BCG

GSMA

Socio-economic impact of allocating 700 MHz band to mobile in Asia Pacific

THE BOSTON CONSULTING GROUP

Executive summary

The impending switchover from analogue to digital broadcasting across the Asia Pacific presents a unique opportunity to impact the future development of countries in the region

Allocation of the 698-806 MHz band[1] to mobile broadband is expected to increase adoption, especially among rural users

- Significantly lower capex and network costs should accelerate rollout and reduce cost to end users

This will generate incremental economic benefit (relative to alternate uses, e.g., broadcasting)

- Positive GDP impact (via increased productivity)
- Incremental job and new business creation
- Increased tax revenues

Increased adoption will also bring significant social benefits, helping address rural-urban inequality

- Accessible education
- Improved healthcare
- Financial inclusion

To fully realise these benefits, two conditions need to hold

- *Sufficient bandwidth:* The 698-806 MHz band must be allocated to mobile broadband in each country
- *Technical harmonization:* The 2x45 MHz bandplan adopted by APT must be implemented across the region, to benefit from economies of scale in equipment and handsets

1. Referred to as the 700 MHz band

Agenda

Introduction

Adoption

Economic benefits

Social benefits

Implications for governments and regulators

Switchover to digital broadcasting presents opportunity to reallocate key block of spectrum to alternative use

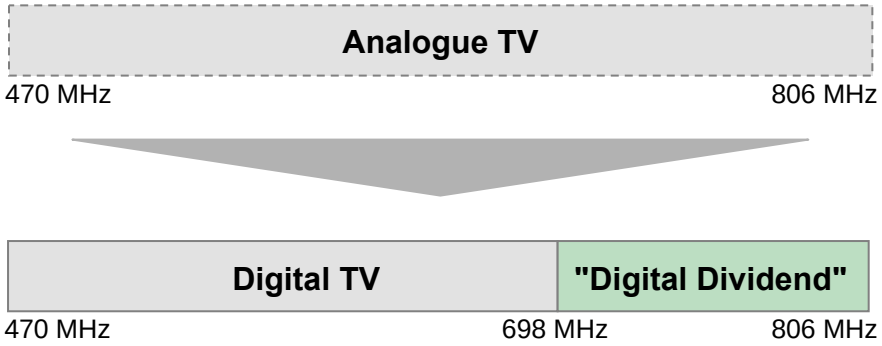
With digitalization, a large portion of the lower UHF band can be freed up...

Today, half of the lower Ultra High Frequency band is used for analogue broadcasting

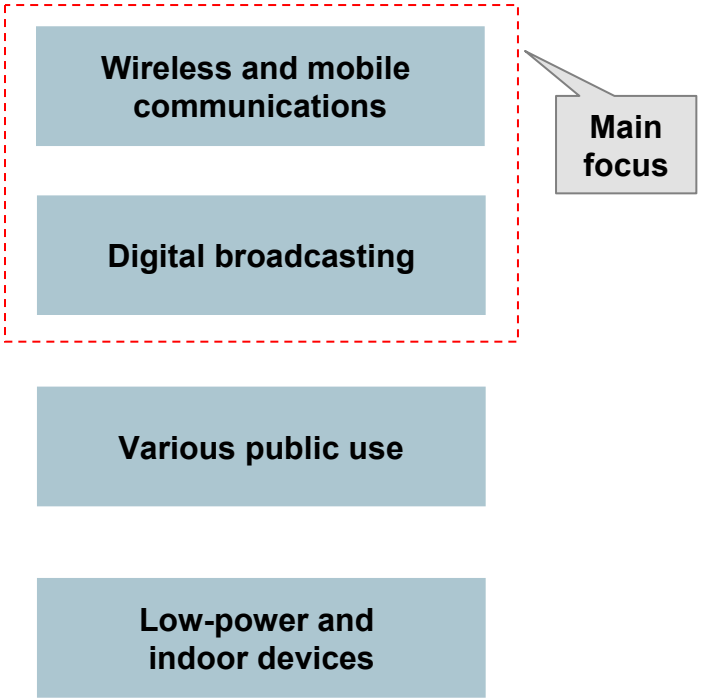
- For most of Asia Pacific, the 470-806 MHz[1] band is used to broadcast analogue television

With digital switch-over, all current channels can be transmitted in a much narrower band

- Studies show that 25% or less of the current spectrum can be sufficient[2] to carry current channels digitally

