

Exhibit 6

Cellular Communication Technologies LLC v. LG Electronics, Inc., et al.**EXHIBIT B TO PLAINTIFF'S ~~FIRST~~SECOND SUPPLEMENTAL INFRINGEMENT CONTENTIONS**

U.S. Pat. No. 6,819,923	'9923 LG ACCUSED PRODUCTS ¹
11. A mobile communication means for communication with a cellular telecommunication network, comprising:	LG, AT&T, and T-Mobile infringe the '9923 patent either directly and/or indirectly. Each Defendant makes, uses, sells, offers to sell, and/or imports '9923 LG Accused Products², each of which is a cellular device that includes the features and capabilities described in this claim. Plaintiff contends that each Defendant directly infringes this claim because it makes, uses, sells, offers to sell, and/or imports the '9923 LG Accused Products, 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 its disclosure to ETSI), its customers' use of the '9923 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 Products within a provided service area), and/or (2) contributing to direct infringement by customers that use the '9923 LG Accused Products to practice each and every one of the following claim elements, with knowledge that infringing features of the '9923 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 the combination for which such features was made infringes this claim.

¹ Discovery in this case is ongoing. 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 '9923 LG Accused Products include the following products: LG A380, LG DoublePlay, LG Escape 4G, LG G Flex, LG G2, LG G2X, LG myTouch, LG myTouch Q, LG Nexus 4, LG Nexus 5, LG Nitro HD, LG Optimus F3, LG Optimus F3Q, LG Optimus F6, LG Optimus G, LG Optimus G Pro, LG Optimus L9, LG Xpression, LG G3, LG G Vista, LG Optimus L70, and LG Optimus L90. Evidence supporting the use of relevant technology contained within this chart is listed in Appendix B-1.

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U.S. Pat. No. 6,819,923	'9923 LG ACCUSED PRODUCTS ¹
	Each '9923 LG Accused Product is a mobile communication means for communication with a cellular telecommunications network. Specifically, each '9923 LG Accused Product is a cellular device (i.e., a mobile station) that includes hardware and software (including memory, one or more processors, radios, firmware, and drivers) configured to support and provide wireless communications in an GSM/EDGE network environment. As such, each '9923 LG Accused Product is compliant with and supports technical specifications published by 3GPP and ETSI for GSM/EDGE technology, including TS 44.060 (Release 5, and future releases).³ Indeed, the '9923 patent is essential to compliance with GSM-EDGE standards.⁴ In the GSM-EDGE network environment, a mobile station is configured to send and receive communications with network nodes. TS 44.060 specifies procedures for the Radio Link Control (RLC) and Medium Access Control (MAC) layers of the radio interface between the mobile station and the GSM/EDGE Radio Access Network (GERAN). Among the RLC/MAC control messages specified in TS 44.060 are system information messages referred to as Packet System Information Type 3 bis ("PSI3 bis"). This message is sent by the network on the PBCCH and PACCH giving information of the BCCH allocation in neighbor cells of the mobile station, and cell selection parameters for non-serving cells.

³ See TS 44.060 Technical Specification, http://www.etsi.org/deliver/etsi_ts/144000_144099/144060/05.21.00_60/ts_144060v052100p.pdf. Generally, the information discussed in this chart is included in §§11.2.20 et seq.

⁴ http://ipr.etsi.org/IPRDetails.aspx?IPRD_ID=698&IPRD_TYPE_ID=2&MODE=2 (last accessed Mar. 20, 2014)

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	11.2.21 Packet System Information Type 3 bis This message is sent by the network on the PBCCH and PACCH giving information of the BCCH allocation in the neighbour cells and cell selection parameters for non-serving cells. This message shall not be segmented across more than one RLC/MAC control block by using the procedures specified in sub-clause 9.1.12a. If not all information fits into one instance of the PSI3bis message, the PSI3bis message can be repeated. Special requirements for the transmission of this message apply on PBCCH, see 3GPP TS 45.002. Message type: PACKET SYSTEM INFORMATION TYPE 3 BIS Direction: network to mobile station Classification: distribution message TS 44.060 sets forth the elements and content in a PSI3 bis message, which include Neighbor Cell parameters. <pre> < PSI3 bis message content > ::= < PAGE_MODE : bit (2) > < PSI3_CHANGE_MARK : bit (2) > < PSI3_BIS_INDEX : bit (4) > < PSI3_BIS_COUNT : bit (4) > { < Neighbour cell parameters > { 1 < Neighbour cell params struct > } ** 0 > < Neighbour Cell parameters 2 > { 1 < Neighbour Cell params 2 struct > } ** 0 > { null 0 bit** = < no string > 1 { 0 1 < LSA Parameters : < LSA Parameters IE >> } { null 0 bit** = < no string > 1 < COMPACT Neighbour Cell Parameters > { 1 < COMPACT Neighbour Cell params 2 struct > } ** 0 > 0 -- The value '1' was used in an earlier version of the protocol and shall not be used. { null 0 bit** = < no string > 1 { 0 1 < CCN Support Description : < CCN Support Description struct >> } { null 0 bit** = < no string > 1 < lu Mode Neighbour Cell Parameters > { 1 < lu Mode Neighbour Cell params struct > } ** 0 > -- Supplementary information for dual lu mode and AVGb mode capable cells < lu mode Only Neighbour Cell Parameters > : { 1 < lu mode Only Neighbour Cell params struct > } ** 0 > < padding bits > } } } // -- truncation at end of message allowed. bits '0' assumed ! < Distribution part error : bit (*) = < no string >> ; } } } </pre> Accordingly, the PSI3 bis message comprises a neighbor cell information message. Further, the Neighbor Cell parameters of the PSI3 bis message includes a set of

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	specific parameter values related to neighbor cells. <pre> < Neighbour Cell params 2 struct > ::= { 00 -- Message escape { 1 < NCP2 Repeat struct > < CELL_PARAMS_POINTER : bit (2) > ** 0 --Up to four pointers to the 'Neighbour parameter set < Neighbour parameter set : < Neighbour parameter set struct > * (1 + max(val(CELL_PARAMS_POINTER))) ! < Message escape: { 01 10 11 } bit** = < no string >> } : -- Reserved for future use </pre> The Neighbor Cell parameters of the PSI3 bis message also includes cell information that includes, for each cell of a plurality of neighbor cells, at least one specific parameter value for a first parameter (as contained in the NCP2 Property struct, such as SAME_RA_AS_SERVING_CELL, CELL_BAR_ACCESS_2, or BCC) and an index for a second parameter (CELL_PARAMS_POINTER). <pre> < Neighbour Cell params 2 struct > ::= { 00 -- Message escape { 1 < NCP2 Repeat struct > < CELL_PARAMS_POINTER : bit (2) > ** 0 --Up to four pointers to the 'Neighbour parameter set < Neighbour parameter set : < Neighbour parameter set struct > * (1 + max(val(CELL_PARAMS_POINTER))) ! < Message escape: { 01 10 11 } bit** = < no string >> } : -- Reserved for future use < NCP2 Repeat struct > ::= { 1 < START_FREQUENCY : bit (10) > -- Multiple START_FREQ/FREQ DIFF sets may be defined < NCP2 Property struct > { < NR_OF_REMAINING_CELLS : { bit (4) - 0000 } > < FREQ_DIFF_LENGTH : bit (3) > { < FREQUENCY_DIFF : bit (1 + val(FREQ_DIFF_LENGTH)) > < NCP2 Property struct > * (val(NR_OF_REMAINING_CELLS)) } < NCP2 Repeat struct > -- Repeated recursively } 0000 -- Break recursion (NR_OF_REMAINING_CELLS == 0) } ! 0 } : -- End recursion (no more START_FREQUENCY) < NCP2 Property struct > ::= < SAME_RA_AS_SERVING_CELL : bit (1) > < CELL_BAR_ACCESS_2 : bit > < BCC : bit (3) > </pre>

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	<pre> < Neighbour parameter set struct > ::= { 0 1 < NCC : bit (3) > } < EXC_ACC : bit > { 0 1 < GPRS_RXLEV_ACCESS_MIN : bit (6) > } { 0 1 < GPRS_MS_TXPWR_MAX_CCH : bit (5) > } { 0 1 < PRIORITY_CLASS : bit (3) > } { 0 1 < HCS_THR : bit (5) > } { 0 1 < SI13_PBCCH_LOCATION : < SI13_PBCCH_LOCATION struct > > } < GPRS_TEMPORARY_OFFSET : bit (3) > < GPRS_PENALTY_TIME : bit (5) > < GPRS_RESELECT_OFFSET : bit (5) > ; </pre> The index indicates which value of the set of specific parameter values is used for the second parameter. As shown above, the mobile station associates a specific value of the specific parameter values indicated by one of the indices with the corresponding second parameter of a neighbor cell. This process is used for network assisted cell reselection within a GSM system.
means for receiving a neighbor cell information message, wherein said neighbor cell information message comprises:	Each '9923 LG Accused Product includes means for receiving a neighbor cell information message comprising the features set forth in this claim. Namely, each '9923 LG Accused Product is a cellular device that contains a receiver which is configured to receive neighbor cell information message which comprises the features listed below.
a set of specific parameter values; and	Each '9923 LG Accused Product is configured to receive a PSI3 bis message which contains a set of specific parameter values. TS 44.060 delineates the required content of the PSI3 bis message that is received:

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	<pre> < PSI3 bis message content > ::= < PAGE_MODE : bit (2) > < PSI3_CHANGE_MARK : bit (2) > < PSI3_BIS_INDEX : bit (4) > < PSI3_BIS_COUNT : bit (4) > { < Neighbour cell parameters > : { 1 < Neighbour cell params struct > } ** 0 > < Neighbour Cell parameters 2 > : { 1 < Neighbour Cell params 2 struct > } ** 0 > { null 0 bit** = < no string > 1 -- Release 1998 additions: { 0 1 < LSA Parameters > : < LSA Parameters IE >> } { null 0 bit** = < no string > 1 -- Release 1999 additions: < COMPACT Neighbour Cell Parameters > : { 1 < COMPACT Neighbour Cell params 2 struct > } ** 0 > 0 -- The value '1' was used in an earlier version of the protocol and shall not be used. { null 0 bit** = < no string > 1 -- Rel-4 additions: { 0 1 < CCN Support Description > : < CCN Support Description struct >> } { null 0 bit** = < no string > 1 -- Rel-5 additions: < lu Mode Neighbour Cell Parameters > : { 1 < lu Mode Neighbour Cell params struct > } ** 0 > --Supplementary information for dual lu mode and A/Gb mode capable cells < lu mode Only Neighbour Cell Parameters > : { 1 < lu mode Only Neighbour Cell params struct > } ** 0 > < padding bits > } } } // -- truncation at end of message allowed. bits '0' assumed ! < Distribution part error : bit (*) = < no string >> ; </pre> The “Neighbour Cell parameters 2” information is further described by TS44.060 as: <pre> < Neighbour Cell params 2 struct > ::= { 00 -- Message escape { 1 < NCP2 Repeat struct > < CELL_PARAMS_POINTER : bit (2) > } ** 0 --Up to four pointers to the 'Neighbour parameter set < Neighbour parameter set > : < Neighbour parameter set struct > > * (1 + max(val(CELL_PARAMS_POINTER))) ! < Message escape: { 01 10 11 } bit** = < no string >> ; -- Reserved for future use </pre> The “Neighbour parameter set struct” information is further described by TS44.060 as:

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	<pre> < Neighbour parameter set struct > ::= { 0 1 < NCC : bit (3) > } < EXC_ACC : bit > { 0 1 < GPRS_RXLEV_ACCESS_MIN : bit (6) > } { 0 1 < GPRS_MS_TXPWR_MAX_CCH : bit (5) > } { 0 1 < PRIORITY_CLASS : bit (3) > } { 0 1 < HCS_THR : bit (5) > } { 0 1 < SI13_PBCCH_LOCATION : < SI13_PBCCH_LOCATION struct > > } < GPRS_TEMPORARY_OFFSET : bit (3) > < GPRS_PENALTY_TIME : bit (5) > < GPRS_RESELECT_OFFSET : bit (5) > ; </pre>
cell information, wherein for each cell of a plurality of neighbor cells, said cell information comprises:	Each '9923 LG Accused Product includes means for receiving a PSI3 bis message which also contains cell information. The cell information corresponds to each cell of a plurality of neighbor cells. The cell information is contained within the "Neighbor Cell parameters 2" information struct: <pre> < Neighbour Cell params 2 struct > ::= { 00 -- Message escape { 1 < NCP2 Repeat struct > < CELL_PARAMS_POINTER : bit (2) > ** 0 --Up to four pointers to the 'Neighbour parameter set < Neighbour parameter set : < Neighbour parameter set struct > * (1 + max(val(CELL_PARAMS_POINTER))) ! < Message escape: { 01 10 11 } bit** = < no string >> } ; -- Reserved for future use </pre> The "NCP2 Repeat struct" is further described by TS44.060 as: <pre> < NCP2 Repeat struct > ::= { 1 < START_FREQUENCY : bit (10) > -- Multiple START FREQ/FREQ DIFF sets may be defined < NCP2 Property struct > { < NR_OF_REMAINING_CELLS : { bit (4) - 0000 } > < FREQ_DIFF_LENGTH : bit (3) > { < FREQUENCY_DIFF : bit (1 + val(FREQ_DIFF_LENGTH)) > < NCP2 Property struct > } * (val(NR_OF_REMAINING_CELLS)) < NCP2 Repeat struct > -- Repeated recursively 0000 } -- Break recursion (NR_OF_REMAINING_CELLS == 0) 0 } ; -- End recursion (no more START_FREQUENCY) < NCP2 Property struct > ::= < SAME_RA_AS_SERVING_CELL : bit (1) > < CELL_BAR_ACCESS_2 : bit > < BCC : bit (3) > ; </pre>

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at least one specific parameter value for a first parameter, and	Each '9923 LG Accused Product includes means for receiving a PSI3 bis message which also contains cell information. The cell information corresponds to each cell of a plurality of neighbor cells. Within the information corresponding to each cell of a plurality of cells, at least one specific parameter value for a first parameter is included, such as SAME_RA_AS_SERVING_CELL, CELL_BAR_ACCESS_2, or BCC. In TS 44.060 this is described in the "NCP2 Property struct": <pre>< NCP2 Property struct > ::= < SAME_RA_AS_SERVING_CELL : bit (1) > < CELL_BAR_ACCESS_2 : bit > < BCC : bit (3) >;</pre>
an index for a second parameter, said index indicating which value of said set of specific parameter values is used for said second parameter; and	Each '9923 LG Accused Product includes means for receiving a PSI3 bis message which also contains cell information. The cell information corresponds to each cell of a plurality of neighbor cells. Within the information corresponding to each cell of a plurality of cells, an index for a second parameter is included, said index indicating which value of said set of specific parameter values is used for said second parameter. In TS 44.060, this is described in within the "Neighbour Cell params 2 struct": <pre>< Neighbour Cell params 2 struct > ::= { 00 -- Message escape { 1 < NCP2 Repeat struct > < CELL_PARAMS_POINTER : bit (2) > } ** 0 --Up to four pointers to the 'Neighbour parameter set < Neighbour parameter set : < Neighbour parameter set struct > * (1 + max(val(CELL_PARAMS_POINTER))) ! < Message escape: { 01 10 11 } bit** = < no string >> } -- Reserved for future use</pre> As indicated in the comments to CELL_PARAMS_POINTER, this information may contain up to four pointers to the Neighbour parameter set.
means for associating a specific value of said set of specific parameter values indicated by one of said index with the	Each '9923 LG Accused Product includes means for associating information contained in a received PSI3 bis messaging, in particular, means for associating a specific value of the set of specific parameter values indicated by one of the

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corresponding second parameter of a neighbor cell.	index with the corresponding second parameter of a neighbor cell. Namely, software and/or hardware stored within the device is capable of interpreting and associating specific values according to the algorithm generally depicted in Figs. 3-5 and generally further described in Col 5:34-49 of the '9923 patent. Such includes logic to recognize the relationship between the CELL_PARAMS_POINTER and the relevant Neighbour parameters. <u>Specifically, the device is configured to indicate a parameter value of a neighbor cell using an index, or a pointer, to identify a parameter value or set of values.</u>
13. The mobile communication means of claim 11, wherein the mobile communication means comprises a cellular telephone.	<i>See</i> analysis of claim 11, which is incorporated herein by reference. Each of the following '9923 LG Accused Products comprise a cellular telephone: LG A380, LG DoublePlay, LG Escape 4G, LG G Flex, LG G2, LG G2X, LG myTouch, LG myTouch Q, LG Nexus 4, LG Nexus 5, LG Nitro HD, LG Optimus F3, LG Optimus F3Q, LG Optimus F6, LG Optimus G, LG Optimus G Pro, LG Optimus L9, LG Xpression, LG G3, LG G Vista, LG Optimus L70, and LG Optimus L90.

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EXHIBIT D TO PLAINTIFF'S ~~First~~Second SUPPLEMENTAL INFRINGEMENT CONTENTIONS

U.S. Pat. No. 7,941,174	'174 LG ACCUSED PRODUCTS ¹
1. A method for operating a radio communication system in which a subscriber station is assigned a plurality of codes for transmitting messages, comprising:	LG, AT&T, and T-Mobile make, use, sell, offer to sell, and/or import the '174 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 directly infringes this claim because it makes, uses, sells, offers to sell, and/or imports the '174 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 the patent's disclosure to ETSI), its customers' use of the '174 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 that use the '174 LG Accused Products to practice each and every one of the following claim elements, with knowledge that the infringing features of the '174 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 features were made infringes this claim. Each '174 LG Accused Product is a subscriber station that performs a method as

¹ Discovery in this case is ongoing. 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 '174 LG Accused Products include the following products: LG DoublePlay, LG Escape 4G, LG G Flex, LG G2, LG G2X, LG myTouch, LG myTouch Q, LG Nexus 4, LG Nexus 5, LG Nitro HD, LG Optimus F3, LG Optimus F3Q, LG Optimus F6, LG Optimus G, LG Optimus G Pro, LG Optimus L9, LG G3, LG G Vista, LG G Pad 7.0 LTE, LG Optimus L70, and LG Optimus L90. Evidence supporting the use of relevant technology contained within this chart is listed in Appendix D-1.

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U.S. Pat. No. 7,941,174	'174 LG ACCUSED PRODUCTS ¹
	set forth in this claim. Specifically, each '174 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 a Universal Mobile Telecommunications System (UMTS) Terrestrial Radio Access Network (UTRAN) environment utilizing HSPA. As such, each '174 LG Accused Product is compliant with and supports technical specifications published by 3GPP and ETSI for UMTS technology, including TS 25.213, TS 25.215, TS 25.133, and TS 25.214.³ Indeed, the '174 patent is essential to compliance with UMTS standards.⁴ In the UMTS network environment, a subscriber station (or user equipment, "UE"), such as each of the '174 LG Accused Products, is assigned a plurality of codes (e.g., DPCCH, DPDCH, HS-DPCCH, E-DPCCH, and E-DPDCH codes) for transmitting wireless messages. Such codes are defined and described in technical specifications published by 3GPP and ETSI for UMTS technology.⁵
determining a transmit power difference which is to be maintained by the subscriber station between on one hand a total maximum transmit power of the subscriber station for the codes and on another hand a total transmit power of the subscriber station for the codes at a start	Each '174 LG Accused Product determines a transmit power difference which is to be maintained by the subscriber station (i.e., the Accused Product) between, on one hand, a total maximum transmit power of the subscriber station for the codes, and on another hand, a total transmit power of the subscriber station for the codes at a start of a message transmission using a first one of the codes. In a UMTS system, each UE is assigned multiple physical channels represented

³ See TS 25.213 Technical Specification, http://www.etsi.org/deliver/etsi_ts/125200_125299/125213/09.02.00_60/ts_125213v090200p.pdf; TS 25.215 Technical Specification, http://www.etsi.org/deliver/etsi_ts/125200_125299/125215/09.02.00_60/ts_125215v090200p.pdf; TS 25.133 Technical Specification, http://www.etsi.org/deliver/etsi_ts/125100_125199/125133/09.07.00_60/ts_125133v090700p.pdf; TS 25.214 Technical Specification, http://www.etsi.org/deliver/etsi_ts/125200_125299/125214/09.07.00_60/ts_125214v090700p.pdf.

⁴ http://ipr.etsi.org/IPRDetails.aspx?IPRD_ID=700&IPRD_TYPE_ID=2&MODE=2 (last accessed Mar. 20, 2014).

⁵ TS 25.213 Technical Specification, http://www.etsi.org/deliver/etsi_ts/125200_125299/125213/09.02.00_60/ts_125213v090200p.pdf, at 8-9.

