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13 August 2010

VIA ELECTRONIC FILING

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, DC 20554

Re: *Notification of Ex Parte Presentation*
PS Docket No. 06-229

Dear Ms. Dortch:

On 12 August 2010, Ken Budka, Wim Brouwer, Maria Palamara, Len Fatica, Paul Kenefick, Dan Johnson, Phil Lamoureux and the undersigned of Alcatel-Lucent met with Jennifer Manner, David Furth, Walter Johnson, Ziad Sleem, Yoon Chang, Behzad Ghaffari, Jerry Stanshine, Gene Fullano, Pat Amodio, Brian Hurley, John Leibovitz and Erika Olson of the Federal Communications Commission ("Commission"). In a separate meeting, Maria Palamara and the undersigned met with Charles Mathias and Brad Gillen in Commissioner Baker's office.

In the meetings, the parties discussed the minimum requirements necessary to allow the 21 jurisdictions specified in the *Waiver Order*[1] to build out public safety interoperable 700 MHz Long Term Evolution ("LTE") wireless broadband networks. In addition, we discussed network requirements for the proposed national network, which were consistent with our filed comments in the Public Safety and Homeland Security Bureau's *Public Notice* that sought "comment on interoperability, out of band emissions, and equipment certification surrounding public safety broadband network interoperability which will serve as the basis for final rules for the public safety 700 MHz broadband network."[2] Further substance of the discussion is set forth in the attached handout.

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[1] *See* Requests for Waiver of Various Petitioners to Allow the Establishment of 700 MHz Interoperable Public Safety Wireless Broadband Networks, PS Docket 06-229, *Order*, FCC 10-xx (rel. May 12, 2010)("*Waiver Order*")(granting waivers for: Adams County, CO, Alabama, Boston, MA, Northern California Consortium (Oakland, San Francisco, and San Jose), Charlotte, NC, Chesapeake, VA, District of Columbia, Hawaii and Counties of Maui, Hawaii, Kauai, and City and County of Honolulu, Iowa, Los Angeles County, Mesa, AZ and TOPAZ Regional Wireless Cooperative Mississippi, New Jersey, New Mexico, New York City, New York State, Oregon, Pembroke Pines, FL, San Antonio, TX, Seattle, WA, Wisconsin Consortium (Calumet, Outagamie and Winnebago Counties)).

[2] *Public Safety and Homeland Security Bureau Seeks Comment on Interoperability, Out of Band Emissions, and Equipment Certification for 700 MHZ Public Safety Broadband Networks, Public Notice,* PS Docket No. 06-229, DA 10-884, ¶ 1 (rel. May 18, 2010) ("*Public Notice*").

Alcatel·Lucent

In accordance with Section 1.1206(b)(2) of the Commission's rules, this letter is being filed electronically with your office. Please contact the undersigned with any questions in connection with this filing.

Respectfully submitted,

Michael McMenamin

cc:

Charles Mathias	Jennifer Manner
David Furth	Erika Olson
Walter Johnson	Yoon Chang
Jerry Stanshine	Behzad Ghaffori
Gene Fullano	Pat Amodio
Brian Hurley	Ziad Sleem
John Leibovitz	Brad Gillen

Alcatel·Lucent

Alcatel-Lucent – FCC Interoperability Ex Parte Presentation

August 12, 2010

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Interoperability (1 of 3)

- Alcatel-Lucent generally agrees with NPSTC BBTF recommendations on required applications
- For initial deployments we see the following exceptions:
  - Exclude Short Message Service/Multimedia Message Service (SMS/MMS)
    - Multiple standards exist for supporting this capability
    - Alcatel-Lucent recommends ERIC specify the use of IMS-based SMS/MMS functionality to avoid the need for equipment to interface to legacy circuit SMS/MMS equipment not currently present in Public Safety networks
  - LMR gateway devices should not be required, since initial deployment are focused on data
  - A definition for the Status/information home page is needed. Several implementation options exist; need requirements to determine optimal solution
    - Does home page direct visitor to their home PDN-GW?
    - Does this page automatically re-direct visitors to their home PDN GW after logging in?
    - Can local entity override priority associated with visitor and/or grant/deny access?
    - What kind of information is expected, and is this expected to be one page per PLMN, or one per jurisdiction?