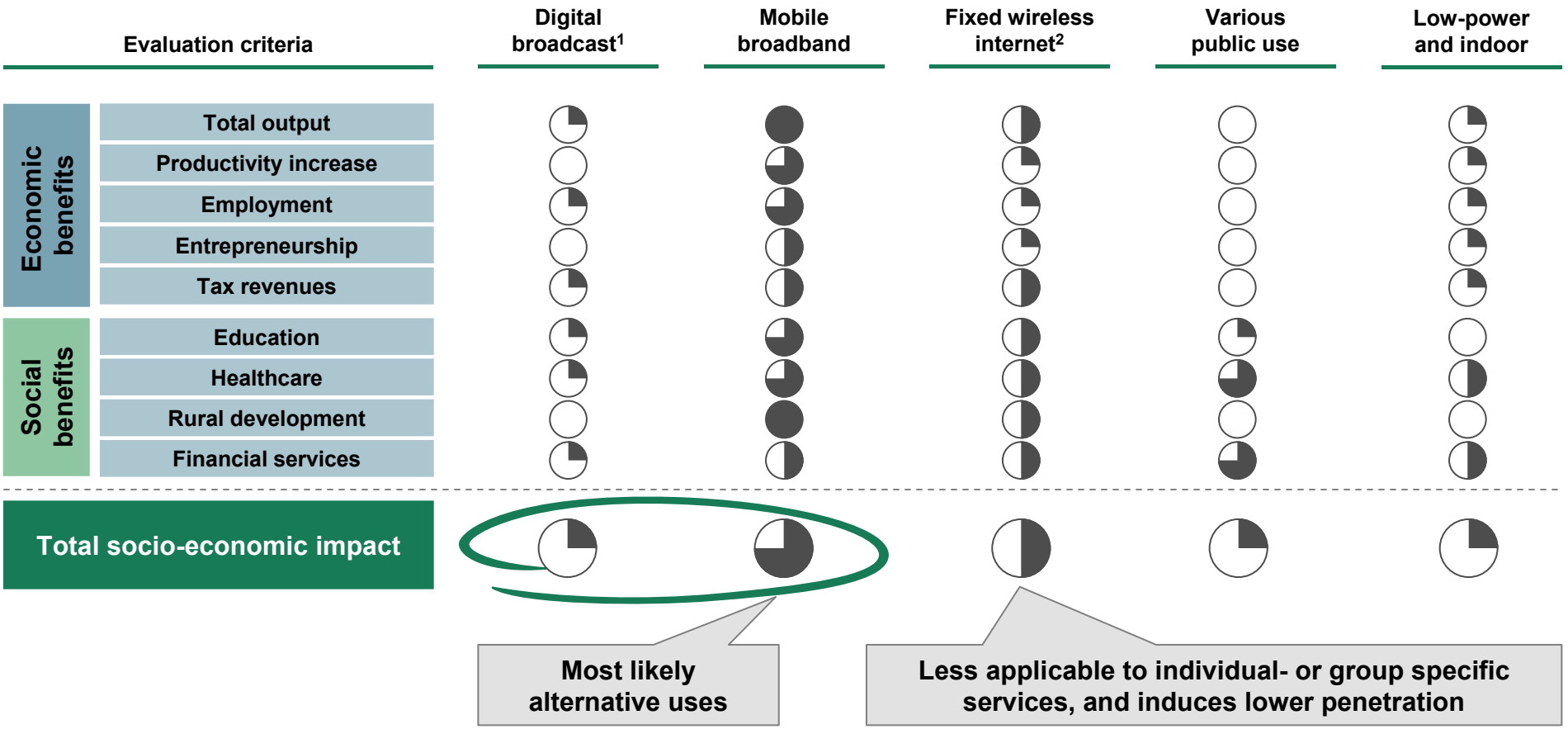


...presenting a "Digital Dividend" of alternative uses in the 698-806 MHz band[3], e.g.:



1. With some variations between countries, some go up to 880 MHz. India does not currently use the 700 MHz band for broadcasting 2. Ofcom's Digital Dividend Review concludes all of UK's 368 MHz of analogue broadcasting could be carried in 40 MHz 3. Referred to as 700 MHz band
Source: Association for International Broadcasting; GSMA

Mobile broadband likely to deliver superior socio-economic impact compared to broadcasting and other uses...



○ No incremental benefit compared to baseline ● High incremental benefit compared to baseline

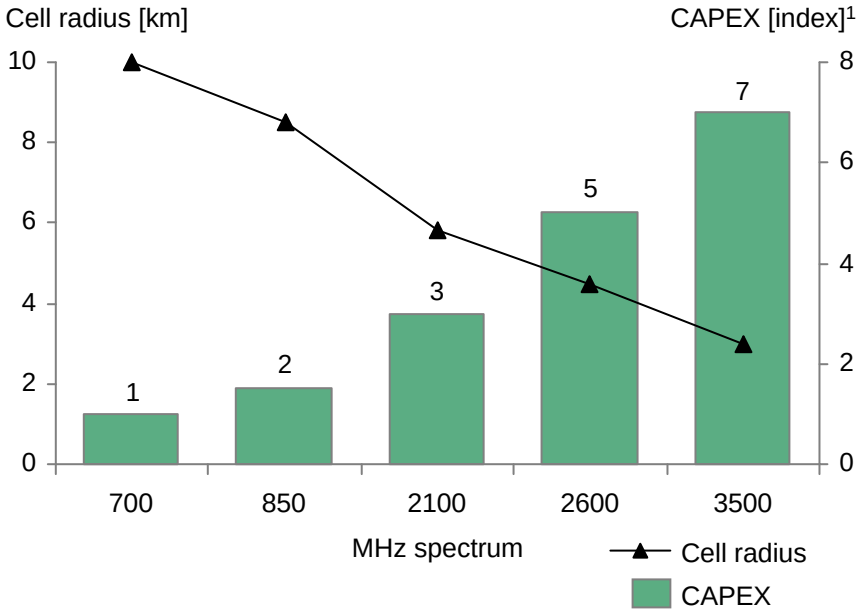
1. Extending number of channels beyond today's analogue which will be switched over 2. E.g. WiFi, WiMAX 3. Including emergency services, disaster warning and recovery
Source: Expert interviews; BCG analysis

... as Digital Dividend band has unique characteristics making it ideal for roll-out of mobile broadband in rural areas

700 MHz band provides optimal combination of range and data capacity

Significantly lower build-out cost can provide access to rural and difficult-to-reach areas

- At 700 MHz the signal covers a reception radius of 10 km, compared to ~6km for 2,100 MHz
- Implies up to 70% lower infrastructure investments needed versus 2,100 MHz



Potential to enable significant benefits if allocated to mobile broadband

Greater coverage and lower service costs would greatly improve customer accessibility

- Rural areas with previously limited coverage
- Low-income households who could not afford internet
- Entrepreneurs and small companies

Substantial economic impact from increased productivity and new business activity

- Increase productivity for businesses and agriculture
- Spur entrepreneurship and employment
- Benefit from infrastructure investment & taxes

Significant social benefits, especially in rural and less developed areas

- Enhance healthcare and education
- Facilitate rural development
- Provide access to information and entertainment

1. E.g. using the 2100 MHz band will require 3 times as many base stations
Source: SCF Associates; GSMA; Expert interviews; BCG analysis

700 MHz band can also help overcome common barriers to Internet adoption ...

Infrastructure availability	**More rapid roll-out, with significantly larger rural footprint** • 700 MHz band has propagation characteristics highly suitable for rural and less densely populated areas	✓
Affordability	**Cost of service will be reduced, improving affordability for the poor** • Halving CAPEX requirements to establish network coverage can lower cost of service by approximately 5-10%, benefiting low income groups	✓
Perceived value of relevant content	**Availability of local content and services will be improved short-term** • Infrastructure investments and uptake likely to boost local content and service development ecosystem	✓
Literacy/ IT literacy	**Usage capabilities and trust in services will to be built up over time** • General and technical education made available to the individual likely to improve general literacy and IT skills over time	✓ Long-term

... and can complement fixed BB to boost business adoption and increase the productivity benefit

Complementary benefits of wireless broadband ...

Efficient management & documentation

- Accessing email on-the-go can save 30 minutes / day
- Data synchronization reduces demand for paper documentation

Field service automation

- Real-time location information and least-distance routing allows field service workers to save time and fuel

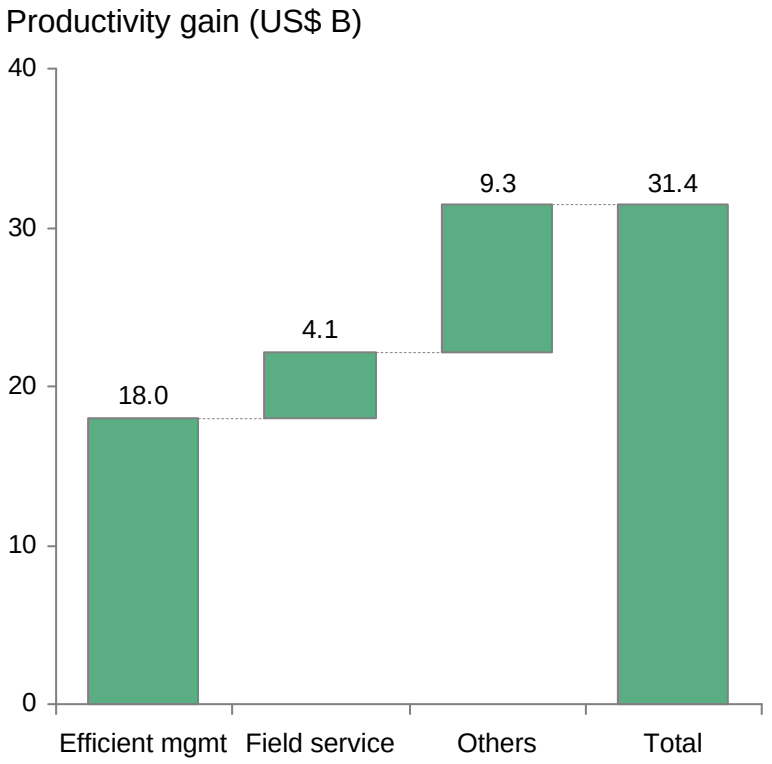
Sales force automation

- Real-time access to inventory reduces risks of unfulfilled orders
- Real-time updating of customer records improves customer relationship management