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of a message transmission using a first one of the codes.	by codes. Such physical channels may include DPCCH, DPDCH, HS-DPCCH, E-DPCCH, and E-DPDCH, each of which is represented by a code.⁶ Additionally, each UE is capable of measuring transmission power headroom and reporting available power headroom for particular channels to nodes in the UMTS network. The reported UE transmission power headroom measurement is an estimate of the average value of the UE transmission power headroom over a 100ms period.⁷ UE transmission power headroom (UPH) is defined in TS 25.215 as follows:⁸ 5.1.14 UE transmission power headroom <table border="1" data-bbox="764 711 1795 1019"> <tr> <td data-bbox="764 711 968 1019">Definition</td><td data-bbox="968 711 1795 1019"> For each uplink DPCCH, UE transmission power headroom (UPH) is the ratio of the maximum UE transmission power and the DPCCH code power, and shall be calculated as following: $UPH = P_{max,tx} / P_{DPCCH}$ where: $P_{max,tx} = \min \{ \text{Maximum allowed UL TX Power, } P_{max} \}$ is the UE maximum transmission power; Maximum allowed UL TX Power is set by UTRAN and defined in [14]; P_{max} is the UE nominal maximum output power according to the UE power class and specified in [18] table 6.1; P_{DPCCH} is the transmitted code power on the DPCCH. The reference point for the UE transmission power headroom shall be the antenna connector of the UE. </td></tr> <tr> <td data-bbox="764 992 968 1019">Applicable for</td><td data-bbox="968 992 1795 1019">CELL_FACH intra, CELL_DCH intra</td></tr> </table> As explained above, each '174 LG Accused Product is configured to support and provide communications in a UMTS environment and therefore complies with UMTS technical specifications. Thus, when communicating in a UMTS environment, each '174 LG Accused Product determines a UPH by receiving and	Definition	For each uplink DPCCH, UE transmission power headroom (UPH) is the ratio of the maximum UE transmission power and the DPCCH code power, and shall be calculated as following: $UPH = P_{max,tx} / P_{DPCCH}$ where: $P_{max,tx} = \min \{ \text{Maximum allowed UL TX Power, } P_{max} \}$ is the UE maximum transmission power; Maximum allowed UL TX Power is set by UTRAN and defined in [14]; P_{max} is the UE nominal maximum output power according to the UE power class and specified in [18] table 6.1; P_{DPCCH} is the transmitted code power on the DPCCH. The reference point for the UE transmission power headroom shall be the antenna connector of the UE.	Applicable for	CELL_FACH intra, CELL_DCH intra
Definition	For each uplink DPCCH, UE transmission power headroom (UPH) is the ratio of the maximum UE transmission power and the DPCCH code power, and shall be calculated as following: $UPH = P_{max,tx} / P_{DPCCH}$ where: $P_{max,tx} = \min \{ \text{Maximum allowed UL TX Power, } P_{max} \}$ is the UE maximum transmission power; Maximum allowed UL TX Power is set by UTRAN and defined in [14]; P_{max} is the UE nominal maximum output power according to the UE power class and specified in [18] table 6.1; P_{DPCCH} is the transmitted code power on the DPCCH. The reference point for the UE transmission power headroom shall be the antenna connector of the UE.				
Applicable for	CELL_FACH intra, CELL_DCH intra				

⁶ *Id.*⁷ TS 25.133 Technical Specification, http://www.etsi.org/deliver/etsi_ts/125100_125199/125133/09.07.00_60/ts_125133v090700p.pdf, at 102.⁸ TS 25.215 Technical Specification, http://www.etsi.org/deliver/etsi_ts/125200_125299/125215/09.02.00_60/ts_125215v090200p.pdf, at 12.

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	interpreting information from the NodeB that factors in the power ratio between the E-DPDCD and DPCCCH as required by $\beta_{ed,k,min}/\beta_c$.⁹ - Any additional scaling of the total transmit power as described above shall be such that the power ratio between DPCCCH and DPDCH, between DPCCCH and HS-DPCCCH, and between DPCCCH and E-DPCCCH, remains as required by sub-clauses 5.1.2.5, 5.1.2.5A and 5.1.2.5B.1, and such that the power ratio between each E-DPDCD and DPCCCH remains as required by $\beta_{ed,k,min}/\beta_c$ if DTX is not used on E-DPDCD. Any slot-level scaling of β_{ed} or DTX of E-DPDCD as described above is applied at layer 1 only and is transparent to higher layers. Thus the UE determines the transmit power difference between a total maximum transmit power of the subscriber station for the codes ($P_{max,tx}$, a constant, or in the alternative, the total allocated power allocated for the codes) and a total transmit power of the subscriber station for the codes at the start of a message transmission using one of the codes (e.g., P_{DPCCCH}). <u>As explained in the cited portion of TS 25.214 shown above, the UE maintains this transmit power difference via a power control procedure applicable at the start of a message transmission on a first code:</u>

⁹ TS 25.214 Technical Specification, http://www.etsi.org/deliver/etsi_ts/125200_125299/125214/09.07.00_60/ts_125214v090700p.pdf at 33-34.

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	5.1.2 DPCCH/DPDCH 5.1.2.1 General The initial uplink DPCCH transmit power is set by higher layers. Subsequently the uplink transmit power control procedure simultaneously and independently controls the power of a DPCCH on each activated uplink frequency and its corresponding DPDCHs (if present). The relative transmit power offset between DPCCH and DPDCHs is determined by the network and is computed according to subclause 5.1.2.5 using the gain factors signalled to the UE using higher layer signalling. The operation of the inner power control loop, described in sub clause 5.1.2.2, adjusts the power of the DPCCH and DPDCHs by the same amount, provided there are no changes in gain factors. Additional adjustments to the power of the DPCCH associated with the use of compressed mode are described in sub clause 5.1.2.3. Any change in the uplink DPCCH transmit power shall take place immediately before the start of the pilot field on the DPCCH. The change in DPCCH power with respect to its previous value is derived by the UE and is denoted by Δ_{DPCCH} (in dB). The previous value of DPCCH power shall be that used in the previous slot, except in the event of an interruption in transmission due to the use of compressed mode or discontinuous uplink DPCCH transmission operation, when the previous value shall be that used in the last slot before the transmission gap. During the operation of the uplink power control procedure the UE transmit power shall not exceed a maximum allowed value which is the lower out of the maximum output power of the terminal power class and a value which may be set by higher layer signalling. Uplink power control shall be performed while the UE transmit power is below the maximum allowed output power. The provisions for power control at the maximum allowed value and below the required minimum output power (as defined in [7]) are described in sub-clause 5.1.2.6.

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	5.1.2.6 Maximum and minimum power limits When E-DCH is not configured, in the case that the total UE transmit power (after applying DPCCH power adjustments and gain factors) would exceed the maximum allowed value, the UE shall apply additional scaling to the total transmit power so that it is equal to the maximum allowed power. This additional scaling shall be such that the power ratio between DPCCH and DPDCH and also DPCCH and HS-DPCCH remains as required by sub-clause 5.1.2.5 and 5.1.2.5A. When E-DCH is configured on a single frequency or E-DCH is configured on multiple frequencies but Secondary_EDCH_Cell_Active is 0. - If the total UE transmit power (after applying DPCCH power adjustments and gain factors) would exceed the maximum allowed value, the UE shall firstly reduce all the E-DPDCH gain factors $\beta_{ed,k}$ by an equal scaling factor to respective values $\beta_{ed,k, reduced}$ so that the total transmit power would be equal to the maximum allowed power. - Also if $E-TFCL_i$ is greater than $E-TFCL_{ec, boost}$, UE shall reduce only E-DPDCH gain factors to respective values $\beta_{ed,k, reduced}$ and E-DPCCH is transmitted using original β_{ec} which is not recalculated according to the reduced E-DPDCH gain factors. After calculating the reduced E-DPDCH gain factors, if $E-TFCL_i$ is smaller than or equal to $E-TFCL_{ec, boost}$, quantization according to table 1B.2 in [3] subclause 4.2.1.3 may be applied, or if $E-TFCL_i$ is greater than $E-TFCL_{ec, boost}$, quantization according to table 1B.2B in [3] subclause 4.2.1.3 may be applied, where each $\beta_{ed,k, reduced}$ is quantized such that $\beta_{ed,k}/\beta_c$ is the largest quantized value for which the condition $\beta_{ed,k} \leq \beta_{ed,k, reduced}$ holds. In case a DPDCH is configured, if any $\beta_{ed,k, reduced}/\beta_c$ is less than the smallest quantized value of Table 1B.2 in [3] subclause 4.2.1.3, DTX may be used on that E-DPDCH (E-DPCCH is, however still transmitted using β_{ec}). In case no DPDCH is configured and regardless of the applied uplink modulation, if any $\beta_{ed,k, reduced}/\beta_c$ is less than $\beta_{ed,k, reduced, min}/\beta_c$, that $\beta_{ed,k}$ shall be set to $\beta_{ed,k, min}$ such that $\beta_{ed,k, min}/\beta_c = \min(\beta_{ed,k, reduced, min}/\beta_c, \beta_{ed,k, original}/\beta_c)$, where $\beta_{ed,k, original}$ denotes the E-DPDCH gain factor before reduction and $\beta_{ed,k, reduced, min}$ is configurable by higher layers. - In the following cases, the UE shall then apply additional scaling to the total transmit power so that it is equal to the maximum allowed power: - if a DPDCH is configured and the total UE transmit power would still exceed the maximum allowed value even though DTX is used on all E-DPDCHs; - if no DPDCH is configured and the total UE transmit power would still exceed the maximum allowed value even though $\beta_{ed,k}$ is equal to $\beta_{ed,k, min}$ for all k. <u>The UE, when receiving a command to scale the transmission power, distributes the increment/decrement among all codes such that ratios are always maintained according to their respective conditions. Hence, the UE, or the processor within the UE, is programmed to maintain a determined transmit power difference.</u> <u>Alternatively, CCE 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</u>

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	<u>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.</u>
6. The method as claimed in claim 6, wherein said determining of the transmit power difference is performed by the subscriber station.	See analysis of claim 1, which is incorporated herein by reference. As each '174 LG Accused Product is compliant with technical specifications published by 3GPP and ETSI for UMTS technology, each '174 LG Accused Product performs the determining of the transmit power difference by virtue of receiving and interpreting information from the NodeB that factors in the power ratio between the E-DPDCD and DPCCH as required by $\beta_{ed,k,min}/\beta_c$.
9. A method for operating a radio communication system in which a subscriber station is assigned a plurality of codes for transmitting messages, comprising:	Each Defendant makes, uses, sells, offers to sell, and/or imports the '174 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 directly infringes this claim because it makes, uses, sells, offers to sell, and/or imports the '174 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 the patent's disclosure to ETSI), its customers' use of the '174 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 each of the Accused Products within a provided service area), and/or (2) contributing to direct infringement by customers that use the '174 LG Accused Products to practice each and every one of the following claim elements, with knowledge that the infringing features of the '174 LG Accused Products have no substantial non-infringing uses and that the combination for which such features were made infringes this claim. Each '174 LG Accused Product is a subscriber station that performs a method as

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	set forth in this claim. Specifically, each '174 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 a Universal Mobile Telecommunications System (UMTS) Terrestrial Radio Access Network (UTRAN) environment. As such, each '174 LG Accused Product is compliant with technical specifications published by 3GPP and ETSI for UMTS technology, including TS 25.213, TS 25.215, TS 25.133, and TS 25.214.¹⁰ Indeed, the '174 patent is essential to compliance with UMTS standards.¹¹ In the UMTS network environment, a subscriber station (or user equipment, "UE"), such as each of the '174 LG Accused Products, is assigned a plurality of codes (e.g., DPCCH, DPDCH, HS-DPCCH, E-DPCCH, and E-DPDCH codes) for transmitting wireless messages. Such codes are defined and described in technical specifications published by 3GPP and ETSI for UMTS technology.¹²
maintaining a previously determined transmit power difference by the subscriber station between on one hand a total maximum power of the subscriber station for the codes and on another hand a total transmit power of the subscriber station for the codes at a start of a message transmission using a first one of	Each '174 LG Accused Product maintains a previously determined transmit power difference by the subscriber station (i.e., the Accused Product) between, on one hand, a total maximum transmit power of the subscriber station for the codes, and on another hand, a total transmit power of the subscriber station for the codes at a start of a message transmission using a first one of the codes. In a UMTS system, each UE is assigned multiple physical channels represented by codes. Such physical channels may include DPCCH, DPDCH, HS-DPCCH, E-DPCCH, and E-DPDCH, each of which is represented by a code.¹³

¹⁰ See TS 25.213 Technical Specification, http://www.etsi.org/deliver/etsi_ts/125200_125299/125213/09.02.00_60/ts_125213v090200p.pdf; TS 25.215 Technical Specification, http://www.etsi.org/deliver/etsi_ts/125200_125299/125215/09.02.00_60/ts_125215v090200p.pdf; TS 25.133 Technical Specification, http://www.etsi.org/deliver/etsi_ts/125100_125199/125133/09.07.00_60/ts_125133v090700p.pdf; TS 25.214 Technical Specification, http://www.etsi.org/deliver/etsi_ts/125200_125299/125214/09.07.00_60/ts_125214v090700p.pdf.

¹¹ http://ipr.etsi.org/IPRDetails.aspx?IPRD_ID=700&IPRD_TYPE_ID=2&MODE=2 (accessed Dec. 28, 2013).

¹² TS 25.213 Technical Specification, http://www.etsi.org/deliver/etsi_ts/125200_125299/125213/09.02.00_60/ts_125213v090200p.pdf at 8-9.

¹³ *Id.*

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the codes.	Additionally, each UE is capable of measuring transmission power headroom and reporting available power headroom for particular channels to nodes in the UMTS network. The reported UE transmission power headroom measurement is an estimate of the average value of the UE transmission power headroom over a 100ms period.¹⁴ UE transmission power headroom (UPH) is defined in TS 25.215 as follows:¹⁵ 5.1.14 UE transmission power headroom <table border="1" data-bbox="764 621 1795 930"> <tr> <td data-bbox="764 621 968 930">Definition</td><td data-bbox="968 621 1795 930"> For each uplink DPCCH, UE transmission power headroom (UPH) is the ratio of the maximum UE transmission power and the DPCCH code power, and shall be calculated as following: $UPH = P_{max,tx} / P_{DPCCH}$ where: $P_{max,tx} = \min \{ \text{Maximum allowed UL TX Power}, P_{max} \}$ is the UE maximum transmission power; Maximum allowed UL TX Power is set by UTRAN and defined in [14]; P_{max} is the UE nominal maximum output power according to the UE power class and specified in [18] table 6.1; P_{DPCCH} is the transmitted code power on the DPCCH. The reference point for the UE transmission power headroom shall be the antenna connector of the UE. </td></tr> <tr> <td data-bbox="764 906 968 930">Applicable for</td><td data-bbox="968 906 1795 930">CELL_FACH intra, CELL_DCH intra</td></tr> </table> As explained above, each '174 LG Accused Product is configured to support and provide communications in a UMTS environment and therefore complies with UMTS technical specifications. Thus, when communicating in a UMTS environment, each '174 LG Accused Product determines a UPH by receiving and interpreting information from the NodeB that factors in the power ratio between the E-DPCCH and DPCCH as required by $\beta_{ed,k,min}/\beta_c$.¹⁶ - Any additional scaling of the total transmit power as described above shall be such that the power ratio between DPCCH and DPDCCH, between DPCCH and HS-DPCCH, and between DPCCH and E-DPCCH, remains as required by	Definition	For each uplink DPCCH, UE transmission power headroom (UPH) is the ratio of the maximum UE transmission power and the DPCCH code power, and shall be calculated as following: $UPH = P_{max,tx} / P_{DPCCH}$ where: $P_{max,tx} = \min \{ \text{Maximum allowed UL TX Power}, P_{max} \}$ is the UE maximum transmission power; Maximum allowed UL TX Power is set by UTRAN and defined in [14]; P_{max} is the UE nominal maximum output power according to the UE power class and specified in [18] table 6.1; P_{DPCCH} is the transmitted code power on the DPCCH. The reference point for the UE transmission power headroom shall be the antenna connector of the UE.	Applicable for	CELL_FACH intra, CELL_DCH intra
Definition	For each uplink DPCCH, UE transmission power headroom (UPH) is the ratio of the maximum UE transmission power and the DPCCH code power, and shall be calculated as following: $UPH = P_{max,tx} / P_{DPCCH}$ where: $P_{max,tx} = \min \{ \text{Maximum allowed UL TX Power}, P_{max} \}$ is the UE maximum transmission power; Maximum allowed UL TX Power is set by UTRAN and defined in [14]; P_{max} is the UE nominal maximum output power according to the UE power class and specified in [18] table 6.1; P_{DPCCH} is the transmitted code power on the DPCCH. The reference point for the UE transmission power headroom shall be the antenna connector of the UE.				
Applicable for	CELL_FACH intra, CELL_DCH intra				

¹⁴ TS 25.133 Technical Specification, http://www.etsi.org/deliver/etsi_ts/125100_125199/125133/09.07.00_60/ts_125133v090700p.pdf, at 102.

¹⁵ TS 25.215 Technical Specification, http://www.etsi.org/deliver/etsi_ts/125200_125299/125215/09.02.00_60/ts_125215v090200p.pdf, at 12.

¹⁶ TS 25.214 Technical Specification, http://www.etsi.org/deliver/etsi_ts/125200_125299/125214/09.07.00_60/ts_125214v090700p.pdf at 33-34.

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	sub-clauses 5.1.2.5, 5.1.2.5A and 5.1.2.5B.1, and such that the power ratio between each E-DPDCH and DPCCH remains as required by $\beta_{ed,ran}/\beta_c$ if DTX is not used on E-DPDCH. Any slot-level scaling of β_{ed} or DTX of E-DPDCH as described above is applied at layer 1 only and is transparent to higher layers. Thus the UE determines and maintains the transmit power difference between a total maximum transmit power of the subscriber station for the codes ($P_{max,tx}$, a constant, or in the alternative, the total allocated power allocated for the codes) and a total transmit power of the subscriber station for the codes at the start of a message transmission using one of the codes (e.g., P_{DPCCH}). <u>As explained in the cited portion of TS 25.214 shown above, the UE maintains this transmit power difference via a power control procedure applicable at the start of a message transmission on a first code:</u> 5.1.2 DPCCH/DPDCH 5.1.2.1 General The initial uplink DPCCH transmit power is set by higher layers. Subsequently the uplink transmit power control procedure simultaneously and independently controls the power of a DPCCH on each activated uplink frequency and its corresponding DPDCHs (if present). The relative transmit power offset between DPCCH and DPDCHs is determined by the network and is computed according to subclause 5.1.2.5 using the gain factors signalled to the UE using higher layer signalling. The operation of the inner power control loop, described in sub clause 5.1.2.2, adjusts the power of the DPCCH and DPDCHs by the same amount, provided there are no changes in gain factors. Additional adjustments to the power of the DPCCH associated with the use of compressed mode are described in sub clause 5.1.2.3. Any change in the uplink DPCCH transmit power shall take place immediately before the start of the pilot field on the DPCCH. The change in DPCCH power with respect to its previous value is derived by the UE and is denoted by Δ_{DPCCH} (in dB). The previous value of DPCCH power shall be that used in the previous slot, except in the event of an interruption in transmission due to the use of compressed mode or discontinuous uplink DPCCH transmission operation, when the previous value shall be that used in the last slot before the transmission gap. During the operation of the uplink power control procedure the UE transmit power shall not exceed a maximum allowed value which is the lower out of the maximum output power of the terminal power class and a value which may be set by higher layer signalling. Uplink power control shall be performed while the UE transmit power is below the maximum allowed output power. The provisions for power control at the maximum allowed value and below the required minimum output power (as defined in [7]) are described in sub-clause 5.1.2.6.

