers) that use the '556 LG Accused Products to practice each and every one of the following claim elements, with knowledge that the infringing components of the '556 LG Accused Products have no substantial non-infringing uses (by their nature as proprietary hardware components and software instructions that work in concert to perform specific, intended functions) and that the combination for which such components were made infringes this claim. See analysis of claim 13, which is incorporated herein by reference. The non-transitory computer readable medium of each '556 LG Accused Product described in claim 13 above includes computer software that executes on hardware which, when executed causes the hardware to perform the steps of claim 13. Further, the power headroom report control element includes at least one of a type 1 power headroom report for a primary serving cell and a type 2 power headroom report for the primary serving cell. This is detailed in TS 36.321:

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	5.4.6 Power Headroom Reporting The Power Headroom reporting procedure is used to provide the serving eNB with information about the difference between the nominal UE maximum transmit power and the estimated power for UL-SCH transmission per activated Serving Cell and also with information about the difference between the nominal UE maximum power and the estimated power for UL-SCH and PUCCH transmission on PCell. The reporting period, delay and mapping of Power Headroom are defined in subclause 9.1.8 of [9]. RRC controls Power Headroom reporting by configuring the two timers <i>periodicPHR-Timer</i> and <i>prohibitPHR-Timer</i>, and by signalling <i>dl-PathlossChange</i> which sets the change in measured downlink pathloss and the required power backoff due to power management (as allowed by P-MPR_c [10]) to trigger a PHR [8]. If the UE has UL resources allocated for new transmission for this TTI: - if it is the first UL resource allocated for a new transmission since the last MAC reset, start <i>periodicPHR-Timer</i>; - if the Power Headroom reporting procedure determines that at least one PHR has been triggered and not cancelled, and; - if the allocated UL resources can accommodate a PHR MAC control element plus its subheader if <i>extendedPHR</i> is not configured, or the Extended PHR MAC control element plus its subheader if <i>extendedPHR</i> is configured, as a result of logical channel prioritization: - if <i>extendedPHR</i> is configured: - for each activated Serving Cell with configured uplink: - obtain the value of the Type 1 power headroom; - if the UE has UL resources allocated for transmission on this Serving Cell for this TTI: - obtain the value for the corresponding P_{C_{MAX,c}} field from the physical layer; - if <i>simultaneousPUCCH-PUSCH</i> is configured: - obtain the value of the Type 2 power headroom for the PCell; - if the UE has a PUCCH transmission in this TTI: - obtain the value for the corresponding P_{C_{MAX,c}} field from the physical layer; - instruct the Multiplexing and Assembly procedure to generate and transmit an Extended PHR MAC control element as defined in subclause 6.1.3.6a based on the values reported by the physical layer; And section 4.2.1 explains:

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	4.2.1 MAC Entities E-UTRA defines two MAC entities; one in the UE and one in the E-UTRAN. These MAC entities handle the following transport channels: - Broadcast Channel (BCH); - Downlink Shared Channel(s) (DL-SCH); - Paging Channel (PCH); - Uplink Shared Channel(s) (UL-SCH); - Random Access Channel(s) (RACH); - Multicast Channel(s) (MCH). The exact functions performed by the MAC entities are different in the UE from those performed in the E-UTRAN. The RN includes both MAC entities; one for communication with UEs and one for communication with the E-UTRAN. If the UE is configured with one or more SCells, there are multiple DL-SCH and there may be multiple UL-SCH per UE; one DL-SCH and UL-SCH on the PCell, one DL-SCH and zero or one UL-SCH for each SCell. CCE alternatively contends that this claim element is met under the doctrine of equivalents because above-described features of the Accused Products perform substantially the same function recited in this element, in substantially the same way to achieve substantially the same result. Any alleged differences between the above-described features and the recited element are insubstantial and immaterial to infringement.
21. An apparatus, comprising: at least one processor; and at least one memory including computer program code, the at least one memory and the computer program code being configured to, with the at least one processor, cause the apparatus at least to:	LG, AT&T, Sprint, and Verizon make, use, sell, offer to sell, and/or import the '556 LG Accused Products, each of which is a cellular device that includes and performs the features and capabilities described in this claim. Plaintiff contends that each Defendant infringes this claim because it makes, uses, sells, offers to sell, and/or imports the '556 LG Accused Products, each of which includes and/or practices each and every element of this claim. Additionally, each Defendant indirectly infringes this claim by (1) inducing, with knowledge of the patent (at least by virtue of disclosure to ETSI), its customers' (e.g., end users, carriers) use of the '872 Samsung Accused Products to practice each and