Interoperability (2 of 3)

- The desired applications in the NPSTC BBTF report should not be required for initial deployments as part of the waiver program
- Interaction between applications and the LTE system to set priority and QoS characteristics needs further definition, such as:
  - How does an application request a certain QoS for a bearer
  - How do we assure consistent user behavior when visiting other networks?

Interoperability (3 of 3)

- In order to assure interoperability as standards evolve, ALU recommends that the systems maintain backwards compatibility with 3GPP Release 8, December 2009 version
  - Older devices will not benefit from all features introduced in later LTE releases
- We recommend that ERIC define test profiles or requirements compliance matrices to improve interoperability amongst different vendors
  - To be filled out by suppliers, based on testing in supplier's labs
  - Sample interface specification supplied by Alcatel-Lucent could be used as a template

Roaming (1 of 3)

- Alcatel-Lucent recommends roaming be supported between public safety LTE networks as well as roaming with commercial LTE networks in early deployments
  - Supported in 3GPP Release 8 standards
  - Subject to availability of devices that support multiple frequency bands
- Inter Radio Access Technology roaming and handoff should not be a mandatory part of early deployments
  - Especially handover is considerably more complex
    - Performance enhancements defined as part of 3GPP Release 9
  - There may be limited device support in early deployment timeframe
- To support roaming we recommend using PLMN ids to govern the roaming, including settling of roaming charges
  - Consistent with commercial network strategy
  - We recommend use of PLMN id at state level, with possibly a separate PLMN id for a few major metropolitan areas
    - Statewide management of LTE core will provide better operational scale for smaller PS entities, and facilitate roaming agreements

Roaming (2 of 3)

- Each UE will be assigned a Home PLMN id
- In addition to Home PLMN id, ALU proposes to use an umbrella PS PLMN id that is used nationwide
  - There may or may not be any subscribers that have the nationwide PLMN id as their HPLMN
- Each PS eNB would broadcast two PLMN ids:
  - HPLMN id the eNB serves; and
  - Nationwide umbrella PLMN id
    - Networks that support the PS spectrum, and are build using a public/private partnership (e.g. with VZ, AT&T ...) would also be expected to broadcast the nationwide PS PLMN id besides their own
- The white list in the UE would contain HPLMN, nationwide PLMN, and possibly a few commercial PLMN ids
  - Commercial network PLMN ids would be used for roaming outside the PS network, if no PS spectrum coverage is present in an area
  - Limits the number of PLMN ids a UE needs to know about, avoiding updating the white list whenever a new PS PLMN is defined

Roaming (3 of 3)

- Alcatel-Lucent recommends that the FCC identify an owner for the nationwide umbrella PLMN id
- We also believe the FCC should provide rules or guidelines for the introduction of a new PLMN id
- To facilitate roaming with commercial service providers we recommend ERIC define a template roaming agreement to facilitate roaming agreements between PS and commercial service providers
  - This should include a recommended treatment of ARP and QCI when a public safety user roams into a commercial network
    - This likely will require mapping of the priority levels used in a public safety network to a smaller number of levels available in a commercial network
    - Precludes the use of pre-emption while roaming in a commercial network
    - Should leverage NGN-GETS capabilities provided in commercial network

System Characteristics, Interfaces and Testing

- Alcatel-Lucent recommends that ERIC define requirements for all interfaces that are required to achieve interoperability
  - Vendors would need to comply to these interface specifications
  - We provided a sample interface specification as guidance for ERIC
- Prior to availability of these specifications two approaches are recommended in order to prove standards compliance:
  - Leverage NIST testbed to facilitate inter-vendor interoperability testing
  - Leverage vendor test labs to test between vendors
- Alcatel-Lucent recommends use of a single third-party clearinghouse to provide interconnection between public safety networks as well as interconnection to commercial networks
  - Support GPRS tunneling and diameter proxy functionality
  - Identify appropriate security mechanisms for these interfaces (IPsec or TLS as well as appropriate security gateways on the diameter proxy interfaces)