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	5.1.2.6 Maximum and minimum power limits When E-DCH is not configured, in the case that the total UE transmit power (after applying DPCCH power adjustments and gain factors) would exceed the maximum allowed value, the UE shall apply additional scaling to the total transmit power so that it is equal to the maximum allowed power. This additional scaling shall be such that the power ratio between DPCCH and DPDCH and also DPCCH and HS-DPCCH remains as required by sub-clause 5.1.2.5 and 5.1.2.5A. When E-DCH is configured on a single frequency or E-DCH is configured on multiple frequencies but Secondary_EDCH_Cell_Active is 0. - If the total UE transmit power (after applying DPCCH power adjustments and gain factors) would exceed the maximum allowed value, the UE shall firstly reduce all the E-DPDCH gain factors $\beta_{ed,k}$ by an equal scaling factor to respective values $\beta_{ed,k, reduced}$ so that the total transmit power would be equal to the maximum allowed power. - Also if $E-TFCL_i$ is greater than $E-TFCL_{ec, boost}$, UE shall reduce only E-DPDCH gain factors to respective values $\beta_{ed,k, reduced}$ and E-DPCCH is transmitted using original β_{ec} which is not recalculated according to the reduced E-DPDCH gain factors. After calculating the reduced E-DPDCH gain factors, if $E-TFCL_i$ is smaller than or equal to $E-TFCL_{ec, boost}$, quantization according to table 1B.2 in [3] subclause 4.2.1.3 may be applied, or if $E-TFCL_i$ is greater than $E-TFCL_{ec, boost}$, quantization according to table 1B.2B in [3] subclause 4.2.1.3 may be applied, where each $\beta_{ed,k, reduced}$ is quantized such that $\beta_{ed,k}/\beta_c$ is the largest quantized value for which the condition $\beta_{ed,k} \leq \beta_{ed,k, reduced}$ holds. In case a DPDCH is configured, if any $\beta_{ed,k, reduced}/\beta_c$ is less than the smallest quantized value of Table 1B.2 in [3] subclause 4.2.1.3, DTX may be used on that E-DPDCH (E-DPCCH is, however still transmitted using β_{ec}). In case no DPDCH is configured and regardless of the applied uplink modulation, if any $\beta_{ed,k, reduced}/\beta_c$ is less than $\beta_{ed,k, reduced, min}/\beta_c$, that $\beta_{ed,k}$ shall be set to $\beta_{ed,k, min}$ such that $\beta_{ed,k, min}/\beta_c = \min(\beta_{ed,k, reduced, min}/\beta_c, \beta_{ed,k, original}/\beta_c)$, where $\beta_{ed,k, original}$ denotes the E-DPDCH gain factor before reduction and $\beta_{ed,k, reduced, min}$ is configurable by higher layers. - In the following cases, the UE shall then apply additional scaling to the total transmit power so that it is equal to the maximum allowed power: - if a DPDCH is configured and the total UE transmit power would still exceed the maximum allowed value even though DTX is used on all E-DPDCHs; - if no DPDCH is configured and the total UE transmit power would still exceed the maximum allowed value even though $\beta_{ed,k}$ is equal to $\beta_{ed,k, min}$ for all k. The UE, when receiving a command to scale the transmission power, distributes the increment/decrement among all codes such that ratios are always maintained according to their respective conditions. Hence, the UE, or the processor within the UE, is programmed to maintain a previously determined transmit power difference. <u>Alternatively, CCE contends that this claim element is met under the doctrine of equivalents because above-described features of the Accused Products perform</u>

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	<u>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.</u>
14. The method as claimed in claim 9, wherein said determining of the transmit power difference is performed by the subscriber station.	See analysis of claim 9, which is incorporated herein by reference. As each '174 LG Accused Product is compliant with technical specifications published by 3GPP and ETSI for UMTS technology, each '174 LG Accused Product performs the determining of the transmit power difference by virtue of receiving and interpreting information from the NodeB that factors in the power ratio between the E-DPDCD and DPCCH as required by $\beta_{ed,k,min}/\beta_c$.
18. A subscriber station for a radio communication system, the subscriber station assigned a plurality of codes for transmitting messages, comprising:	Each Defendant makes, uses, sells, offers to sell, and/or imports the '174 LG Accused Products, each which is a cellular device that includes and performs the features and capabilities described in this claim. Plaintiff contends that each Defendant directly infringes this claim because it makes, uses, sells, offers to sell, and/or imports the '174 LG Accused Products, each of which includes and/or practices each and every element of this claim. Each '174 LG Accused Product is a subscriber station for a radio communication system, as set forth in this claim. Specifically, each '174 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 a Universal Mobile Telecommunications System (UMTS) Terrestrial Radio Access Network (UTRAN) environment. As such, each '174 LG Accused Product is compliant with technical specifications published by 3GPP and ETSI for UMTS technology, including TS 25.213, TS 25.215, TS 25.133, and TS 25.214.¹⁷ Indeed, the '174 patent is essential to

¹⁷ See TS 25.213 Technical Specification, http://www.etsi.org/deliver/etsi_ts/125200_125299/125213/09.02.00_60/ts_125213v090200p.pdf; TS 25.215 Technical Specification, http://www.etsi.org/deliver/etsi_ts/125200_125299/125215/09.02.00_60/ts_125215v090200p.pdf; TS 25.133 Technical Specification,

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	compliance with UMTS standards.¹⁸ In the UMTS network environment, a subscriber station (or user equipment, "UE"), such as each of the '174 LG Accused Products, is assigned a plurality of codes (e.g., DPCCH, DPDCH, HS-DPCCH, E-DPCCH, and E-DPDCH codes) for transmitting wireless messages. Such codes are defined and described in technical specifications published by 3GPP and ETSI for UMTS technology.¹⁹
at least one processor programmed to determine a transmit power difference which is to be maintained by the subscriber station between on one hand a total maximum transmit power of the subscriber station for the codes and on another hand a total transmit power of the subscriber station for the codes at a start of a message transmission using a first one of the codes.	Each '174 LG Accused Product includes a processor programmed to determine a transmit power difference which is to be maintained by the subscriber station (i.e., the Accused Product) between, on one hand, a total maximum transmit power of the subscriber station for the codes, and on another hand, a total transmit power of the subscriber station for the codes at a start of a message transmission using a first one of the codes. In a UMTS system, each UE is assigned multiple physical channels represented by codes. Such physical channels may include DPCCH, DPDCH, HS-DPCCH, E-DPCCH, and E-DPDCH, each of which is represented by a code.²⁰ Additionally, each UE is capable of measuring transmission power headroom and reporting available power headroom for particular channels to nodes in the UMTS network. The reported UE transmission power headroom measurement is an estimate of the average value of the UE transmission power headroom over a 100ms period.²¹ UE transmission power headroom (UPH) is defined in TS 25.215 as follows:²²

http://www.etsi.org/deliver/etsi_ts/125100_125199/125133/09.07.00_60/ts_125133v090700p.pdf; TS 25.214 Technical Specification,

http://www.etsi.org/deliver/etsi_ts/125200_125299/125214/09.07.00_60/ts_125214v090700p.pdf.

¹⁸ http://ipr.etsi.org/IPRDetails.aspx?IPRD_ID=700&IPRD_TYPE_ID=2&MODE=2 (accessed Dec. 28, 2013).

¹⁹ TS 25.213 Technical Specification, http://www.etsi.org/deliver/etsi_ts/125200_125299/125213/09.02.00_60/ts_125213v090200p.pdf, at 8-9.

²⁰ *Id.*

²¹ TS 25.133 Technical Specification, http://www.etsi.org/deliver/etsi_ts/125100_125199/125133/09.07.00_60/ts_125133v090700p.pdf, at 102.

²² TS 25.215 Technical Specification, http://www.etsi.org/deliver/etsi_ts/125200_125299/125215/09.02.00_60/ts_125215v090200p.pdf, at 12.

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	5.1.14 UE transmission power headroom <table border="1" data-bbox="764 370 1793 678"> <tr> <td data-bbox="764 370 968 678">Definition</td><td data-bbox="968 370 1793 678"> For each uplink DPCCH, UE transmission power headroom (UPH) is the ratio of the maximum UE transmission power and the DPCCH code power, and shall be calculated as following: $UPH = P_{max,tx} / P_{DPCCH}$ where: $P_{max,tx} = \min$ {Maximum allowed UL TX Power, P_{max}} is the UE maximum transmission power; Maximum allowed UL TX Power is set by UTRAN and defined in [14]; P_{max} is the UE nominal maximum output power according to the UE power class and specified in [18] table 6.1; P_{DPCCH} is the transmitted code power on the DPCCH. The reference point for the UE transmission power headroom shall be the antenna connector of the UE. </td></tr> <tr> <td data-bbox="764 654 968 678">Applicable for</td><td data-bbox="968 654 1793 678">CELL_FACH intra, CELL_DCH intra</td></tr> </table> As explained above, each '174 LG Accused Product is configured to support and provide communications in a UMTS environment and therefore complies with UMTS technical specifications. Thus, when communicating in a UMTS environment, each '174 LG Accused Product determines a UPH by receiving and interpreting information from the NodeB that factors in the power ratio between the E-DPDCH and DPCCH as required by $\beta_{ed,k,min}/\beta_c$.²³ - Any additional scaling of the total transmit power as described above shall be such that the power ratio between DPCCH and DPDCH, between DPCCH and HS-DPCCH, and between DPCCH and E-DPCCH, remains as required by sub-clauses 5.1.2.5, 5.1.2.5A and 5.1.2.5B.1, and such that the power ratio between each E-DPDCH and DPCCH remains as required by $\beta_{ed,k,min}/\beta_c$ if DTX is not used on E-DPDCH. Any slot-level scaling of β_{ed} or DTX of E-DPDCH as described above is applied at layer 1 only and is transparent to higher layers. Thus the UE determines the transmit power difference between a total maximum transmit power of the subscriber station for the codes ($P_{max,tx}$, a constant, or in the alternative, the total allocated power allocated for the codes) and a total transmit power of the subscriber station for the codes at the start of a message transmission using one of the codes (e.g., P_{DPCCH}). <u>As explained in the cited portion of TS 25.214 shown above, the UE maintains this transmit power</u>	Definition	For each uplink DPCCH, UE transmission power headroom (UPH) is the ratio of the maximum UE transmission power and the DPCCH code power, and shall be calculated as following: $UPH = P_{max,tx} / P_{DPCCH}$ where: $P_{max,tx} = \min$ {Maximum allowed UL TX Power, P_{max}} is the UE maximum transmission power; Maximum allowed UL TX Power is set by UTRAN and defined in [14]; P_{max} is the UE nominal maximum output power according to the UE power class and specified in [18] table 6.1; P_{DPCCH} is the transmitted code power on the DPCCH. The reference point for the UE transmission power headroom shall be the antenna connector of the UE.	Applicable for	CELL_FACH intra, CELL_DCH intra
Definition	For each uplink DPCCH, UE transmission power headroom (UPH) is the ratio of the maximum UE transmission power and the DPCCH code power, and shall be calculated as following: $UPH = P_{max,tx} / P_{DPCCH}$ where: $P_{max,tx} = \min$ {Maximum allowed UL TX Power, P_{max}} is the UE maximum transmission power; Maximum allowed UL TX Power is set by UTRAN and defined in [14]; P_{max} is the UE nominal maximum output power according to the UE power class and specified in [18] table 6.1; P_{DPCCH} is the transmitted code power on the DPCCH. The reference point for the UE transmission power headroom shall be the antenna connector of the UE.				
Applicable for	CELL_FACH intra, CELL_DCH intra				

²³ TS 25.214 Technical Specification, http://www.etsi.org/deliver/etsi_ts/125200_125299/125214/09.07.00_60/ts_125214v090700p.pdf at 33-34.

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	<u>difference via a power control procedure applicable at the start of a message transmission on a first code:</u> 5.1.2 DPCCH/DPDCH 5.1.2.1 General The initial uplink DPCCH transmit power is set by higher layers. Subsequently the uplink transmit power control procedure simultaneously and independently controls the power of a DPCCH on each activated uplink frequency and its corresponding DPDCHs (if present). The relative transmit power offset between DPCCH and DPDCHs is determined by the network and is computed according to subclause 5.1.2.5 using the gain factors signalled to the UE using higher layer signalling. The operation of the inner power control loop, described in sub clause 5.1.2.2, adjusts the power of the DPCCH and DPDCHs by the same amount, provided there are no changes in gain factors. Additional adjustments to the power of the DPCCH associated with the use of compressed mode are described in sub clause 5.1.2.3. Any change in the uplink DPCCH transmit power shall take place immediately before the start of the pilot field on the DPCCH. The change in DPCCH power with respect to its previous value is derived by the UE and is denoted by Δ_{DPCCH} (in dB). The previous value of DPCCH power shall be that used in the previous slot, except in the event of an interruption in transmission due to the use of compressed mode or discontinuous uplink DPCCH transmission operation, when the previous value shall be that used in the last slot before the transmission gap. During the operation of the uplink power control procedure the UE transmit power shall not exceed a maximum allowed value which is the lower out of the maximum output power of the terminal power class and a value which may be set by higher layer signalling. Uplink power control shall be performed while the UE transmit power is below the maximum allowed output power. The provisions for power control at the maximum allowed value and below the required minimum output power (as defined in [7]) are described in sub-clause 5.1.2.6.

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	5.1.2.6 Maximum and minimum power limits When E-DCH is not configured, in the case that the total UE transmit power (after applying DPCCH power adjustments and gain factors) would exceed the maximum allowed value, the UE shall apply additional scaling to the total transmit power so that it is equal to the maximum allowed power. This additional scaling shall be such that the power ratio between DPCCH and DPDCH and also DPCCH and HS-DPCCH remains as required by sub-clause 5.1.2.5 and 5.1.2.5A. When E-DCH is configured on a single frequency or E-DCH is configured on multiple frequencies but Secondary_EDCH_Cell_Active is 0. - If the total UE transmit power (after applying DPCCH power adjustments and gain factors) would exceed the maximum allowed value, the UE shall firstly reduce all the E-DPDCH gain factors $\beta_{ed,k}$ by an equal scaling factor to respective values $\beta_{ed,k, reduced}$ so that the total transmit power would be equal to the maximum allowed power. - Also if $E-TFCL_i$ is greater than $E-TFCL_{ec, boost}$, UE shall reduce only E-DPDCH gain factors to respective values $\beta_{ed,k, reduced}$ and E-DPCCH is transmitted using original β_{ec} which is not recalculated according to the reduced E-DPDCH gain factors. After calculating the reduced E-DPDCH gain factors, if $E-TFCL_i$ is smaller than or equal to $E-TFCL_{ec, boost}$, quantization according to table 1B.2 in [3] subclause 4.2.1.3 may be applied, or if $E-TFCL_i$ is greater than $E-TFCL_{ec, boost}$, quantization according to table 1B.2B in [3] subclause 4.2.1.3 may be applied, where each $\beta_{ed,k, reduced}$ is quantized such that $\beta_{ed,k}/\beta_c$ is the largest quantized value for which the condition $\beta_{ed,k} \leq \beta_{ed,k, reduced}$ holds. In case a DPDCH is configured, if any $\beta_{ed,k, reduced}/\beta_c$ is less than the smallest quantized value of Table 1B.2 in [3] subclause 4.2.1.3, DTX may be used on that E-DPDCH (E-DPCCH is, however still transmitted using β_{ec}). In case no DPDCH is configured and regardless of the applied uplink modulation, if any $\beta_{ed,k, reduced}/\beta_c$ is less than $\beta_{ed,k, reduced, min}/\beta_c$, that $\beta_{ed,k}$ shall be set to $\beta_{ed,k, min}$ such that $\beta_{ed,k, min}/\beta_c = \min(\beta_{ed,k, reduced, min}/\beta_c, \beta_{ed,k, original}/\beta_c)$, where $\beta_{ed,k, original}$ denotes the E-DPDCH gain factor before reduction and $\beta_{ed,k, reduced, min}$ is configurable by higher layers. - In the following cases, the UE shall then apply additional scaling to the total transmit power so that it is equal to the maximum allowed power: - if a DPDCH is configured and the total UE transmit power would still exceed the maximum allowed value even though DTX is used on all E-DPDCHs; - if no DPDCH is configured and the total UE transmit power would still exceed the maximum allowed value even though $\beta_{ed,k}$ is equal to $\beta_{ed,k, min}$ for all k. <u>The UE, when receiving a command to scale the transmission power, distributes the increment/decrement among all codes such that ratios are always maintained according to their respective conditions. Hence, the UE, or the processor within the UE, is programmed to maintain a determined transmit power difference.</u> <u>Alternatively, CCE 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</u>

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	<u>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.</u>
19. A subscriber station as claimed in claim 18, wherein said at least one processor is further programmed to maintain the transmit power difference.	See analysis of claim 18, which is incorporated herein by reference. As each '174 LG Accused Product is compliant with technical specifications published by 3GPP and ETSI for UMTS technology, the processor of each '174 LG Accused Product is further programmed to maintain the previously determined transmit power difference. ~~The~~<u>As noted above, the</u> UE, when receiving a command to scale the transmission power, distributes the increment/decrement among all codes such that ratios are always maintained according to their respective conditions. Hence, the UE, or the processor within the UE, is programmed to maintain a previously determined transmit power difference.

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U.S. Pat. No. 8,055,820	'820 LG ACCUSED PRODUCTS ¹
1. A method, comprising:	LG, AT&T, Verizon, Sprint, and T-Mobile infringe the '820 patent either directly and/or indirectly. Each Defendant makes, uses, sells, offers to sell, and/or imports '820 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 directly infringes this claim because it makes, uses, sells, offers to sell, and/or imports the '820 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 its disclosure to ETSI), its customers' use of the '820 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 that use the '820 LG Accused Products to practice each and every one of the following claim elements, with knowledge that infringing features of the '820 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 the combination for which such features was made infringes this claim.

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¹ Discovery in this case is ongoing. 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 '820 LG Accused Products include the following products: LG Connect 4G, LG Escape 4G, LG Esteem 4G, LG F7, LG G Flex, LG G2, LG Intuition, LG Lucid 2, LG Lucid 4G, LG Mach 4G LTE, LG Motion 4G, LG Nexus 5, LG Nitro HD, LG Optimus F3, LG Optimus F3Q, LG Optimus F6, LG Optimus G, LG Optimus G Pro, LG Regard, LG Revolution 4G, LG Spectrum 2, LG Spectrum 4G, LG Spirit 4G, LG Viper 4G LTE, LG VL600 Modem, LG G3, LG G Vista, LG G Pad 7.0 LTE, LG Lucid 3, and LG Volt. Evidence supporting the use of relevant technology contained within this chart is listed in Appendix E-1.

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U.S. Pat. No. 8,055,820	'820 LG ACCUSED PRODUCTS ¹
	Each '820 LG Accused Product is a subscriber station that performs a method as set forth in this claim. Specifically, each '820 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 (E-UTRA) environment. As such, each '820 LG Accused Product is compliant with and supports technical specifications published by 3GPP and ETSI for LTE (E-UTRA) technology, including TS 36.321, Release 8 and subsequent versions.³ Indeed, the '820 patent is essential to compliance with LTE (E-UTRA) standards.⁴ In the LTE (E-UTRA) network environment, a subscriber station (or user equipment, "UE"), such as each '820 LG Accused Product, is configured to perform a buffer status reporting procedure as set forth in TS 36.321. Buffer Status Reports (BSRs) from UE to network nodes are used to assist network allocation of uplink radio resources. In an LTE (E-UTRA) network environment, radio resources are only allocated for transmission to or from a UE if data is available to be sent or received. In the downlink direction, the network node scheduler is aware of the amount of data to be delivered to a UE. In the uplink direction, however, scheduling decisions are performed by a network node (e.g., an eNodeB) and the buffer for the data is located in the UE. Accordingly, BSRs must be sent by the UE to the network node to indicate the amount of data in the UE that needs to be transmitted over the uplink. <i>See</i> Stefania Sesia, et al., "LTE: The UMTS Long Term Evolution: From Theory to Practice," John Wiley & Sons, 2009. Accordingly, each '820 LG Accused Product performs a BSR reporting procedure, set forth in TS 36.321, to provide serving network nodes with information about the amount of data available for transmission in its uplink

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³ See TS 36.321 Technical Specification, http://www.etsi.org/deliver/etsi_ts/136300_136399/136321/08.12.00_60/ts_136321v081200p.pdf

⁴ http://ipr.etsi.org/IPRDetails.aspx?IPRD_ID=691&IPRD_TYPE_ID=2&MODE=2 (last accessed Mar. 20, 2014)

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	buffers. More specifically, a BSR is triggered in each '820 LG Accused Product if any of certain pre-selected conditions corresponding to the buffers occur, as set forth in TS 36.321. Depending on the condition detected, each '820 LG Accused Product designates a BSR reporting format (e.g., long BSR, truncated BSR, short BSR): 5.4.5 Buffer Status Reporting The Buffer Status reporting procedure is used to provide the serving eNB with information about the amount of data available for transmission in the UL buffers of the UE. RRC controls BSR reporting by configuring the two timers <i>periodicBSR-Timer</i> and <i>retxBSR-Timer</i> and by, for each logical channel, optionally signalling <i>logicalChannelGroup</i> which allocates the logical channel to an LCG [8]. For the Buffer Status reporting procedure, the UE shall consider all radio bearers which are not suspended and may consider radio bearers which are suspended. A Buffer Status Report (BSR) shall be triggered if any of the following events occur: - UL data, for a logical channel which belongs to a LCG, becomes available for transmission in the RLC entity or in the PDCP entity (the definition of what data shall be considered as available for transmission is specified in [3] and [4] respectively) and either the data belongs to a logical channel with higher priority than the priorities of