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	every one of the following claim elements with knowledge that such practice infringes this claim and intent to cause such infringement (as evidenced for example, in user guides and other instructional materials provided by each Defendant such as instructions to operate the Accused Product within a provided service area), and/or (2) contributing to direct infringement by customers (e.g., end users, carriers) that use the '872 Samsung Accused Products to practice each and every one of the following claim elements, with knowledge that the infringing components of the '872 Samsung Accused Products have no substantial non-infringing uses (by their nature as proprietary hardware components and software instructions that work in concert to perform specific, intended functions) and that the combination for which such components were made infringes this claim. Each '556 LG Accused Product is a terminal (UE) that contains the functionality as set forth in this claim. Specifically, each '556 LG Accused Product is a cellular device that includes hardware and software (including memory, one or more processors, radios, firmware, and drivers) configured to support and provide wireless communications in an LTE-A network environment. As such, each '556 LG Accused Product is compliant with and supports technical specifications published by 3GPP and ETSI for LTE-A technology, including TS 36.321 and TS 36.331. Indeed, the '556 patent is essential to compliance with LTE-A standards. Each '556 LG Accused Product comprises a processor (such as a baseband processor) and at least one memory including computer program code, the memory and the computer program code being configured to, with the at least one processor, cause the '556 LG Accused Product at least to perform the steps below.
prepare a power headroom report control element,	Each '556 LG Accused Product contains a processor with software and memory that causes the processor to prepare a power headroom report control element. This is described in TS 36.321:

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	5.4.6 Power Headroom Reporting The Power Headroom reporting procedure is used to provide the serving eNB with information about the difference between the nominal UE maximum transmit power and the estimated power for UL-SCH transmission per activated Serving Cell and also with information about the difference between the nominal UE maximum power and the estimated power for UL-SCH and PUCCH transmission on PCell. The reporting period, delay and mapping of Power Headroom are defined in subclause 9.1.8 of [9]. RRC controls Power Headroom reporting by configuring the two timers <i>periodicPHR-Timer</i> and <i>prohibitPHR-Timer</i>, and by signalling <i>dl-PathlossChange</i> which sets the change in measured downlink pathloss and the required power backoff due to power management (as allowed by P-MPR_c [10]) to trigger a PHR [8]. If the UE has UL resources allocated for new transmission for this TTI: - if it is the first UL resource allocated for a new transmission since the last MAC reset, start <i>periodicPHR-Timer</i>; - if the Power Headroom reporting procedure determines that at least one PHR has been triggered and not cancelled, and; - if the allocated UL resources can accommodate a PHR MAC control element plus its subheader if <i>extendedPHR</i> is not configured, or the Extended PHR MAC control element plus its subheader if <i>extendedPHR</i> is configured, as a result of logical channel prioritization: - if <i>extendedPHR</i> is configured: - for each activated Serving Cell with configured uplink: - obtain the value of the Type 1 power headroom; - if the UE has UL resources allocated for transmission on this Serving Cell for this TTI: - obtain the value for the corresponding P_{C_{MAX,e}} field from the physical layer; - if <i>simultaneousPUCCH-PUSCH</i> is configured: - obtain the value of the Type 2 power headroom for the PCell; - if the UE has a PUCCH transmission in this TTI: - obtain the value for the corresponding P_{C_{MAX,e}} field from the physical layer; - instruct the Multiplexing and Assembly procedure to generate and transmit an Extended PHR MAC control element as defined in subclause 6.1.3.6a based on the values reported by the physical layer; CCE alternatively contends that this claim element is met under the doctrine of equivalents because above-described features of the Accused Products perform substantially the same function recited in this element, in substantially the same way to achieve substantially the same result. Any alleged differences between the above-described features and the recited element are insubstantial and immaterial to infringement.
based on a trigger configured by a base	In each '556 LG Accused Product, the power headroom report control element is based on a trigger configured by a base station, as evidenced by TS 36.321 and

