

# **TD-LTE Industry Support for Global Markets**

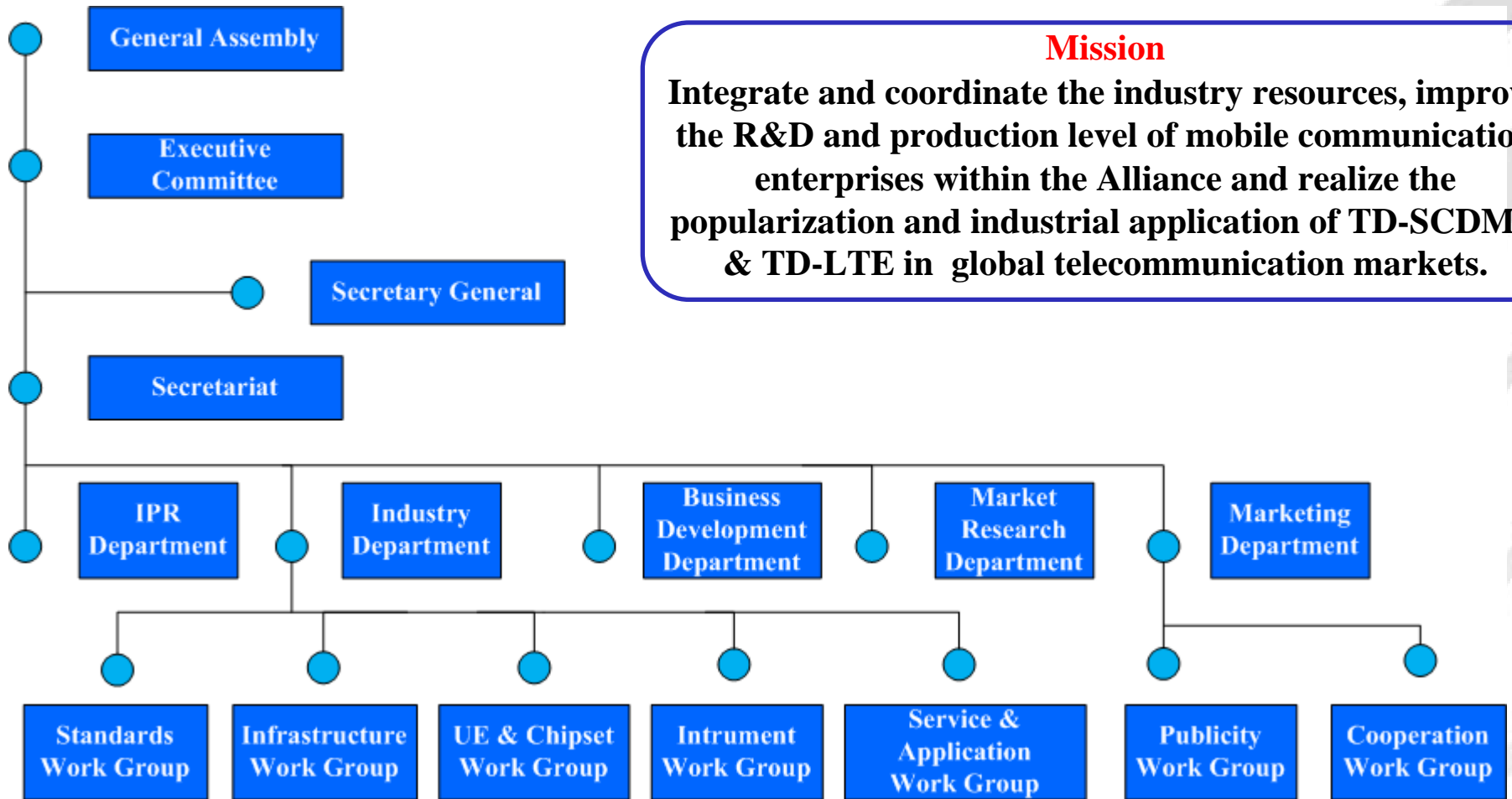
**TD Industry Alliance**

**Wang Peng**

**Tokyo, Japan**

**2012.4.25**

# Organization Structure of TDIA



**Mission**  
Integrate and coordinate the industry resources, improve the R&D and production level of mobile communication enterprises within the Alliance and realize the popularization and industrial application of TD-SCDMA & TD-LTE in global telecommunication markets.

**Vision**  
Based on TDD technology innovation, make TDIA one of the most important industrial associations that push the development of mobile communication technologies and industry all over the world.

