



LTE-U Industry Workshop

San Diego, CA
May 28, 2015



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Agenda

- 9:00 – 9:10 Welcome – LTE-U Forum Chair
- 9:10 – 9:40 LTE-U Forum introduction and simulation results – Qualcomm
- 9:40 – 10:00 eNB MPS specs – ALU
- 10:00 - 10:20 UE MPS spec – Samsung
- 10:20 - 10:30 Break
- 10:30 – 11:15 Coexistence spec – Ericsson
- 11:15 – 12:00 Coexistence mechanism – Ericsson
- 12:00 - 12:45 Lunch
- 12:45 – 2:00 Coexistence mechanism and test results – Qualcomm
- 2:00 – 4:00 LTE-U demos – Qualcomm (offsite with shuttle transportation)
 - 2:00-3:00 Group **Red** (Stress Room); Group **Blue** (OTA Outdoor)
 - 3:00-4:00 Group **Green** (Stress Room); Group **Red** (OTA Outdoor)
- 4:00 – 5:30 Q&A session
- 5:30 – 5:45 Concluding remarks

Main conf room: R-324; Break/Test Equipment demo room: R-321



Workshop Objectives and Participation

- **Workshop objectives**

- Provide an overview of the LTE-U Forum specifications (R 1.0) and ensure a clear interpretation of these
- Interact with a broad segment of the Industry to discuss coexistence with Wi-Fi
- Provide LTE-U Demos showing Coexistence with Wi-Fi
- Provide a reference to interested service providers and vendors planning the deployment of related products

- **Workshop participation (29 companies and organizations)**

- LTE-U Forum members: ALU, Ericsson, LGE, Qualcomm Technologies, Samsung, Verizon
- Operators: AT&T(by phone), T-Mobile USA
- Infrastructure vendors: Nokia, SpiderCloud
- Device and chipset vendors: Altair, Google, HTC, Intel, Marvell, MediaTek, Microsoft, Motorola(Lenovo), Sequans, SONY
- Test equipment vendors: Anritsu, Rhode & Schwarz
- Wi-Fi vendors and technology enablers: Aruba, Broadcom, Cisco, Ruckus
- Other organizations: CableLabs, IEEE 802 (by phone), WFA



Two Versions of LTE in Unlicensed Spectrum

• LTE Rel-10/11/12 compatible design – focus of LTE-U Forum

- Downlink-only and compatible with LTE Rel-10/11/12
- Coexistence and fair sharing with dynamic channel selection, CSAT, and release of channel at low traffic load
- Meets regulatory requirements in the US
- New RF band support (e.g. 5GHz) needed at eNB and UE (receiver-only)
- 5 GHz operation uses U-NII-1 and U-NII-3 only

• 3GPP Rel-13 LAA (Licensed-Assisted Access)

- Meets specific LBT waveform and uplink PSD requirements in Europe, Japan and other regions
- Add “Listen Before Talk” feature in downlink and uplink with advanced PHY/MAC enhancements

Today’s workshop is focused on LTE-U as specified by LTE-U Forum



LTE-U Forum – Objectives and Background

- **LTE-U Forum Objectives**

- Develop a set of specifications for LTE-U products based on 3GPP Release 10 and beyond published specs

- **Scope**

- LTE operation in the 5GHz U-NII-1 and U-NII-3 bands as Supplemental Downlink (SDL) carriers, aggregated with an LTE deployment in licensed bands.
- Targeted for the US in full compliance with FCC regulations
- Ensure proper validation of fair-sharing coexistence between LTE-U and Wi-Fi as well as between LTE-U operators with the coexistence spec

- **Forum was formed by industry members with both LTE and Wi-Fi expertise**

- ALU; Ericsson; LGE; Qualcomm Technologies Inc.; Samsung; Verizon



LTE-U Forum Documents

- **Completed LTE-U Forum documents (Release 1.0) at the end of February 2015**
 - Technical Report(TR) including coexistence evaluation methodology and simulation results
 - SDL Coexistence specification (LTE-U/Wi-Fi, LTE-U/LTE-U)
 - eNB and UE Minimum Performance Spec in U-NII-1/3 bands
 - Conformance spec (to be completed soon)
- LTE-U Forum documents are available at:
 - <http://www.lteuforum.org/>