Security

- Alcatel-Lucent supports recommendations provided in NPSTC BBTF report
- In addition to the required security features, the following optional features are recommended (consistent with BBTF report):
  - The Radio Resource Control (RRC - TS 36.331) protocol layer should implement LTE signaling layer security features;
  - The Network Access Stratum (NAS - TS 24.301) protocol layer should implement EPC signaling layer security features; and
  - The Packet Data Convergence Sublayer (PDCP - TS 36.323) protocol layer should implement user data plane security features
- We also recommend that all the Authentication and Key Agreement (AKA) procedures described in section 6, 7, and 8 of 3GPP TS 33.401 be implemented
- Rather than the multitude of algorithms defined in 3GPP 33.210 and 33.310 Alcatel-Lucent recommends following TS 33.401 which requires tunnel mode IPsec Encapsulating Security Payload with IKEv2 certificates and allow the use of a Security Gateway on the core side

Performance, Reliability, Capacity and Coverage

- Specific performance requirements should be set by the jurisdictions
  - They have the best view of local requirements
  - Budgets may dictate (e.g. throughput level at the cell edge directly affects number of eNB sites)
    - If significant coverage gaps exist it might be useful to identify these on the visitor status page
- We recommend use of MME and SGW pooling as defined by 3GPP to provide geographic redundancy between eNB and EPC
  - Using a standards-based method for geographic redundancy will maximize interoperability

Nationwide Core

- Given that a single Enhanced Packet Core with a single PLMN id requires public safety specific mechanisms, Alcatel-Lucent recommends the use of a small number of PLMN ids (~60) together with a small number of cores
  - Note that a given PLMN id can only reside on one core
- We believe several network models should be considered for the core:
  - Core owned by a public safety region/state;
  - Multiple regions sharing a single core;
  - Core hosted (i.e. owned and managed) by a separate entity, possibly supporting multiple regions;
  - Core provided by public safety and managed by a separate entity; or
  - Core provided through partnership with a commercial provider

Network Operations, Administration and Maintenance

- In general OA&M is vendor-specific and should not be subjected to specific requirements beyond the ones already defined in the various standards bodies (e.g. use of SOAP/XML, SNMP, charging interfaces, call trace interfaces, …)
- Device management should follow the requirements specified in 3GPP and the Open Mobile Alliance standards
  - Should include management of device settings as well as the ability to update device software and/or firmware

Out-of-Band Emissions

- OOBE limit
  - Alcatel-Lucent supports current 43 + 10logP dB for operations in the PSBB Block as currently specified
  - Likely that the same will be used in both D-block and PS BB block
  - This approach is consistent with other bands where no guard band was needed between adjacent blocks
  - Making OOBE limits more stringent will delay device and eNB availability as would the introduction of a guard band
- Adjacent interference
  - This is a normal occurrence in wireless networks
  - Can be minimized by improving a device's RF selectivity at a cost and larger physical device size
  - Collocating PS and D-block equipment would be best option, but can not be guaranteed without public-private partnership
  - Alternatively avoiding designs that use low-height D-block sites and high-height PS sites or vice versa in the same area would help minimize interference

Equipment Certification

- PS leverages work done by commercial service providers
  - Commercial providers enforce backwards compatibility for devices
  - Mandate easy software upgrades to later 3GPP releases
- Commission should require devices to at least be compliant with 3GPP Release 8, December 2009 version
  - Consistent with some major commercial LTE providers
- Commission should require future releases to be backwards compatible with Release 8 to avoid device obsolescence
- PS network operators should be represented in commercial service provider programs intended to improve interoperability
  - One such program is managed by the NVIOT Forum
- Roaming onto commercial networks requires device interoperability with commercial partner network
    - This may require one or more commercial partners depending on local coverage

Key Takeaways

- Early deployments will play an essential role in further developing recommendations and requirements
- To maximize early success of the LTE waiver deployments Alcatel-Lucent recommends focusing on the mandatory requirements specified in the BBTF, but not require SMS/MMS, status/home page, and LMR gateway support
- We recommend to focus interoperability on the following key areas:
  - Roaming between Public Safety LTE networks and between PS LTE networks and commercial networks, both LTE and non-LTE
  - Handover between LTE networks, both PS and commercial
- Other areas that are important for interoperability are:
  - QoS and priority access mechanisms and interfaces with public safety applications
  - Access portal requirements