U.S. Patent No. 6,628,629

T-Mobile & Ericsson Infringement Contentions

Claims 1-4

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1. A method for assigning future slots of a transmission frame to a data packet in the transmission frame for transmission over a wireless medium, comprising:	**T-Mobile and Ericsson each directly infringe claim 1 under 35 U.S.C. § 271 (a) by literally method step.** T-Mobile performs all steps of claim 1 and its dependent claims literally by making, installing, n testing, or operating a wireless telecom network in accordance with Long-Term Evolution (“LTE stations in the T-Mobile network are Evolved Node-Bs (“eNodeB” or “eNB”) provided by Erics 8640 (Ericsson Press Release, Sep. 23, 2014); IVMN00008641-42 (Ericsson Press Release, May IVMN00008649-51 (T-Mobile Press Release, May 7, 2012). T-Mobile performs all steps either controlling its subscribers. Ericsson performs all steps of claim 1 and its dependent claims literally by operating, maintainin wireless base stations, e.g., eNodeBs, in the T-Mobile network. *See, e.g.*, IVMN00008638-8640 Sep. 23, 2014); IVMN00008641-42 (Ericsson Press Release, May 8, 2012); IVMN00008649-51 May 7, 2012). **Ericsson indirectly infringes claim 1 under 35 U.S.C. § 271 (b) by inducing T-Mobile to lite claimed method step, and under 35 U.S.C. § 271 (c) by selling material or apparatus for us claimed method step.** Ericsson has induced, and continues to induce, T-Mobile to infringe claim 1 and its dependent cl contributory infringement of claim 1 and its dependent claims by providing the hardware and so Mobile to perform the claimed method, along with instructions that induce T-Mobile to perform Ericsson has taken, and continues to take, active steps to induce T-Mobile to infringe claim 1 an knowing that those steps will induce, encourage, and facilitate direct infringement by T-Mobile. described in detail below and include, but are not limited to, configuring Ericsson eNodeBs to p scheduling, providing instructions on the use of the semi-persistent scheduling feature, and parti operation, and maintenance of the T-Mobile network specifically for the purpose of performing To the extent the preamble is found to be limiting, T-Mobile and Ericsson each perform a metho preamble language.

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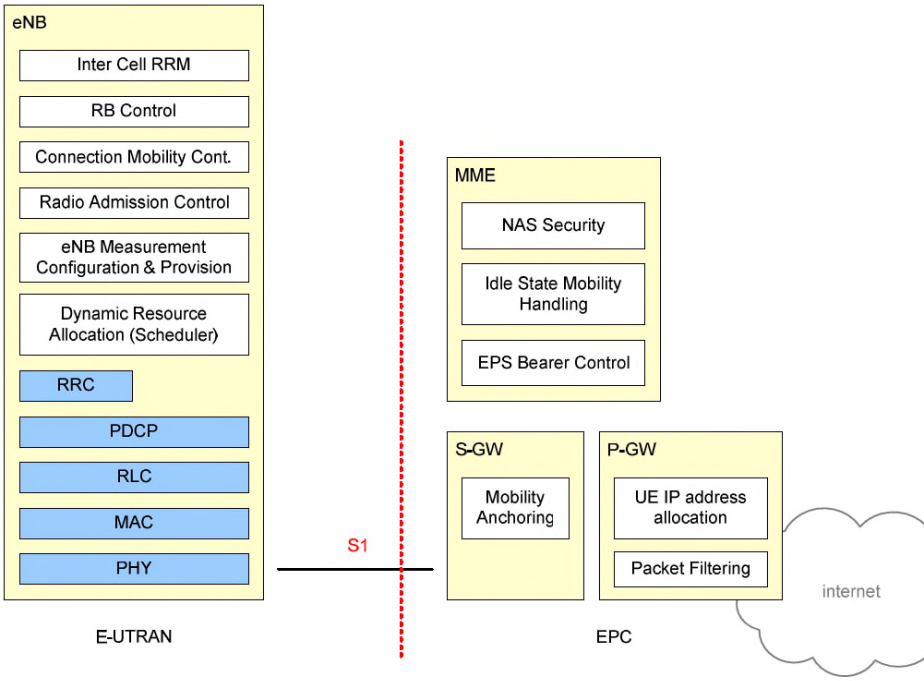
	<u>OVERVIEW OF LTE NETWORK</u> Figure 4.1-1 (below) shows an eNB connected to an Evolved Packet Core (“EPC”). TS 36.300[1] §  **Figure 4.1-1: Functional Split between E-UTRAN and EPC** TS 36.300 § 4.1. An eNB communicates wirelessly with user equipment (“UE,” e.g., smart phones). TS 36.300 § § 4.4.3.2; TR 21.905 §§ 3B, 3E, 3N. EPC components include: a signaling gateway (“S-GW”); entity (“MME”); and a packet gateway (“P-GW”) that interfaces with packet data networks (“PD TS 23.401 §§ 4.1 & 4.4; TS 36.300 § 4.1; TS 23.228 § 4. The eNB and UEs communicate via a physical (“PHY”), medium access control (“MAC”), radio link control (“RLC”), and packet data (“PDCP”) layers. TS 36.300 §§ 4 & 6. The eNB also operates a radio resource control (“RRC”)