## LTE FDD Standards

RAN1 WI Completed    RAN2/3/4 WI Completed    RAN5 WI Completed

## TD-LTE Standards

- RAN1: Physical Layer
- RAN2: L2 & RRC
- RAN3: L1 & Transport, S1/X2 AP
- RAN4: UE & eNB Tx/Rx, RRM core, RRM test, eNB test
- RAN5: Common env., Signaling, RF Tx/Rx, RF RRM

**DL100Mbps/UL50Mbps**



2006

2007

2008

2009

2010

2011

2012

N frequency

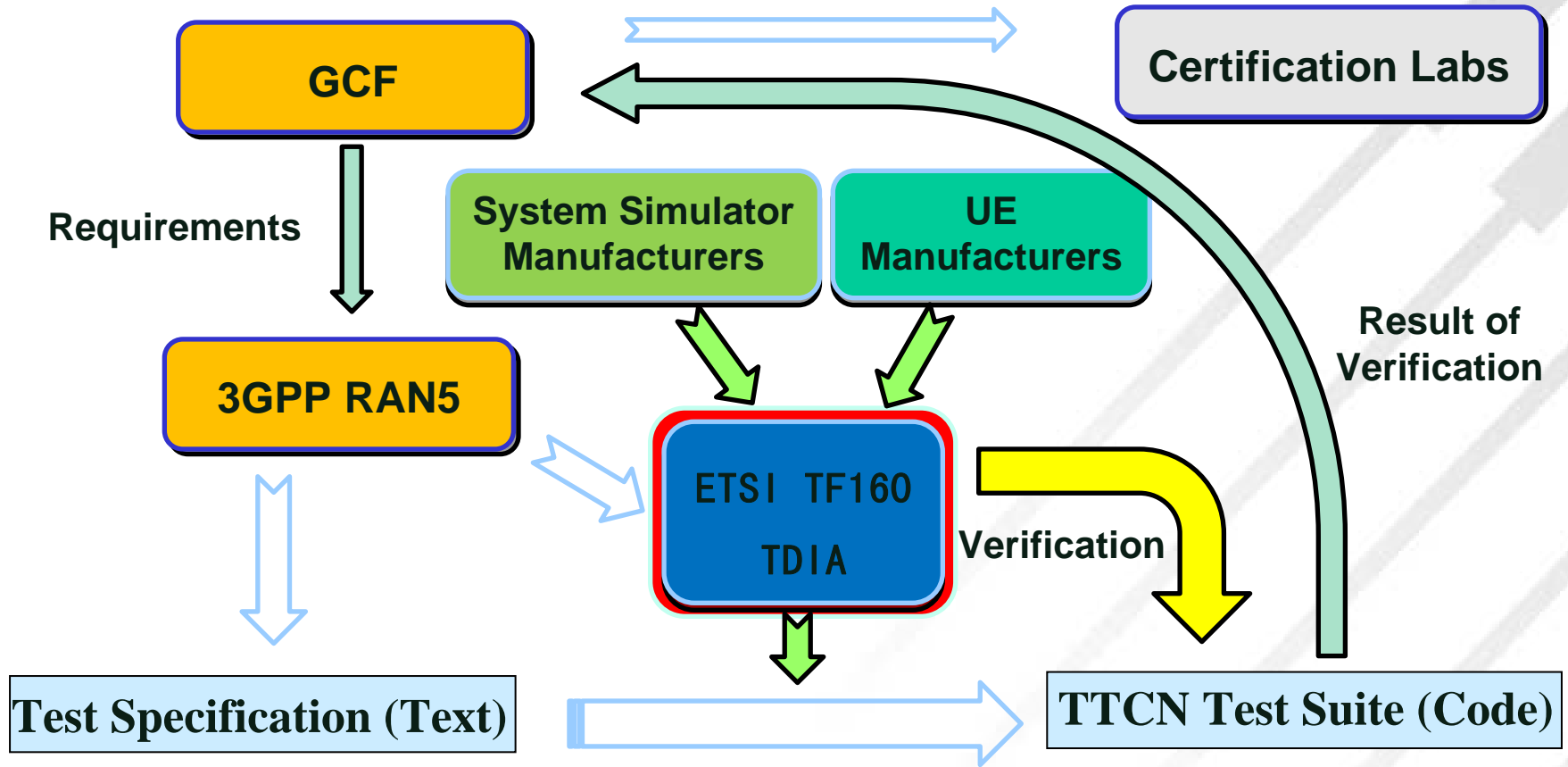
**HSDPA: DL2.8M bps/1.6MHz**  
**HSUPA: UL2.2 Mbps/1.6MHz**  
**MBMS**