Others

- Virtual network office reduces need for staff at headquarters
- Replacement of landlines with VOIP also saves cost

... helped U.S. realize productivity gain of US$ 31B in '05[1]

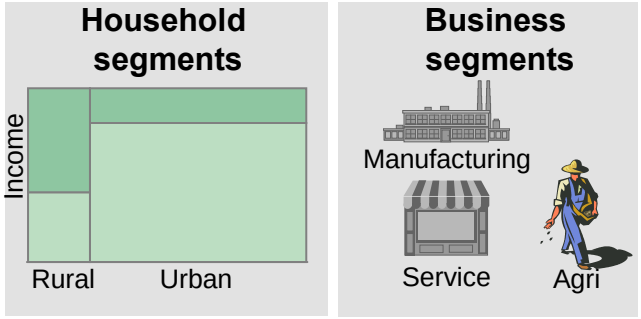


1. Based on 25% wireless BB penetration among enterprise users of telecom services

Source: The Increasingly Important Impact of Wireless Broadband Technology and Services on the U.S. Economy - Roger Entner 2008; BCG analysis

Study builds on rigorous cost-benefit analysis to estimate incremental adoption uplift from mobile broadband

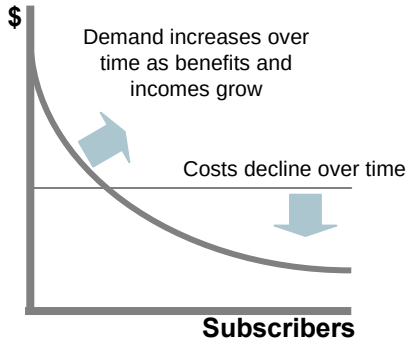
Cost-benefit analysis of businesses and households

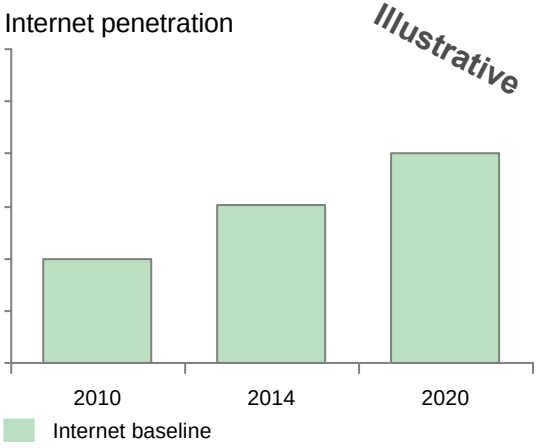


Benefits
- Increased profits for businesses
- Increased income/welfare for households

Costs
- Device
- Subscription/ access

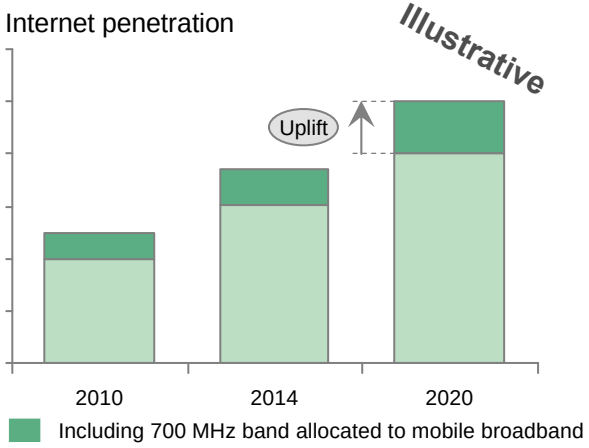
Baseline estimate for Internet penetration





Incremental effect of mobile broadband in 700 MHz band

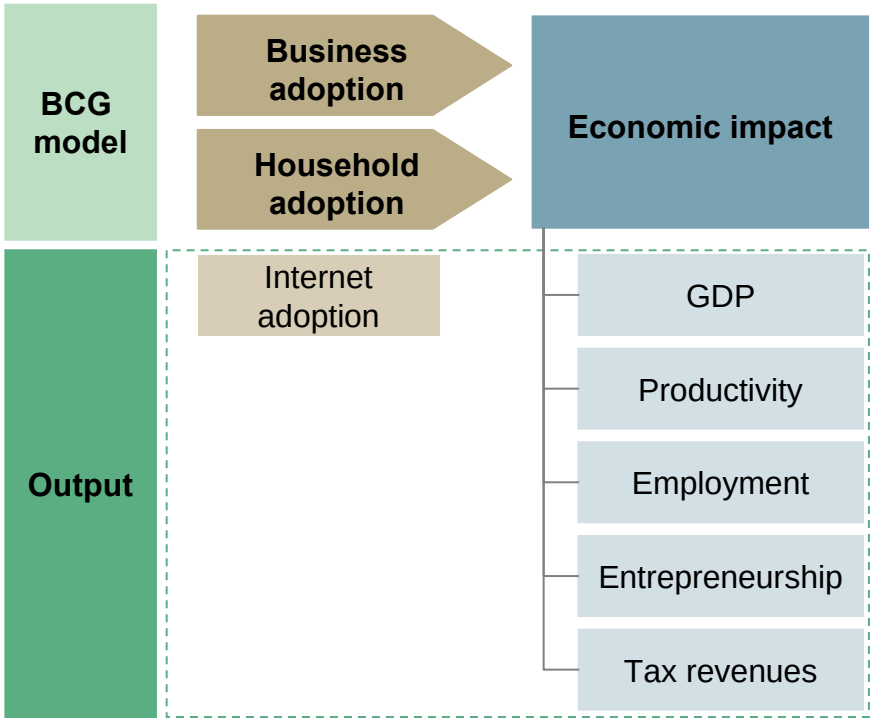
Mobile broadband in 700 MHz band will increase benefits and reduce costs
- Greater coverage and lower service costs will improve accessibility
- Economic benefits from increased productivity and rate of adoption
- Significant social and economic benefits in rural areas