[1] Citations to TR __.___ and TS __.___ refer to 3rd Generation Partnership Project (“3GPP”) LTE documentation list
and Infringement Contentions served concurrently herewith. Unless a specific version is noted, the citation refers to

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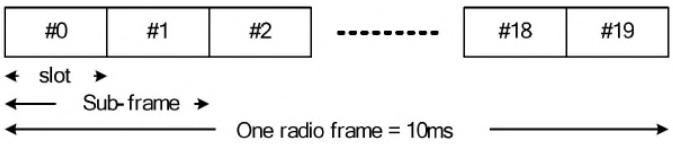
	<u>OVERVIEW OF LTE RADIO TRANSMISSION SCHEMES AND RADIO RESOURCES</u> The wireless transmissions between an eNodeB and UE include downlink (“DL”) transmissions and uplink (“UL”) transmissions (i.e., from a UE to an eNB) organized in either of two frame str duplex (“FDD”), and time division duplex (“TDD”). TS 36.300 § 5. On information and belief, operates at least in accordance with FDD. *Id.* at §§ 5 & 5.1.1; TS 36.211 §§ 4 & 6. The FDD and both divide frequency into subcarriers, and divide time into frames, subframes and slots. *Id.* As (below), each frame includes ten subframes, each subframe includes two slots, wherein each fran each subframe has a duration of 1ms, and each slot has a duration of 0.5ms. *Id.*  **Figure 5-1: Frame structure type 1** TS 36.300 § 5. Figures 5.2.1-1 and 6.2.2-1 (below) show UL and DL resource grids, respectively. TS 36.211 §§ Both grids plot time and frequency on horizontal and vertical axes, and both divide time into fran as described above. *Id.*; *see also* TS 36.300 § 5. Both grids also divide frequency into subcarrie types of modulation. *Id.* Referring to Figure 6.2.2-1 (below), DL transmission uses orthogonal fr multiplexing (“OFDM”). *Id.* OFDM divides frequency into sub-carriers spaced 15 kHz apart. *Id* resource elements (“REs”) and resource blocks (“RBs”). *Id.* at § 6.2. Each RE includes one sub symbol period. *Id.* Each RB contains 12 subcarriers for a duration of one slot. *Id.* When using each slot has seven symbols. *Id.* So, with a normal cyclic prefix, each RB has 84 REs (12 rows

[2] A cyclic prefix is part of an OFDM symbol. TS 36.211 §§ 4.1, 4.2 & 6.2.3. LTE transmission schemes use either a no symbols per slot) or an extended cyclic prefix (6 OFDM symbols per slot). TS 36.300 § 5.1.1.