**HSPA+: 64QAM**  
**MIMO**  
**OFDM**  
**CPC**

**Dual stream BF**  
**eMBMS**  
**Home eNodeB**  
**Positioning**

**Research/ standardization /industrialization**  
**LTE-A has been chosen as one of 4G standards**





- Development of TD-LTE TTCN Test Suite keep the same pace with FDD
- Verification of TD-LTE TTCN Test Code :
  - P1/P2/P3 Test Cases :100%, P4 Test Cases: Over 50%
  - GCF P1: 100%, P2: 97%, P3: 94%, P4: 58%

# Development of TD Industry

**2013~2014**

**TD-SCDMA 400,000+ BS  
200,000,000+ users**

**TD-LTE 200,000+ BS  
40+ commercial/Trial**

**10+ Infrastructure Vendors  
18+ Chipset Vendors  
10+ Test Equipment Vendors  
50+ UE Vendors**



**2012  
TD-SCDMA 300,000+ BS,  
TD-LTE 20,000 +BS**



**2011  
TD-LTE trial & internationalization,  
90 members in TDIA**



**2009~2010  
TD-SCDMA commercialization, market developed rapidly  
TD-LTE industrialization**

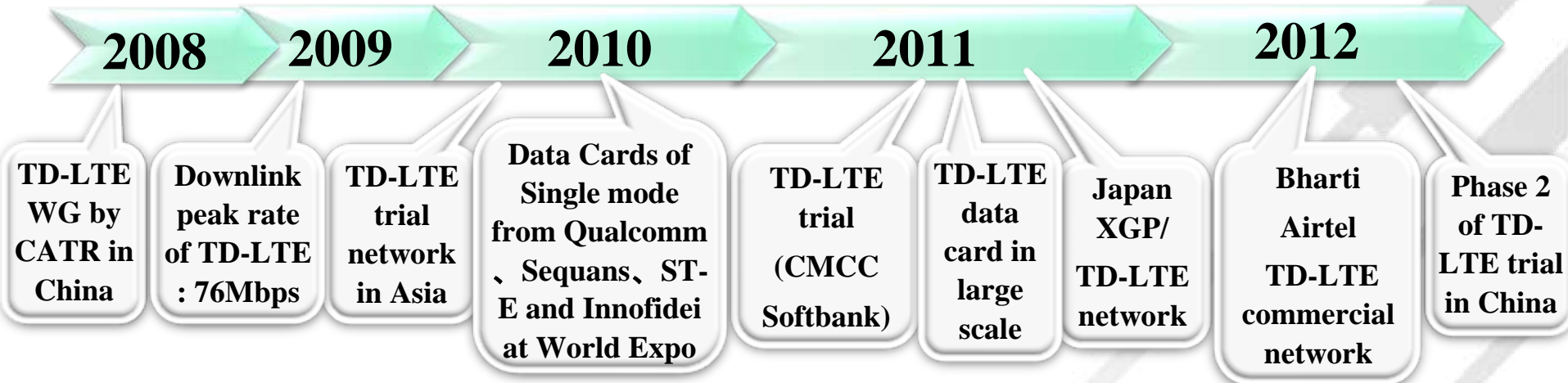