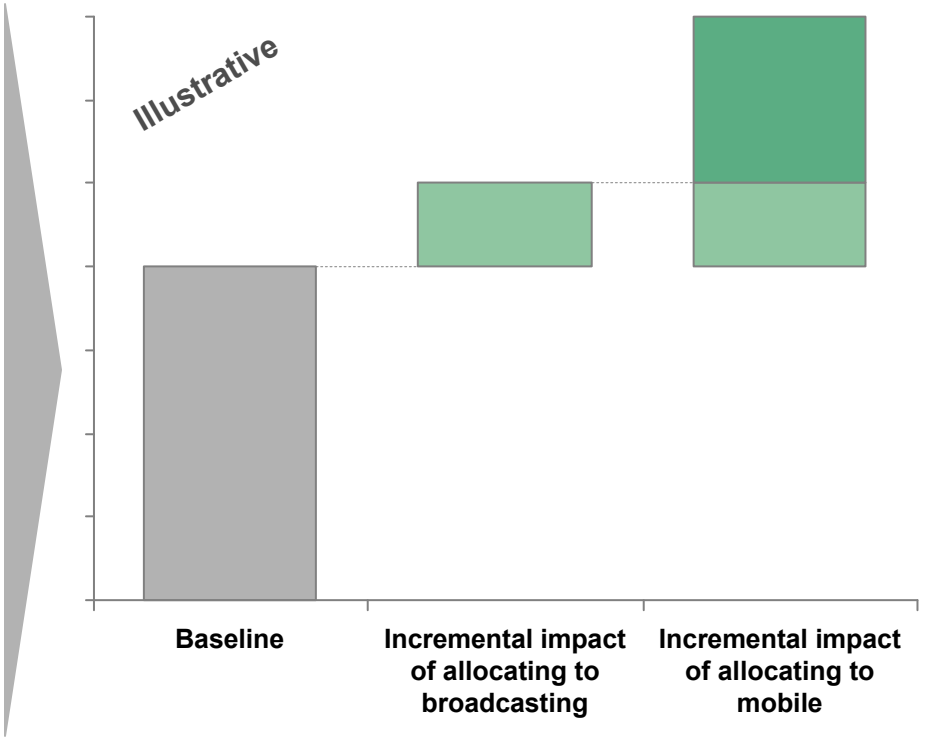
Note: Figures are illustrative

Adoption is translated into five economic factors...

Five economic factors are modeled...



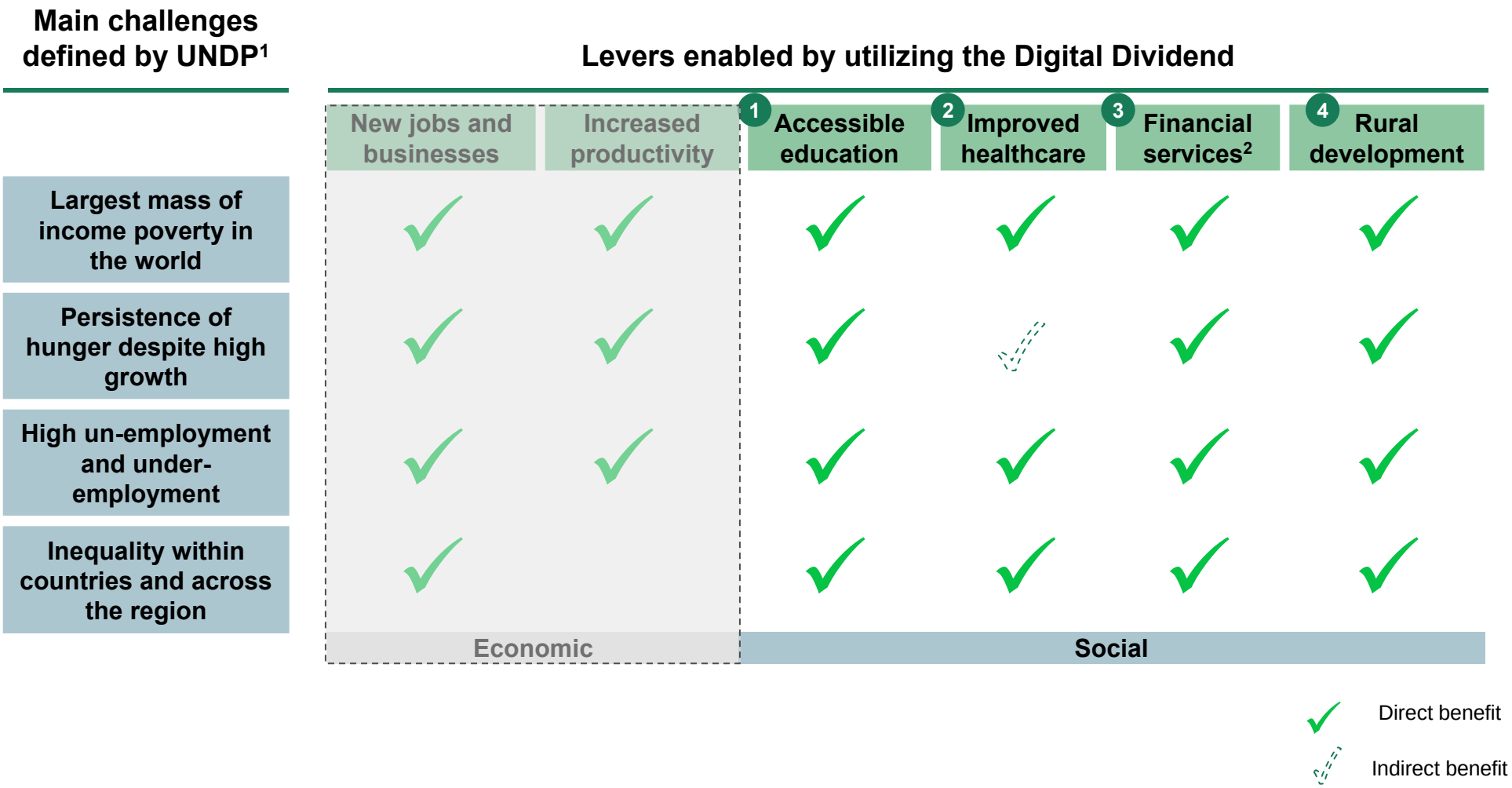
... to assess incremental value of allocating 700 MHz band to mobile



Costs related to digital switchover assumed to be sunk costs, and are not factored in the estimates

Note: Graphs are illustrative

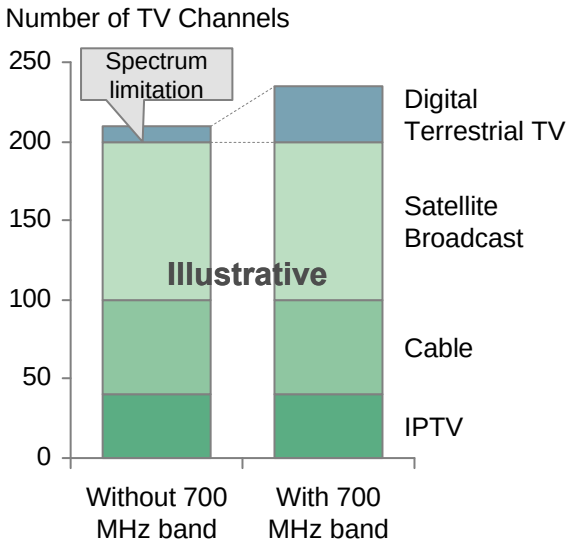
...and four social impact levers to help address the most important challenges across Asia Pacific[1]

