

No. **1** WINNING
TOGETHER
TOGETHER

true

move **H** | online | visions | money | Life+

TRUE's Outlook on TDD Spectrum Requirements

Agenda Thailand Mobile Market

Introduction to True

Data usage demand

TD-LTE Advantage and Opportunity

Keys take away

67 million

Thailand Population

88 million

Mobile user

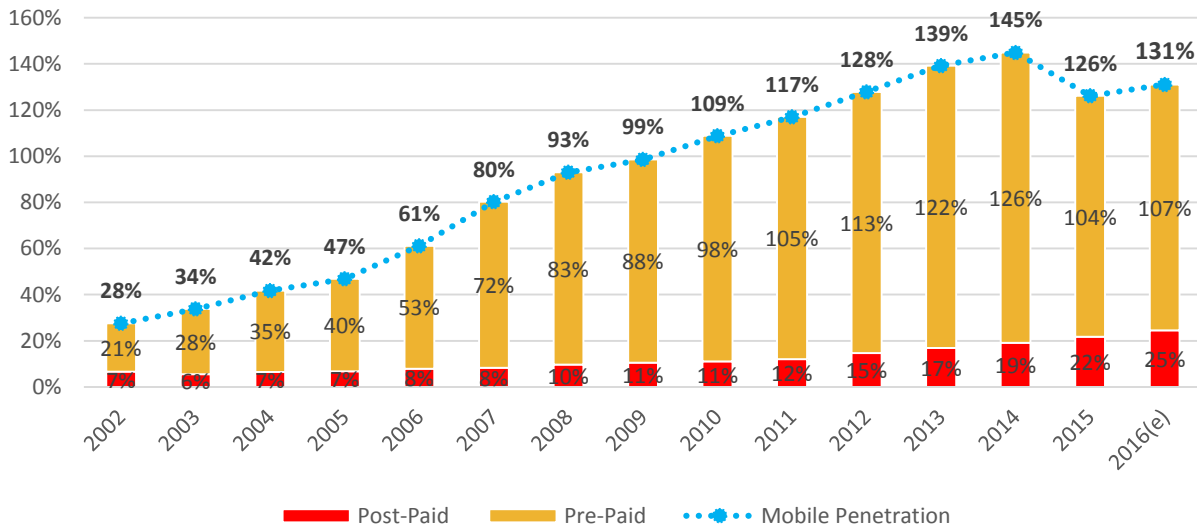
4.9 million

Fixed Line user

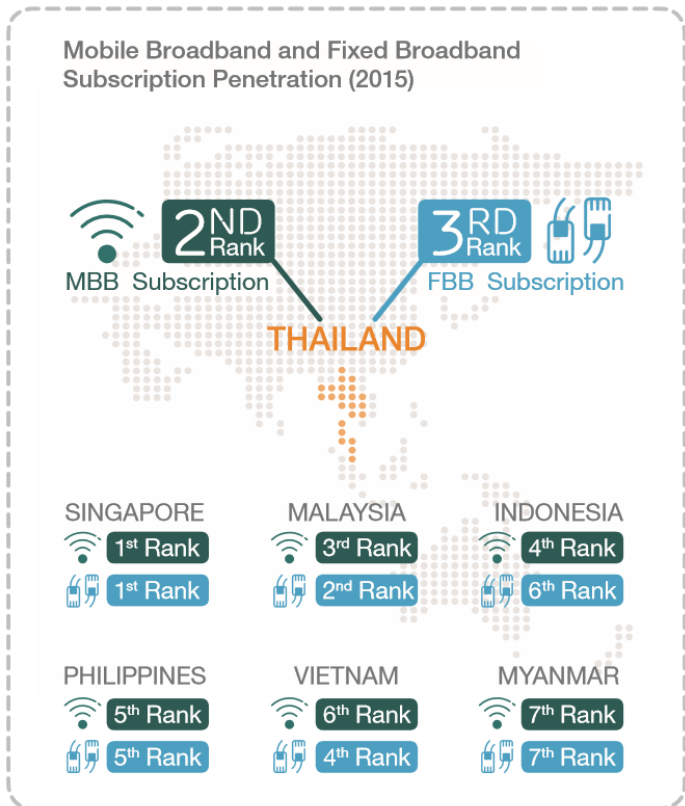
6.7 million

Broadband user

Thailand Mobile Penetration

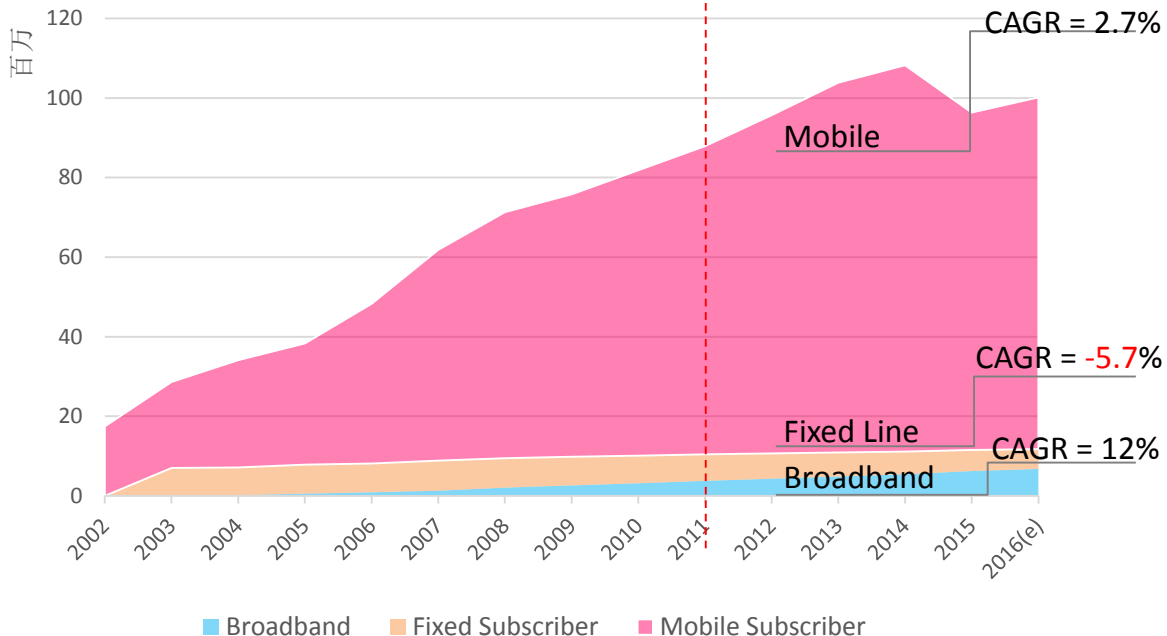


Source : NBTC, Information as of 2016Q3



Source : Ericsson Digital Thailand Report, Oct 2016

No. of Subscription



Source : NBTC information as of Oct 2016
CAGR : Calculated from 2011 to 2016

True Group - Thailand's convergence lifestyle leader

Mobile Group



- Market Leader in 3G & 4G high speed mobile data service
- Thailand's largest licensed frequency resources covering all ecosystems
- 3G & 4G networks cover 98% population coverage
- 20.8% revenue market share
- 19.1 mn subscribers

Wireline/Online



- #1 Broadband Operator Nationwide and #1 Fixed-line operator in BMA
- 41.5% broadband revenue market share
- 2.4 mn broadband subscribers
- With largest over 100,000 WiFi hotspots

Pay TV



- Thailand's #1 nationwide pay TV provider
- 55% revenue market share
- 3.1 mn subscribers
- Enhanced, secure HD broadcasting system with MPEG-4
- 41 self produced Thai language channels