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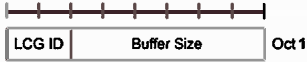
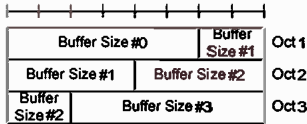
U.S. Pat. No. 8,055,820	'820 LG ACCUSED PRODUCTS ¹
	the logical channels which belong to any LCG and for which data is already available for transmission, or there is no data available for transmission for any of the logical channels which belong to a LCG, in which case the BSR is referred below to as "Regular BSR"; - UL resources are allocated and number of padding bits is equal to or larger than the size of the Buffer Status Report MAC control element plus its subheader, in which case the BSR is referred below to as "Padding BSR"; <i>retxBSR-Timer</i> expires and the UE has data available for transmission for any of the logical channels which belong to a LCG, in which case the BSR is referred below to as "Regular BSR"; <i>periodicBSR-Timer</i> expires, in which case the BSR is referred below to as "Periodic BSR". For Regular and Periodic BSR: - if more than one LCG has data available for transmission in the TTI where the BSR is transmitted: report Long BSR; - else report Short BSR. For Padding BSR: - if the number of padding bits is equal to or larger than the size of the Short BSR plus its subheader but smaller than the size of the Long BSR plus its subheader: - if more than one LCG has data available for transmission in the TTI where the BSR is transmitted: report Truncated BSR of the LCG with the highest priority logical channel with data available for transmission; - else report Short BSR. - else if the number of padding bits is equal to or larger than the size of the Long BSR plus its subheader, report Long BSR. Long BSRs, Short BSRs, and Truncated BSRs are formatted as set forth in TS 36.321:

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	The fields LCG ID and Buffer Size are defined as follow: - LCG ID: The Logical Channel Group ID field identifies the group of logical channel(s) which buffer status is being reported. The length of the field is 2 bits; - Buffer Size: The Buffer Size field identifies the total amount of data available across all logical channels of a logical channel group after the MAC PDU has been built. The amount of data is indicated in number of bytes. It shall include all data that is available for transmission in the RLC layer and in the PDCP layer; the definition of what data shall be considered as available for transmission is specified in [3] and [4] respectively. The size of the RLC and MAC headers are not considered in the buffer size computation. The length of this field is 6 bits. The values taken by the Buffer Size field are shown in Table 6.1.3.1-1.  Figure 6.1.3.1-1: Short BSR and Truncated BSR MAC control element  Figure 6.1.3.1-2: Long BSR MAC control element As shown above, the Short BSR format comprises 1 byte of information with a 2-bit LCG identifier and a 6-bit buffer size, while the Long BSR format comprises 3 bytes of information with four segments, 6 bits long, each corresponding to a particular LCG. Accordingly, the Long BSR reports the amount of data for four logical channel groups (LCGs), while the Short BSR reports the amount of data for one LCG. In the LTE (E-UTRA) network environment, each radio bearer (or logical channel) is mapped to a LCG by a network node (e.g., eNodeB) based on the quality of service attributes of the radio bearers (e.g., QoS Class Identifier). Accordingly, the Short BSR format corresponds to the buffer status of a single radio bearer group and the Long BSR format corresponds to the buffer status of multiple radio bearer groups. As shown above, TS 36.321 sets forth conditions under which a "Regular BSR" or "Periodic BSR" is triggered. For "Regular BSRs" and "Periodic BSRs," if

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	more than one LCG has data available for transmission, the Long BSR format is used. Accordingly, each '820 LG Accused Product designates the Long BSR format when multiple buffers for different radio bearer groups store data beyond a preselected threshold (e.g., when uplink data becomes available for transmission in different bearer groups). As further shown above, in the case of "Padding BSR," each '820 LG Accused Product reports a Long BSR when (1) uplink resources are allocated for buffered data (i.e., the buffers contain data waiting to be transferred from the UE to the network), (2) the number of padding bits is equal to or larger than the size of the BSR MAC control element plus its sub-header, and (3) the number of padding bits is equal to or larger than the size of a Long BSR plus its sub-header. Thus, when there is sufficient uplink bandwidth available for a Long BSR, each '820 LG Accused Product designates and communicates using the Long BSR format. Continuing with the case of "Padding BSR," each '820 LG Accused Product reports a Short or Truncated BSR when the number of padding bits is smaller than the size of a Long BSR but equal to or larger than a Short BSR. In such circumstances, if more than once LCG has data for transmission, each '820 LG Accused Product will report a Truncated BSR of the LCG with the highest priority logical channel with data available for transmission.
monitoring a usage of a plurality of buffers;	Each '820 LG Accused Product monitors a usage of a plurality of buffers. As explained above, each '820 LG Accused Product provides BSRs based on the buffer status of one or more LCGs.
detecting one of a plurality of pre-selected conditions corresponding to the plurality of buffers;	Each '820 LG Accused Product detects one of a plurality of pre-selected conditions corresponding to the plurality of buffers. As explained above, the pre-selected conditions corresponding to buffers that may be detected by each '820 LG Accused Product are set forth in TS 36.321:

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	5.4.5 Buffer Status Reporting The Buffer Status reporting procedure is used to provide the serving eNB with information about the amount of data available for transmission in the UL buffers of the UE. RRC controls BSR reporting by configuring the two timers <i>periodicBSR-Timer</i> and <i>retxBSR-Timer</i> and by, for each logical channel, optionally signalling <i>logicalChannelGroup</i> which allocates the logical channel to an LCG [8]. For the Buffer Status reporting procedure, the UE shall consider all radio bearers which are not suspended and may consider radio bearers which are suspended. A Buffer Status Report (BSR) shall be triggered if any of the following events occur: - UL data, for a logical channel which belongs to a LCG, becomes available for transmission in the RLC entity or in the PDCP entity (the definition of what data shall be considered as available for transmission is specified in [3] and [4] respectively) and either the data belongs to a logical channel with higher priority than the priorities of the logical channels which belong to any LCG and for which data is already available for transmission, or there is no data available for transmission for any of the logical channels which belong to a LCG, in which case the BSR is referred below to as "Regular BSR"; - UL resources are allocated and number of padding bits is equal to or larger than the size of the Buffer Status Report MAC control element plus its subheader, in which case the BSR is referred below to as "Padding BSR"; <i>retxBSR-Timer</i> expires and the UE has data available for transmission for any of the logical channels which belong to a LCG, in which case the BSR is referred below to as "Regular BSR"; <i>periodicBSR-Timer</i> expires, in which case the BSR is referred below to as "Periodic BSR". For Regular and Periodic BSR: - if more than one LCG has data available for transmission in the TTI where the BSR is transmitted: report Long BSR; - else report Short BSR. For Padding BSR: - if the number of padding bits is equal to or larger than the size of the Short BSR plus its subheader but smaller than the size of the Long BSR plus its subheader: - if more than one LCG has data available for transmission in the TTI where the BSR is transmitted: report Truncated BSR of the LCG with the highest priority logical channel with data available for transmission; - else report Short BSR. - else if the number of padding bits is equal to or larger than the size of the Long BSR plus its subheader, report Long BSR.
designating one of a plurality of buffer	Each '820 LG Accused Product designates one of a plurality of buffer status

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status reporting formats comprising a long buffer status reporting format and a short buffer status reporting format depending on the pre-selected condition detected; and	reporting formats comprising a long buffer status reporting format and a short buffer status reporting format depending on the pre-selected condition detected. As explained above, each '820 LG Accused Product designates a Long BSR, Truncated BSR, or Short BSR depending on detected conditions. In the case of "Regular BSRs" and "Periodic BSRs," if more than one LCG has data available for transmission, the Long BSR format is used. Accordingly, each '820 LG Accused Product designates the Long BSR format when multiple buffers for different radio bearer groups store data beyond a preselected threshold (e.g., when uplink data becomes available for transmission in different bearer groups). In the case of "Padding BSR," each '820 LG Accused Product reports a Long BSR when (1) uplink resources are allocated for buffered data (i.e., the buffers contain data waiting to be transferred from the UE to the network), (2) the number of padding bits is equal to or larger than the size of the BSR MAC control element plus its sub-header, and (3) the number of padding bits is equal to or larger than the size of a Long BSR plus its sub-header. Each '820 LG Accused Product reports a Short or Truncated BSR when the number of padding bits is smaller than the size of a Long BSR but equal to or larger than a Short BSR.
communicating a buffer status report to a network device in accordance with the buffer status reporting format designated,	Each '820 LG Accused Product communicates a buffer status report to a network device in accordance with the buffer status reporting format designated. As explained above, each '820 LG Accused Product transmits a BSR (e.g., a Long BSR, Truncated BSR, or Short BSR) to a LTE (E-UTRA) network node (e.g., an eNodeB).
wherein the designating designates the long buffer status reporting format when there is sufficient uplink bandwidth to communicate using the long buffer status reporting format.	Each '820 LG Accused Product designates the long buffer status reporting format when there is sufficient uplink bandwidth to communicate using the long buffer status reporting format. For instance, as explained above in the case of "Padding BSR," each '820 LG Accused Product reports a Long BSR when (1) uplink resources are allocated for

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	buffered data (i.e., the buffers contain data waiting to be transferred from the UE to the network), (2) the number of padding bits is equal to or larger than the size of the BSR MAC control element plus its sub-header, and (3) the number of padding bits is equal to or larger than the size of a Long BSR plus its sub-header. <u>Additionally, as explained above for "Regular BSRs" and "Periodic BSRs," if more than one LCG has data available for transmission and bandwidth is available, the Long BSR format is used. In such instances, the Long BSR has priority over other data, including user data.</u> Thus, when there is sufficient uplink bandwidth available for a Long BSR (e.g., when there is enough space in the uplink resources allocated for buffered data), each '820 LG Accused Product designates and communicates using the Long BSR format. <u>Alternatively, CCE 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.</u>
4. The method of claim 1, wherein the short buffer status reporting format corresponds to reporting a buffer status of a single radio bearer group and the long buffer status reporting format corresponds to reporting a buffer status of multiple radio bearer groups.	<i>See</i> analysis of claim 1, which is incorporated herein by reference. As shown above, each '820 LG Accused Product includes and performs the features and capabilities described in claim 1. Further, the short buffer status reporting format used by each '820 LG Accused Product corresponds to reporting a buffer status of a single radio bearer group and the long buffer status reporting format corresponds to reporting a buffer status of multiple radio bearer groups. As explained above, Long BSRs, Short BSRs, and Truncated BSRs are formatted as set forth in TS 36.321:

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U.S. Pat. No. 8,055,820	'820 LG ACCUSED PRODUCTS ¹
	The fields LCG ID and Buffer Size are defined as follow: - LCG ID: The Logical Channel Group ID field identifies the group of logical channel(s) which buffer status is being reported. The length of the field is 2 bits; - Buffer Size: The Buffer Size field identifies the total amount of data available across all logical channels of a logical channel group after the MAC PDU has been built. The amount of data is indicated in number of bytes. It shall include all data that is available for transmission in the RLC layer and in the PDCP layer; the definition of what data shall be considered as available for transmission is specified in [3] and [4] respectively. The size of the RLC and MAC headers are not considered in the buffer size computation. The length of this field is 6 bits. The values taken by the Buffer Size field are shown in Table 6.1.3.1-1. <pre> ----- LCG ID Buffer Size ----- Oct 1 </pre> Figure 6.1.3.1-1: Short BSR and Truncated BSR MAC control element <pre> ----- Buffer Size #0 Buffer Size #1 ----- Buffer Size #1 Buffer Size #2 ----- Buffer Size #2 Buffer Size #3 ----- Oct 1 Oct 2 Oct 3 </pre> Figure 6.1.3.1-2: Long BSR MAC control element The Short BSR format comprises 1 byte of information with a 2-bit LCG identifier and a 6-bit buffer size, while the Long BSR format comprises 3 bytes of information with four segments, 6 bits long, each corresponding to a particular LCG. Accordingly, the Long BSR reports the amount of data for four logical channel groups (LCGs), while the Short BSR reports the amount of data for one LCG. In the LTE (EUTRA) network environment, each radio bearer (or logical channel) is mapped to a LCG by a network node (e.g., eNodeB) based on the quality of service attributes of the radio bearers (e.g., QoS Class Identifier). Accordingly, the Short BSR format corresponds to the buffer status of a single radio bearer group and the Long BSR format corresponds to the buffer status of multiple radio bearer groups.
6. The method of claim 1, wherein the designating designates the short buffer	~~See analysis of claim 1, which is incorporated herein by reference.~~

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U.S. Pat. No. 8,055,820	'820 LG ACCUSED PRODUCTS ¹
~~status reporting format when there is insufficient uplink bandwidth.~~	~~As shown above, each '820 LG Accused Product includes and performs the features and capabilities described in claim 1. Further, the short buffer status reporting format is used when there is insufficient uplink bandwidth for a long BSR.~~ 5.4.5 Buffer Status Reporting The Buffer Status reporting procedure is used to provide the serving eNB with information about the amount of data available for transmission in the UL buffers of the UE. RRC controls BSR reporting by configuring the two timers <i>periodicBSR-Timer</i> and <i>retxBSR-Timer</i> and by, for each logical channel, optionally signalling <i>logicalChannelGroup</i> which allocates the logical channel to an LCG [8]. ~~For the Buffer Status reporting procedure, the UE shall consider all radio bearers which are not suspended and may consider radio bearers which are suspended.~~ A Buffer Status Report (BSR) shall be triggered if any of the following events occur: • UL data, for a logical channel which belongs to a LCG, becomes available for transmission in the RLC entity or in the PDCP entity (the definition of what data shall be considered as available for transmission is specified in [3] and [4] respectively) and either the data belongs to a logical channel with higher priority than the priorities of

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	the logical channels which belong to any LCG and for which data is already available for transmission, or there is no data available for transmission for any of the logical channels which belong to a LCG, in which case the BSR is referred below to as "Regular BSR"; - UL resources are allocated and number of padding bits is equal to or larger than the size of the Buffer Status Report MAC control element plus its subheader, in which case the BSR is referred below to as "Padding BSR"; ~~retx~~BSR-Timer expires and the UE has data available for transmission for any of the logical channels which belong to a LCG, in which case the BSR is referred below to as "Regular BSR"; ~~periodic~~BSR-Timer expires, in which case the BSR is referred below to as "Periodic BSR". For Regular and Periodic BSR: - if more than one LCG has data available for transmission in the TTI where the BSR is transmitted: report Long BSR; - else report Short BSR. For Padding BSR: - if the number of padding bits is equal to or larger than the size of the Short BSR plus its subheader but smaller than the size of the Long BSR plus its subheader: - if more than one LCG has data available for transmission in the TTI where the BSR is transmitted: report Truncated BSR of the LCG with the highest priority logical channel with data available for transmission; - else report Short BSR. - else if the number of padding bits is equal to or larger than the size of the Long BSR plus its subheader, report Long BSR.
~~7.6.~~ The method of claim 1, wherein the <u>designating designates the</u> short buffer status reporting format <u>comprises 1 byte of information and the long buffer status reporting format comprises 3 bytes of information</u>when there is insufficient uplink bandwidth.	<u>See analysis of claim 1, which is incorporated herein by reference.</u> As shown above, each '820 LG Accused Product includes and performs the features and capabilities described in claim 1. Further, the short buffer status reporting format <u>of each '820 LG Accused Product comprises 1 byte of information and the long buffer status reporting format comprises 3 bytes of information</u>is used when there is insufficient uplink bandwidth for a long BSR: <u>As</u>

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U.S. Pat. No. 8,055,820	'820 LG ACCUSED PRODUCTS ¹
	5.4.5 Buffer Status Reporting The Buffer Status reporting procedure is used to provide the serving eNB with information about the amount of data available for transmission in the UL buffers of the UE. RRC controls BSR reporting by configuring the two timers <i>periodicBSR-Timer</i> and <i>retxBSR-Timer</i> and by, for each logical channel, optionally signalling <i>logicalChannelGroup</i> which allocates the logical channel to an LCG [8]. For the Buffer Status reporting procedure, the UE shall consider all radio bearers which are not suspended and may consider radio bearers which are suspended. A Buffer Status Report (BSR) shall be triggered if any of the following events occur: - UL data, for a logical channel which belongs to a LCG, becomes available for transmission in the RLC entity or in the PDCP entity (the definition of what data shall be considered as available for transmission is specified in [3] and [4] respectively) and either the data belongs to a logical channel with higher priority than the priorities of the logical channels which belong to any LCG and for which data is already available for transmission, or there is no data available for transmission for any of the logical channels which belong to a LCG, in which case the BSR is referred below to as "Regular BSR"; - UL resources are allocated and number of padding bits is equal to or larger than the size of the Buffer Status Report MAC control element plus its subheader, in which case the BSR is referred below to as "Padding BSR"; - <i>retxBSR-Timer</i> expires and the UE has data available for transmission for any of the logical channels which belong to a LCG, in which case the BSR is referred below to as "Regular BSR"; - <i>periodicBSR-Timer</i> expires, in which case the BSR is referred below to as "Periodic BSR". For Regular and Periodic BSR: - if more than one LCG has data available for transmission in the TTI where the BSR is transmitted: report Long BSR; - else report Short BSR. For Padding BSR: - if the number of padding bits is equal to or larger than the size of the Short BSR plus its subheader but smaller than the size of the Long BSR plus its subheader: - if more than one LCG has data available for transmission in the TTI where the BSR is transmitted: report Truncated BSR of the LCG with the highest priority logical channel with data available for transmission; - else report Short BSR. - else if the number of padding bits is equal to or larger than the size of the Long BSR plus its subheader, report Long BSR. ~~For instance, as explained above, Long BSRs, Short BSRs, and Truncated BSRs~~

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	~~in the case of "Padding BSR," each '820 LG Accused Product are formatted as set forth in TS 36.321:~~ The fields LCG ID and Buffer Size are defined as follow: - LCG ID: The Logical Channel Group ID field identifies the group of logical channel(s) which buffer status is being reported. The length of the field is 2 bits; - Buffer Size: The Buffer Size field identifies the total amount of data available across all logical channels of a logical channel group after the MAC PDU has been built. The amount of data is indicated in number of bytes. It shall include all data that is available for transmission in the RLC layer and in the PDCP layer; the definition of what data shall be considered as available for transmission is specified in [3] and [4] respectively. The size of the RLC and MAC headers are not considered in the buffer size computation. The length of this field is 6 bits. The values taken by the Buffer Size field are shown in Table 6.1.3.1-1. LCG ID Buffer Size Oct 1 Figure 6.1.3.1-1: Short BSR and Truncated BSR MAC control element Buffer Size #0 Buffer Size #1 Oct 1 Buffer Size #1 Buffer Size #2 Oct 2 Buffer Size #2 Buffer Size #3 Oct 3 Figure 6.1.3.1-2: Long BSR MAC control element ~~The reports a Short or Truncated BSR when the number of padding bits is smaller than the size of a Long BSR but equal to or larger than a Short BSR-format of each '820 LG Accused Product comprises 1 byte (i.e., 8 bits) of information with a 2-bit LCG identifier and a 6-bit buffer size, while the Long BSR-format of each '820 LG Accused Product comprises 3 bytes (i.e., 24 bits) of information with four segments, 6 bits long, each corresponding to a particular LCG.~~ <u>Alternatively, CCE 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</u>

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	<u>immaterial to infringement.</u>												
~~8. The method of claim 1, wherein the short buffer status reporting format comprises a 2 bit radio bearer group identifier and a 6 bit buffer size.~~	~~See analysis of claim 1, which is incorporated herein by reference.~~ ~~As shown above, each '820 LG Accused Product includes and performs the features and capabilities described in claim 1. Further, the short buffer status reporting format of each '820 LG Accused Product comprises a 2 bit radio bearer group identifier and a 6 bit buffer size.~~ ~~As explained above, Long BSRs, Short BSRs, and Truncated BSRs of each '820 LG Accused Product are formatted as set forth in TS 36.321:~~ The fields LCG ID and Buffer Size are defined as follow: • LCG ID: The Logical Channel Group ID field identifies the group of logical channel(s) which buffer status is being reported. The length of the field is 2 bits; • Buffer Size: The Buffer Size field identifies the total amount of data available across all logical channels of a logical channel group after the MAC PDU has been built. The amount of data is indicated in number of bytes. It shall include all data that is available for transmission in the RLC layer and in the PDCP layer; the definition of what data shall be considered as available for transmission is specified in [3] and [4] respectively. The size of the RLC and MAC headers are not considered in the buffer size computation. The length of this field is 6 bits. The values taken by the Buffer Size field are shown in Table 6.1.3.1-1. <table><tr><td>LCG ID</td><td>Buffer Size</td><td>Oct 1</td></tr></table> Figure 6.1.3.1-1: Short BSR and Truncated BSR MAC control element <table><tr><td>Buffer Size #0</td><td>Buffer Size #1</td><td>Oct 1</td></tr><tr><td>Buffer Size #1</td><td>Buffer Size #2</td><td>Oct 2</td></tr><tr><td>Buffer Size #2</td><td>Buffer Size #3</td><td>Oct 3</td></tr></table> Figure 6.1.3.1-2: Long BSR MAC control element ~~The Short BSR format of each '820 LG Accused Product comprises 1 byte (i.e., 8 bits) of information with a 2 bit LCG identifier and a 6 bit buffer size, while the Long BSR format of each '820 LG Accused Product comprises 3 bytes (i.e., 24~~	LCG ID	Buffer Size	Oct 1	Buffer Size #0	Buffer Size #1	Oct 1	Buffer Size #1	Buffer Size #2	Oct 2	Buffer Size #2	Buffer Size #3	Oct 3
LCG ID	Buffer Size	Oct 1											
Buffer Size #0	Buffer Size #1	Oct 1											
Buffer Size #1	Buffer Size #2	Oct 2											
Buffer Size #2	Buffer Size #3	Oct 3											