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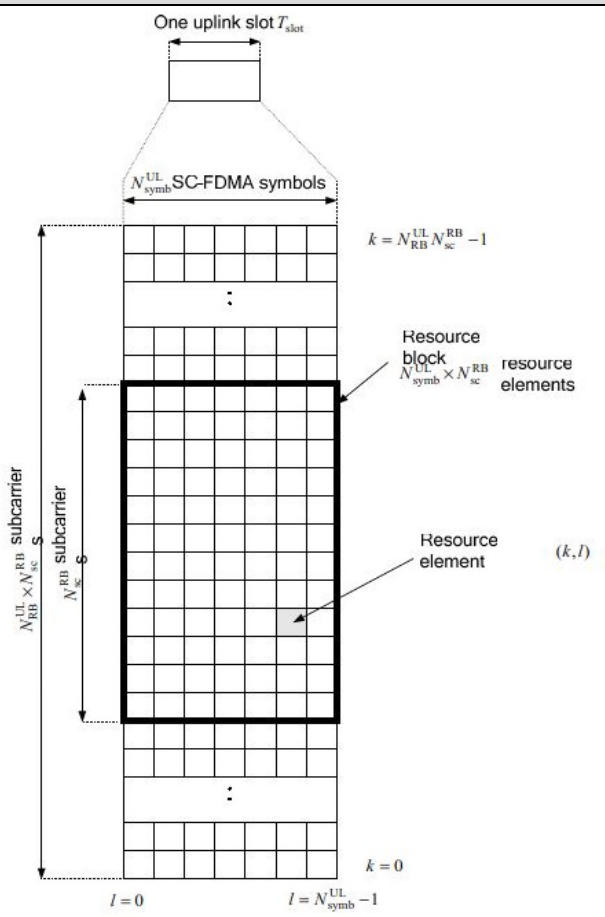

Figure 5.2.1-1: Uplink resource grid.

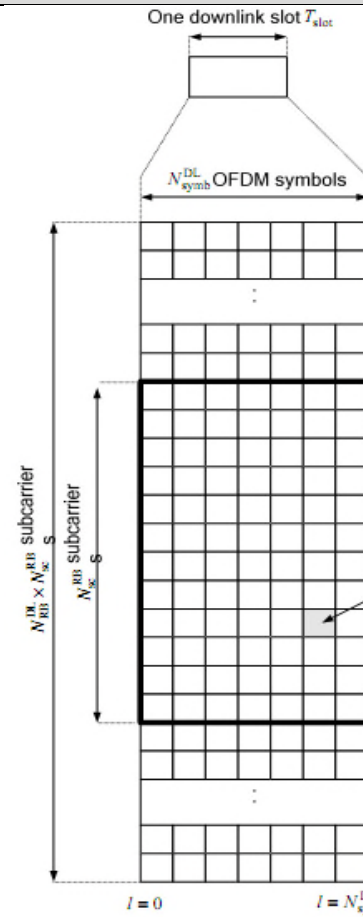

Figure 6.2.2-1: Down

Referring to Fig. 5.2.2-1 (above), the UL resource grid also includes REs and RBs. TS 36.211 § belief, the T-Mobile network uses Single Carrier Frequency Division Multiple Access (“SC-FDM transmission. *Id*. at §§ 5.2. & 5.3. SC-FDMA divides frequency into sub-carriers spaced 15 kHz normal cyclic prefix, each RB in the UL resource grid includes 84 REs (12 rows by 7 columns of

<u>OVERVIEW OF LTE PHYSICAL CHANNELS CARRYING DATA AND CONTROL MESSAGES</u>

The DL radio resources are used to transport downlink physical channels that are shared by mult with a single eNB in the DL direction. Likewise, UL radio resources are used to transport uplink shared by the UEs to communicate with the eNB in the UL direction. TS 36.300 §§ 5, 6, 6.1 &

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	eNB and UEs must exchange control messages in order to allocate resources (i.e., specified RBs and from UEs. *Id*. These resource allocations may be valid for one or more subframes, wherein to a transmission time interval (“TTI”) of one millisecond. *See* TS 36.300 §§ 5, 5.1.1 and 11. Ph LTE include: • physical downlink control channel (“PDCCH”) carrying control information sent from an eN including downlink resource allocations, and uplink scheduling grants; • enhanced physical downlink control channel (“EPDCCH”) carrying control information sent including downlink resource allocations, and uplink scheduling grants; • physical downlink shared channel (“PDSCH”) carrying data sent from an eNB to one or mor • physical uplink control channel (“PUCCH”) carrying control information sent from one or m • physical uplink shared channel (“PUSCH”) carrying data sent from one or more UEs to an eI TS 36.300 V12.0.0 § 5. Discussions in this document about resource allocation and grant control information sent on a P monitoring a PDCCH for control information, applies also to resource allocation and grant contr EPDCCH, when an EDPCCH is configured. **LTE TRANSPORT CHANNELS, LOGICAL CHANNELS, AND RADIO BEARERS** Figures 6-1 and 6-2 (below) show relationships between transport channels, logical channels, an downlink and uplink communications. TS 36.300 §§ 4.1 & 6.

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