Challenges and Opportunities with CDMA/LTE Interworking

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LTE Vision

- Business drivers
  - Global economies of scale
  - Broad contributions across the industry
  - International roaming for today’s global business partnerships

- Technical drivers
  - Achievable peak rates up to 278 Mbps in 20 MHz and 4x4 MIMO
  - Much reduced latency capable of supporting commercial VoIP services
  - Interworking with 1xRTT and HRPD networks for a smooth migration to LTE

- Timeline
  - First clean version of LTE specification is available from Dec. 2007, and will be stable in Dec. 2008
  - Prototype live demo available today from most tier 1 vendors
Key Technologies of LTE

**Physical spectrum efficiency Improvement**
(OFDMA/SC-FDMA/MIMO/Time and space scheduler/Interference mitigation)

**Benefit:**
- DL: 3~4×R6 HSDPA average
- UL: 2~3×R6 HSUPA average
- DL: 141Mbps peak (2*2 MIMO)
- UL: 50Mbps peak (1*2MIMO)

**Efficient usage of PHY layer**
(Always on /short TTI/Efficient MAC Mapping/E-MBMS)

**Benefit:**
- Lower data plan latency
- Lower idle->active latency
- Higher APP throughput
- E-MBMS comparable to DVB-H

**Networking**
(Scalable bandwidth/All-IP/Flat architecture/SON)

**Benefit:**
- Lower CAPEX/OPEX
- Explore spectrum (including re-farming) efficiently
- Enable more business models
CDG Believes LTE will Co-exist with CDMA

- “One technology fits all” approach to meeting today’s telecommunications requirements will not hold true in the next generation of mobile broadband solutions. Rather, operators will match particular applications and services to the technologies that best suit them.

- 3G CDMA will remain the leading and most economical platform to deliver core mobile broadband services, and operators will use OFDM-based systems such as LTE etc. to complement those services with additional features and broadband capacity.

— The CDMA Development Group (CDG)
CTIA WIRELESS 2008—LAS VEGAS—March 31, 2008

“Verizon Selects LTE as 4G Wireless Broadband Direction”

— Verizon.com – Nov. 29th 2007
Requirements to Achieve a Smooth Migration to LTE

- Flexible spectrum re-farming options
- Broad portfolio to address a wide range of deployment scenarios leveraging multimode equipment on the ground
- Quality of Experience across access networks through seamless interworking
- Smooth network migration to the new architecture leveraging common platforms and open interfaces
Typical Spectrum Usage for LTE Introduction

Carrier Bandwidth Scalability and Multimode BTS are Critical
Potential LTE Roll Out Strategies

Hotspot Coverage: broadband access, web surfing, nomadic

Macro Coverage: Mobile Broadband, Real-time services, VoIP

Convergence & fixed broadband services

Broad and Flexible LTE/SAE Portfolio is a Must Have!
LTE/EPC Interworking with 1xEV-DO Rev-A Network – Common Platform and Open Interfaces Allows for Scalability and Flexibility
Two Interworking Options

- **Non-optimized inter-working between SAE and HRPD**
  - Longer service interruption time with little impact on HRPD network
  - Suitable for Best effort service in the initial stage

- **Optimized interworking between EPS and 1xEV-DO**
  - Minimize the total service interruption time experienced at the UE

source access system

leaving the source access system

Data Transfer in target access system

attach and perform service activation (in the case of E-UTRAN) OR perform a session configuration or traffic allocation request (HRPD)

target access system
High-Level Functionalities for Ev-DO/LTE Optimized Interworking

- **BTS & eNodeB** – System Information Broadcast, Measurement Control, HO control, Tunneling procedures over the air & over core network interfaces, data forwarding procedure
- **RNC & MME** – Tunneling procedures to/from the base stations, S101 interface and data forwarding bearer establishment
- **HRGW & Serving GW** – Establish bearers for data forwarding procedures over S103 interface
- **PDN GW** – Implementation of the data plane anchoring function for CDMA traffic and the S2a interface
Seamless Voice Interworking Between LTE/1X

- Adopt 3GPP2 IMS VCC to anchor all voice call
- The IWS function to reside in the 1X MSC
- S102 extends the tunneling of 1X messages from the MME to IWS
- 1X call establishment messages is tunneled over the air and S1-MME
Huawei Overview

- **Partnership**
  - Focus on Innovation, Dedication, Customization and Cost
  - Experience, Stability, and Support of a Tier-1 Vendor with 70k employees
  - Fastest Growing Vendor with End-to-End Portfolio

- **Innovation**
  - TCO Savings through Technology Innovation
  - Common Platform across multiple Products

- **Dedication**
  - 32k+ R&D engineers
  - Customized R&D for Customers

$16B contract sales in 2007
Key Take-Away

- LTE offers real business benefits, high value technical improvements and early availability for CDMA operators.

- Flexible broad multimode portfolio and seamless interoperability are the key factors as CDMA and LTE might co-exist for a long time

- Huawei is a leading player in LTE
Thank you

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