LTE Patents for Standards Data 2Q 2016

LTE Patents for Standards Data 2Q 2016 is a custom research of TechIPm, LLC (www.techipm.com) based on LTE patents analysis for the market leaders among LTE UE (cellular phones, smart phones, PDAs, mobile PCs, etc.) and base station (eNB) product manufactures and innovators:

Methodology

1. Search for LTE related patents.

- Search the current ETSI and USPTO database for the LTE patents issued as of 2Q 2016
- 3GPP Release 10 technical specifications (LTE-Advanced) for LTE RAN (Radio Access Network):
  - PHY: TS 36.101, 211, 212, 213, 305
  - L2/L3 Protocols: TS 36.300, 304, 321, 322, 323, 331, 355
- 3GPP Release 11 technical specifications for CoMP (TR 36.819), 3GPP Release 12 technical specifications for EPDCCH (TS 36.211, 213) and D2D (Device to Device; TR 36.843) Communications.
- * LTE RAN products: LTE UE (cellular phones, smart phones, PDAs, mobile PCs, etc.) and base station (eNB) baseband modem and radio SW products
2. Review the searched patents for essential patent candidates.

- Review the patents
- Categorize the identified patents through the evaluation process by technology in the standard specifications

Key technology components for an implementation of the LTE baseband modem:
- OFDM/OFDMA (Frame & Slot Structure, Modulation), SC-FDMA (PUSCH, PUCCH), Channel Estimation (UL RS, DL RS, CQI), Cell Search & Connection (PRACH, DL SS), MIMO (Transmit Diversity, Spatial Multiplexing), Resource Management (Resource Allocation, Scheduling), Coding (Convolution, Turbo), Power Control, HARQ, Carrier Aggregation, Relay, and Positioning Technology.

Key technology components for an implementation of the LTE radio protocol:
- Random Access, HARQ, Channel Prioritization, Scheduling (Dynamic, SPS), Protocol Format (PDUs, SDUs), Radio Link Control (ARQ), PDCP Process (SRB, DRB, ROHC), Security (Ciphering, Integrity), System Information, Connection Control, Mobility (Handover, Inter-RAT, Measurements), QoS, MBMS, and Carrier Aggregation.

- Evaluate the level of essentiality

  Patent disclosures in claims and detail description for patent are compared to the standard specifications.

  Essentiality Index (EI):
  - E1 : Patent disclosure is weakly related to LTE technical specifications
  - E2 : Patent disclosure is partially related to LTE technical specifications
  - E3 : Patent disclosure is related to LTE technical specifications overall
  - E4 : Patent disclosure is strongly related to LTE technical specifications
  
  *To be a potential standard essential patent (SEP) candidate, EI should be E3 or E4.

- E4 Example

  A patent has one or more claims that cover completely some part of the standard specification.
Deliverables

**MS excel file** for current assignee, patent number (USPTO & EPO Families hyperlinked to Google Patent), standard specifications series & section number, technology category, and Essentiality Index

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