Mobile Network Evolution

telecomasia.net

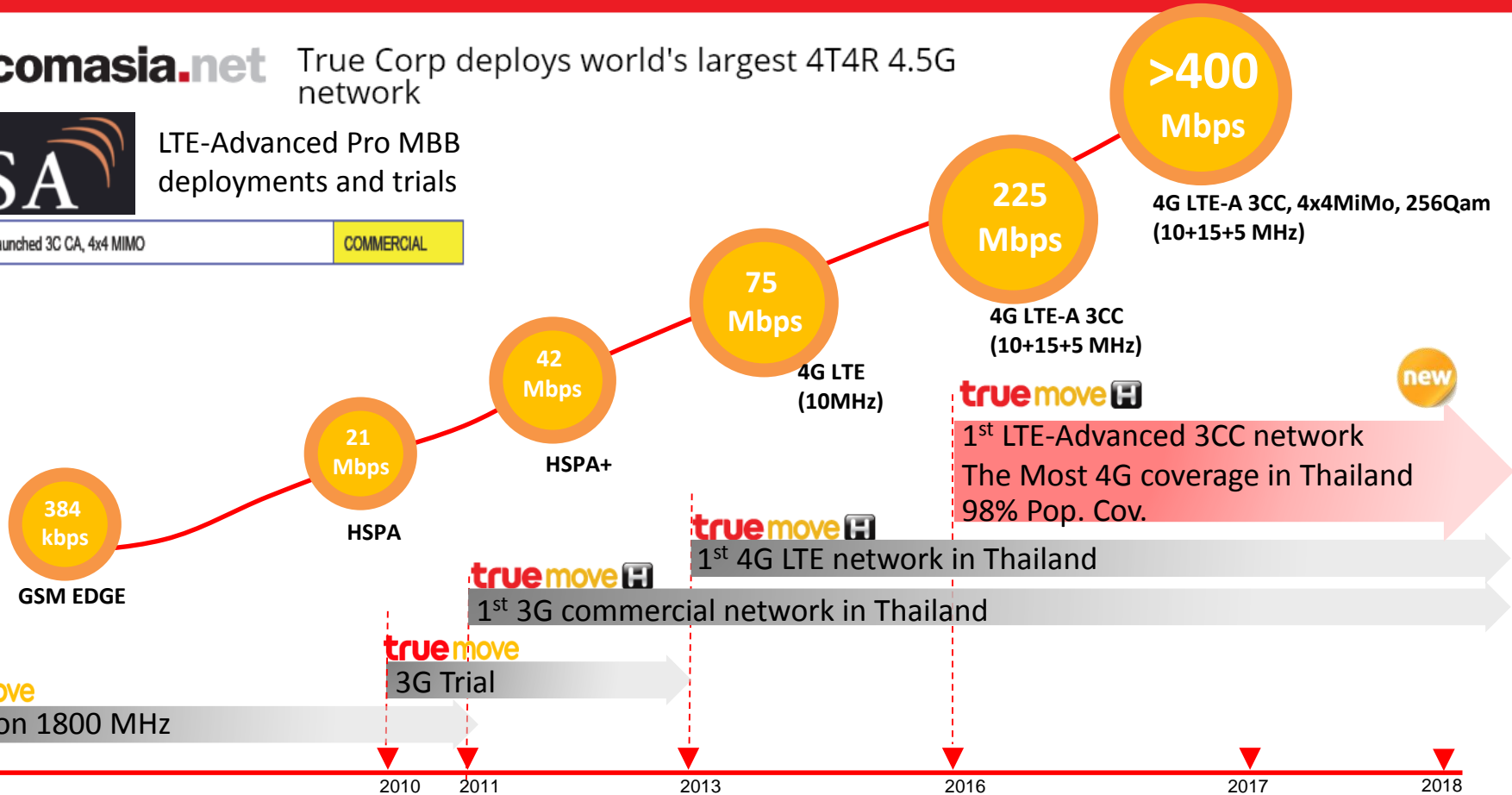
True Corp deploys world's largest 4T4R 4.5G network