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station,	TS 36.331. TS 36.321 states: 5.4.6 Power Headroom Reporting The Power Headroom reporting procedure is used to provide the serving eNB with information about the difference between the nominal UE maximum transmit power and the estimated power for UL-SCH transmission per activated Serving Cell and also with information about the difference between the nominal UE maximum power and the estimated power for UL-SCH and PUCCH transmission on PCell. The reporting period, delay and mapping of Power Headroom are defined in subclause 9.1.8 of [9]. RRC controls Power Headroom reporting by configuring the two timers <i>periodicPHR-Timer</i> and <i>prohibitPHR-Timer</i>, and by signalling <i>dl-PathlossChange</i> which sets the change in measured downlink pathloss and the required power backoff due to power management (as allowed by $P\text{-MPR}_c$ [10]) to trigger a PHR [8]. TS 36.331 states: 5.3.10 Radio resource configuration 5.3.10.0 General The UE shall: 1> if the received <i>radioResourceConfigDedicated</i> includes the <i>srb-ToAddModList</i>: 2> perform the SRB addition or reconfiguration as specified in 5.3.10.1; 1> if the received <i>radioResourceConfigDedicated</i> includes the <i>drb-ToReleaseList</i>: 2> perform DRB release as specified in 5.3.10.2; 1> if the received <i>radioResourceConfigDedicated</i> includes the <i>drb-ToAddModList</i>: 2> perform DRB addition or reconfiguration as specified in 5.3.10.3; 1> if the received <i>radioResourceConfigDedicated</i> includes the <i>mac-MainConfig</i>: 2> perform MAC main reconfiguration as specified in 5.3.10.4; Mac-MainConfig is further defined in TS 36.331: — MAC-MainConfig The IE <i>MAC-MainConfig</i> is used to specify the MAC main configuration for signalling and data radio bearers.