**2003~2008, TD-SCDMA trial / TD-LTE standardization, Industry chain set up**



**2002, TD-SCDMA industrialization, TDIA established with 8 members**

# Milestone Events of TD-LTE Industry Chain



## Infrastructure



## Chipset



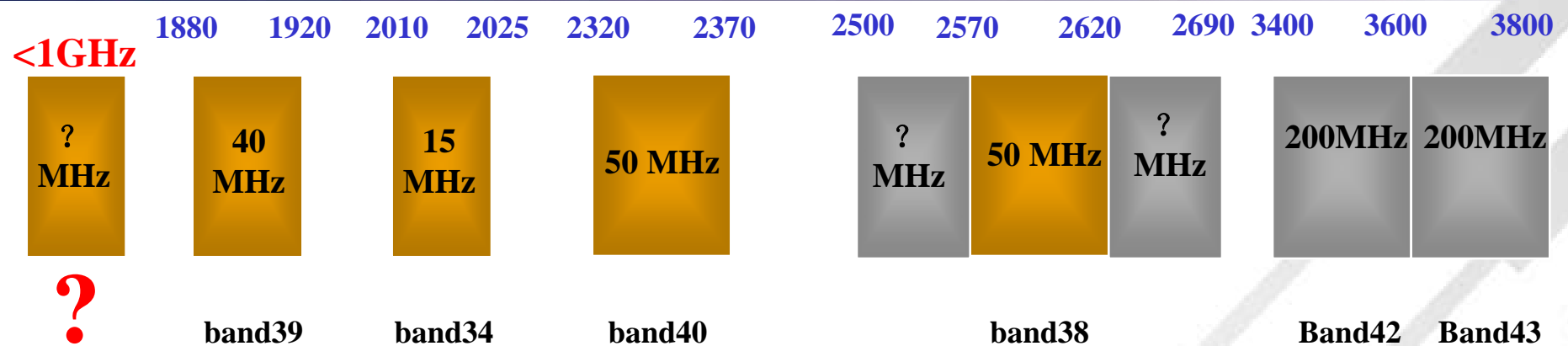
## Test Instrument



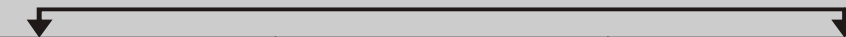

## Organization



# Spectrum: Lifeblood of TDD Industry



- Harmonized spectrum is necessary for IMT to achieve economy of scale.
- Frequency below 1GHz is recommended for seamless TD-LTE coverage.
- 2.6GHz band is a very promising band that can provide global roaming capability for TD-LTE.

MHz	2 500	2 550	2 600	2 650	2 690
<b>C1</b>					
	MS Tx	TDD		BS Tx	
<b>C2</b>					
	MS Tx	BS Tx (external)		BS Tx	
<b>C3</b>	Flexible FDD/TDD				
	2 500				2 690





Europe



**Hybrid: 2x70MHz FDD + 50MHz TDD**  
 - 2500-2570/2620-2690MHz FDD,  
 Duplex spacing 120MHz  
 - 2570-2620MHz TDD

## USA: 2.6GHz TDD band

2496MHz      194MHz TDD spectrum      2690MHz



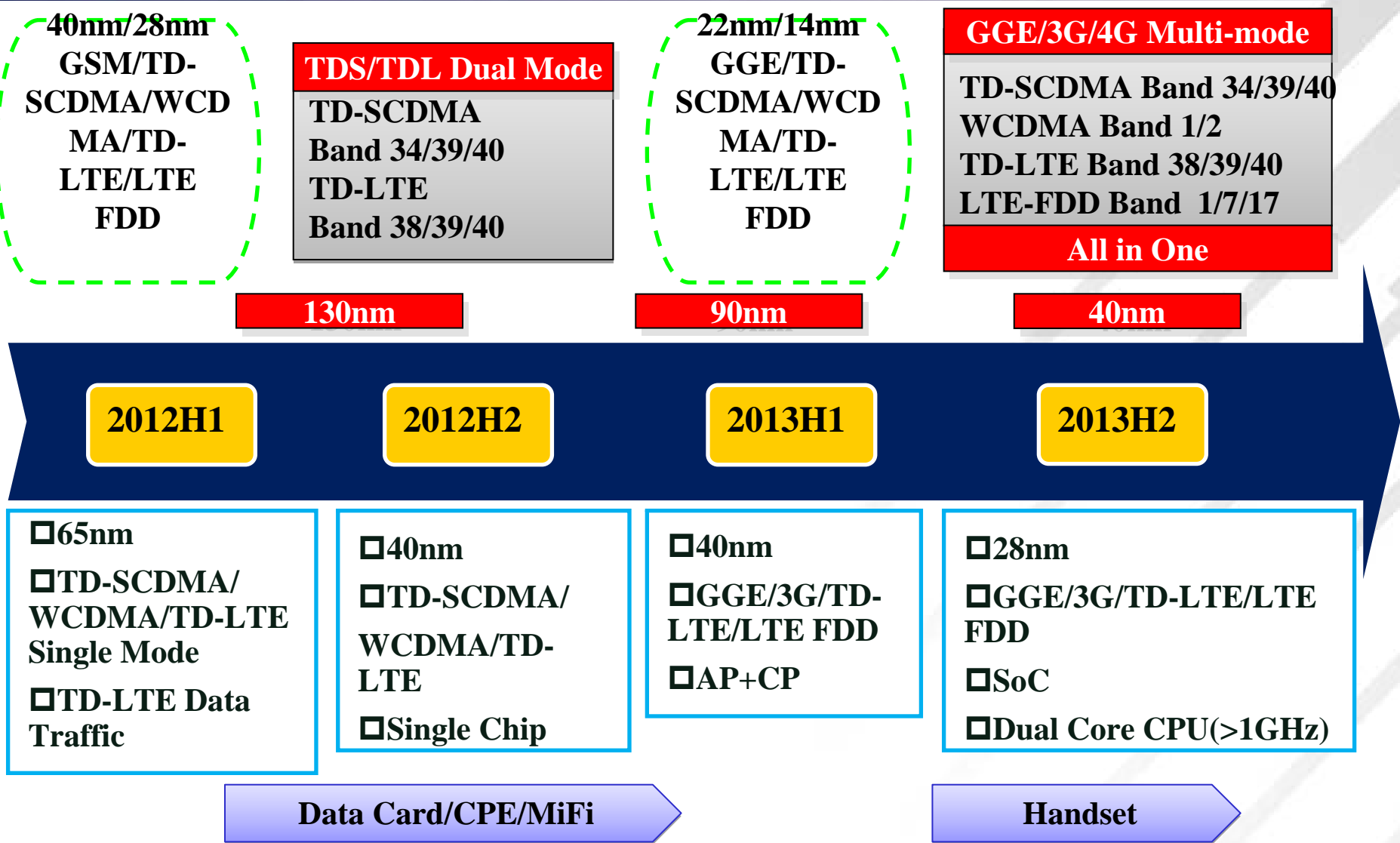
1. Operators need to upgrade its legacy network to TD-LTE
2. TD-LTE is the best choice

