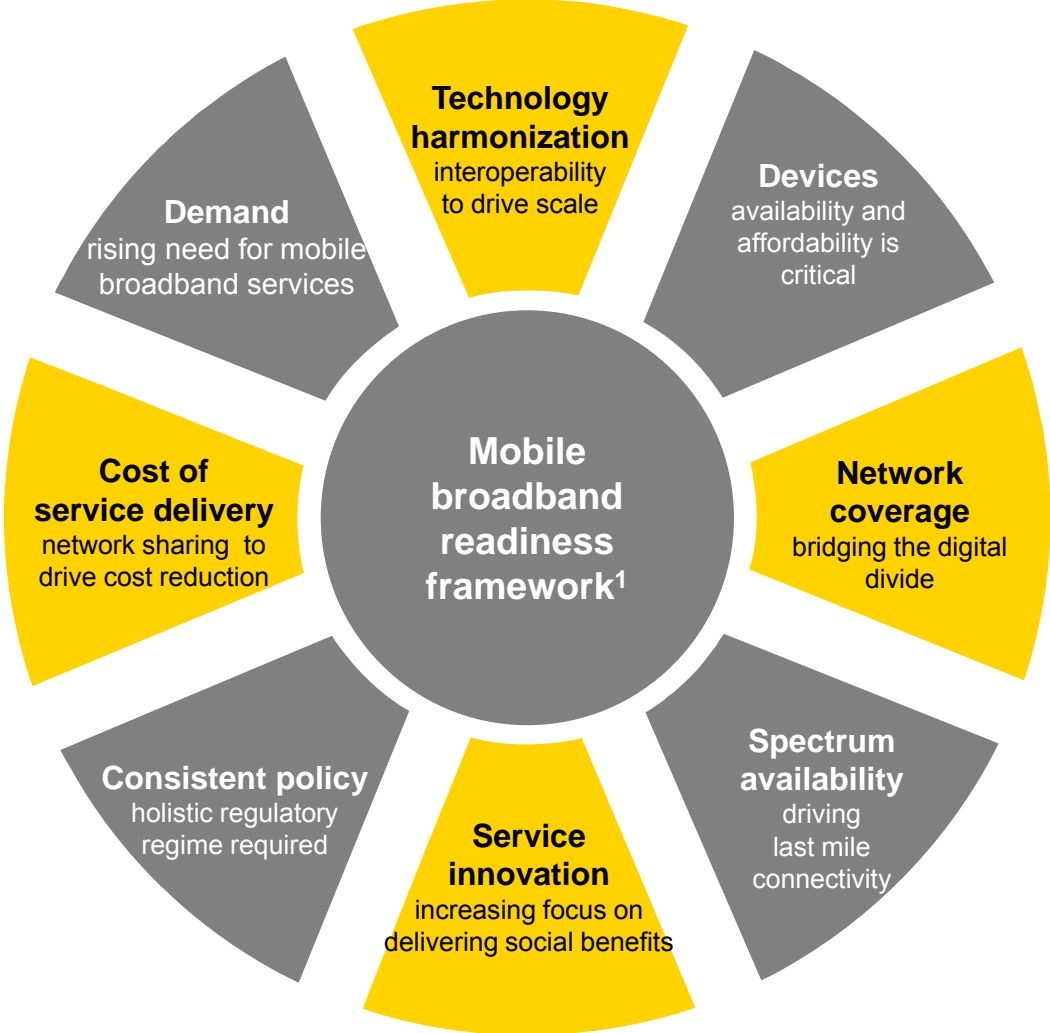


Mobile Broadband Readiness

Key drivers to create a positive environment

GSMA Mobile Asia Expo
June 2012

Mobile broadband readiness framework



1. Ernst & Young analysis

Demand for mobile data is growing exponentially across Asia Pacific

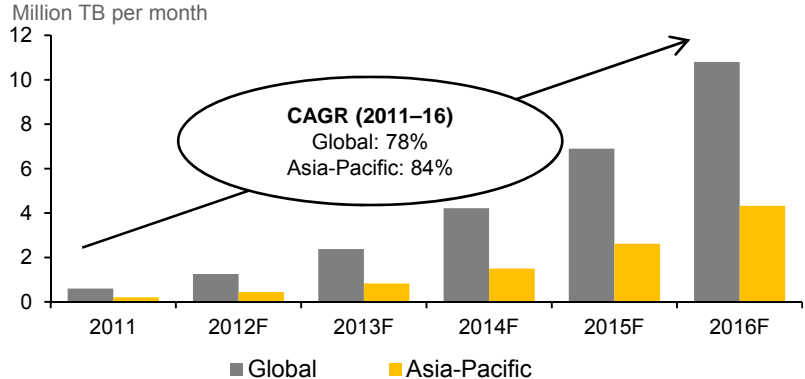
Data tsunami is redefining mobile connectivity

- ▶ Twenty-four-hour connectivity is now a reality with a huge number of connected devices
- ▶ Asia-Pacific is witnessing exponential growth of data volumes, boosted by the growing popularity of smartphone and tablets
 - ▶ By 2016, APAC is expected to account for one-third of the total global mobile data traffic

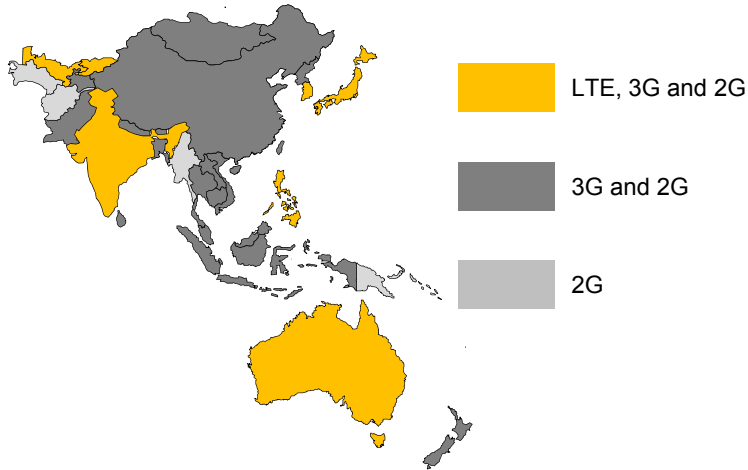
Attention shifting from operational aspects to network infrastructure

- ▶ Surge in data traffic is placing enormous pressure on the already limited network capacity
- ▶ Operators in the region are increasingly rolling out 4G networks as one of the strategies to relieve network strain