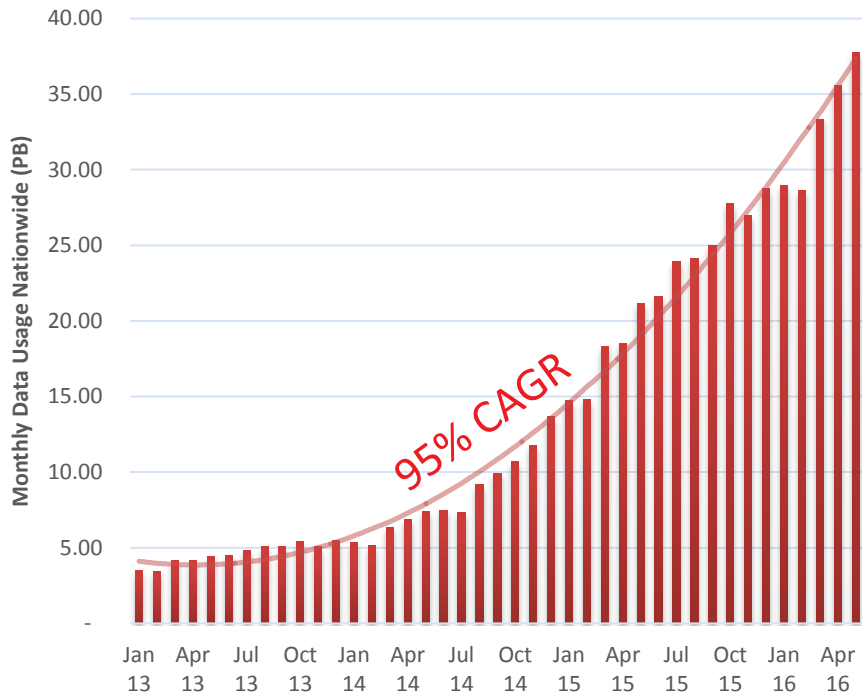
LTE-Advanced Pro MBB deployments and trials