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	And Mac-MainConfig field descriptions in TS36.311 provide: <table><tr><th>MAC-MainConfig field descriptions</th></tr><tr><td><i>dl-PathlossChange</i> DL Pathloss Change and the change of the required power backoff due to power management (as allowed by P-MPRc [42]) for PHR reporting in TS 36.321 [6]. Value in dB. Value dB1 corresponds to 1 dB, dB3 corresponds to 3 dB and so on. The same value applies for each serving cell (although the associated functionality is performed independently for each cell).</td></tr><tr><td><i>extendedPHR</i> Indicates if power headroom shall be reported using the Extended Power Headroom Report MAC control element defined in TS 36.321 [6] (value <i>setup</i>). Otherwise the power headroom shall be reported using the Power Headroom Report MAC control element defined in TS 36.321 [6]. E-UTRAN always configures the value <i>setup</i> if more than one Serving Cell with uplink is configured.</td></tr><tr><td><i>periodicPHR-Timer</i> Timer for PHR reporting in TS 36.321 [6]. Value in number of sub-frames. Value sf10 corresponds to 10 subframes, sf20 corresponds to 20 subframes and so on.</td></tr><tr><td><i>prohibitPHR-Timer</i> Timer for PHR reporting in TS 36.321 [6]. Value in number of sub-frames. Value sf0 corresponds to 0 subframes, sf100 corresponds to 100 subframes and so on.</td></tr></table> CCE alternatively contends that this claim element is met under the doctrine of equivalents because above-described features of the Accused Products perform substantially the same function recited in this element, in substantially the same way to achieve substantially the same result. Any alleged differences between the above-described features and the recited element are insubstantial and immaterial to infringement.	MAC-MainConfig field descriptions	<i>dl-PathlossChange</i> DL Pathloss Change and the change of the required power backoff due to power management (as allowed by P-MPRc [42]) for PHR reporting in TS 36.321 [6]. Value in dB. Value dB1 corresponds to 1 dB, dB3 corresponds to 3 dB and so on. The same value applies for each serving cell (although the associated functionality is performed independently for each cell).	<i>extendedPHR</i> Indicates if power headroom shall be reported using the Extended Power Headroom Report MAC control element defined in TS 36.321 [6] (value <i>setup</i>). Otherwise the power headroom shall be reported using the Power Headroom Report MAC control element defined in TS 36.321 [6]. E-UTRAN always configures the value <i>setup</i> if more than one Serving Cell with uplink is configured.	<i>periodicPHR-Timer</i> Timer for PHR reporting in TS 36.321 [6]. Value in number of sub-frames. Value sf10 corresponds to 10 subframes, sf20 corresponds to 20 subframes and so on.	<i>prohibitPHR-Timer</i> Timer for PHR reporting in TS 36.321 [6]. Value in number of sub-frames. Value sf0 corresponds to 0 subframes, sf100 corresponds to 100 subframes and so on.
MAC-MainConfig field descriptions						
<i>dl-PathlossChange</i> DL Pathloss Change and the change of the required power backoff due to power management (as allowed by P-MPRc [42]) for PHR reporting in TS 36.321 [6]. Value in dB. Value dB1 corresponds to 1 dB, dB3 corresponds to 3 dB and so on. The same value applies for each serving cell (although the associated functionality is performed independently for each cell).						
<i>extendedPHR</i> Indicates if power headroom shall be reported using the Extended Power Headroom Report MAC control element defined in TS 36.321 [6] (value <i>setup</i>). Otherwise the power headroom shall be reported using the Power Headroom Report MAC control element defined in TS 36.321 [6]. E-UTRAN always configures the value <i>setup</i> if more than one Serving Cell with uplink is configured.						
<i>periodicPHR-Timer</i> Timer for PHR reporting in TS 36.321 [6]. Value in number of sub-frames. Value sf10 corresponds to 10 subframes, sf20 corresponds to 20 subframes and so on.						
<i>prohibitPHR-Timer</i> Timer for PHR reporting in TS 36.321 [6]. Value in number of sub-frames. Value sf0 corresponds to 0 subframes, sf100 corresponds to 100 subframes and so on.						
the trigger determines when the power headroom report control element is to be sent in an uplink;	Further, in each '556 LG Accused Product, the trigger determines when the power headroom report control element is to be sent in an uplink.					

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	5.4.6 Power Headroom Reporting The Power Headroom reporting procedure is used to provide the serving eNB with information about the difference between the nominal UE maximum transmit power and the estimated power for UL-SCH transmission per activated Serving Cell and also with information about the difference between the nominal UE maximum power and the estimated power for UL-SCH and PUCCH transmission on PCell. The reporting period, delay and mapping of Power Headroom are defined in subclause 9.1.8 of [9]. RRC controls Power Headroom reporting by configuring the two timers <i>periodicPHR-Timer</i> and <i>prohibitPHR-Timer</i>, and by signalling <i>dl-PathlossChange</i> which sets the change in measured downlink pathloss and the required power backoff due to power management (as allowed by P-MPR_e [10]) to trigger a PHR [8]. A Power Headroom Report (PHR) shall be triggered if any of the following events occur: - <i>prohibitPHR-Timer</i> expires or has expired and the path loss has changed more than <i>dl-PathlossChange</i> dB for at least one activated Serving Cell which is used as a pathloss reference since the last transmission of a PHR when the UE has UL resources for new transmission; - <i>periodicPHR-Timer</i> expires; CCE alternatively contends that this claim element is met under the doctrine of equivalents because above-described features of the Accused Products perform substantially the same function recited in this element, in substantially the same way to achieve substantially the same result. Any alleged differences between the above-described features and the recited element are insubstantial and immaterial to infringement.
preparation of the power headroom report control element includes incorporating a bitmap indicating which power headroom reports are being reported,	In each '556 LG Accused Product, the preparing of the power headroom report control element includes incorporating a bitmap indicating which power headroom reports are being indicated. This is described in TS 36.321:

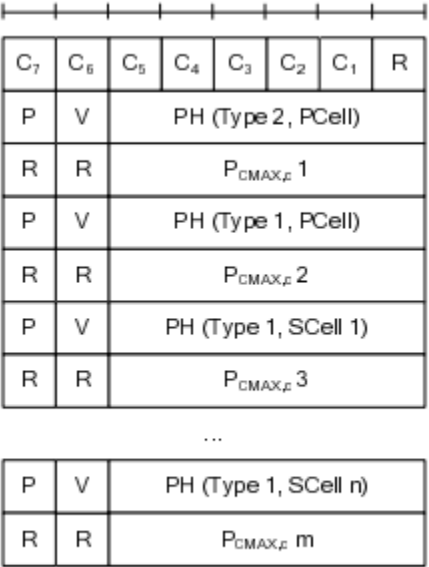
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	6.1.3.6a Extended Power Headroom MAC Control Element The Extended Power Headroom MAC control element is identified by a MAC PDU subheader with LCID as specified in table 6.2.1-2. It has a variable size and is defined in Figure 6.1.3.6a-2. When Type 2 PH is reported, the octet containing the Type 2 PH field is included first after the octet indicating the presence of PH per SCell and followed by an octet containing the associated $P_{\text{CMAX},c}$ field (if reported). Then follows in ascending order based on the <i>ServCellIndex</i> [8] an octet with the Type 1 PH field and an octet with the associated $P_{\text{CMAX},c}$ field (if reported), for the PCell and for each SCell indicated in the bitmap. The Extended Power Headroom MAC Control Element is defined as follows: - C_i: this field indicates the presence of a PH field for the SCell with <i>SCellIndex</i> i as specified in [8]. The C_i field set to "1" indicates that a PH field for the SCell with <i>SCellIndex</i> i is reported. The C_i field set to "0" indicates that a PH field for the SCell with <i>SCellIndex</i> i is not reported; - R: reserved bit, set to "0"; - V: this field indicates if the PH value is based on a real transmission or a reference format. For Type 1 PH, V=0 indicates real transmission on PUSCH and V=1 indicates that a PUSCH reference format is used. For Type 2 PH, V=0 indicates real transmission on PUCCH and V=1 indicates that a PUCCH reference format is used. Furthermore, for both Type 1 and Type 2 PH, V=0 indicates the presence of the associated $P_{\text{CMAX},c}$ field, and V=1 indicates that the associated $P_{\text{CMAX},c}$ field is omitted; - Power Headroom (PH): this field indicates the power headroom level. The length of the field is 6 bits. The reported PH and the corresponding power headroom levels are shown in Table 6.1.3.6-1 (the corresponding measured values in dB can be found in subclause 9.1.8.4 of [9]); - P: this field indicates whether the UE applies power backoff due to power management (as allowed by P-MPR_c [10]). The UE shall set P=1 if the corresponding $P_{\text{CMAX},c}$ field would have had a different value if no power backoff due to power management had been applied; - $P_{\text{CMAX},c}$: if present, this field indicates the $P_{\text{CMAX},c}$ or $\tilde{P}_{\text{CMAX},c}$ [2] used for calculation of the preceding PH field. The reported $P_{\text{CMAX},c}$ and the corresponding nominal UE transmit power levels are shown in Table 6.1.3.6a-1 (the corresponding measured values in dBm can be found in subclause 9.6.1 of [9]). Figure 6.1.3.6a-1: Void