## Asia - Pacific

Country / Region	Operators	Band (MHz)	Frequency range
Japan	Softbank	30	2545-2575 MHz
	UQ Com	30	2595-2625 MHz
New Zealand	Vodafone Mobile NZ Ltd	30	2540-2575 MHz
	Blue Reach Ltd	30	2660-2690 MHz
Singapore	StarHub	12	2576-2588 MHz
	Pacific Internet	30	2600-2672MHz 2678-2696MHz
India	Bharti	40	2332.5-2352.5MHz 2305-2325MHz
Taiwan, China	Fitel	30	2565-2595MHz
	Global On Corporation	30	2595-2625MHz
	Vmax Telecom	30	2660-2690MHz
	FET	30	2565-2595MHz
	Tatung Telecom	30	2595-2625MHz
Hong Kong, China	21 ViaNet Group	30	2300-2330MHz
	CMCC	30	2330-2360MHz
	Hutchison	30	2360-2390MHz



# Roadmap of TD-LTE Chipset & UE



# Roadmap of TD-LTE Voice Solution

n



**LTE Evolved Voice Solution**

- ✓VoIMS+SRVCC is defined by 3GPP as the ultimate voice solution
- ✓Challenges to meet the continuity requirement of voice traffic
- ✓High cost for deployment of network

**SRVCC**



**Long-term Coexistence**



**LTE Initial Voice Solution**

**CSFB(CS Fallback)**

- ✓Defined by 3GPP Protocol
- ✓No need for IMS network
- ✓Call delay longer than 2G/3G