- ▶ At 32% APAC holds the largest share of global capex in 2011, driven by investments in China and India
 - ▶ 3G accounts for almost 80% of new connections in China

Mobile data traffic forecast¹



Commercial networks availability across the region²



1. Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2011-16

2. Global Mobile Suppliers Association (GSA), ITU

Mobile provides an ideal platform for driving growth

Mobile is the great leveler

- ▶ Asia Pacific is a heterogeneous market with countries under different stages of development
 - ▶ Diverse maturity of economies, infrastructure development and technology adoption
- ▶ Huge rural areas pose significant challenge
- ▶ Fixed-line infrastructure and policies are limited in many countries leading to large digital divide
- ▶ However, mobile penetration is consistently high across the region making it the ideal medium to deliver services

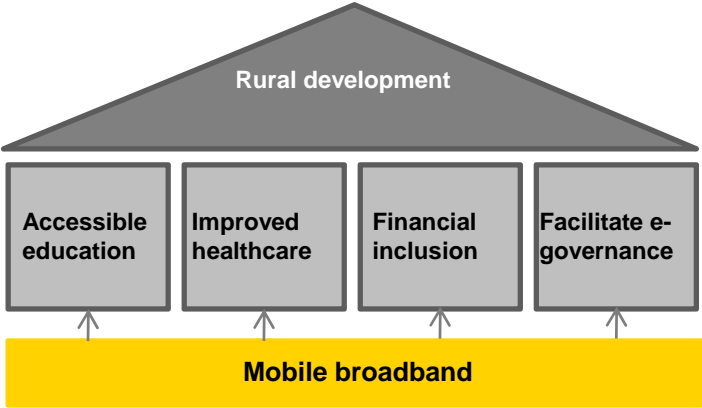
Increased social inclusion through mobile