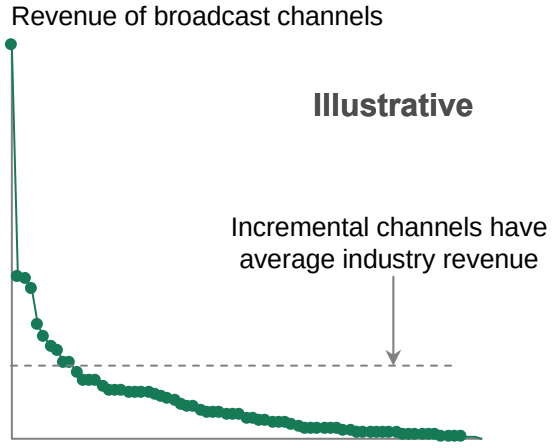


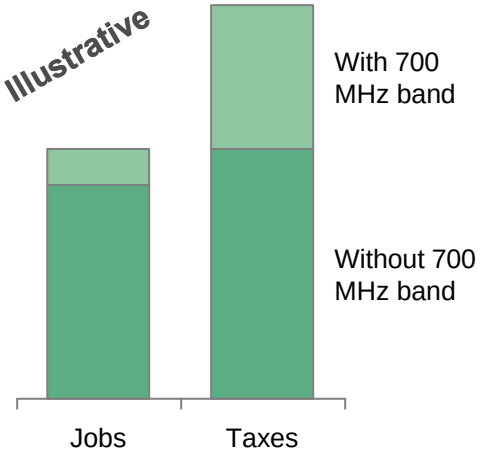
1. As defined by United Nations Development Programme (2009) 2. Including e.g micro-finance, micro-insurance and infrastructure for targeted financial aid from government and NGOs
Source: UNDP

Broadcast impact calculated with best-case assumptions, to ensure conservative estimates of mobile benefit

700 MHz band allows more TV channels... → **Generating revenue across supply chain...** → **As well as broadcast jobs and taxes**







Generous assumptions on additional channels

- 25-35 additional channels are technically possible in most countries
- Possibility that channels may not be commercially viable deliberately excluded

Optimistic revenue assumptions: overall industry effect may be lower

- Additional channels will cannibalize existing offerings
- Marginal channels likely to be niche

Few spinoff effects to general economy

- Existing public service channels already provide wide range of educational content
- Special interest groups well served by cable/satellite

Analysis of four representative study countries extrapolated to estimate impact for entire Asia Pacific

Countries clustered based on HDI[1], urbanization and mobile penetration...

Current human development level

- Increased mobile access, particularly in rural areas, has potential to improve education, healthcare, rural employment, etc.
- Current UN Human Development Index (UN HDI) score used as metric of development

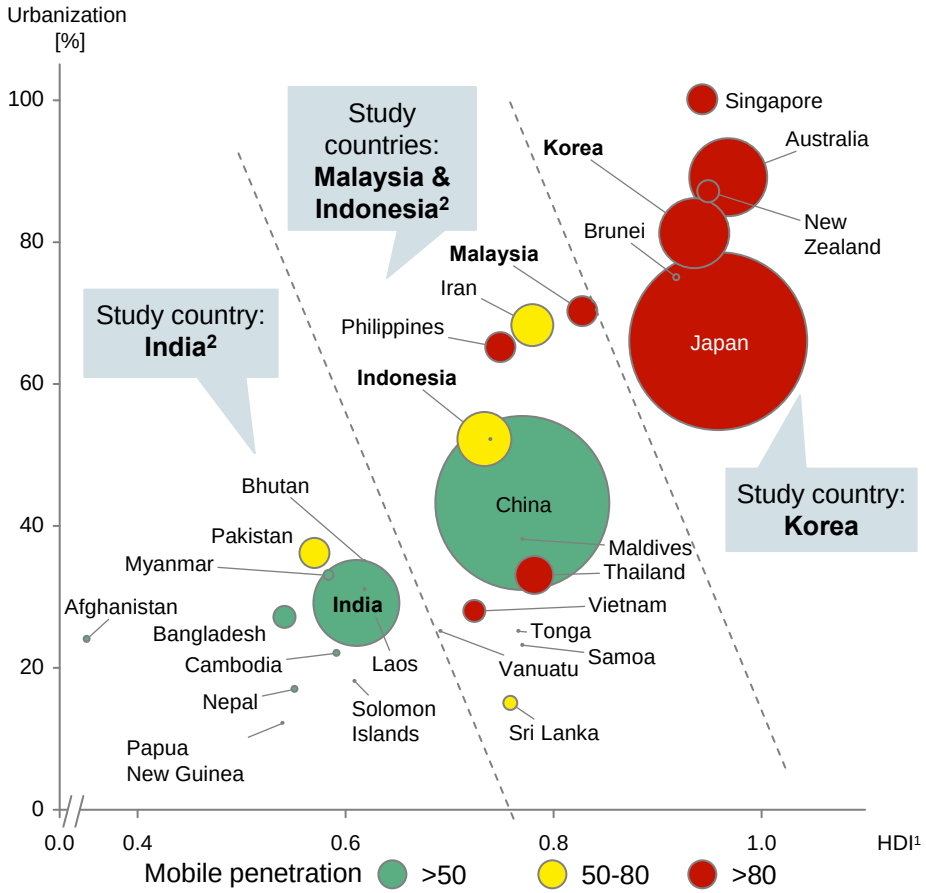
Rural-urban split

- High proportion of rural, low-density population increases incremental value of 700 MHz band

Mobile penetration

- High mobile penetration decreases incremental value of 700 MHz band

... and representative countries modeled to aggregate socio-economic impact



1. Human development Index 2. Two countries chosen to reflect diversity of cluster 2. Two regions modeled to reflect country diversity
Note: Size of bubble denotes GDP at constant prices (2009) , Kiribati, Marshall Islands, Micronesia, Tuvalu and North Korea omitted as HDI is not reported
Source: IMF; UNDP; CIA World Factbook; ITU; BCG Analysis

Extrapolation from study countries based on level of urbanization and current mobile penetration

Inverse average of urbanization and penetration used as uplift factor...

