Network deployment Solution for Evolution from 3G to TD-LTE

China Mobile
April. 2012

Outline

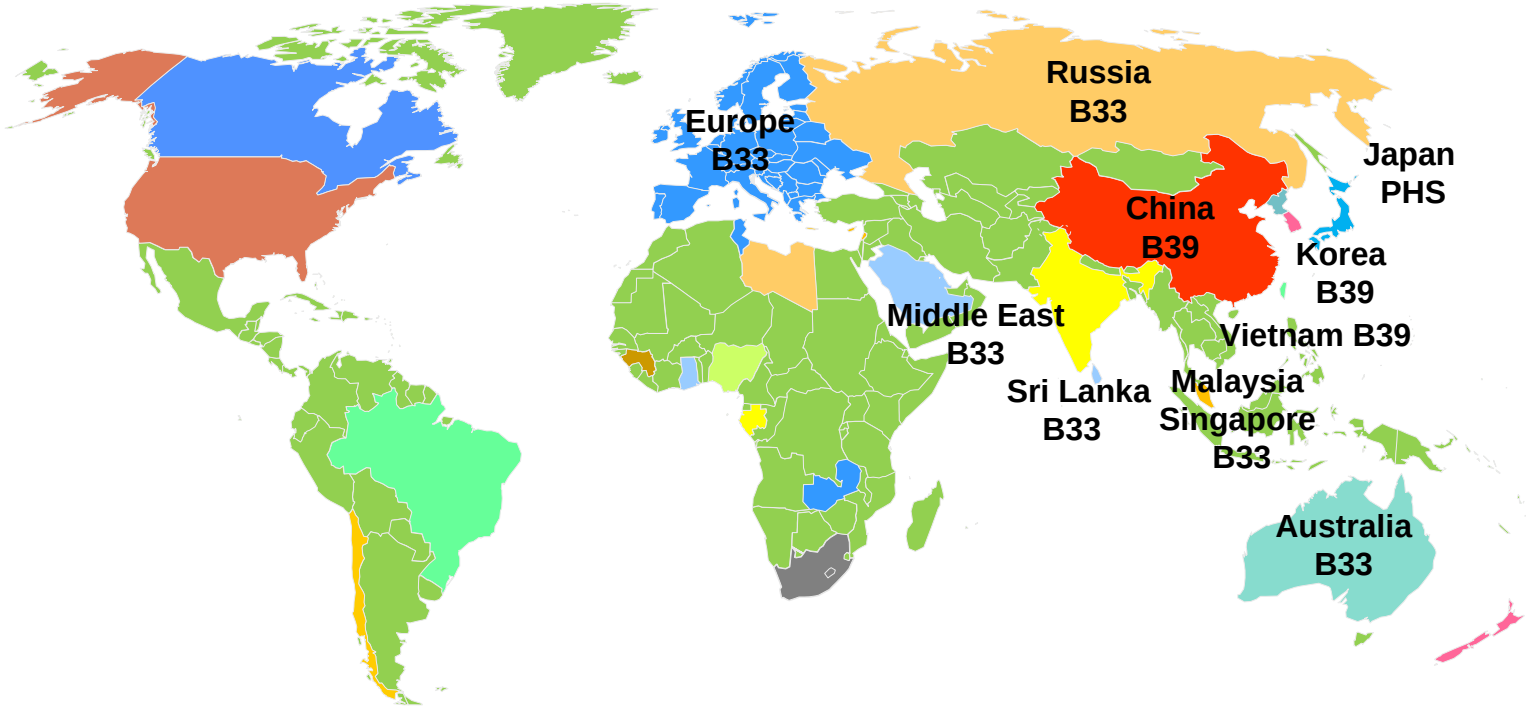
1. TDD Spectrum Allocation
2. Evolution from 3G to TD-LTE
3. Field Trial Results of Upgrading solution
4. Future Plans

TDD Spectrum for China Mobile

No.	Frequency	Range	Mode
A	2.0G	2010-2025MHz	TD-SCDMA
F	1.9G	1880-1920MHz	TD-SCDMA/TD-LTE
E	2.3G	2320-2370MHz	TD-SCDMA/TD-LTE
D	2.6G	2570-2620MHz	TD-LTE