- ▶ According to World Bank, every 10% increase in mobile penetration leads to 1.5% increase in GDP for emerging economies
- ▶ Mobile solutions have a unique role to play leading to considerable social and economic dividends
- ▶ Mobile broadband will drive scalability in facilitating many of these services, especially in rural areas

Different stage of development across Asian markets (2011)¹

	GDP per capita	Rural population	Mobile penetration	Broadband penetration
Australia	50748	11%	101%	24%
Hong Kong	31757	0%	196%	30%
Japan	42831	33%	95%	27%
Singapore	41120	0%	145%	25%
South Korea	20757	17%	105%	36%
China	4428	53%	64%	9%
India	1410	70%	61%	1%
Indonesia	2946	56%	92%	1%
Malaysia	8373	28%	119%	7%
Philippines	2140	51%	86%	2%
Thailand	4608	66%	104%	5%
Vietnam	1224	70%	175%	4%

Sustained socio-economic improvements through broadband²



1. World Bank, CIA World Factbook, ITU

2. Ernst & Young analysis

Growth of mobile broadband penetration is lagging behind mobile penetration

Mobile broadband yet to reach critical mass

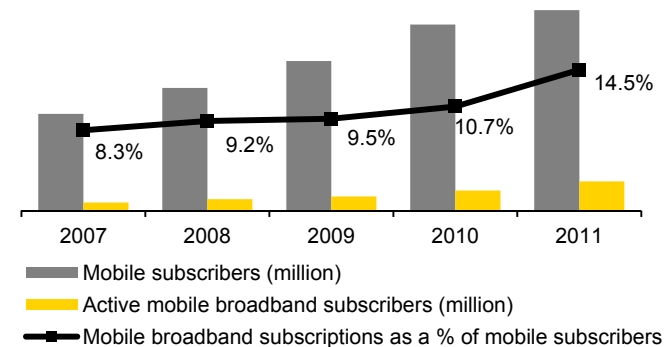
- ▶ Mobile broadband not incorporated as a part of the economic development plan for many countries
- ▶ ICT maturity is diverse with countries at various stages of literacy rates and technological evolution
- ▶ Easy availability of low cost handsets and tablets poses a challenge
- ▶ Mindset of partnership needs to change, with greater openness between different industries and telecom operators

Diversity of technology environment complicates the rollout of mobile broadband

- ▶ Competing technologies in 2G, 3G and 4G complicate and delay operators' network investment decision
- ▶ Different technologies influence spectrum requirement and licensing
- ▶ Performance of different technologies in terms of speed and coverage also affects customer experience
- ▶ VoLTE is not yet mature, leaving LTE as primarily a data carriage technology

1. ITU
2. Ernst & Young analysis

Mobile and mobile broadband subscribers in APAC¹



Presence of multiple networks in selected Asian countries²

	WCDMA	CDMA 2000	TD-SCDMA	FDD-LTE	TD-LTE	WiMAX
Australia	●			●		●
China	●	●	●	●	◐	
HK	●	●		●	◐	
India	●			◐	●	●
Japan	●	●		●	●	●
S.Korea	●	●		●		●
Taiwan	●	●		◐		●