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	~~bits) of information with four segments, 6 bits long, each corresponding to a particular LCG.~~
9. The method of claim 1, wherein the long buffer status reporting format comprises four segments of 6-bits of information, each segment thereof corresponding to a distinct radio bearer group.	See analysis of claim 1, which is incorporated herein by reference. As shown above, each '820 LG Accused Product includes and performs the features and capabilities described in claim 1. Further, the long buffer status reporting format of each '820 LG Accused Product comprises four segments of 6-bits of information, each segment thereof corresponding to a distinct radio bearer group. As explained above, Long BSRs, Short BSRs, and Truncated BSRs of each '820 LG Accused Product are formatted as set forth in TS 36.321: The fields LCG ID and Buffer Size are defined as follow: - LCG ID: The Logical Channel Group ID field identifies the group of logical channel(s) which buffer status is being reported. The length of the field is 2 bits; - Buffer Size: The Buffer Size field identifies the total amount of data available across all logical channels of a logical channel group after the MAC PDU has been built. The amount of data is indicated in number of bytes. It shall include all data that is available for transmission in the RLC layer and in the PDCP layer; the definition of what data shall be considered as available for transmission is specified in [3] and [4] respectively. The size of the RLC and MAC headers are not considered in the buffer size computation. The length of this field is 6 bits. The values taken by the Buffer Size field are shown in Table 6.1.3.1-1. Figure 6.1.3.1-1: Short BSR and Truncated BSR MAC control element Figure 6.1.3.1-2: Long BSR MAC control element The Short BSR format of each '820 LG Accused Product comprises 1 byte (i.e., 8

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	bits) of information with a 2-bit LCG identifier and a 6-bit buffer size, while the Long BSR format of each '820 LG Accused Product comprises 3 bytes (i.e., 24 bits) of information with four segments, 6 bits long, each corresponding to a particular LCC. Accordingly, the Long BSR reports the amount of data for four logical channel groups (LCGs) of each '820 LG Accused Product, while the Short BSR reports the amount of data for one LCG. In the LTE (E-UTRA) network environment of each '820 LG Accused Product, each radio bearer (or logical channel) is mapped to a LCG by a network node (e.g., eNodeB) based on the quality of service attributes of the radio bearers (e.g., QoS Class Identifier). Accordingly, the Short BSR format of each '820 LG Accused Product corresponds to the buffer status of a single radio bearer group and the Long BSR format of each '820 LG Accused Product corresponds to the buffer status of multiple radio bearer groups.
10. The method of claim 1, further comprising: selecting a buffer status of a radio bearer group of a highest priority.	See analysis of claim 1, which is incorporated herein by reference. As shown above, each '820 LG Accused Product includes and performs the features and capabilities described in claim 1. Further, for each '820 LG Accused Product, in the case of "Padding BSR", when more than one LCG has data available for transmission in the interval where the BSR is transmitted, a Truncated BSR for the LCG with the highest priority logical channel with data available for transmission is selected for reporting.

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	5.4.5 Buffer Status Reporting The Buffer Status reporting procedure is used to provide the serving eNB with information about the amount of data available for transmission in the UL buffers of the UE. RRC controls BSR reporting by configuring the two timers <i>periodicBSR-Timer</i> and <i>retxBSR-Timer</i> and by, for each logical channel, optionally signalling <i>logicalChannelGroup</i> which allocates the logical channel to an LCG [8]. For the Buffer Status reporting procedure, the UE shall consider all radio bearers which are not suspended and may consider radio bearers which are suspended. A Buffer Status Report (BSR) shall be triggered if any of the following events occur: - UL data, for a logical channel which belongs to a LCG, becomes available for transmission in the RLC entity or in the PDCP entity (the definition of what data shall be considered as available for transmission is specified in [3] and [4] respectively) and either the data belongs to a logical channel with higher priority than the priorities of the logical channels which belong to any LCG and for which data is already available for transmission, or there is no data available for transmission for any of the logical channels which belong to a LCG, in which case the BSR is referred below to as "Regular BSR"; - UL resources are allocated and number of padding bits is equal to or larger than the size of the Buffer Status Report MAC control element plus its subheader, in which case the BSR is referred below to as "Padding BSR"; <i>retxBSR-Timer</i> expires and the UE has data available for transmission for any of the logical channels which belong to a LCG, in which case the BSR is referred below to as "Regular BSR"; <i>periodicBSR-Timer</i> expires, in which case the BSR is referred below to as "Periodic BSR". For Regular and Periodic BSR: - if more than one LCG has data available for transmission in the TTI where the BSR is transmitted: report Long BSR; - else report Short BSR. For Padding BSR: - if the number of padding bits is equal to or larger than the size of the Short BSR plus its subheader but smaller than the size of the Long BSR plus its subheader: - if more than one LCG has data available for transmission in the TTI where the BSR is transmitted: report Truncated BSR of the LCG with the highest priority logical channel with data available for transmission; - else report Short BSR. - else if the number of padding bits is equal to or larger than the size of the Long BSR plus its subheader, report Long BSR.

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	<u>Alternatively, CCE 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.</u>
12. An apparatus, comprising:	LG, AT&T, Verizon, Sprint, and T-Mobile infringe the '820 patent either directly and/or indirectly. Each Defendant makes, uses, sells, offers to sell, and/or imports the '820 LG Accused Products, each of which is a cellular device that includes the features and capabilities described in this claim. Plaintiff contends that each Defendant directly infringes this claim because it makes, uses, sells, offers to sell, and/or imports the '820 LG Accused Products, each of which includes and/or practices each and every element of this claim. Each '820 LG Accused Product is a subscriber station (apparatus) that contains each of the elements set forth in this claim. Specifically, each '820 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 (E-UTRA) environment. As such, each '820 LG Accused Product is compliant with and supports technical specifications published by 3GPP and ETSI for LTE (E-UTRA) technology, including TS 36.321. Indeed, the '820 patent is essential to compliance with LTE (E-UTRA) standards. In the LTE (E-UTRA) network environment, a subscriber station (or user equipment, "UE"), such as each '820 LG Accused Product, is configured to perform a buffer status reporting procedure as set forth in TS 36.321. Buffer Status Reports (BSRs) from UE to network nodes are used to assist network allocation of uplink radio resources. In an LTE (E-UTRA) network environment, radio resources are only allocated for transmission to or from a UE if data is available to be sent or received. In the downlink direction, the network node

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	scheduler is aware of the amount of data to be delivered to a UE. In the uplink direction, however, scheduling decisions are performed by a network node (e.g., an eNodeB) and the buffer for the data is located in the UE. Accordingly, BSRs must be sent by the UE to the network node to indicate the amount of data in the UE that needs to be transmitted over the uplink. <i>See</i> Stefania Sesia, et al., "LTE: The UMTS Long Term Evolution: From Theory to Practice," John Wiley & Sons, 2009. Accordingly, each '820 LG Accused Product performs a BSR reporting procedure, set forth in TS 36.321, to provide serving network nodes with information about the amount of data available for transmission in its uplink buffers. More specifically, a BSR is triggered in each '820 LG Accused Product if any of certain pre-selected conditions corresponding to the buffers occur, as set forth in TS 36.321. Depending on the condition detected, each '820 LG Accused Product designates a BSR reporting format (e.g., long BSR, truncated BSR, short BSR): 5.4.5 Buffer Status Reporting The Buffer Status reporting procedure is used to provide the serving eNB with information about the amount of data available for transmission in the UL buffers of the UE. RRC controls BSR reporting by configuring the two timers <i>periodicBSR-Timer</i> and <i>retxBSR-Timer</i> and by, for each logical channel, optionally signalling <i>logicalChannelGroup</i> which allocates the logical channel to an LCG [8]. For the Buffer Status reporting procedure, the UE shall consider all radio bearers which are not suspended and may consider radio bearers which are suspended. A Buffer Status Report (BSR) shall be triggered if any of the following events occur: UL data, for a logical channel which belongs to a LCG, becomes available for transmission in the RLC entity or in the PDCP entity (the definition of what data shall be considered as available for transmission is specified in [3] and [4] respectively) and either the data belongs to a logical channel with higher priority than the priorities of

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	the logical channels which belong to any LCG and for which data is already available for transmission, or there is no data available for transmission for any of the logical channels which belong to a LCG, in which case the BSR is referred below to as "Regular BSR"; - UL resources are allocated and number of padding bits is equal to or larger than the size of the Buffer Status Report MAC control element plus its subheader, in which case the BSR is referred below to as "Padding BSR"; <i>retxBSR-Timer</i> expires and the UE has data available for transmission for any of the logical channels which belong to a LCG, in which case the BSR is referred below to as "Regular BSR"; <i>periodicBSR-Timer</i> expires, in which case the BSR is referred below to as "Periodic BSR". For Regular and Periodic BSR: - if more than one LCG has data available for transmission in the TTI where the BSR is transmitted: report Long BSR; - else report Short BSR. For Padding BSR: - if the number of padding bits is equal to or larger than the size of the Short BSR plus its subheader but smaller than the size of the Long BSR plus its subheader: - if more than one LCG has data available for transmission in the TTI where the BSR is transmitted: report Truncated BSR of the LCG with the highest priority logical channel with data available for transmission; - else report Short BSR. - else if the number of padding bits is equal to or larger than the size of the Long BSR plus its subheader, report Long BSR. Long BSRs, Short BSRs, and Truncated BSRs are formatted as set forth in TS 36.321:

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	The fields LCG ID and Buffer Size are defined as follow: - LCG ID: The Logical Channel Group ID field identifies the group of logical channel(s) which buffer status is being reported. The length of the field is 2 bits; - Buffer Size: The Buffer Size field identifies the total amount of data available across all logical channels of a logical channel group after the MAC PDU has been built. The amount of data is indicated in number of bytes. It shall include all data that is available for transmission in the RLC layer and in the PDCP layer; the definition of what data shall be considered as available for transmission is specified in [3] and [4] respectively. The size of the RLC and MAC headers are not considered in the buffer size computation. The length of this field is 6 bits. The values taken by the Buffer Size field are shown in Table 6.1.3.1-1. <pre> ----- LCG ID Buffer Size ----- Oct 1 </pre> Figure 6.1.3.1-1: Short BSR and Truncated BSR MAC control element <pre> ----- Buffer Size #0 Buffer Size #1 ----- Buffer Size #1 Buffer Size #2 ----- Buffer Size #2 Buffer Size #3 ----- Oct 1 Oct 2 Oct 3 </pre> Figure 6.1.3.1-2: Long BSR MAC control element As shown above, the Short BSR format comprises 1 byte of information with a 2-bit LCG identifier and a 6-bit buffer size, while the Long BSR format comprises 3 bytes of information with four segments, 6 bits long, each corresponding to a particular LCG. Accordingly, the Long BSR reports the amount of data for four logical channel groups (LCGs), while the Short BSR reports the amount of data for one LCG. In the LTE (E-UTRA) network environment, each radio bearer (or logical channel) is mapped to a LCG by a network node (e.g., eNodeB) based on the quality of service attributes of the radio bearers (e.g., QoS Class Identifier). Accordingly, the Short BSR format corresponds to the buffer status of a single radio bearer group and the Long BSR format corresponds to the buffer status of multiple radio bearer groups. As shown above, TS 36.321 sets forth conditions under which a “Regular BSR” or “Periodic BSR” is triggered. For “Regular BSRs” and “Periodic BSRs,” if

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	more than one LCG has data available for transmission, the Long BSR format is used. Accordingly, each '820 LG Accused Product designates the Long BSR format when multiple buffers for different radio bearer groups store data beyond a preselected threshold (e.g., when uplink data becomes available for transmission in different bearer groups). As further shown above, in the case of "Padding BSR," each '820 LG Accused Product reports a Long BSR when (1) uplink resources are allocated for buffered data (i.e., the buffers contain data waiting to be transferred from the UE to the network), (2) the number of padding bits is equal to or larger than the size of the BSR MAC control element plus its sub-header, and (3) the number of padding bits is equal to or larger than the size of a Long BSR plus its sub-header. Thus, when there is sufficient uplink bandwidth available for a Long BSR, each '820 LG Accused Product designates and communicates using the Long BSR format. Continuing with the case of "Padding BSR," each '820 LG Accused Product reports a Short or Truncated BSR when the number of padding bits is smaller than the size of a Long BSR but equal to or larger than a Short BSR. In such circumstances, if more than once LCG has data for transmission, each '820 LG Accused Product will report a Truncated BSR of the LCG with the highest priority logical channel with data available for transmission.
a processor	Each '820 LG Accused Product contains a processor (such as a baseband processor) that is utilized in communicating buffer status reports.
a memory including computer program code, the memory and the computer program code configured to, with the processor, cause the apparatus at least to	Each '820 LG Accused Product contains a memory which includes computer program code. The memory, in combination with its computer program code and the processor cause each '820 LG Accused Product at least to perform the below steps:
monitor a usage of a plurality of buffers;	Each '820 LG Accused Product monitors a usage of a plurality of buffers. As explained above, each '820 LG Accused Product provides BSRs based on the

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	buffer status of one or more LCGs.
detect one of a plurality of pre-selected conditions corresponding to the plurality of buffers;	Each '820 LG Accused Product detects one of a plurality of pre-selected conditions corresponding to the plurality of buffers. As explained above, the pre-selected conditions corresponding to buffers that may be detected by each '820 LG Accused Product are set forth in TS 36.321: 5.4.5 Buffer Status Reporting The Buffer Status reporting procedure is used to provide the serving eNB with information about the amount of data available for transmission in the UL buffers of the UE. RRC controls BSR reporting by configuring the two timers <i>periodicBSR-Timer</i> and <i>retxBSR-Timer</i> and by, for each logical channel, optionally signalling <i>logicalChannelGroup</i> which allocates the logical channel to an LCG [8]. For the Buffer Status reporting procedure, the UE shall consider all radio bearers which are not suspended and may consider radio bearers which are suspended. A Buffer Status Report (BSR) shall be triggered if any of the following events occur: UL data, for a logical channel which belongs to a LCG, becomes available for transmission in the RLC entity or in the PDCP entity (the definition of what data shall be considered as available for transmission is specified in [3] and [4] respectively) and either the data belongs to a logical channel with higher priority than the priorities of

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U.S. Pat. No. 8,055,820	'820 LG ACCUSED PRODUCTS ¹
	the logical channels which belong to any LCG and for which data is already available for transmission, or there is no data available for transmission for any of the logical channels which belong to a LCG, in which case the BSR is referred below to as "Regular BSR"; - UL resources are allocated and number of padding bits is equal to or larger than the size of the Buffer Status Report MAC control element plus its subheader, in which case the BSR is referred below to as "Padding BSR"; - retxBSR-Timer expires and the UE has data available for transmission for any of the logical channels which belong to a LCG, in which case the BSR is referred below to as "Regular BSR"; - periodicBSR-Timer expires, in which case the BSR is referred below to as "Periodic BSR". For Regular and Periodic BSR: - if more than one LCG has data available for transmission in the TTI where the BSR is transmitted: report Long BSR; - else report Short BSR. For Padding BSR: - if the number of padding bits is equal to or larger than the size of the Short BSR plus its subheader but smaller than the size of the Long BSR plus its subheader: - if more than one LCG has data available for transmission in the TTI where the BSR is transmitted: report Truncated BSR of the LCG with the highest priority logical channel with data available for transmission; - else report Short BSR. - else if the number of padding bits is equal to or larger than the size of the Long BSR plus its subheader, report Long BSR.
designate one of a plurality of buffer status reporting formats comprising a long buffer status reporting format and a short buffer status reporting format depending on the pre-selected condition detected; and	Each '820 LG Accused Product designates one of a plurality of buffer status reporting formats comprising a long buffer status reporting format and a short buffer status reporting format depending on the pre-selected condition detected. As explained above, each '820 LG Accused Product designates a Long BSR, Truncated BSR, or Short BSR depending on detected conditions. In the case of "Regular BSRs" and "Periodic BSRs," if more than one LCG has data available for transmission, the Long BSR format is used. Accordingly, each '820 LG Accused Product designates the Long BSR format when multiple buffers for different radio bearer groups store data beyond a preselected threshold (e.g., when uplink data becomes available for transmission in different bearer

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	groups). In the case of "Padding BSR," each '820 LG Accused Product reports a Long BSR when (1) uplink resources are allocated for buffered data (i.e., the buffers contain data waiting to be transferred from the UE to the network), (2) the number of padding bits is equal to or larger than the size of the BSR MAC control element plus its sub-header, and (3) the number of padding bits is equal to or larger than the size of a Long BSR plus its sub-header. Each '820 LG Accused Product reports a Short or Truncated BSR when the number of padding bits is smaller than the size of a Long BSR but equal to or larger than a Short BSR.
communicate a buffer status report to a network device in accordance with the buffer status reporting format designated,	Each '820 LG Accused Product communicates a buffer status report to a network device in accordance with the buffer status reporting format designated. As explained above, each '820 LG Accused Product transmits a BSR (e.g., a Long BSR, Truncated BSR, or Short BSR) to a LTE (E-UTRA) network node (e.g., an eNodeB).
wherein the designating unit is configured to designate the long buffer status reporting format when there is sufficient uplink bandwidth to communicate using the long buffer status reporting format.	~~Each '820 LG Accused Product designates the long buffer status reporting format when there is sufficient uplink bandwidth to communicate using the long buffer status reporting format.~~ <u>Each '820 LG Accused Product includes a designating unit configured to designate the long buffer status reporting format when there is sufficient uplink bandwidth to communicate using the long buffer status reporting format. The designating unit of each Accused Product comprises hardware (e.g., a baseband processor) and/or software (e.g., baseband software and related drivers) configured to perform one or more of the algorithms set forth in the '820 patent at 6:1-42, 7:58-8:1, 8:17-39, 10:29-44, and Figures 2-4. Such hardware and software is capable of detecting available uplink bandwidth or capacity (e.g., the size of an uplink grant or transport block) and designating one of a plurality of BSR formats. As explained herein, the designating unit may ascertain an appropriate BSR format (e.g., short or long) in light of the available uplink bandwidth or capacity detected. For instance, the designating unit may determine</u>

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	<u>whether there is sufficient uplink bandwidth or capacity to communicate a buffer status report using the long BSR format and, if so, designate the long BSR format. However, if it detects there is not enough uplink bandwidth or capacity to use the long BSR format, it may designate a short BSR format. The designating unit may also take into account priority of buffered data. For example, if it detects there is not enough uplink bandwidth or capacity to use the long BSR format, it may designate a short BSR format for a buffer having a highest priority.</u> For instance, as explained above in the case of "Padding BSR," each '820 LG Accused Product reports a Long BSR when (1) uplink resources are allocated for buffered data (i.e., the buffers contain data waiting to be transferred from the UE to the network), (2) the number of padding bits is equal to or larger than the size of the BSR MAC control element plus its sub-header, and (3) the number of padding bits is equal to or larger than the size of a Long BSR plus its sub-header. <u>Additionally, as explained above for "Regular BSRs" and "Periodic BSRs," if more than one LCG has data available for transmission and bandwidth is available, the Long BSR format is used. In such instances, the Long BSR has priority over other data, including user data.</u> Thus, when there is sufficient uplink bandwidth available for a Long BSR (e.g., when there is enough space in the uplink resources allocated for buffered data), each '820 LG Accused Product designates and communicates using the Long BSR format. <u>Alternatively, CCE 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.</u>
~~15-17.~~ The apparatus of claim 12,	See analysis of claim 12, which is incorporated herein by reference.