**No Voice over LTE Data Card/CPE**

2012H1	2012H2	2013H1	2013H2
--------	--------	--------	--------





✓TD-SCDM

A  
/TD-LTE

✓WCDMA  
/TD-LTE

✓GSM/TD-SCDMA/  
WCDMA/TD-LTE

multi-mode  
✓Support for  
LTE FDD

2012Q1

2012Q2

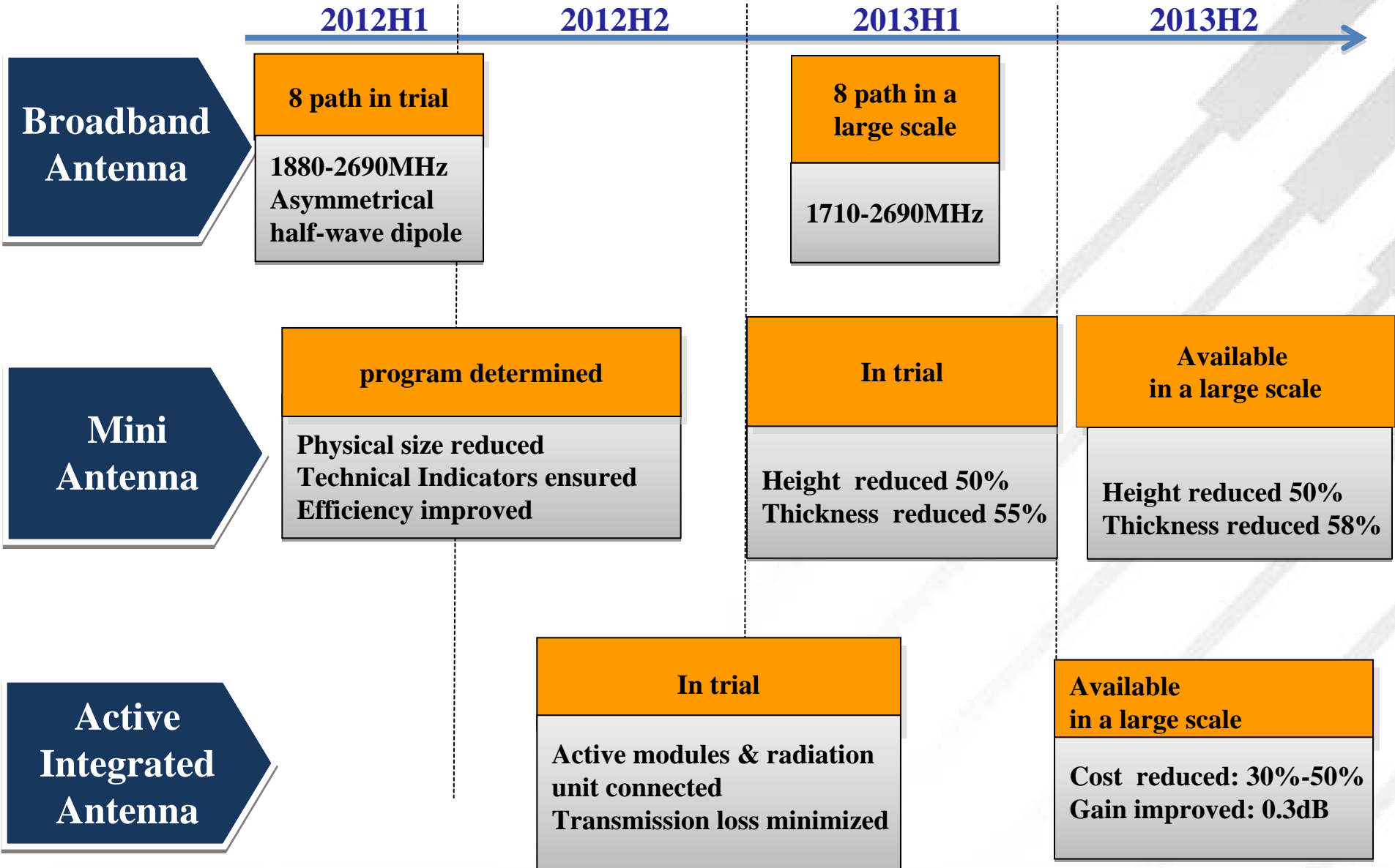
2012Q3

2012Q4

✓TD-SCDMA/  
WCDMA/TD-LTE  
✓ TTCN3 conform  
ance testing for  
TD-LTE

✓GSM/TD-SCDMA/  
WCDMA/TD-LTE/LTE  
FDD multi-mode,  
covering 3GPP TS36.521- 1  
✓All the conformance  
testing about RF, protocol,  
RRM in 3GPP

# Roadmap of Antenna



## Traditional Operators

■ Vodafone, Bharti , Softbank, UK Broadband, Hi3G, DOCOMO, Deutsche Telekom, France Telecom, SaudiTelecom, FETnet, SKT, etc.

## Wimax Operators

■ Clearwire, Yota, Witribe, etc.

## Newly Developing Operators

■ RosTelecom, Antares, Devas, Vivid, Solorz, MVS, Austar, etc.

■ Existed TDD bands  
■ Decrease operation cost, increase system capacity  
■ Evolve from CSFB to SRVCC  
■ Evolve from data card to handset  
■ TDD/FDD convergence is a trend

■ Existed TDD bands and subscribers  
■ Rich experience in TDD network deployment and operation  
■ Available TD-LTE and Wimax convergence solution  
■ Voice service over handsets

■ Easily get TDD bands with low cost  
■ Data cards for transition, or handsets directly  
■ SRVCC for voice solution directly  
■ Flexible business model, target on new market, such as VPN and smart city



# Thank you!

wangpeng@tdia.cn

Tel: +86-10-84170081/82/83

Fax: +86-10-84170087

Http://www.tdia.cn