● Commercial service ◐ Trial / Planned

Greater regulatory consensus is required for spectrum allocation

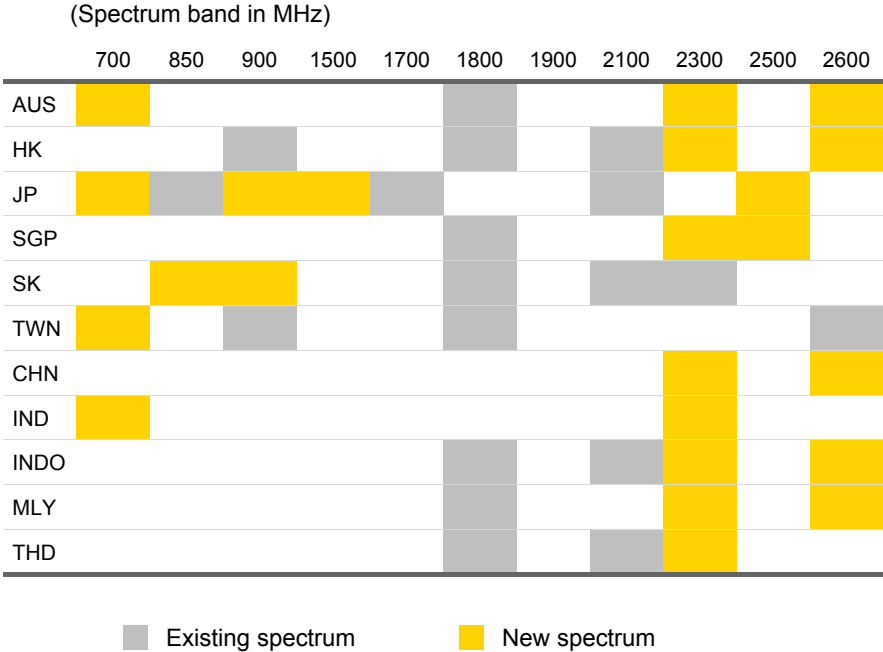
Tremendous effort to harmonize spectrum

- ▶ Fragmentation in the 4G (LTE, WiMAX) spectrum remained an issue globally and within the Asia Pacific
 - ▶ Digital dividend, 700/800MHz and 2.6GHz bands are emerging as new spectrum for LTE services
- ▶ Limited availability of spectrum restricts mass market coverage and deteriorates service quality

Spectrum policy remains unclear

- ▶ Absence of state policies has caused a delay in decision making in key spectrum release
- ▶ Future availability of spectrum is not always transparent
 - ▶ Spectrum refarming policy to free up capacity in existing bands is not clear in many emerging markets
- ▶ The lack of low-frequency band (e.g. 800MHz) made rural broadband services less efficient
- ▶ Spectrum trading and re-farming is still not a common practice in Asia

Frequency bands where LTE spectrum is / to be made available¹



1. Ernst & Young analysis

Broadband policies are in place but most focus on developing fixed-line broadband

Current National broadband plans are not sufficient

- ▶ Most emerging economies have a national broadband plan in place. However, most focus on building a robust fixed-line infrastructure
 - ▶ Costs of covering the large rural population may not justify the investments required in building such networks
- ▶ In developed countries, the access cost is high for customers

Economies of scale can be achieved by mobile broadband adoption

- ▶ Policy makers and governments need to build in mobile broadband in the NBN to achieve economies of scale
- ▶ Mobile penetration has been high in the region, leaving immense potential for mobile broadband once customers are provided cheaper access
 - ▶ Wider access of high speed internet will lead to greater customer acceptance and drive affordability

PPP in National broadband plans (NBN)¹

Country	National broadband plan
Australia	<ul style="list-style-type: none"> ▶ Plans to build a wholesale-only FTTH access network to reach 93% of premises over next 7–8 years. ▶ Government’s contribution: A\$45 billion
China	<ul style="list-style-type: none"> ▶ Construction of an integrated next-generation national information infrastructure with broadband bandwidth ▶ 250 million households to have access to broadband by the end of 2015
India	<ul style="list-style-type: none"> ▶ Plans to invest approximately US\$13.1 billion to set up a broadband network, which totals more 2.5 million km ▶ 175 million broadband connections by 2017, and 600 million by 2020 at minimum 2 Mbps download speed
Indonesia	<ul style="list-style-type: none"> ▶ Provide 30% of the population with broadband access by 2014 ▶ Broadband plan has an outlay of US\$9.2 billion, including US\$4.3 billion PPP funding allocation
Japan	<ul style="list-style-type: none"> ▶ Provide fixed broadband speed of 1Gbps and mobile broadband speed of over 100Mbps covering more than 90% of households by 2015
South Korea	<ul style="list-style-type: none"> ▶ Plans to upgrade 1Gbps broadband convergence network through a 1.3 trillion won (US\$1.1 billion) fund and 32.8 trillion won (\$27.8 billion) being generated through private funding
Singapore	<ul style="list-style-type: none"> ▶ Plans to invest S\$1 billion in building and operating a FTTH next-generation national broadband network. ▶ Nationwide availability to all homes and businesses will be effective from January 2013