Illustration: Uplift factors for Cluster A

	Urb. (2)	+ Penetr.	= Uplift factor
Korea	1.00	1.00	**1.00**
Australia	1.10	1.15	**0.89**
Brunei	0.93	1.08	**1.00**
Japan	0.81	0.91	**1.16**
New Zealand	1.07	1.11	**0.92**
Singapore	1.23	1.42	**0.75**

... to estimate socio-economic impact for entire cluster of countries

GDP impact based on impact/GDP ratio

$$\sum_{Countries} \frac{\text{GDP uplift study country}}{\text{GDP of study country}} * \text{country GDP} * \text{uplift factor}$$

Governmental revenue based on tax/GDP ratio

$$\sum_{Countries} \frac{\text{Tax uplift study country}}{\text{Tax of study country}} * \text{country tax} * \text{uplift factor}$$

Jobs created based on uplift ratio

$$\sum_{Countries} \frac{\text{Jobs created study country}}{\text{Total job increase study country}} * \text{annual job increase} * \text{uplift factor}$$

New business creation based on job uplift

$$\sum_{Countries} \frac{\text{New biz created study country}}{\text{Total job increase study country}} * \text{annual job increase} * \text{uplift factor}$$

1. Indexed to study country. For Cluster B, countries indexed to average of study countries Malaysia and Indonesia, for India towards average of Maharashtra and Rajastan
Source: IMF; UNDP; CIA World Factbook; ITU; BCG Analysis

Uplift factors estimated for all countries relative to their cluster study country/countries

Cluster A	Cluster B[1]	Cluster C[1]
Australia: 0.89	China: 1.51	Afghanistan: 1.11
Brunei: 1.00	Fiji: 1.18	Bangladesh: 1.22
Japan: 1.16	Indonesia: 1.00 (study country)	Bhutan: 0.88
New Zealand: 0.92	Iran: 1.05	Cambodia: 1.23
Singapore: 0.75	Malaysia: 1.00 (study country)	India: 1.00 (study country)
Korea: 1.00 (study country)	Philippines: 1.02	Laos: 0.89
	Samoa: 1.52	Myanmar: 1.73
	Sri Lanka: 1.96	Nepal: 1.70
	Thailand: 1.05	Pakistan: 0.79
	Tonga: 2.05	Papua New Guinea: 2.78
	Vanuatu: 2.01	Solomon Islands: 2.66
	Vietnam: 1.27	

1. Uplift factors based on driver values indexed to the average of the study countries/circles
Note: Kiribati, Marshall Islands, Micronesia, Nauru, North Korea and Tuvalu not included due to lack of reliable data
Source: IMF; UNDP; CIA World Factbook; ITU; BCG Analysis

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Social benefits

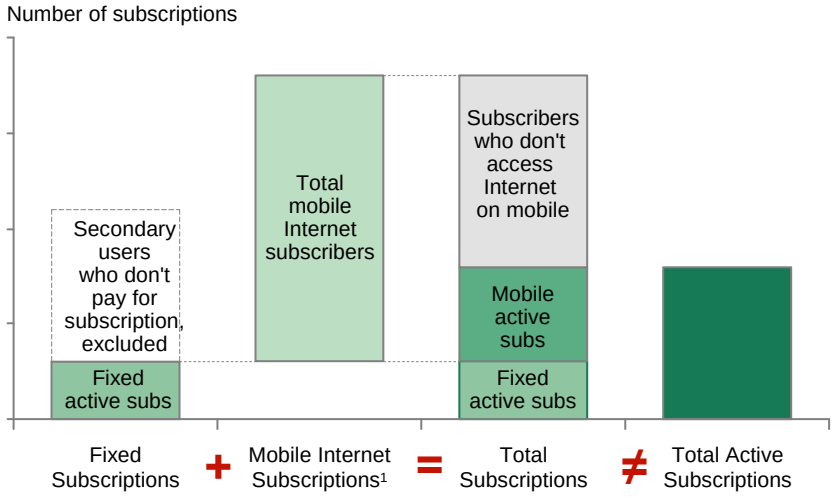
Implications for governments and regulators

Baseline Internet penetration calculated as Active Subscriptions, to better predict economic impact

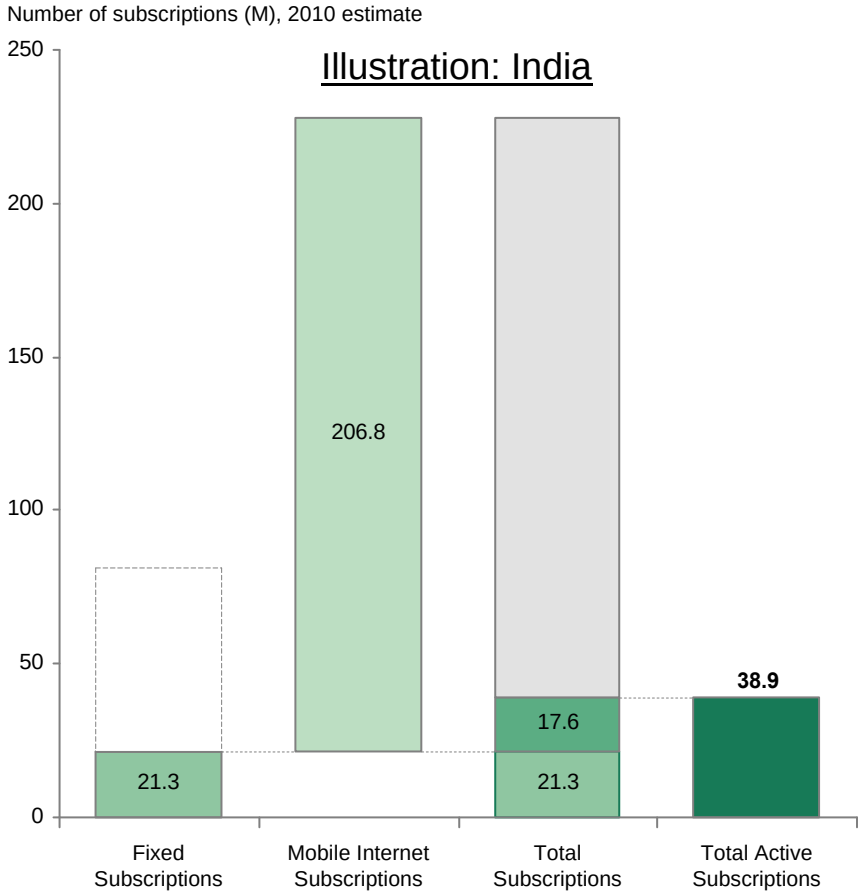
Internet statistics differ according to subscription vs usage

For fixed line internet, generally Users > Subscriptions
- Many people use internet at cafes, or share in household
- Each subscription often shared with secondary users

- **For mobile internet, generally Users < Subscriptions**
- "Subscriptions" counts people with Internet-enabled phones[1] in areas with 2.5G or better coverage
- A subscription could potentially go unused due to unwillingness to pay incremental data charges or lack of awareness of the Internet