Thailand: True launched 3C CA, 4x4 MIMO

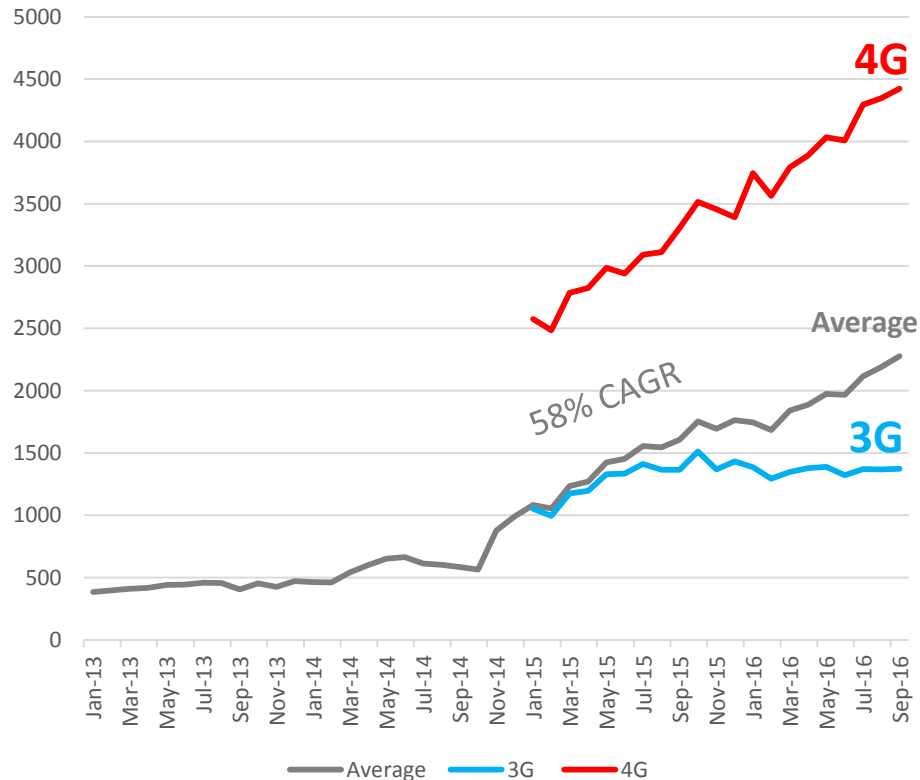
COMMERCIAL



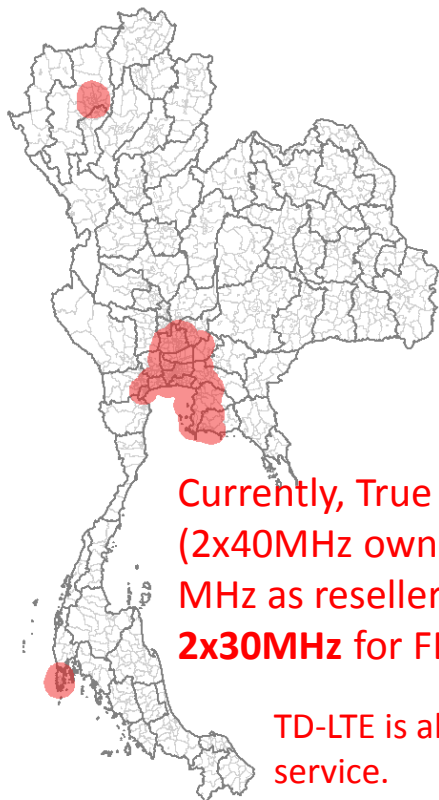
Monthly Data Usage (PB)



Monthly Data Usage per Sub (MB)

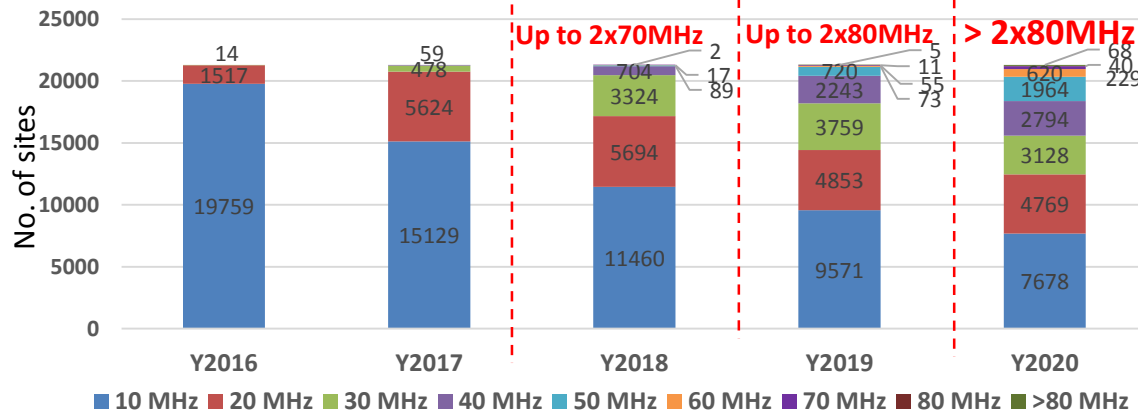


The area requires more bandwidth



Currently, True has spectrum **2x55MHz** (2x40MHz owned by True and 2x15 MHz as reseller) and True has deployed **2x30MHz** for FDD-LTE.

TD-LTE is also planned for FWA service.



IMT Roadmap in Thailand (NBTC)

MHz	NBTC Allocation	true move
450 MHz	Y2025	
700 MHz	Y2023	
800/900 MHz	2x45MHz	2x25MHz*
1500 MHz	Y2025	
1800/1900 MHz	2x75MHz	2x15MHz
2100 MHz	2x60MHz	2x15MHz
2300 MHz	60MHz	
2600 MHz	Y2022	