- Equipments with 1.9G/2.3G has been widely deployed around China
- All these sites support upgrading to TD-LTE
- Most of TD-LTE macro coverage can be provided by 1.9G
- 2.6G will focus on TD-LTE capacity requirement

Global 1.9G TDD Spectrum Allocation

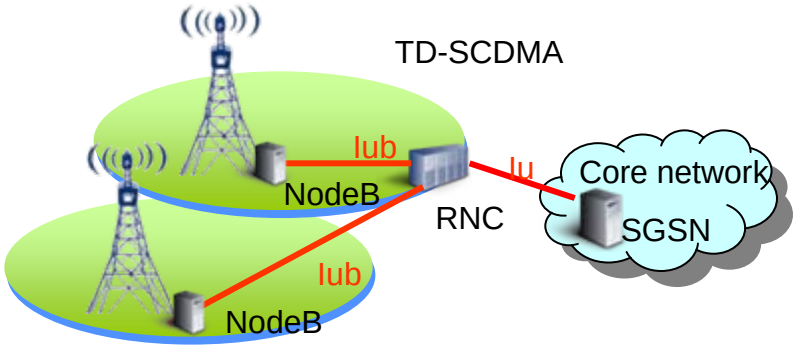


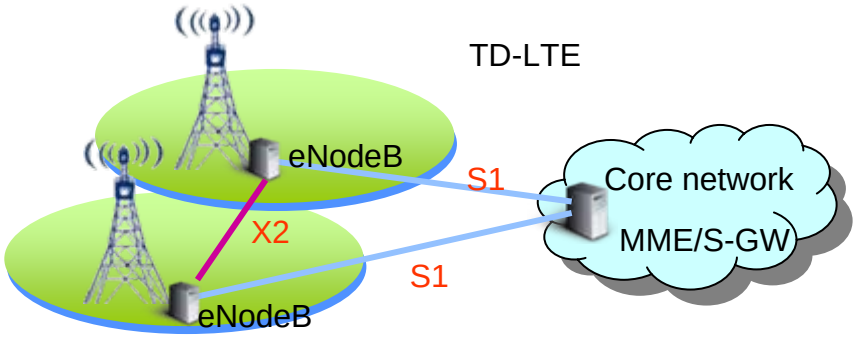
Band Definition

- Band 39: 1880~1920MHz
- Band 33: 1900~1920MHz
- PHS: 1884.5 -1919.6MHz

Evolution from 3G TD-SCDMA to TD-LTE

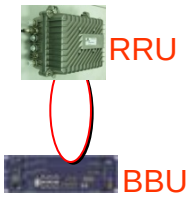
- **Network infrastructure evolution**





RNC eliminated in TD-LTE network, related function integrated to eNodeB

- **Base Station Products**
  - Most of TD-SCDMA products are distributed BBU+RRU

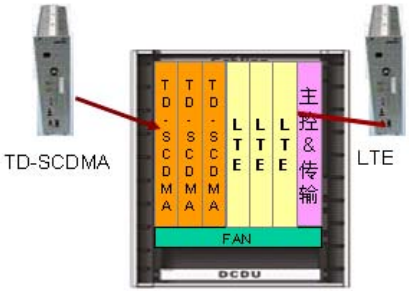


  - TD-LTE will also deploy distributed macro basestation at initial stage

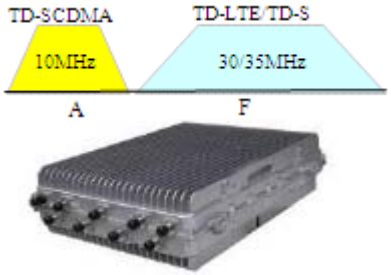
Evolution from TD-SCDMA to TD-LTE based on distributed BBU+RRU mostly

Upgrading Solution for 3G Base station

- **BBU**
  - Common hardware platform for TD-SCDMA and TD-LTE
  - TD-LTE baseband card deployed in the existing TD-SCDMA BBU
  - GPS、Backhaul、Power supply are shared