2010 baseline aligned with national and industry statistics

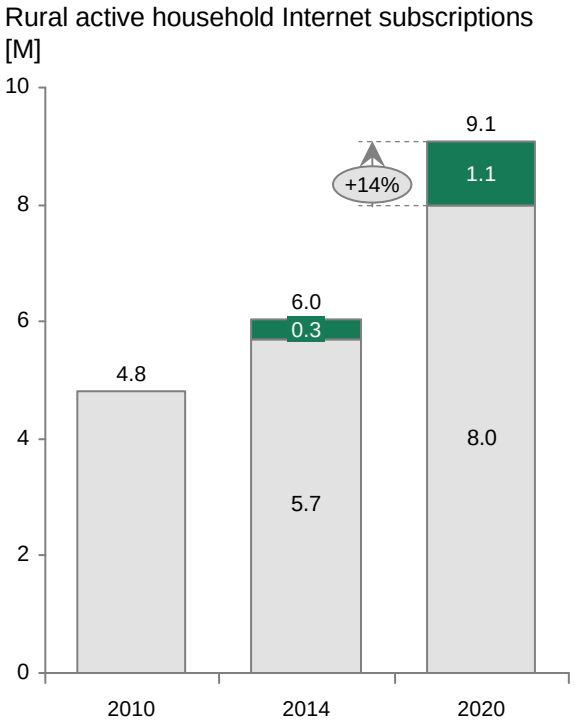


1. Includes dongles and other wireless data devices

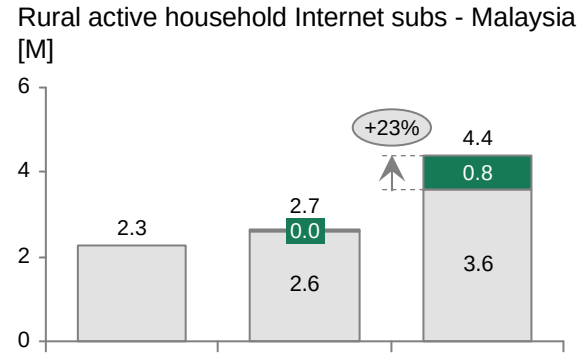
Source: TRAI Telecom Subscription Data as of 31st August 2010; IDFC Securities Indian wireless June 2010; Wireless Intelligence; GSMA; TeleGeography; BCG analysis

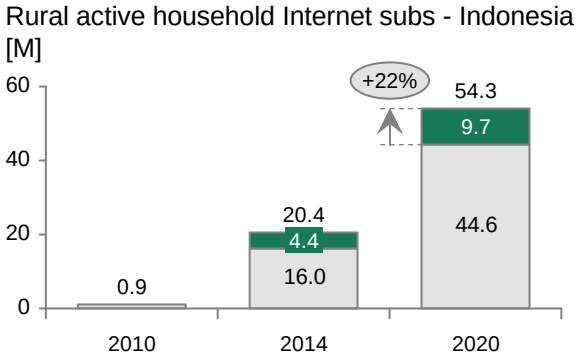
Allocating 700 MHz band to mobile broadband can increase rural Internet subscriptions by 14-23% by 2020[2]

Cluster A: 14% in Korea

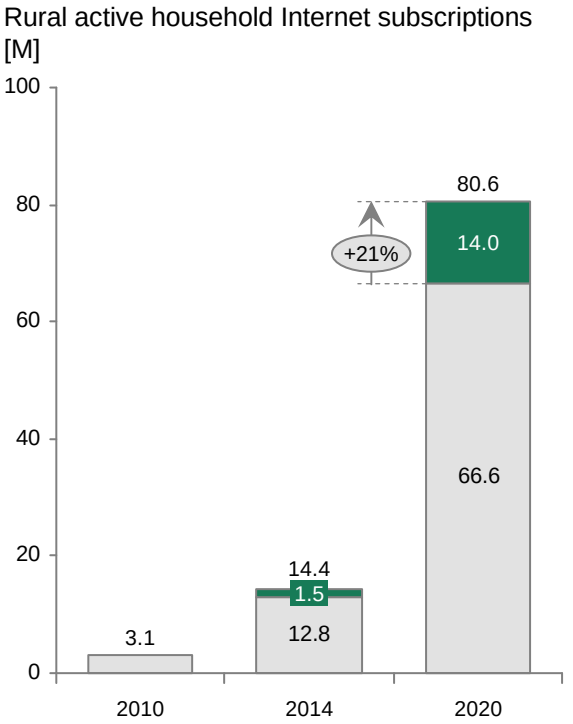


Cluster B: 23% in Malaysia and 22% in Indonesia





Cluster C: 21% increase in India



Internet baseline | Including 700 MHz band allocated to mobile broadband

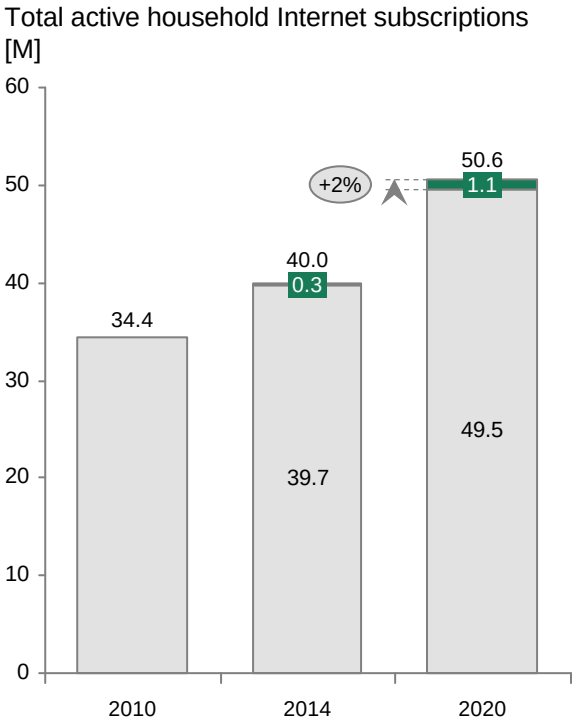
Reduced cost of service[1]	3%	6%	5%	10%	5%	10%

1. Cost of service due to lower infrastructure build-out cost conservatively assumed 6% for Cluster A and 10% for Cluster B and C countries, with half effect the first year
2. For comparison, roll-out is assumed in 2014 for all countries, while the potential reduced impact of delaying is illustrated for Indonesia in the "Implications for governments and regulators" section

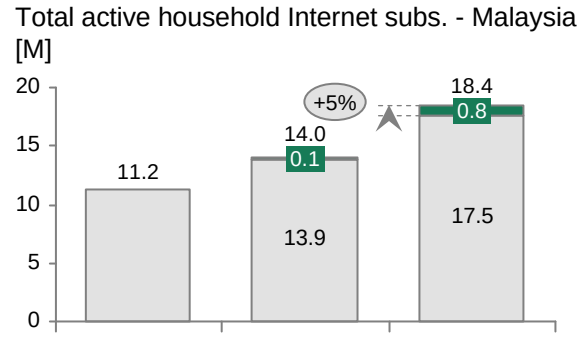
Source: GSMA; ITU; Industry; BCG analysis

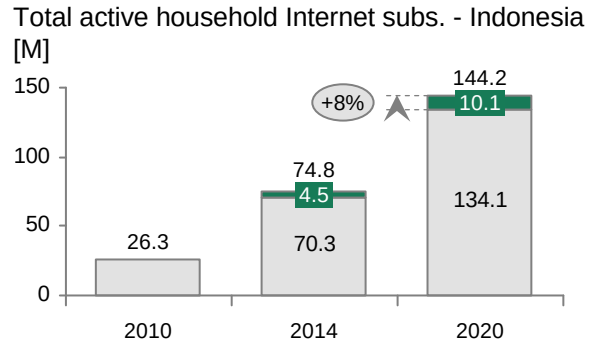
Overall number of Internet subscriptions expected to increase 2-8%