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wherein the ~~memory and the computer program code are further configured to, with the processor, cause the apparatus at least to designate the short buffer status reporting format corresponds to reporting a buffer status of a single radio bearer group and the long buffer status reporting format corresponds to reporting a buffer status of multiple radio bearer groups~~when there is insufficient uplink bandwidth.	~~As shown above, each '820~~<u>Each 820</u> LG Accused Product includes the features and capabilities described in claim 12. Further, <u>when there is insufficient uplink bandwidth to send a long buffer status report, the processor is configured to designate</u> the short buffer status reporting format ~~used by~~. 5.4.5 Buffer Status Reporting The Buffer Status reporting procedure is used to provide the serving eNB with information about the amount of data available for transmission in the UL buffers of the UE. RRC controls BSR reporting by configuring the two timers <i>periodicBSR-Timer</i> and <i>retxBSR-Timer</i> and by, for each logical channel, optionally signalling <i>logicalChannelGroup</i> which allocates the logical channel to an LCG [8]. For the Buffer Status reporting procedure, the UE shall consider all radio bearers which are not suspended and may consider radio bearers which are suspended. A Buffer Status Report (BSR) shall be triggered if any of the following events occur: UL data, for a logical channel which belongs to a LCG, becomes available for transmission in the RLC entity or in the PDCP entity (the definition of what data shall be considered as available for transmission is specified in [3] and [4] respectively) and either the data belongs to a logical channel with higher priority than the priorities of

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U.S. Pat. No. 8,055,820	'820 LG ACCUSED PRODUCTS ¹
	the logical channels which belong to any LCG and for which data is already available for transmission, or there is no data available for transmission for any of the logical channels which belong to a LCG, in which case the BSR is referred below to as "Regular BSR"; - UL resources are allocated and number of padding bits is equal to or larger than the size of the Buffer Status Report MAC control element plus its subheader, in which case the BSR is referred below to as "Padding BSR"; <i>retxBSR-Timer</i> expires and the UE has data available for transmission for any of the logical channels which belong to a LCG, in which case the BSR is referred below to as "Regular BSR"; <i>periodicBSR-Timer</i> expires, in which case the BSR is referred below to as "Periodic BSR". For Regular and Periodic BSR: - if more than one LCG has data available for transmission in the TTI where the BSR is transmitted: report Long BSR; - else report Short BSR. For Padding BSR: - if the number of padding bits is equal to or larger than the size of the Short BSR plus its subheader but smaller than the size of the Long BSR plus its subheader: - if more than one LCG has data available for transmission in the TTI where the BSR is transmitted: report Truncated BSR of the LCG with the highest priority logical channel with data available for transmission; - else report Short BSR. - else if the number of padding bits is equal to or larger than the size of the Long BSR plus its subheader, report Long BSR. <u>For instance, as explained above in the case of "Padding BSR," each '820 LG Accused Product corresponds to reporting a buffer status of a single radio bearer group and the long buffer status reporting format corresponds to reporting a buffer status of multiple radio bearer groups reports a Short or Truncated BSR when the number of padding bits is smaller than the size of a Long BSR but equal to or larger than a Short BSR.</u> <u>As explained above, Long BSRs, Short BSRs, and Truncated BSRs are formatted as set forth in TS 36.321.</u>

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U.S. Pat. No. 8,055,820	'820 LG ACCUSED PRODUCTS ¹
	The fields LCG ID and Buffer Size are defined as follow: - LCG ID: The Logical Channel Group ID field identifies the group of logical channel(s) which buffer status is being reported. The length of the field is 2 bits; - Buffer Size: The Buffer Size field identifies the total amount of data available across all logical channels of a logical channel group after the MAC PDU has been built. The amount of data is indicated in number of bytes. It shall include all data that is available for transmission in the RLC layer and in the PDCP layer; the definition of what data shall be considered as available for transmission is specified in [3] and [4] respectively. The size of the RLC and MAC headers are not considered in the buffer size computation. The length of this field is 6 bits. The values taken by the Buffer Size field are shown in Table 6.1.3.1-1. LCG ID Buffer Size Oct 1 Figure 6.1.3.1-1: Short BSR and Truncated BSR MAC control element Buffer Size #0 Buffer Size #1 Oct 1 Buffer Size #1 Buffer Size #2 Oct 2 Buffer Size #2 Buffer Size #3 Oct 3 Figure 6.1.3.1-2: Long BSR MAC control element ~~The Short BSR format comprises 1 byte of information with a 2 bit LCG identifier and a 6 bit buffer size, while the Long BSR format comprises 3 bytes of information with four segments, 6 bits long, each corresponding to a particular LCG. Accordingly, the Long BSR reports the amount of data for four logical channel groups (LCGs), while the Short BSR reports the amount of data for one LCG. In the LTE (EUTRA) network environment, each radio bearer (or logical channel) is mapped to a LCG by a network node (e.g., eNodeB) based on the quality of service attributes of the radio bearers (e.g., QoS Class Identifier). Accordingly, the Short BSR format corresponds to the buffer status of a single radio bearer group and the Long BSR format corresponds to the buffer status of multiple radio bearer groups. Alternatively, CCE 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.~~

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	<u>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.</u>
~~17. The apparatus of claim 12, wherein the memory and the computer program code are further configured to, with the processor, cause the apparatus at least to designate the short buffer status reporting format when there is insufficient uplink bandwidth.~~	~~See analysis of claim 12, which is incorporated herein by reference.~~ ~~Each '820 LG Accused Product includes the features and capabilities described in claim 12. Further, when there is insufficient uplink bandwidth to send a long buffer status report, the processor is configured to designate the short buffer status reporting format.~~ 5.4.5 Buffer Status Reporting The Buffer Status reporting procedure is used to provide the serving eNB with information about the amount of data available for transmission in the UL buffers of the UE. RRC controls BSR reporting by configuring the two timers <i>periodicBSR-Timer</i> and <i>retxBSR-Timer</i> and by, for each logical channel, optionally signalling <i>logicalChannelGroup</i> which allocates the logical channel to an LCG [8]. ~~For the Buffer Status reporting procedure, the UE shall consider all radio bearers which are not suspended and may consider radio bearers which are suspended.~~ A Buffer Status Report (BSR) shall be triggered if any of the following events occur: - UL data, for a logical channel which belongs to a LCG, becomes available for transmission in the RLC entity or in the PDCP entity (the definition of what data shall be considered as available for transmission is specified in [3] and [4] respectively) and either the data belongs to a logical channel with higher priority than the priorities of

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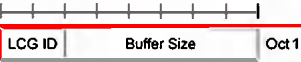
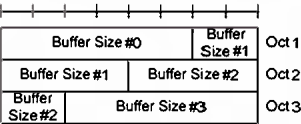
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	the logical channels which belong to any LCG and for which data is already available for transmission, or there is no data available for transmission for any of the logical channels which belong to a LCG, in which case the BSR is referred below to as "Regular BSR"; - UL resources are allocated and number of padding bits is equal to or larger than the size of the Buffer Status Report MAC control element plus its subheader, in which case the BSR is referred below to as "Padding BSR"; <i>retxBSR-Timer</i> expires and the UE has data available for transmission for any of the logical channels which belong to a LCG, in which case the BSR is referred below to as "Regular BSR"; <i>periodicBSR-Timer</i> expires, in which case the BSR is referred below to as "Periodic BSR". For Regular and Periodic BSR: - if more than one LCG has data available for transmission in the TTI where the BSR is transmitted: report Long BSR; - else report Short BSR. For Padding BSR: - if the number of padding bits is equal to or larger than the size of the Short BSR plus its subheader but smaller than the size of the Long BSR plus its subheader: - if more than one LCG has data available for transmission in the TTI where the BSR is transmitted: report Truncated BSR of the LCG with the highest priority logical channel with data available for transmission; - else report Short BSR. - else if the number of padding bits is equal to or larger than the size of the Long BSR plus its subheader, report Long BSR.
~~18. The apparatus of claim 12, wherein the short buffer status reporting format comprises 1 byte of information and the long buffer status reporting format comprises 3 bytes of information.~~	~~See analysis of claim 12, which is incorporated herein by reference.~~ ~~As shown above, each '820 LG Accused Product includes the features and capabilities described in claim 12. Further, the short buffer status reporting format of each '820 LG Accused Product comprises 1 byte of information and the long buffer status reporting format comprises 3 bytes of information.~~ ~~As explained above, Long BSRs, Short BSRs, and Truncated BSRs of each '820 LG Accused Product are formatted as set forth in TS 36.321.~~

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U.S. Pat. No. 8,055,820	'820 LG ACCUSED PRODUCTS ¹
	The fields LCG ID and Buffer Size are defined as follow: • LCG ID: The Logical Channel Group ID field identifies the group of logical channel(s) which buffer status is being reported. The length of the field is 2 bits; • Buffer Size: The Buffer Size field identifies the total amount of data available across all logical channels of a logical channel group after the MAC PDU has been built. The amount of data is indicated in number of bytes. It shall include all data that is available for transmission in the RLC layer and in the PDCP layer; the definition of what data shall be considered as available for transmission is specified in [3] and [4] respectively. The size of the RLC and MAC headers are not considered in the buffer size computation. The length of this field is 6 bits. The values taken by the Buffer Size field are shown in Table 6.1.3.1-1.  Figure 6.1.3.1-1: Short BSR and Truncated BSR MAC control element  Figure 6.1.3.1-2: Long BSR MAC control element ~~The Short BSR format of each '820 LG Accused Product comprises 1 byte (i.e., 8 bits) of information with a 2 bit LCG identifier and a 6 bit buffer size, while the Long BSR format of each '820 LG Accused Product comprises 3 bytes (i.e., 24 bits) of information with four segments, 6 bits long, each corresponding to a particular LCG.~~
~~19. The apparatus of claim 12, wherein the short buffer status reporting format comprises a 2-bit radio bearer group identifier (ID) and a 6-bit buffer size.~~	~~See analysis of claim 12, which is incorporated herein by reference.~~ ~~As shown above, each '820 LG Accused Product includes the features and capabilities described in claim 12. Further, the short buffer status reporting format of each '820 LG Accused Product comprises a 2-bit radio bearer group identifier and a 6-bit buffer size.~~

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	~~As explained above, Long BSRs, Short BSRs, and Truncated BSRs of each '820 LG Accused Product are formatted as set forth in TS 36.321:~~ The fields LCG ID and Buffer Size are defined as follow: - LCG ID: The Logical Channel Group ID field identifies the group of logical channel(s) which buffer status is being reported. The length of the field is 2 bits; - Buffer Size: The Buffer Size field identifies the total amount of data available across all logical channels of a logical channel group after the MAC PDU has been built. The amount of data is indicated in number of bytes. It shall include all data that is available for transmission in the RLC layer and in the PDCP layer; the definition of what data shall be considered as available for transmission is specified in [3] and [4] respectively. The size of the RLC and MAC headers are not considered in the buffer size computation. The length of this field is 6 bits. The values taken by the Buffer Size field are shown in Table 6.1.3.1-1. Figure 6.1.3.1-1: Short BSR and Truncated BSR MAC control element Figure 6.1.3.1-2: Long BSR MAC control element ~~The Short BSR format of each '820 LG Accused Product comprises 1 byte (i.e., 8 bits) of information with a 2-bit LCG identifier and a 6-bit buffer size, while the Long BSR format of each '820 LG Accused Product comprises 3 bytes (i.e., 24 bits) of information with four segments, 6 bits long, each corresponding to a particular LCG.~~
20. The apparatus of claim 12, wherein the long buffer status reporting format comprises four segments of 6-bits of information, each segment thereof corresponding to a distinct radio bearer	<i>See</i> analysis of claim 12, which is incorporated herein by reference. As shown above, each '820 LG Accused Product has and performs the features and capabilities described in claim 12. Further, the long buffer status reporting

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group.	format of each '820 LG Accused Product comprises four segments of 6-bits of information, each segment thereof corresponding to a distinct radio bearer group. As explained above, Long BSRs, Short BSRs, and Truncated BSRs of each '820 LG Accused Product are formatted as set forth in TS 36.321: The fields LCG ID and Buffer Size are defined as follow: - LCG ID: The Logical Channel Group ID field identifies the group of logical channel(s) which buffer status is being reported. The length of the field is 2 bits; - Buffer Size: The Buffer Size field identifies the total amount of data available across all logical channels of a logical channel group after the MAC PDU has been built. The amount of data is indicated in number of bytes. It shall include all data that is available for transmission in the RLC layer and in the PDCP layer; the definition of what data shall be considered as available for transmission is specified in [3] and [4] respectively. The size of the RLC and MAC headers are not considered in the buffer size computation. The length of this field is 6 bits. The values taken by the Buffer Size field are shown in Table 6.1.3.1-1. Figure 6.1.3.1-1: Short BSR and Truncated BSR MAC control element Figure 6.1.3.1-2: Long BSR MAC control element The Short BSR format of each '820 LG Accused Product comprises 1 byte (i.e., 8 bits) of information with a 2-bit LCG identifier and a 6-bit buffer size, while the Long BSR format of each '820 LG Accused Product comprises 3 bytes (i.e., 24 bits) of information with four segments, 6 bits long, each corresponding to a particular LCC. Accordingly, the Long BSR reports the amount of data for four logical channel groups (LCGs) of each '820 LG Accused Product, while the Short BSR reports the amount of data for one LCG. In the LTE (E-UTRA) network environment of each '820 LG Accused Product, each radio bearer (or logical channel) is mapped to a LCG by a network node (e.g., eNodeB) based on

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	the quality of service attributes of the radio bearers (e.g., QoS Class Identifier). Accordingly, the Short BSR format of each '820 LG Accused Product corresponds to the buffer status of a single radio bearer group and the Long BSR format of each '820 LG Accused Product corresponds to the buffer status of multiple radio bearer groups.
21. The apparatus of claim 12, wherein the memory and the computer program code are further configured to, with the processor, cause the apparatus at least to select a buffer status of a radio bearer group of a highest priority.	See analysis of claim 12, which is incorporated herein by reference. As shown above, each '820 LG Accused Product includes the features and capabilities described in claim 12. Further, for each '820 LG Accused Product, in the case of "Padding BSR", when more than one LCG has data available for transmission in the interval where the BSR is transmitted, a Truncated BSR for the LCG with the highest priority logical channel with data available for transmission is selected for reporting. 5.4.5 Buffer Status Reporting The Buffer Status reporting procedure is used to provide the serving eNB with information about the amount of data available for transmission in the UL buffers of the UE. RRC controls BSR reporting by configuring the two timers <i>periodicBSR-Timer</i> and <i>retxBSR-Timer</i> and by, for each logical channel, optionally signalling <i>logicalChannelGroup</i> which allocates the logical channel to an LCG [8]. For the Buffer Status reporting procedure, the UE shall consider all radio bearers which are not suspended and may consider radio bearers which are suspended. A Buffer Status Report (BSR) shall be triggered if any of the following events occur: UL data, for a logical channel which belongs to a LCG, becomes available for transmission in the RLC entity or in the PDCP entity (the definition of what data shall be considered as available for transmission is specified in [3] and [4] respectively) and either the data belongs to a logical channel with higher priority than the priorities of

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	the logical channels which belong to any LCG and for which data is already available for transmission, or there is no data available for transmission for any of the logical channels which belong to a LCG, in which case the BSR is referred below to as "Regular BSR"; - UL resources are allocated and number of padding bits is equal to or larger than the size of the Buffer Status Report MAC control element plus its subheader, in which case the BSR is referred below to as "Padding BSR"; - retxBSR-Timer expires and the UE has data available for transmission for any of the logical channels which belong to a LCG, in which case the BSR is referred below to as "Regular BSR"; - periodicBSR-Timer expires, in which case the BSR is referred below to as "Periodic BSR". For Regular and Periodic BSR: - if more than one LCG has data available for transmission in the TTI where the BSR is transmitted: report Long BSR; - else report Short BSR. For Padding BSR: - if the number of padding bits is equal to or larger than the size of the Short BSR plus its subheader but smaller than the size of the Long BSR plus its subheader: - if more than one LCG has data available for transmission in the TTI where the BSR is transmitted: report Truncated BSR of the LCG with the highest priority logical channel with data available for transmission; - else report Short BSR. - else if the number of padding bits is equal to or larger than the size of the Long BSR plus its subheader, report Long BSR. <u>Alternatively, CCE 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.</u>
24. A non-transitory computer-readable medium encoded with a computer program configured to control a processor to perform operations comprising:	LG, AT&T, Verizon, Sprint, and T-Mobile infringe the '820 patent either directly and/or indirectly. Each Defendant makes, uses, sells, offers to sell, and/or imports '820 LG Accused Products, each of which is a cellular device that includes and performs the features and capabilities described in this claim.

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	Plaintiff contends that each Defendant directly infringes this claim because it makes, uses, sells, offers to sell, and/or imports the '820 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 its disclosure to ETSI), its customers' use of the '820 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 that use the '820 LG Accused Products to practice each and every one of the following claim elements, with knowledge that infringing features of the '820 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 the combination for which such features was made infringes this claim. Each '820 LG Accused Product is a subscriber station that includes software stored in non-transitory memory configured to control a processor to perform the steps and elements as set forth in this claim. Specifically, each '820 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 (E-UTRA) environment. As such, each '820 LG Accused Product is compliant with and supports technical specifications published by 3GPP and ETSI for LTE (E-UTRA) technology, including TS 36.321, Release 8 and subsequent versions. Indeed, the '820 patent is essential to compliance with LTE (E-UTRA) standards. In the LTE (E-UTRA) network environment, a subscriber station (or user equipment, "UE"), such as each '820 LG Accused Product, is configured to perform a buffer status reporting procedure as set forth in TS 36.321. Buffer

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	Status Reports (BSRs) from UE to network nodes are used to assist network allocation of uplink radio resources. In an LTE (E-UTRA) network environment, radio resources are only allocated for transmission to or from a UE if data is available to be sent or received. In the downlink direction, the network node scheduler is aware of the amount of data to be delivered to a UE. In the uplink direction, however, scheduling decisions are performed by a network node (e.g., an eNodeB) and the buffer for the data is located in the UE. Accordingly, BSRs must be sent by the UE to the network node to indicate the amount of data in the UE that needs to be transmitted over the uplink. <i>See</i> Stefania Sesia, et al., "LTE: The UMTS Long Term Evolution: From Theory to Practice," John Wiley & Sons, 2009. Accordingly, each '820 LG Accused Product performs a BSR reporting procedure, set forth in TS 36.321, to provide serving network nodes with information about the amount of data available for transmission in its uplink buffers. More specifically, a BSR is triggered in each '820 LG Accused Product if any of certain pre-selected conditions corresponding to the buffers occur, as set forth in TS 36.321. Depending on the condition detected, each '820 LG Accused Product designates a BSR reporting format (e.g., long BSR, truncated BSR, short BSR): 5.4.5 Buffer Status Reporting The Buffer Status reporting procedure is used to provide the serving eNB with information about the amount of data available for transmission in the UL buffers of the UE. RRC controls BSR reporting by configuring the two timers <i>periodicBSR-Timer</i> and <i>retxBSR-Timer</i> and by, for each logical channel, optionally signalling <i>logicalChannelGroup</i> which allocates the logical channel to an LCG [8]. For the Buffer Status reporting procedure, the UE shall consider all radio bearers which are not suspended and may consider radio bearers which are suspended. A Buffer Status Report (BSR) shall be triggered if any of the following events occur: UL data, for a logical channel which belongs to a LCG, becomes available for transmission in the RLC entity or in the PDCP entity (the definition of what data shall be considered as available for transmission is specified in [3] and [4] respectively) and either the data belongs to a logical channel with higher priority than the priorities of

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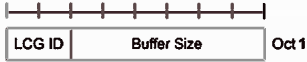
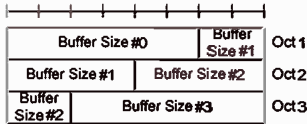
U.S. Pat. No. 8,055,820	'820 LG ACCUSED PRODUCTS ¹
	the logical channels which belong to any LCG and for which data is already available for transmission, or there is no data available for transmission for any of the logical channels which belong to a LCG, in which case the BSR is referred below to as "Regular BSR"; - UL resources are allocated and number of padding bits is equal to or larger than the size of the Buffer Status Report MAC control element plus its subheader, in which case the BSR is referred below to as "Padding BSR"; <i>retxBSR-Timer</i> expires and the UE has data available for transmission for any of the logical channels which belong to a LCG, in which case the BSR is referred below to as "Regular BSR"; <i>periodicBSR-Timer</i> expires, in which case the BSR is referred below to as "Periodic BSR". For Regular and Periodic BSR: - if more than one LCG has data available for transmission in the TTI where the BSR is transmitted: report Long BSR; - else report Short BSR. For Padding BSR: - if the number of padding bits is equal to or larger than the size of the Short BSR plus its subheader but smaller than the size of the Long BSR plus its subheader: - if more than one LCG has data available for transmission in the TTI where the BSR is transmitted: report Truncated BSR of the LCG with the highest priority logical channel with data available for transmission; - else report Short BSR. - else if the number of padding bits is equal to or larger than the size of the Long BSR plus its subheader, report Long BSR. Long BSRs, Short BSRs, and Truncated BSRs are formatted as set forth in TS 36.321:

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	The fields LCG ID and Buffer Size are defined as follow: - LCG ID: The Logical Channel Group ID field identifies the group of logical channel(s) which buffer status is being reported. The length of the field is 2 bits; - Buffer Size: The Buffer Size field identifies the total amount of data available across all logical channels of a logical channel group after the MAC PDU has been built. The amount of data is indicated in number of bytes. It shall include all data that is available for transmission in the RLC layer and in the PDCP layer; the definition of what data shall be considered as available for transmission is specified in [3] and [4] respectively. The size of the RLC and MAC headers are not considered in the buffer size computation. The length of this field is 6 bits. The values taken by the Buffer Size field are shown in Table 6.1.3.1-1.  Figure 6.1.3.1-1: Short BSR and Truncated BSR MAC control element  Figure 6.1.3.1-2: Long BSR MAC control element As shown above, the Short BSR and Truncated BSR format comprises 1 byte of information with a 2-bit LCG identifier and a 6-bit buffer size, while the Long BSR format comprises 3 bytes of information with four segments, 6 bits long, each corresponding to a particular LCG. Accordingly, the Long BSR reports the amount of data for four logical channel groups (LCGs), while the Short BSR and Truncated BSR reports the amount of data for one LCG. In the LTE (E-UTRA) network environment, each radio bearer (or logical channel) is mapped to a LCG by a network node (e.g., eNodeB) based on the quality of service attributes of the radio bearers (e.g., QoS Class Identifier). Accordingly, the Short BSR and Truncated BSR format corresponds to the buffer status of a single radio bearer group and the Long BSR format corresponds to the buffer status of multiple radio bearer groups. As shown above, TS 36.321 sets forth conditions under which a "Regular BSR"

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	or "Periodic BSR" is triggered. For "Regular BSRs" and "Periodic BSRs," if more than one LCG has data available for transmission and bandwidth is available, the Long BSR format is used. Accordingly, each '820 LG Accused Product designates the Long BSR format when multiple buffers for different radio bearer groups store data beyond a preselected threshold (e.g., when uplink data becomes available for transmission in different bearer groups and/or buffers). As further shown above, in the case of "Padding BSR," each '820 LG Accused Product reports a Long BSR when (1) uplink resources are allocated for buffered data (i.e., the buffers contain data waiting to be transferred from the UE to the network), (2) the number of padding bits is equal to or larger than the size of the BSR MAC control element plus its sub-header, and (3) the number of padding bits is equal to or larger than the size of a Long BSR plus its sub-header. Thus, when there is sufficient uplink bandwidth available for a Long BSR, each '820 LG Accused Product designates and communicates using the Long BSR format. Continuing with the case of "Padding BSR," each '820 LG Accused Product reports a Short or Truncated BSR when the number of padding bits is smaller than the size of a Long BSR but equal to or larger than a Short BSR. In such circumstances, if more than once LCG has data for transmission, each '820 LG Accused Product will report a Truncated BSR of the LCG with the highest priority logical channel with data available for transmission. If only one LCG has data for transmission, each '820 LG Accused Product will report a Short BSR.
monitoring a usage of a plurality of buffers;	Each '820 LG Accused Product monitors a usage of a plurality of buffers. As explained above, each '820 LG Accused Product provides BSRs based on the buffer status of one or more LCGs.
detecting one of a plurality of pre-selected conditions corresponding to the plurality	Each '820 LG Accused Product detects one of a plurality of pre-selected conditions corresponding to the plurality of buffers. As explained above, the pre-selected conditions corresponding to buffers (e.g., presence of data in one or

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of buffers;	multiple buffers) that may be detected by each '820 LG Accused Product are set forth in TS 36.321: 5.4.5 Buffer Status Reporting The Buffer Status reporting procedure is used to provide the serving eNB with information about the amount of data available for transmission in the UL buffers of the UE. RRC controls BSR reporting by configuring the two timers <i>periodicBSR-Timer</i> and <i>retxBSR-Timer</i> and by, for each logical channel, optionally signalling <i>logicalChannelGroup</i> which allocates the logical channel to an LCG [8]. For the Buffer Status reporting procedure, the UE shall consider all radio bearers which are not suspended and may consider radio bearers which are suspended. A Buffer Status Report (BSR) shall be triggered if any of the following events occur: UL data, for a logical channel which belongs to a LCG, becomes available for transmission in the RLC entity or in the PDCP entity (the definition of what data shall be considered as available for transmission is specified in [3] and [4] respectively) and either the data belongs to a logical channel with higher priority than the priorities of

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	the logical channels which belong to any LCG and for which data is already available for transmission, or there is no data available for transmission for any of the logical channels which belong to a LCG, in which case the BSR is referred below to as "Regular BSR"; - UL resources are allocated and number of padding bits is equal to or larger than the size of the Buffer Status Report MAC control element plus its subheader, in which case the BSR is referred below to as "Padding BSR"; <i>retxBSR-Timer</i> expires and the UE has data available for transmission for any of the logical channels which belong to a LCG, in which case the BSR is referred below to as "Regular BSR"; <i>periodicBSR-Timer</i> expires, in which case the BSR is referred below to as "Periodic BSR". For Regular and Periodic BSR: - if more than one LCG has data available for transmission in the TTI where the BSR is transmitted: report Long BSR; - else report Short BSR. For Padding BSR: - if the number of padding bits is equal to or larger than the size of the Short BSR plus its subheader but smaller than the size of the Long BSR plus its subheader: - if more than one LCG has data available for transmission in the TTI where the BSR is transmitted: report Truncated BSR of the LCG with the highest priority logical channel with data available for transmission; - else report Short BSR. - else if the number of padding bits is equal to or larger than the size of the Long BSR plus its subheader, report Long BSR.
designating one of a plurality of buffer status reporting formats comprising a long buffer status reporting format and a short buffer status reporting format depending on the pre-selected condition detected; and	Each '820 LG Accused Product designates one of a plurality of buffer status reporting formats comprising a long buffer status reporting format and a short buffer status reporting format depending on the pre-selected condition detected. As explained above, each '820 LG Accused Product designates a Long BSR, Truncated BSR, or Short BSR depending on detected conditions. In the case of "Regular BSRs" and "Periodic BSRs," if more than one LCG has data available for transmission and bandwidth is available, the Long BSR format is used. Accordingly, each '820 LG Accused Product designates the Long BSR format when multiple buffers for different radio bearer groups store data beyond a preselected threshold (e.g., when uplink data becomes available for

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	transmission in different bearer groups and/or buffers). In the case of "Padding BSR," each '820 LG Accused Product reports a Long BSR when (1) uplink resources are allocated for buffered data (i.e., the buffers contain data waiting to be transferred from the UE to the network), (2) the number of padding bits is equal to or larger than the size of the BSR MAC control element plus its sub-header, and (3) the number of padding bits is equal to or larger than the size of a Long BSR plus its sub-header. Each '820 LG Accused Product reports a Short or Truncated BSR when the number of padding bits is smaller than the size of a Long BSR but equal to or larger than a Short BSR.
communicating a buffer status report to a network device in accordance with the buffer status reporting format designated,	Each '820 LG Accused Product communicates a buffer status report to a network device in accordance with the buffer status reporting format designated. As explained above, each '820 LG Accused Product transmits a BSR (e.g., a Long BSR, Truncated BSR, or Short BSR) to a LTE (E-UTRA) network node (e.g., an eNodeB).
wherein the designating designates the long buffer status reporting format when there is sufficient uplink bandwidth to communicate using the long buffer status reporting format.	Each '820 LG Accused Product designates the long buffer status reporting format when there is sufficient uplink bandwidth to communicate using the long buffer status reporting format. For instance, as explained above for "Regular BSRs" and "Periodic BSRs," if more than one LCG has data available for transmission and bandwidth is available, the Long BSR format is used. <u>In such instances, the Long BSR has priority over other data, including user data.</u> Further, as explained above in the case of "Padding BSR," each '820 LG Accused Product reports a Long BSR when (1) uplink resources are allocated for buffered data (i.e., the buffers contain data waiting to be transferred from the UE to the network), (2) the number of padding bits is equal to or larger than the size of the BSR MAC control element plus its sub-header, and (3) the number of padding bits is equal to or larger than the size of a Long BSR plus its sub-header. Thus, when there is sufficient uplink bandwidth available for a Long BSR (e.g.,

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	when there is enough space in the uplink resources allocated for buffered data), each '820 LG Accused Product designates and communicates using the Long BSR format. <u>Alternatively, CCE 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.</u>

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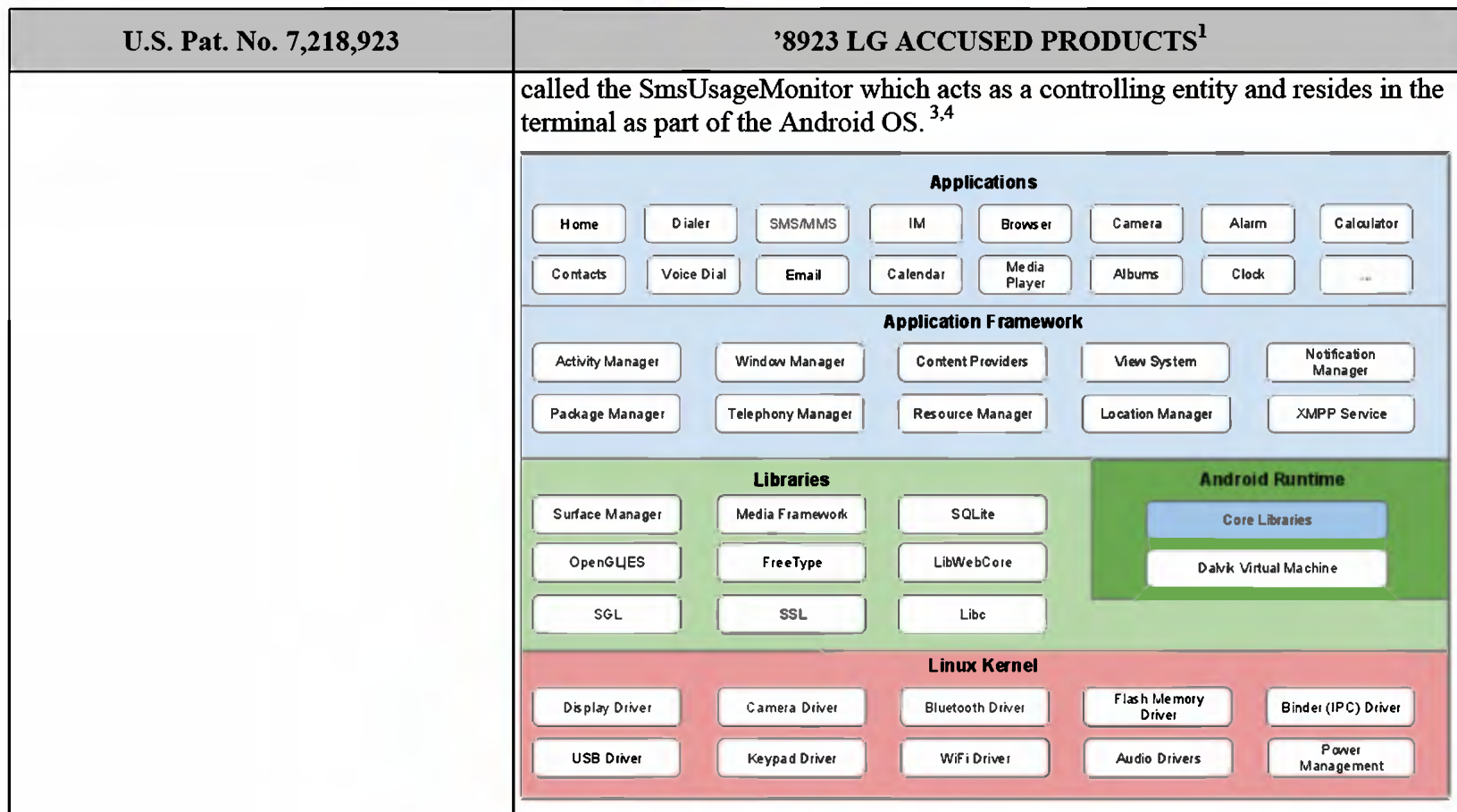
U.S. Pat. No. 7,218,923	'8923 LG ACCUSED PRODUCTS ¹
24. A terminal for a communication system, the terminal comprising:	LG, AT&T, Verizon, Sprint, and T-Mobile directly infringe the '8923 patent. Each Defendant makes, uses, sells, offers to sell, and/or imports the '8923 LG Accused Products², each of which is a cellular device or tablet that includes the features and capabilities described in this claim. Plaintiff contends that each Defendant directly infringes this claim because it makes, uses, sells, offers to sell, and/or imports the '8923 LG Accused Products, each of which includes each and every element of this claim. Each '8923 LG Accused Product is a terminal for a communication system. Each Accused Product operates using the Android Operating System, and includes at least one application program configured to send messages towards a communication network, using, for example, SMS or MMS messaging functionality. Such an application program may be a native SMS/MMS program provided by the Android OS, or it may include other third party applications which are configured to send messages toward a communication network. For example, third party applications such as Handcent are also configured to send messages towards a communication network. The Android OS further contains a diverting unit that is part of the Application Framework of the operating system. In order for third party applications or the native messaging app to send text messages using the Android OS, these applications utilize the android.telephony API and call, for example, the

¹ Discovery in this case is ongoing. 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 '8923 LG Accused Products include the following products: LG Enact, LG F7, LG G Flex, LG G2, LG Intuition, LG Lucid 2, LG Nexus 4, LG Nexus 5, LG Optimus F3, LG Optimus F3Q, LG Optimus F6, LG Optimus G, LG Optimus G Pro, LG Optimus L9, LG Spectrum 2, LG Venice, LG G3, LG G Pad 7.0 LTE, LG G Vista, LG Lucid 3, LG Optimus Exceed 2, LG Optimus L70, LG Optimus L90, LG Optimus Zone 2, and LG Volt. Evidence supporting the use of relevant technology contained within this chart is listed in Appendix F-1.

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	sendTextMessage or sendMultipartTextMessage methods of the SMSManager class. Publicly available Google source code indicates that the SmsUsageMonitor.java is configured to limit the number of SMS/MMS messages an app can send in a particular period. This class controls the application based on the claimed criteria.
an application program configured to send messages towards a communication network;	Each '8923 LG Accused Product operates using the Android Operating System, and includes at least one application program configured to send messages towards a communication network, using, for example, SMS or MMS messaging functionality. Such an application program may be a native SMS/MMS program provided by the Android OS (e.g. the "Messaging" app), or it may include other third party applications which are configured to send messages toward a communication network. For example, third party applications such as Handcent are also configured to send messages towards a communication network.
and a diverting unit configured to divert a message of the messages sent from the application program and destined for the communication network to a controlling entity residing in the terminal,	Each '8923 LG Accused Product contains a diverting unit configured to divert a message of the messages sent from the application program and destined for the communication network to a controlling entity residing in the terminal. More specifically, the Android OS contains a diverting unit (e.g. the Telephony Manager) that is part of the Application Framework of the operating system. In order for third party applications or the native messaging app to send text messages using the Android OS, these applications utilize the android.telephony API and call, for example, the sendTextMessage or sendMultipartTextMessage methods of the SMSManager class. The diverting unit (i.e. the Telephony Manager) diverts a message of the messages sent when the respective method calls are made by the application. The message is diverted to a controlling entity

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³ See <http://source.android.com/tech/security/>

⁴ See <http://developer.android.com/reference/android/telephony/SmsManager.html>

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	Android API level: 17 + android.support.v4.app android.support.v4.view android.support.v4.view.accessibility android.support.v4.widget android.telephony android.telephony.cdma android.telephony.gsm android.test android.test.mock android.test.suitebuilder android.text android.text.format android.text.method android.text.style *** CellSignalStrengthCdma CellSignalStrengthGsm CellSignalStrengthLte NeighboringCellInfo PhoneNumberFormattingTextUtils PhoneNumberUtils PhoneStateListener ServiceState SignalStrength SmsManager SmsMessage SmsMessage.SubmitPdu TelephonyManager Throws <i>IllegalArgumentException</i> if destinationAddress or data are empty public void sendTextMessage (String destinationAddress, String scAddress, String text, PendingIntent sentIntent, PendingIntent deliveryIntent) Added in API level 4 Send a text based SMS. Parameters destinationAddress the address to send the message to scAddress is the service center address or null to use the current default SMSC text the body of the message to send sentIntent if not NULL this <i>PendingIntent</i> is broadcast when the message is successfully sent, or failed. The result code will be <i>Activity.RESULT_OK</i> for success, or one of these errors: <i>RESULT_ERROR_GENERIC_FAILURE</i> <i>RESULT_ERROR_RADIO_OFF</i> <i>RESULT_ERROR_NULL_PDU</i> For <i>RESULT_ERROR_GENERIC_FAILURE</i> the sentIntent may include the extra "errorCode" containing a radio technology specific value, generally only useful for troubleshooting. The per-application based SMS control checks sentIntent. If sentIntent is NULL the caller will be checked against all unknown applications, which cause smaller number of SMS to be sent in checking period. deliveryIntent if not NULL this <i>PendingIntent</i> is broadcast when the message is delivered to the recipient. The raw pdu of the status report is in the extended data ("pdu"). Throws <i>IllegalArgumentException</i> if destinationAddress or text are empty <u>Alternatively, CCE 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.</u>
wherein the controlling entity is configured to control, based on the message and before the message is transmitted to the communication network, whether the application program behaves in a predetermined manner in the	The controlling entity is configured to control, based on the message and before the message is transmitted to the communication network, whether the application program behaves in a predetermined manner in the communication terminal. Namely, the SmsUsageMonitor determines whether the application program has sent too many messages in a given time period. If, for example, the application

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communication terminal,	attempts to send too many messages within a certain period, the SmsUsageMonitor will warn the user before the message is transmitted. In the alternative, the SmsUsageMonitor will determine if the message is being sent to a premium SMS short code. If the message is destined for a premium SMS short code, the controlling entity will require seek confirmation from the user before the message is transmitted.⁵ <pre> 58. 59. /** 60. * Implement the per-application based SMS control, which limits the number of 61. * SMS/MMS messages an app can send in the checking period. 62. * 63. * This code was formerly part of {@link SMSDispatcher}, and has been moved 64. * into a separate class to support instantiation of multiple SMSDispatchers on 65. * dual-mode devices that require support for both 3GPP and 3GPP2 format messages. 66. */ 67. public class SmsUsageMonitor { 68. private static final String TAG = "SmsUsageMonitor"; 69. private static final boolean DBG = false; 70. private static final boolean VDBG = false; 71. 72. private static final String SHORT_CODE_PATH = "/data/misc/sms/codes"; 73. 74. /** Default checking period for SMS sent without user permission. */ 75. private static final int DEFAULT_SMS_CHECK_PERIOD = 60000; // 1 minute 76. 77. /** Default number of SMS sent in checking period without user permission. */ 78. private static final int DEFAULT_SMS_MAX_COUNT = 30; </pre>

⁵ See <https://android.googlesource.com/platform/frameworks/opt/telephony/+master/src/java/com/android/internal/telephony/SmsUsageMonitor.java>

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	<pre> 383. /** 384. * Check if the destination is a possible premium short code. 385. * NOTE: the caller is expected to strip non-digits from the destination number with 386. * {@link PhoneNumberUtil#extractNetworkPortion} before calling this method. 387. * This happens in {@link SMSDispatcher#sendRawPdu} so that we use the same phone number 388. * for testing and in the user confirmation dialog if the user needs to confirm the number. 389. * This makes it difficult for malware to fool the user or the short code pattern matcher 390. * by using non-ASCII characters to make the number appear to be different from the real 391. * destination phone number. 392. * 393. * @param destAddress the destination address to test for possible short code 394. * @return {@link #CATEGORY_NOT_SHORT_CODE}, {@link #CATEGORY_FREE_SHORT_CODE}, 395. * {@link #CATEGORY_POSSIBLE_PREMIUM_SHORT_CODE}, or {@link #CATEGORY_PREMIUM_SHORT_CODE}. 396. */ 397. public int checkDestination(String destAddress, String countryIso) { 398. synchronized (mSettingsObserverHandler) { </pre> <u>Alternatively, CCE 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.</u>
and wherein the terminal is a terminal of a communications system.	Each '8923 LG Accused Product is either a tablet device with messaging capabilities or a cellular device with messaging capabilities. The messaging capabilities of both of these classifications of devices mean that each accused product is a terminal of a communications system.
26. The terminal according to claim 24, wherein the controlling entity is configured to reside in a tamper resistant area of the terminal.	See analysis of claim 24, which is incorporated herein by reference. Each of the '8923 LG Accused Products contains a controlling entity which is configured to reside in a tamper resistant area of the terminal. Specifically, the controlling entity is the SmsUsageMonitor and is configured to execute as part of the Android operating system. The Android operating system utilizes an Application Sandbox approach to prevent unauthorized access to processes. Such security is kernel level security and prevents applications from interfering with one another, but also prevents applications from accessing objects that execute as

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	part of the operating system itself without explicit permission to do so.⁶ Thus, the controlling entity resides in a tamper resistant area of the terminal. The Application Sandbox The Android platform takes advantage of the Linux user-based protection as a means of identifying and isolating application resources. The Android system assigns a unique user ID (UID) to each Android application and runs it as that user in a separate process. This approach is different from other operating systems (including the traditional Linux configuration), where multiple applications run with the same user permissions. This sets up a kernel-level Application Sandbox. The kernel enforces security between applications and the system at the process level through standard Linux facilities, such as user and group IDs that are assigned to applications. By default, applications cannot interact with each other and applications have limited access to the operating system. If application A tries to do something malicious like read application B's data or dial the phone without permission (which is a separate application), then the operating system protects against this because application A does not have the appropriate user privileges. The sandbox is simple, auditable, and based on decades-old UNIX-style user separation of processes and file permissions Since the Application Sandbox is in the kernel, this security model extends to native code and to operating system applications. All of the software above the kernel in Figure 7, including operating system libraries, application framework, application runtime, and all applications run within the Application Sandbox. On some platforms, developers are constrained to a specific development framework, set of APIs, or language in order to enforce security. On Android, there are no restrictions on how an application can be written that are required to enforce security; in this respect, native code is just as secure as interpreted code In some operating systems, memory corruption errors generally lead to completely compromising the security of the device. This is not the case in Android due to all applications and their resources being sandboxed at the OS level. A memory corruption error will only allow arbitrary code execution in the context of that particular application, with the permissions established by the operating system. Like all security features, the Application Sandbox is not unbreakable. However, to break out of the Application Sandbox in a properly configured device, one must compromise the security of the the Linux kernel. System Partition and Safe Mode The system partition contains Android's kernel as well as the operating system libraries, application runtime, application framework, and applications. This partition is set to read-only. When a user boots the device into Safe Mode, only core Android applications are available. This ensures that the user can boot their phone into an environment that is free of third-party software. Filesystem Permissions In a UNIX-style environment, filesystem permissions ensure that one user cannot alter or read another user's files. In the case of Android, each application runs as its own user. Unless the developer explicitly exposes files to other applications, files created by one application cannot be read or altered by another application.
32. The terminal according to claim 24, wherein the terminal comprises a mobile	See analysis of claim 24, which is incorporated herein by reference.