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	 Figure 6.1.3.6a-2: Extended Power Headroom MAC Control Element CCE alternatively contends that this claim element is met under the doctrine of equivalents because above-described features of the Accused Products perform substantially the same function recited in this element, in substantially the same way to achieve substantially the same result. Any alleged differences between the above-described features and the recited element are insubstantial and immaterial to infringement.
the preparation of the power headroom report control element further includes preparing the bitmap to include bits for power headroom reports for a plurality of the secondary cells; and send the power headroom report control element to the	In each '556 LG Accused Product, the preparation of the power headroom report control element further includes preparing the bitmap to include bits for power headroom reports to a plurality of secondary cells; and sending the prepared power headroom report control element to the base station. This is detailed in TS 36.321.

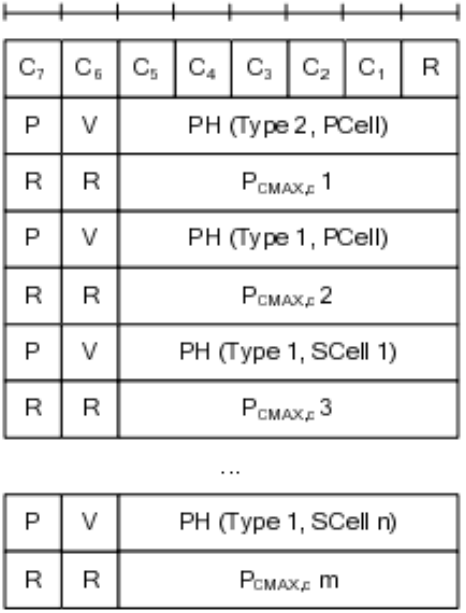
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base station.	In certain conditions, for example, TS 36.321 requires: - instruct the Multiplexing and Assembly procedure to generate and transmit an Extended PHR MAC control element as defined in subclause 6.1.3.6a based on the values reported by the physical layer; Where 6.1.3.6a informs that: 6.1.3.6a Extended Power Headroom MAC Control Element The Extended Power Headroom MAC control element is identified by a MAC PDU subheader with LCID as specified in table 6.2.1-2. It has a variable size and is defined in Figure 6.1.3.6a-2. When Type 2 PH is reported, the octet containing the Type 2 PH field is included first after the octet indicating the presence of PH per SCell and followed by an octet containing the associated $P_{\text{CMAX},e}$ field (if reported). Then follows in ascending order based on the <i>ServCellIndex</i> [8] an octet with the Type 1 PH field and an octet with the associated $P_{\text{CMAX},e}$ field (if reported), for the PCell and for each SCell indicated in the bitmap. The Extended Power Headroom MAC Control Element is defined as follows: - C_i: this field indicates the presence of a PH field for the SCell with <i>SCellIndex</i> i as specified in [8]. The C_i field set to "1" indicates that a PH field for the SCell with <i>SCellIndex</i> i is reported. The C_i field set to "0" indicates that a PH field for the SCell with <i>SCellIndex</i> i is not reported; - R: reserved bit, set to "0"; - V: this field indicates if the PH value is based on a real transmission or a reference format. For Type 1 PH, V=0 indicates real transmission on PUSCH and V=1 indicates that a PUSCH reference format is used. For Type 2 PH, V=0 indicates real transmission on PUCCH and V=1 indicates that a PUCCH reference format is used. Furthermore, for both Type 1 and Type 2 PH, V=0 indicates the presence of the associated $P_{\text{CMAX},e}$ field, and V=1 indicates that the associated $P_{\text{CMAX},e}$ field is omitted; - Power Headroom (PH): this field indicates the power headroom level. The length of the field is 6 bits. The reported PH and the corresponding power headroom levels are shown in Table 6.1.3.6-1 (the corresponding measured values in dB can be found in subclause 9.1.8.4 of [9]); Figure 6.1.3.6a-1: Void