1. Ernst & Young analysis

Affordable devices with smarter capabilities will drive mobile broadband growth

Cost of smarter handset an important barrier for uptake

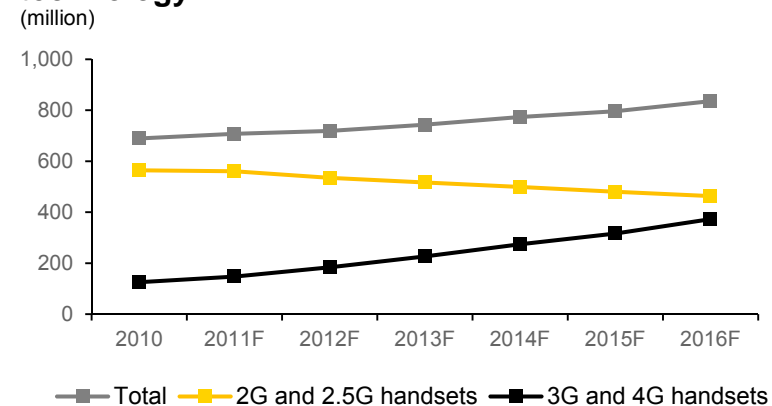
- ▶ In many developing countries, total cost of ownership of a handset is high for low-income rural groups
- ▶ Availability of affordable handsets and other access devices is the key to bridge the digital divide between urban and rural

Smarter, faster and cheaper

- ▶ Smarter capabilities are required to provide complete user experience as well as reduce strain on the network
- ▶ Rise of tablet devices is likely to spur even greater demand through form factor enhancements which allow for a more PC-like internet experience
 - ▶ However, the story does not end with its aspirational form factor, as shown by recent developments in India.
- ▶ Government subsidies on handsets and tablets will lead to achieving social inclusiveness

1. IDC
2. Ernst & Young analysis

Asia-Pacific mobile handset shipments by technology¹



Low-cost tablet reaches new user groups²

- ▶ A US\$35 tablet, named Aakash, was launched by the Indian government in October 2011 to boost e-learning
- ▶ This tablet is a part of the e-education initiative – National Mission for Education through Information and Communication Technology (NME-ICT)
- ▶ First step - 100,000 such tablets were distributed to students across the country
- ▶ The governments aims to increase the production to further bring down the cost

Network sharing is an effective way of lowering cost of service delivery

Opportunity to reduce cost of service

- ▶ Network sharing results in decrease of capital as well as operating expenditure, leading to cost efficiencies
 - ▶ It also enables rapid network rollout, provide broader coverage, and offer new services and applications
- ▶ With more infrastructure shared, the available economic resources will enable getting to smaller cell sizes, thereby reducing the impact of spectrum shortage

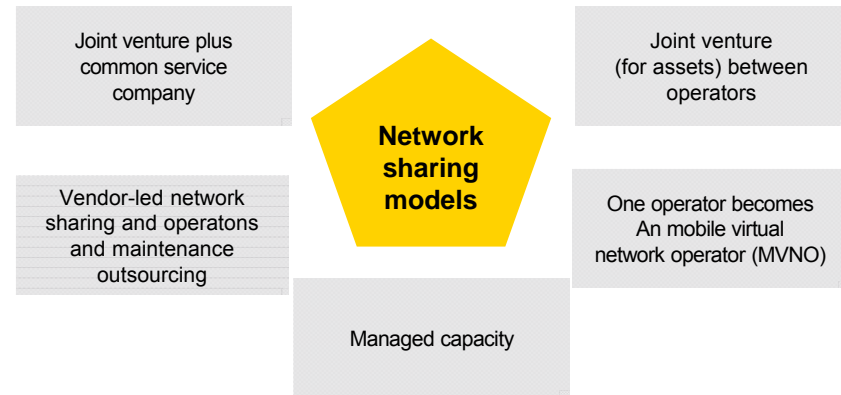
Moving toward active sharing

- ▶ Currently, majority of network sharing deals are at the passive level. However, some operators are already sharing active network elements
 - ▶ Some Asian countries like Indonesia have started allowing sharing of active network elements
- ▶ Active sharing is likely to emerge as a best practice for LTE networks
- ▶ Commercial benefits of network sharing are evident but government support is equally important