⁶ See <http://source.android.com/tech/security/>

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terminal.	Each of the '8923 LG Accused Products comprises a mobile terminal such as a tablet or a cellular phone device.

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U.S. Pat. No. 6,810,019	'019 LG ACCUSED PRODUCTS ¹
11. A terminal in a wireless telecommunications system comprising:	LG, AT&T, and T-Mobile directly infringe the '019 patent. Each Defendant makes, uses, sells, offers to sell, and/or imports the '019 LG Accused Products², each of which is a cellular device that includes the features and capabilities described in this claim. Plaintiff contends that each Defendant directly infringes this claim because it makes, uses, sells, offers to sell, and/or imports the '019 LG Accused Products, which include and/or practice each and every element of this claim. Each '019 LG Accused Product is mobile communication device that contains each element as describe below. More specifically, each '019 LG Accused Product comprises a mobile communication device configured to function in a wireless telecommunications system and includes hardware and software (including memory, one or more processors, radios, firmware, and drivers) configured to support and provide wireless communications using 3G (e.g., W-CDMA) network technologies. By nature of its configuration for the W-CDMA network, each Accused Product is configured to receive measurements pattern definitions according the W-CDMA network to which it subscribes. The use of W-CDMA is part of the UMTS standard, and as such, each '019 LG Accused Product is compliant with the technical specifications published by 3GPP and ETSI for UMTS technology, including TS 25.215³ and TS 25.212⁴. Indeed, the

¹ Discovery in this case is ongoing. 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 '019 LG Accused Products include the following products: LG DoublePlay, LG Escape 4G, LG G Flex, LG G2, LG G2X, LG myTouch, LG myTouch Q, LG Nexus 4, LG Nexus 5, LG Nitro HD, LG Optimus F3, LG Optimus F3Q, LG Optimus F6, LG Optimus G, LG Optimus G Pro, LG Optimus L9, LG G3, LG G Pad 7.0 LTE, LG G Vista, LG Optimus L70, and LG Optimus L90. Evidence supporting the use of relevant technology contained within this chart is listed in Appendix G-1.

³ See TS 25.215 Technical Specification, http://www.etsi.org/deliver/etsi_ts/125200_125299/125215/09.02.00_60/ts_125215v090200p.pdf.

⁴ See TS 25.212 Technical Specification, http://www.etsi.org/deliver/etsi_ts/125200_125299/125212/09.02.00_60/ts_125212v090200p.pdf.

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	'019 is essential to compliance with UMTS standards. ⁵ Each Accused Product also contains processing means that is used to arrange gaps in transmission in a time slot frame based on the received pattern definitions.
a receiver for receiving measurements pattern definitions made by the telecommunications system;	Each '019 LG Accused Product is configured to receive from the cellular network at least one compressed mode transmission gap pattern sequence from the UTRAN network with which it is registered. The transmission gap pattern sequence is used in connection with monitoring cells on various frequencies, as well as other purposes as explained by 3GPP technical specifications. According to TS 25.215, commands to monitor cells are issued from the UTRAN:

⁵ http://ipr.etsi.org/IPRDetails.aspx?IPRD_ID=689&IPRD_TYPE_ID=2&MODE=2 (last accessed Mar. 20, 2014).

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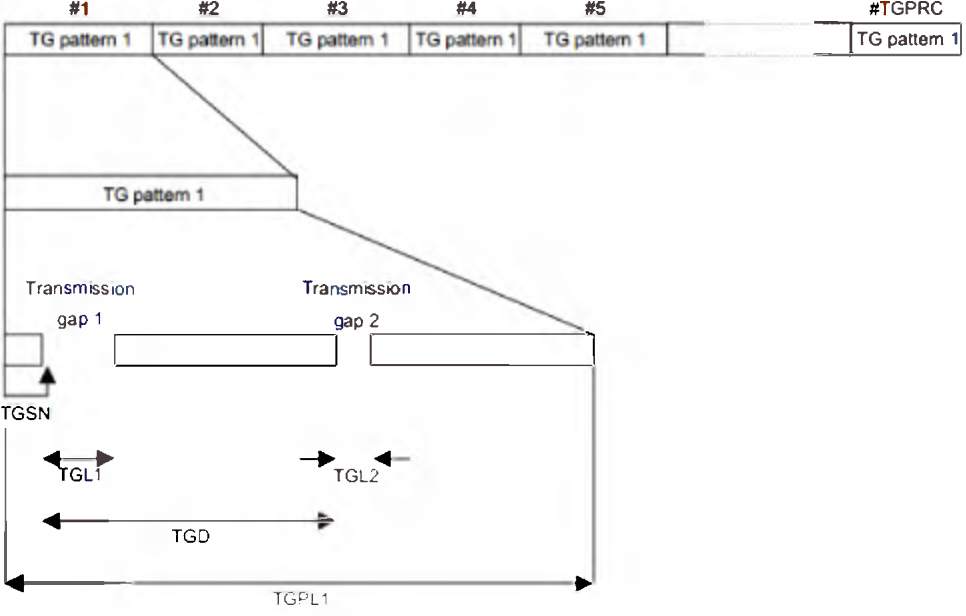
U.S. Pat. No. 6,810,019	'019 LG ACCUSED PRODUCTS ¹
	6 Measurements for UTRA FDD 6.1 UE measurements 6.1.1 Compressed mode 6.1.1.1 Use of compressed mode for monitoring On command from the UTRAN, a UE shall monitor cells on other FDD frequencies and on other modes and radio access technologies that are supported by the UE (i.e. TDD, GSM, E-UTRA). To allow the UE to perform measurements, UTRAN shall command that the UE enters in compressed mode, depending on the UE capabilities. The UE capabilities define whether a UE requires compressed mode in order to monitor cells on other FDD frequencies and on other modes and radio access technologies. UE capabilities indicate the need for compressed mode separately for the uplink and downlink and for each mode, radio access technology and frequency band. A UE shall support compressed mode for all cases for which the UE indicates that compressed mode is required. A UE does not need to support compressed mode for cases for which the UE indicates that compressed mode is not required. For these cases, the UE shall support an alternative means of making the measurements. The UE shall support one single measurement purpose for one transmission gap pattern sequence. The measurement purpose of the transmission gap pattern sequence is signalled by higher layers. The following subclause provides rules to parameterise the compressed mode. 6.1.1.2 Parameterisation of the compressed mode In response to a request from higher layers, the UTRAN shall signal to the UE the compressed mode parameters. A transmission gap pattern sequence consists of consecutive occurrences of transmission gap pattern 1, where transmission gap pattern 1 consists of one or two transmission gaps. See figure 1. The measurements pattern definitions (as explained in TS 25.215) may include a transmission gap starting slot number, a transmission gap length, a transmission gap start distance, a transmission gap pattern length, a transmission gap pattern repetition count, and/or a transmission gap connection frame number:

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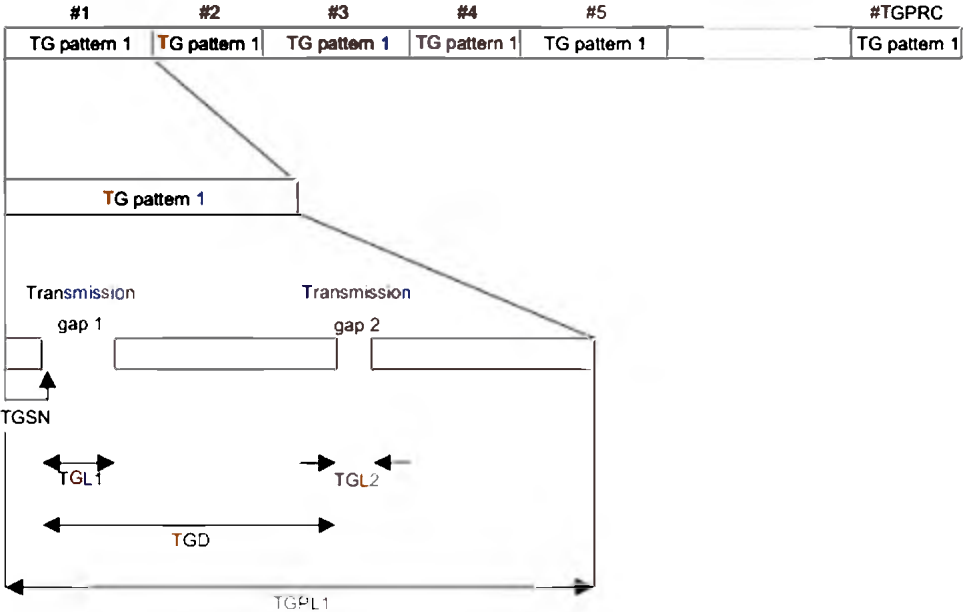
U.S. Pat. No. 6,810,019	'019 LG ACCUSED PRODUCTS ¹
	6.1.1.2 Parameterisation of the compressed mode In response to a request from higher layers, the UTRAN shall signal to the UE the compressed mode parameters. A transmission gap pattern sequence consists of consecutive occurrences of transmission gap pattern 1, where transmission gap pattern 1 consists of one or two transmission gaps. See figure 1. The following parameters characterise a transmission gap pattern: - TGSN (Transmission Gap Starting Slot Number): A transmission gap pattern begins in a radio frame, henceforward called first radio frame of the transmission gap pattern, containing at least one transmission gap slot. TGSN is the slot number of the first transmission gap slot within the first radio frame of the transmission gap pattern; - TGL1 (Transmission Gap Length 1): This is the duration of the first transmission gap within the transmission gap pattern, expressed in number of slots; - TGL2 (Transmission Gap Length 2): This is the duration of the second transmission gap within the transmission gap pattern, expressed in number of slots. If this parameter is not explicitly set by higher layers, then TGL2 = TGL1; - TGD (Transmission Gap start Distance): This is the duration between the starting slots of two consecutive transmission gaps within a transmission gap pattern, expressed in number of slots. The resulting position of the second transmission gap within its radio frame(s) shall comply with the limitations of [2]. If this parameter is not set by higher layers, then there is only one transmission gap in the transmission gap pattern; - TGPL1 (Transmission Gap Pattern Length): This is the duration of transmission gap pattern 1, expressed in number of frames; The following parameters control the transmission gap pattern sequence start and repetition: - TGPRC (Transmission Gap Pattern Repetition Count): This is the number of transmission gap patterns within the transmission gap pattern sequence; - TGCFN (Transmission Gap Connection Frame Number): This is the CFN of the first radio frame of the first pattern 1 within the transmission gap pattern sequence.
and processing means for arranging gaps in a time-slot frame according to the measurement pattern definitions,	Each '019 LG Accused Product contains a processor which is configured to arrange gaps in a time-slot frame according to the measurement pattern definitions. The measurement pattern definitions (as explained in TS 25.215) include at least a transmission gap length (shown below as TGL1), and may contain a second transmission gap length (shown below as TGL2) which are arranged in a time-slot frame by the processing means. <u>Additionally, the measurement pattern definitions include a transmission gap distance (TGD).</u>

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	<u>transmission gap pattern length (TGPL), and transmission gap period repetition count (TGPRC) parameters for transmission gap patterns that include more than one gap. The processor (which constitutes a processing means described in the '019 patent) is configured to TGL, TGD, TGPL, and TGPRC parameters for transmission gap patterns that include more than one gap. Additionally, the processor is configured to apply TGL, TGPL, and TGPRC parameters if there is only one gap in a transmission in a transmission gap pattern.</u>  Figure 1: Illustration of compressed mode pattern parameters <u>Alternatively, CCE 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</u>

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	<u>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.</u>
wherein the processing means are also arranged to set for the measurement pattern definition a delay according to the measurement pattern definitions.	Each '019 LG Accused Product contains a processor which is arranged to set for the measurement pattern definition a delay according to the measurement pattern definitions. The delay is given by a transmission gap starting slot number (TGSN) and/or a transmission gap connection frame number (TGCFN). <u>The processor is configured to apply a TGSN-TGCFN parameter combination specific to the terminal.</u> Such is explained in TS 25.215:  Figure 1: Illustration of compressed mode pattern parameters

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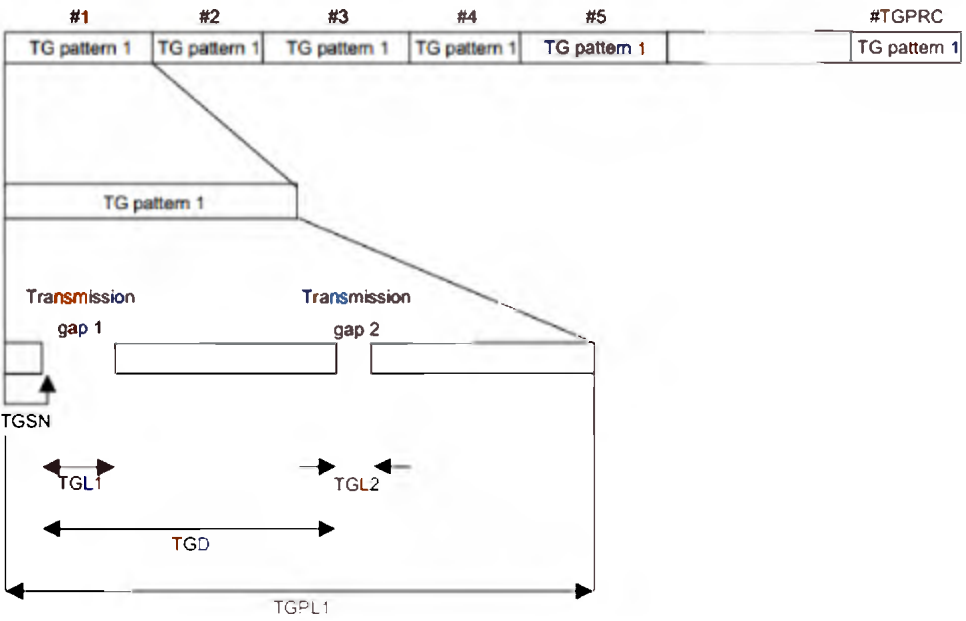
U.S. Pat. No. 6,810,019	'019 LG ACCUSED PRODUCTS ¹
	<u>Alternatively, CCE contends that this claim element is met under the doctrine of equivalents because above-described features of the Accused Products perform substantially the same function recited in this element, in substantially the same way to achieve substantially the same result. Any alleged differences between the above-described features and the recited element are insubstantial and immaterial to infringement.</u>
12. A terminal as claimed in claim 11, wherein the processing means are arranged to set the measurement pattern definition into the time-slot frame at least by means of a gap length and a gap pattern length.	See analysis of claim 11, which is incorporated herein by reference. Each '019 LG Accused Product contains a processor which arranges gaps in a time-slot frame according to the measurement pattern definitions. The measurement pattern definitions include at least a transmission gap length (shown below as TGL1), and may contain a second transmission gap length (shown below as TGL2) which are arranged in a time-slot frame by the processing means. The measurement pattern definitions also contain a gap pattern length (<u>shown below as</u> TGPL1). Such is explained in TS 25.215:

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	Figure 1: Illustration of compressed mode pattern parameters
and the measurement pattern delay by means of a frame number and a time-slot number.	Each '019 LG Accused Product contains a processor which is arranged to set for the measurement pattern definition a delay according to the measurement pattern definition. The delay is given by a transmission gap starting slot number (TGSN) and/or a transmission gap connection frame number (TGCFN)-) <u>parameter combination specific to the terminal</u>. Such is explained in TS 25.215:

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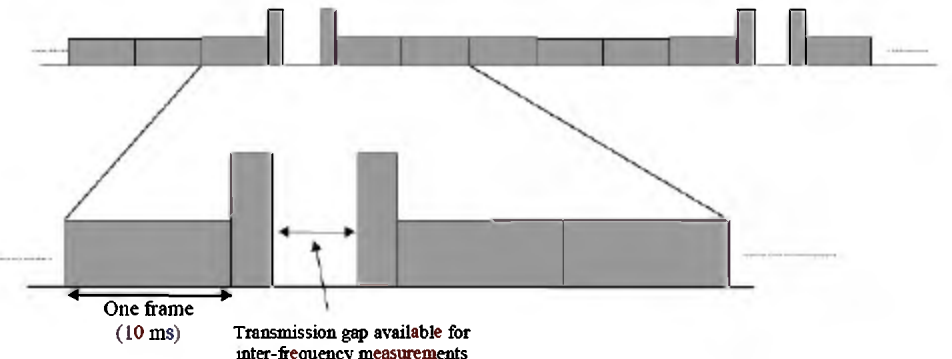
U.S. Pat. No. 6,810,019	'019 LG ACCUSED PRODUCTS ¹
	 Figure 1: Illustration of compressed mode pattern parameters
13. A terminal as claimed in claim 12, wherein the terminal is a frequency division duplex wideband code division multiple access system, which is arranged to perform measurements of inter-frequencies of the system in a compressed mode during the gaps	See analysis of claim 12, which is incorporated herein by reference. Each '019 LG Accused Product is a FDD W-CDMA system. Under W-CDMA, each UE is arranged such that measurements of inter-frequencies of the W-CDMA system are performed in a compressed mode during the transmission gaps. Such is described in 3GPP technical literature including TS 25.212 and TS 25.215.

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	W-CDMA Wideband Code Division Multiple Access W-CDMA – the radio technology of UMTS - is a part of the ITU IMT-2000 family of 3G Standards. Both Frequency Division Duplex (FDD) and Time Division Duplex (TDD) variants are supported. W-CDMA is a spread-spectrum modulation technique; one which uses channels whose bandwidth is much greater than that of the data to be transferred. Instead of each connection being granted a dedicated frequency band just wide enough to accommodate its envisaged maximum data rate, W-CDMA channels share a much larger band. The modulation technique encodes each channel in such a way that a decoder, knowing the code, can pick out the wanted signal from other signals using the same band, which simply appear as so much noise. UMTS uses a core network derived from that of GSM, ensuring backward compatibility of services and allowing seamless handover between GSM access technology and W CDMA. (Source: http://www.3gpp.org/Technologies/Keywords-Acronyms/article/w-cdma) The UE shall support one compressed mode pattern sequence for each measurement purpose while operating in FDD mode, assuming the UE needs compressed mode to perform the respective measurement. In case the UE supports several of the measurement purposes, it shall support in parallel one compressed mode pattern sequence for each supported measurement purpose where the UE needs compressed mode to perform the measurement. The capability of the UE to operate in compressed mode in uplink and downlink is given from the UE capabilities. (Source: http://www.etsi.org/deliver/etsi_ts/125200_125299/125215/09.02.00_60/ts_125215v090200p.pdf)

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	In compressed frames, TGL slots from N_{first} to N_{last} are not used for transmission of data. As illustrated in figure 11, the instantaneous transmit power is increased in the compressed frame in order to keep the quality (BER, FER, etc.) unaffected by the reduced processing gain. The amount of power increase depends on the transmission time reduction method (see subclause 4.4.3). What frames are compressed, are decided by the network. When in compressed mode, compressed frames can occur periodically, as illustrated in figure 11, or requested on demand. The rate and type of compressed frames is variable and depends on the environment and the measurement requirements.  Figure 11: Compressed mode transmission (Source: http://www.etsi.org/deliver/etsi_ts/125200_125299/125212/09.02.00_60/ts_125212v090200p.pdf) <u>Alternatively, CCE 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.</u>