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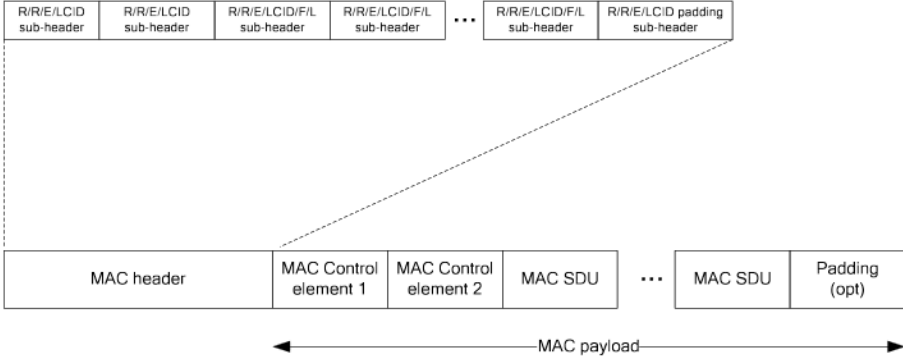
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	 Figure 6.1.3.6a-2: Extended Power Headroom MAC Control Element CCE alternatively contends that this claim element is met under the doctrine of equivalents because above-described features of the Accused Products perform substantially the same function recited in this element, in substantially the same way to achieve substantially the same result. Any alleged differences between the above-described features and the recited element are insubstantial and immaterial to infringement.
22. The apparatus of claim 21, wherein the at least one memory and the computer program code are configured to, with the at least one processor, cause the apparatus at least to prepare the power headroom	LG, AT&T, Sprint, and Verizon make, use, sell, offer to sell, and/or import the '556 LG Accused Products, each of which is a cellular device that includes and performs the features and capabilities described in this claim. Plaintiff contends that each Defendant infringes this claim because it makes, uses,

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report control element by preparing the bitmap in one of: a MAC subheader and a payload.	sells, offers to sell, and/or imports the '556 LG Accused Products, each of which includes and/or practices each and every element of this claim. Additionally, each Defendant indirectly infringes this claim by (1) inducing, with knowledge of the patent (at least by virtue of disclosure to ETSI), its customers' (e.g., end users, carriers) use of the '556 LG Accused Products to practice each and every one of the following claim elements with knowledge that such practice infringes this claim and intent to cause such infringement (as evidenced for example, in user guides and other instructional materials provided by each Defendant such as instructions to operate the Accused Product within a provided service area), and/or (2) contributing to direct infringement by customers (e.g., end users, carriers) that use the '556 LG Accused Products to practice each and every one of the following claim elements, with knowledge that the infringing components of the '556 LG Accused Products have no substantial non-infringing uses (by their nature as proprietary hardware components and software instructions that work in concert to perform specific, intended functions) and that the combination for which such components were made infringes this claim. See analysis of claim 21, which is incorporated herein by reference. The processor of each '556 LG Accused Product discussed above with claim 21, with associated memory and computer program code, is configured to cause the '556 LG Accused Product to prepare the power headroom report control element including preparing the bitmap in one of a MAC subheader and a payload. This is detailed in TS 36.321:

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	6.1.2 MAC PDU (DL-SCH and UL-SCH except transparent MAC and Random Access Response, MCH) A MAC PDU consists of a MAC header, zero or more MAC Service Data Units (MAC SDU), zero, or more MAC control elements, and optionally padding; as described in Figure 6.1.2-3. Both the MAC header and the MAC SDUs are of variable sizes. A MAC PDU header consists of one or more MAC PDU subheaders; each subheader corresponds to either a MAC SDU, a MAC control element or padding. 6.1.3.6a Extended Power Headroom MAC Control Element The Extended Power Headroom MAC control element is identified by a MAC PDU subheader with LCID as specified in table 6.2.1-2. It has a variable size and is defined in Figure 6.1.3.6a-2. When Type 2 PH is reported, the octet containing the Type 2 PH field is included first after the octet indicating the presence of PH per SCell and followed by an octet containing the associated $P_{\text{CMAX},e}$ field (if reported). Then follows in ascending order based on the <i>ServCellIndex</i> [8] an octet with the Type 1 PH field and an octet with the associated $P_{\text{CMAX},e}$ field (if reported), for the PCell and for each SCell indicated in the bitmap. The Extended Power Headroom MAC Control Element is defined as follows: - C_i: this field indicates the presence of a PH field for the SCell with <i>SCellIndex</i> i as specified in [8]. The C_i field set to "1" indicates that a PH field for the SCell with <i>SCellIndex</i> i is reported. The C_i field set to "0" indicates that a PH field for the SCell with <i>SCellIndex</i> i is not reported;  Figure 6.1.2-3: Example of MAC PDU consisting of MAC header, MAC control elements, MAC SDUs and padding