TD-SCDMA/TD-LTE BBU



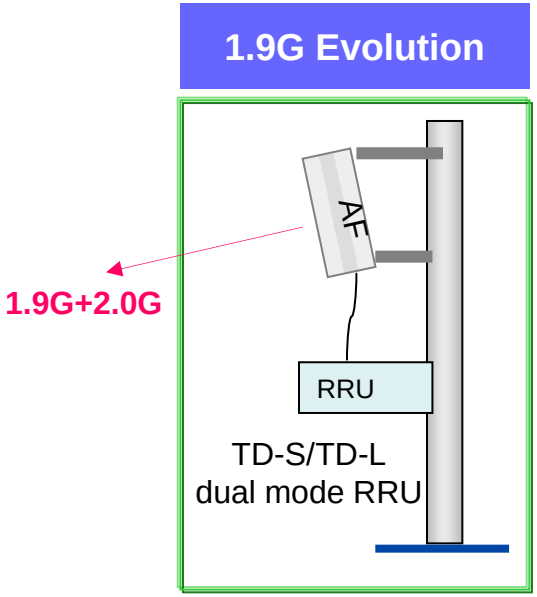
Dual mode RRU

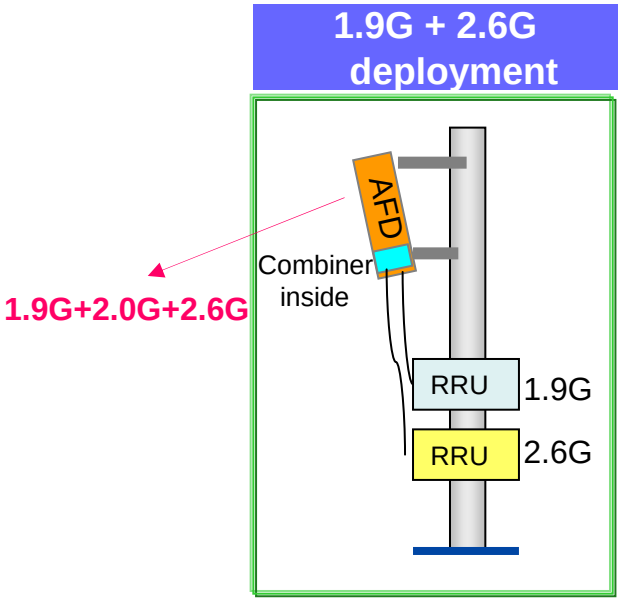
- **RRU**
  - Software upgrading, supporting TD-SCDMA/TD-LTE at the same time
  - Bandwidth、RF perfermance、output power meet dual mode requirements

Frequency	Bandwidth	Mode	Typical Configuration
1.9G	30/35M	Dual mode or TD-LTE only	(20M TD-LTE+ 10M TD-SCDM) or 30/35M LTE
2.3G	50M	Dual mode or TD-LTE only	2*20M TD-LTE+ 10M TD-SCDMA

Upgrading Solution for Antenna

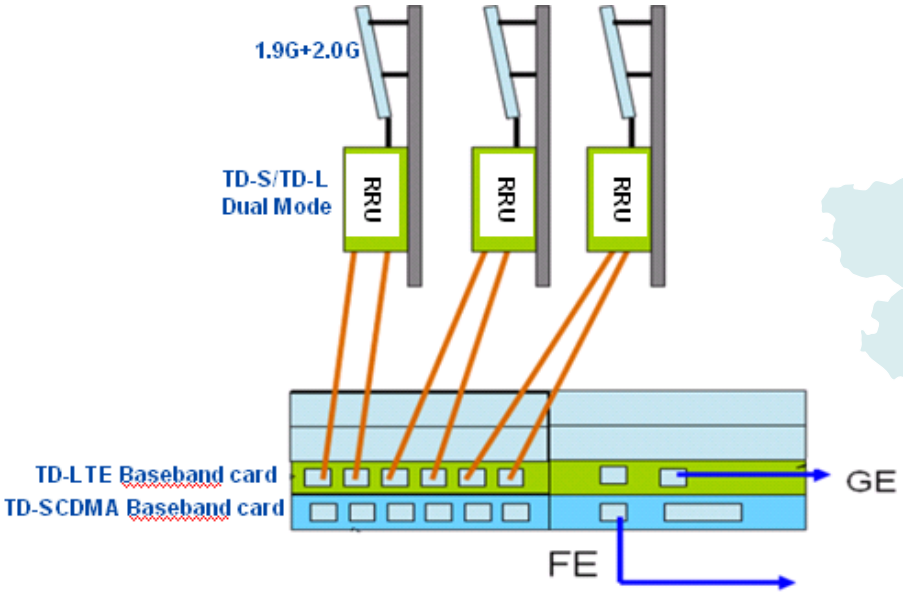
- **1.9G Evoluation**
  - More than 90% TD-SCDMA 8-antenna support 1.9G already
  - No change needed for antenna and cable
- **1.9G + 2.6G deployment**
  - FAD antenna ready since 2011, supporting 1.9G+2.0G+2.6G
  - Combiner inside for 1.9G RRU and 2.6G RRU