1. Ernst & Young analysis

2. Company websites

Telecom network sharing models ¹



Network sharing in select markets ²

Country	Network sharing plans
Canada	▶ Two integrated telcos have jointly deployed a national HSPA network on 1900 MHz and 850 MHz, which can be upgraded to LTE
Sweden	▶ Two 4G operators have entered into a joint venture for LTE rollout ▶ Telcos share spectrum in the 900 MHz and 2.6 GHz band, and plan to cover 99% of population by 2013
UK	▶ Market leading telco proposed variation of its 1800MHz spectrum licences to allow use of LTE and WiMAX technologies ▶ Post the merger of two telcos, subscribers have the advantage of using either of the telcos' 2G and 3G network

Comprehensive ICT policies to formulate strategic development are vital

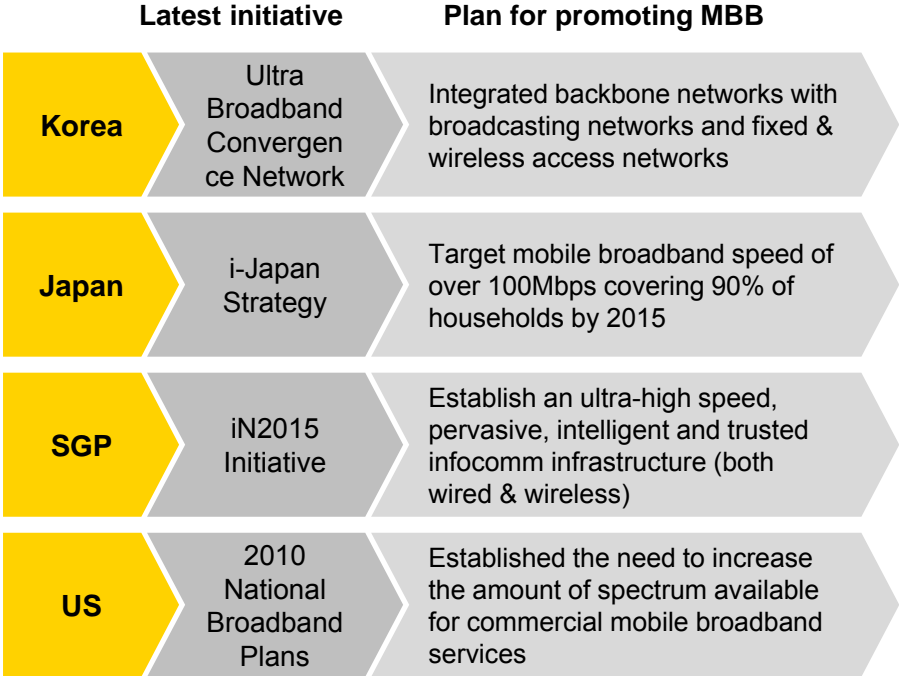
The promise of a comprehensive trans-sector policies

- ▶ One that takes into account social and economic issues to build on the economic development and innovation
- ▶ The infrastructure needs to be viewed as national infrastructure, not telecom infrastructure
- ▶ Spectrum regulation must be based on a trans-sector vision, rather than on silo-based policies
 - ▶ A fair and well-balanced reallocation of the spectrum between the mobile broadband, broadcasting and ICT industries