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	CCE alternatively contends that this claim element is met under the doctrine of equivalents because above-described features of the Accused Products perform substantially the same function recited in this element, in substantially the same way to achieve substantially the same result. Any alleged differences between the above-described features and the recited element are insubstantial and immaterial to infringement.
23. The apparatus of claim 21, wherein the at least one memory and the computer program code are configured to, with the at least one processor, cause the apparatus at least to prepare the power headroom report control element by including at least one of: a type 1 power headroom report for a primary serving cell or a type 2 power headroom report for the primary serving cell.	LG, AT&T, Sprint, and Verizon make, use, sell, offer to sell, and/or import the '556 LG Accused Products, each of which is a cellular device that includes and performs the features and capabilities described in this claim. Plaintiff contends that each Defendant infringes this claim because it makes, uses, sells, offers to sell, and/or imports the '556 LG Accused Products, each of which includes and/or practices each and every element of this claim. Additionally, each Defendant indirectly infringes this claim by (1) inducing, with knowledge of the patent (at least by virtue of disclosure to ETSI), its customers' (e.g., end users, carriers) use of the '556 LG Accused Products to practice each and every one of the following claim elements with knowledge that such practice infringes this claim and intent to cause such infringement (as evidenced for example, in user guides and other instructional materials provided by each Defendant such as instructions to operate the Accused Product within a provided service area), and/or (2) contributing to direct infringement by customers (e.g., end users, carriers) that use the '556 LG Accused Products to practice each and every one of the following claim elements, with knowledge that the infringing components of the '556 LG Accused Products have no substantial non-infringing uses (by their nature as proprietary hardware components and software instructions that work in concert to perform specific, intended functions) and that the combination for which such components were made infringes this claim. See analysis of claim 21, which is incorporated herein by reference. The processor of each '556 LG Accused Product discussed above with claim 21, with associated memory and computer program code, are configured to prepare

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	the power headroom report control element by including at least one of: a type 1 power headroom report for a primary serving cell or a type 2 power headroom report for the primary serving cell. This is detailed in TS 36.321: 4.2.1 MAC Entities E-UTRA defines two MAC entities; one in the UE and one in the E-UTRAN. These MAC entities handle the following transport channels: - Broadcast Channel (BCH); - Downlink Shared Channel(s) (DL-SCH); - Paging Channel (PCH); - Uplink Shared Channel(s) (UL-SCH); - Random Access Channel(s) (RACH); - Multicast Channel(s) (MCH). The exact functions performed by the MAC entities are different in the UE from those performed in the E-UTRAN. The RN includes both MAC entities; one for communication with UEs and one for communication with the E-UTRAN. If the UE is configured with one or more SCells, there are multiple DL-SCH and there may be multiple UL-SCH per UE; one DL-SCH and UL-SCH on the PCell, one DL-SCH and zero or one UL-SCH for each SCell. CCE alternatively contends that this claim element is met under the doctrine of equivalents because above-described features of the Accused Products perform substantially the same function recited in this element, in substantially the same way to achieve substantially the same result. Any alleged differences between the above-described features and the recited element are insubstantial and immaterial to infringement.