3G network Upgrade to TD-LTE is Verified

- Field trial information
  - Test location: **Guangzhou, Shenzhen, Hangzhou**
  - Base station construction: upgraded from and co-equipment with TD-SCDMA
  - System configuration: DL:UL=3:1; DwPTS:GP:UpPTS = 3:9:2
  - Terminal: CPE, CAT4



3G network Upgrade to TD-LTE is Verified

- Test results
  - Peak throughput: 81.7-85.1Mbps, about 90.8%-94.6% of theoretical value
  - Cell throughput: 47.1Mbps (70% loaded), about 52% of system maximum capacity
  - Latency: User-Plane ~20ms, C-Plane ~86ms, agreeing with system design target
  - Network KPI:

Attach Success Rate	98%-100%	Call Setup Success Rate	98%-100%
Paging Success Rate	100%	Handover Success Rate	99%-100%
Call Drop Rate	0-1%		

  - No obvious performance degradation to existing 3G networks

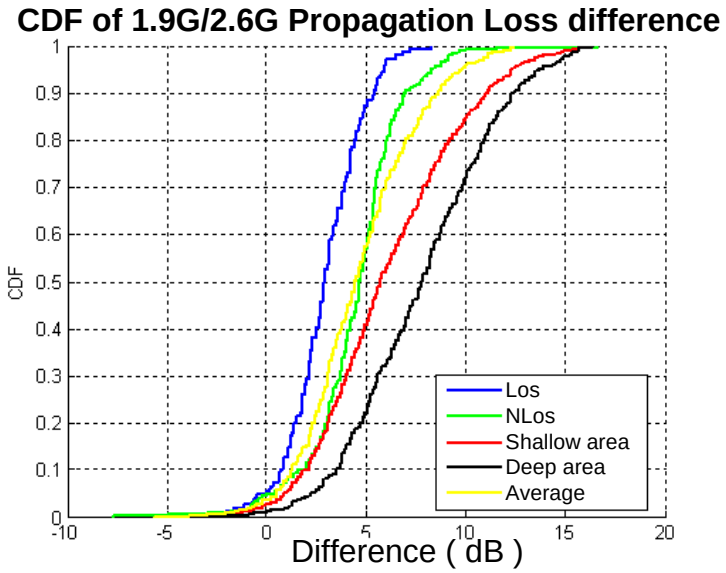
- Conclusions
  - Both TD-LTE and TD-SCDMA can work well after upgrade
  - Upgrade from TD-SCDMA is an efficient method to setup TD-LTE network

1.9G/2.6G Propagation Loss Comparison

Conclusion from field test:

1.9G coverage performance is 2.3dB ~ 8.3dB better than 2.6G

Outdoor Coverage difference	**Los**	**NLos**
	2.9dB	**4.5dB**
Indoor Coverage difference	**Shallow area**	**Deep area**
	4.9dB	**7.8dB**



Outdoor

Outdoor

Indoor

Indoor

1.9G Industry Progress

Infrastructure Products

- 3 vendors' 1.9G RRU/BBU have been widely deployed in China, supporting 3G/TD-LTE dual mode
- Another 3 vendors will released 1.9G commercial products by 2012Q3

RRU -- 2 path

1.9G

RRU -- 8 path

1.9G

Terminls

- 1.9G MiFi is on commercial operation in Zhejiang, China
- 7 chipsets&terminal vendors will release 1.9G data card by 2012Q3





Commercial Activities in China

Target: Full coverage in most cities

1.upgrade from 3G TD-SCDMA BS

2.build new TD-LTE BS

2012
20k base stations, 9 cities

↓

2013
200k base stations, Major cities

•Commercial multi-mode terminal, smartphone
•Converged LTE TDD/FDD enables global roaming

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Thank You