Developed markets offer learning points

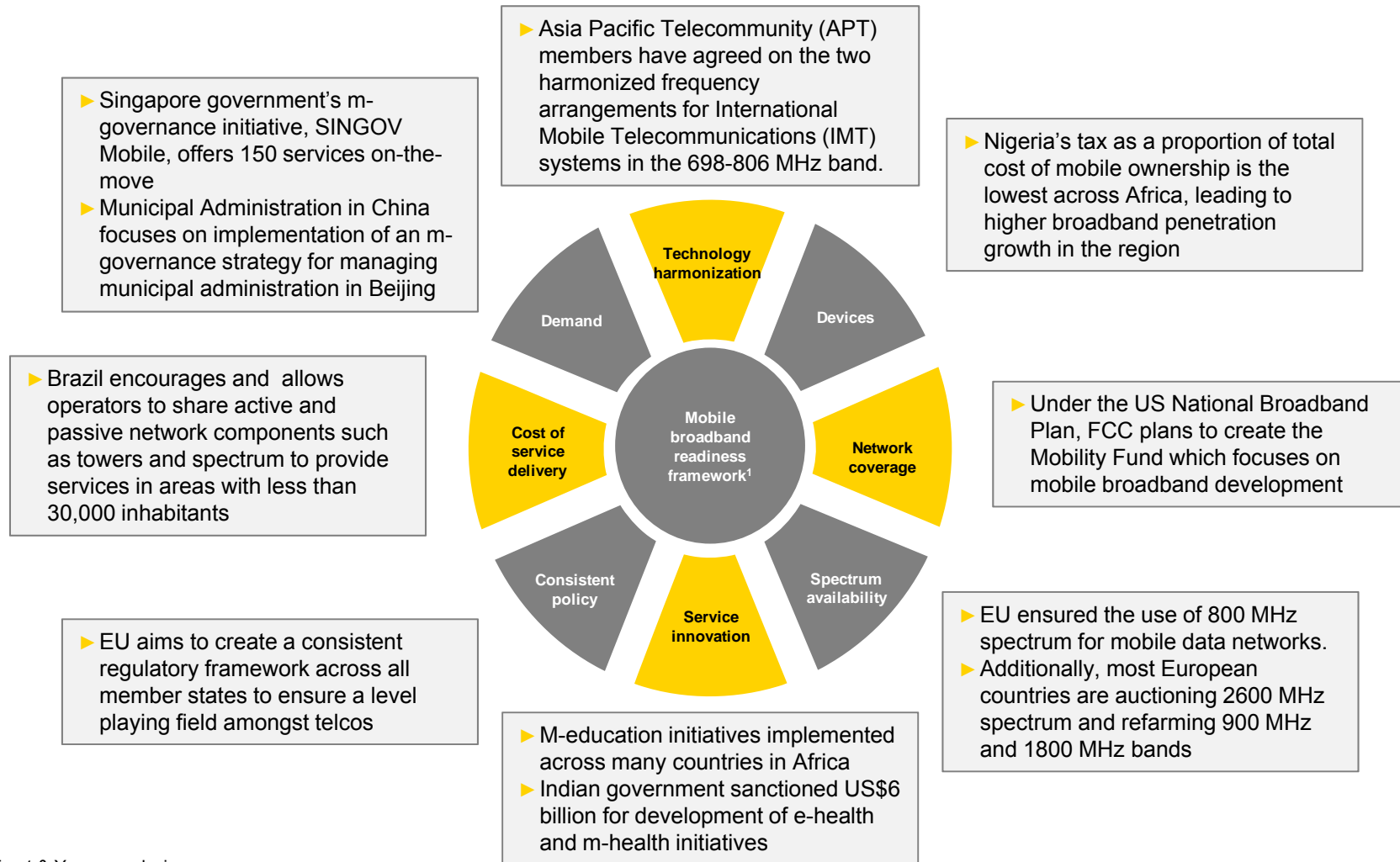
- ▶ A series of evolving strategic plans to push forward the ICT industry roadmap
 - ▶ Plans for public investment in broadband infrastructure and incentives for private investment
 - ▶ Initiatives to aggregate and expand demand for broadband services through e-Government services and promotion of e-commerce and digital literacy
 - ▶ Policies to promote affordable universal access to broadband
 - ▶ Supporting industries policies such as R&D promotion and incentives to vitalise venture capital markets

Best practices of national informatization master plan for promoting mobile broadband¹



1. Ernst & Young analysis

Government initiatives aiding the mobile broadband readiness framework



1. Ernst & Young analysis