* Including 2x15MHz of 850MHz as CAT reseller

- Potential TDD Spectrum in **Thailand**

Band 40, 2300 MHz : 70 MHz Bandwidth

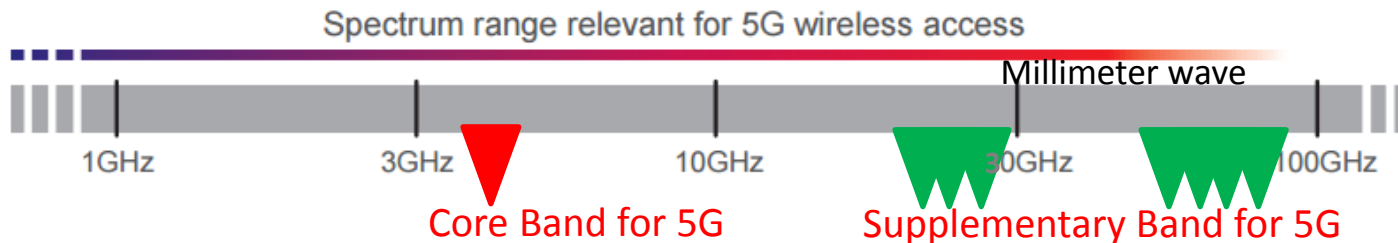
Band 38, 2600 MHz : 50 MHz Bandwidth

- New business opportunity
 - ❖ TD-LTE for **FWA service**

- Wider Bandwidth for TDD Spectrum

TDD Spectrum	1.9 GHz (B39) 1880 – 1920 MHz	2.3 GHz (B40) 2300 – 2400 MHz	2.6 GHz (B38) 2570 – 2620 MHz	2.6 GHz (B41) 2496 – 2690 MHz	3.6 GHz (B42/43) 3400 – 3800 MHz	700 MHz (B44) 703 – 803 MHz
TDD Bandwidth	40 MHz	100 MHz	50 MHz	194 MHz	400 MHz	100 MHz

- Potential TDD Spectrum in spectrum band below and above 6 GHz for 5G



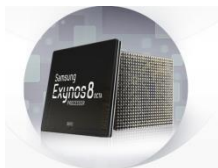
True operates 2G, 3G and 4G in two network codes on both licensing and Netco/OpcO model as a joint venture. The key concerns to manage network are :

- Inter working of multi technologies
- Inter working of multi vendors
- Inter working of multi PLMNs
- Readiness of ecosystem
 - 54% of 4G devices in True network support FDD+TDD
 - But for FDD + TDD CA only one commercial UE can be seen

Available Mobile chipset and device



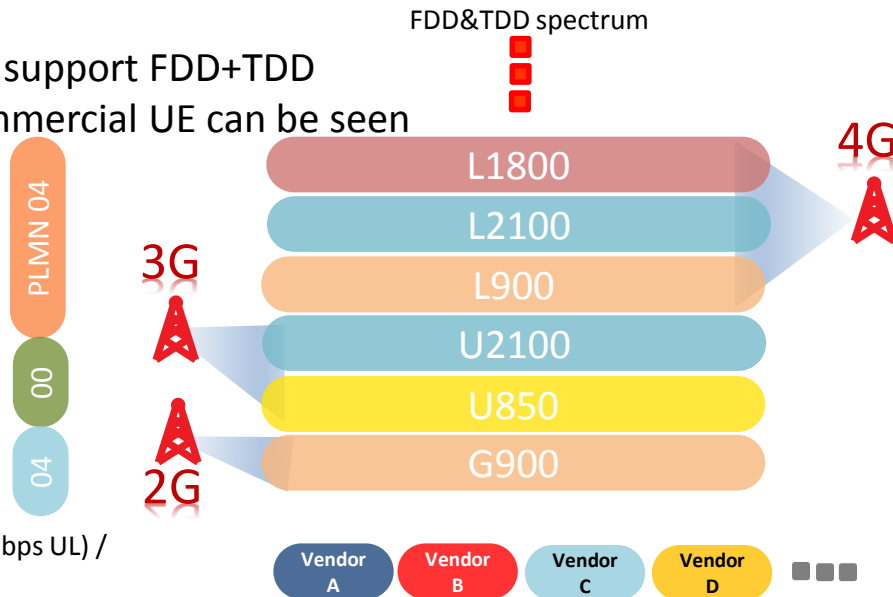
Samsung Galaxy S6 Edge Samsung Galaxy Note 5



Samsung Ezynos8 Chipset

LTE Category 12(600Mbps DL), Category 13(150Mbps UL) /

FDD-TDD Joint Carrier Aggregation



- FDD-LTE spectrum is used to provide baseline coverage for customers. TD-LTE can be used as capacity layer for higher speeds.
- TD-LTE for FWA service.
- TD-LTE device ecosystem is mature to support for TD-LTE network deployment.
- Although Carrier aggregation between FDD-LTE and TD-LTE is standardized but the availability of supported devices is still concerned.

No. **1** WINNING
TOGETHER
TOGETHER

true

move  | online | visions | money | Life+