Maximize the Value of CDMA Networks and Smoothly Evolve to the Next Generation

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Mobile Technology Evolution

Mobile technologies are evolving to 4G

2G
GSM, IS-95

3G
UMTS, CDMA, TD-SCDMA

4G

LTE™
Mobile Market Trends

Source: CDG

- Growth of 3G expected to peak
- 3G subs expected to exceed 2G subs
- Growth of 2G peaks
- 2G subs exceed 1G subs – Roughly 15 years after inception of industry.

Timeline:
- 1985
- 1990
- 1995
- 2000
- 2005
- 2010
- 2015
- Beyond 2020
**Different Characteristics**

**Basic Services**
Guaranteed communication connections at anytime and anywhere.

**Value Added Services**
Requiring high throughput and low latency communication connections covered in relative small areas or hot spots.
High Traffic Increase vs.. Slow Revenue Growth

Mobile Data Traffic and Revenue

Global Mobile Revenue (million USD)

Source: 3rd party
**Concurrent Voice & Data Services**

**Voice and Data Concurrent Services**
CDMA currently does not support voice and data concurrent services. But this is a very important feature for smart phones.

**Overloaded Data Services Impact on Voice Calls**
Data service not only increases the data traffic, but also occupies a lot of bandwidth on signaling channel, which causes high call drop rate.
**Dual Network Architecture**

- **Voice bearer network (IP)**
- **Internet bearer network (IP)**
- **Servers**
- **Voice**
- **Broadband Data**

*No TCO Increases!*
Independent Migration Paths

Smooth Evolution

CDMA2000 1X → CDMA2000 1X Adv

CDMA2000 HRPD → CDMA and LTE
Different Deployment Strategy

Voice Networks
- Wide area coverage for voice and low throughput data services

Data Networks
- To cover high density areas for data services
- Interworking and evolving to single data network
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Values of CDMA Voice Networks

CDMA Technology

Voice Quality

System Capacity

Network Coverage
Voice Capacity

Voice Capacity for 10MHz Bandwidth (users / sector)

1X EVRC Single Rx
1X EVRC-B + QLIC Single Rx
1X Advanced EVRC-B Single Rx
1X Advanced EVRC-B Dual Rx
LTE AMR 12.2 Dual Rx

2.3 X Capacity Compared To LTE

All capacity numbers assume a backoff factor 78% from pole capacity

3GPP2 methodology: 2km site-to-site distance
1X uses EVRC or EVRC-B
LTE VoIP use AMR 12.2 vocoder, 45msec RL CTA delay
Radio Coverage

1X Advanced
- Soft handoff
- Continuous power transmission mode
- EVRC-B

LTE VoIP
- Without soft handoff
- Discontinuous power transmission mode
- AMR ≈ 12.2 kbps

RL Budget Difference
- ≈ 2 db
- ≈ 6 db

CDMA 1X
- 0.56 Km

VoIP

LTE
- 0.32 Km
Migration to 1X Advanced

Over 3x Capacity Gain

Hardware upgrade required

- Enhanced FL IC
- Reverse Link Interference Cancellation (RLIC)
- Smart Blanking of the 1/8 rate frame
- Improved closed loop power control
- Early termination of forward and reverse links

Software Upgrade

- EVRC-B(4GV)
- Mobile Receive Diversity (MRD)
- Quasi Linear Interference Cancellation (QLIC)
- Quasi Orthogonal Function (QOF)

50% More Capacity Gain
Benefits to Data Services

The same voice capacity on 1X advanced only takes 25% of the existing spectrum.

Saved spectrum can be used for DO or LTE to increase data capacity.
Future Network Consideration
UNI-RAN for Multi-Radio Technologies

Single Platform

Multi-Radio Technologies

SDR BBU Platform

CDMA2000 1X
Baseband module + software upgrade

CDMA2000 1X
CDMA2000 EV-DO
Baseband module + software upgrade

LTE and CDMA enhancement
**UNI-RAN for Multi-band Radios**

Single Platform

- **700MHz** (LTE(SM))
  - CDMA
  - > 100MHz

- **800MHz**
  - LTE RRU

- **1900MHz**
  - CDMA
  - LTE
  - < 20MHz

- **CDMA + LTE RRU**
UNI-RAN: Much Easier to Install
UNI-CORE for Smooth Network Migration

Core network
- Core network components
- MSCe, MGW, AAA, PDSN/HA, S2a

Wireless network
- Wireless network components
- BSC/PCF, BTS

Network Migration
- SAE-GW, MME, HSS, PCRF, AAA

Internet
- Firewall

IP Cloud
- EPC
- E-UTRAN

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UNI-CORE for Smooth Network Migration

Core network:
- MSCe
- MGW
- AAA-Proxy
- HSGW

Wireless network:
- eAN
- /PCF
- BTS

EPC:
- P-GW
- S-GW
- MME
- HSS
- PCRF
- AAA

E-UTRAN:
- eNB

Cloud:
- IP Cloud

Internet:
- Firewall
Unified Network Platforms

Unified Network Platforms

- MSR/MBR/SDR
- Multi-mode BBU
- Multi-mode Baseband Cluster
- Combined BSC/RNC
- Micro/Pico/Femto

UNI-BEARER

- Unified-NMS
- Unified-User Profile Service Platform
- Unified Gateway

Apps
Summary:

- Voice & Data dual network strategy
- Maximized the values of CDMA
- Maximized spectrum efficiency of voice for data services
- Unified Network Platform provides a way to smoothly migrate to LTE
Thanks!

Bringing you closer

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