Cluster A: 2% in Korea[2]

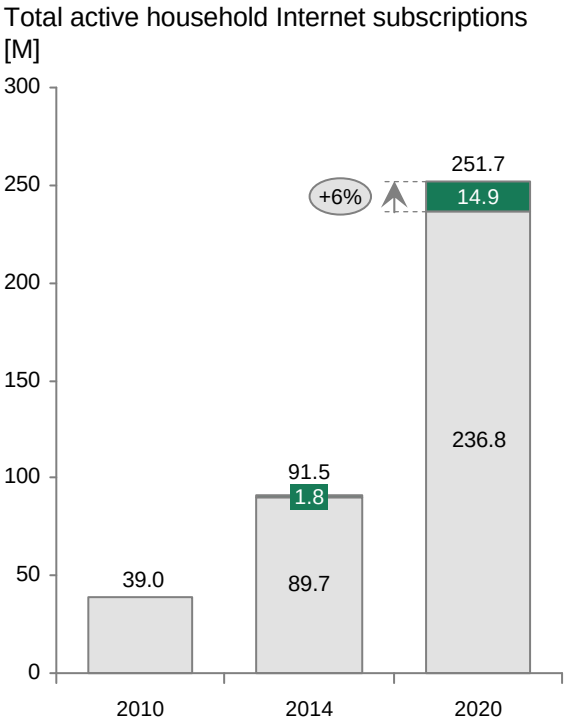


Cluster B: 5% in Malaysia[3], 8% in Indonesia[4]





Cluster C: 6% increase in India[5]



Internet baseline Including 700 MHz band allocated to mobile broadband

Reduced cost of service[1]: 3% | 6% | 5% | 10% | 5% | 10%

1. Cost of service due to lower infrastructure build-out cost conservatively assumed 6% for Cluster A and 10% for Cluster B and C countries, with 50% effect the first year
2. Corresponds to 2.2% total penetration change 3. Corresponds to 2.7% total penetration change 4. Corresponds to 4.2% total penetration change 5. Corresponds to 1.2% total penetration change
Source: GSMA; ITU; Industry; BCG analysis

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Adoption

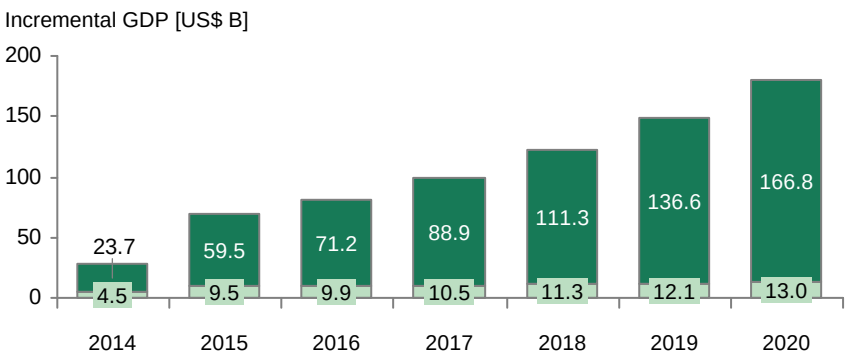
Economic benefits

Social benefits

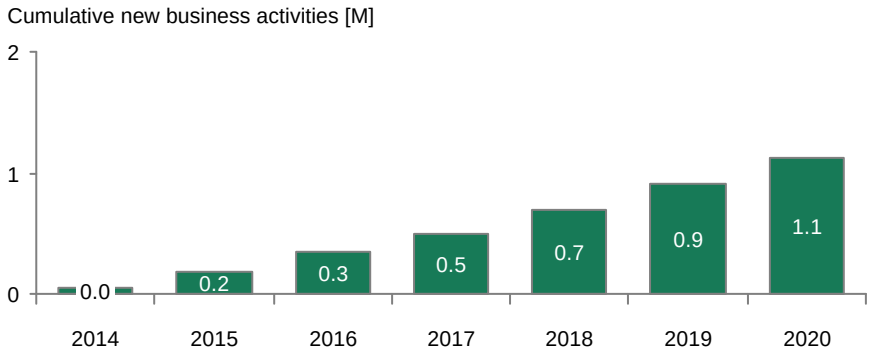
Implications for governments and regulators

Allocation of 698-806 MHz band to mobile will have significant incremental economic benefits over broadcasting

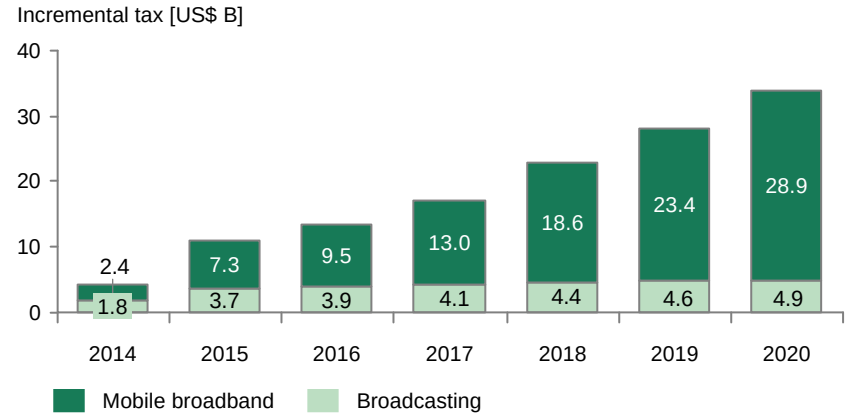
GDP increased US$ 658B 2014-2020 (NPV US$ 502B)



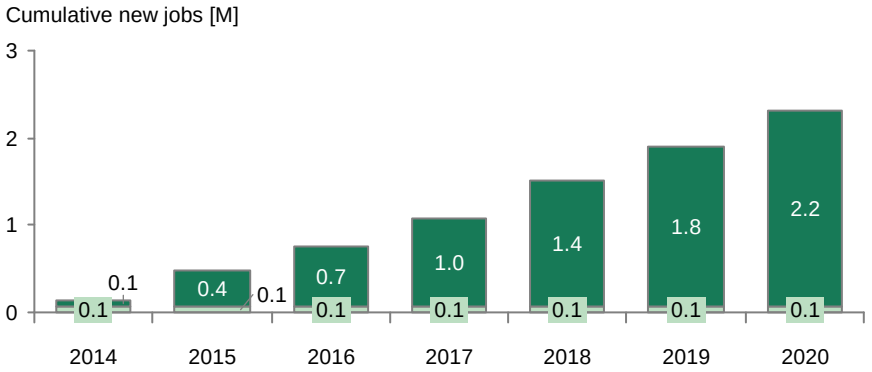
1.1M new business activities by 2020[1]



Government revenues up US$ 103B (NPV US$76B)



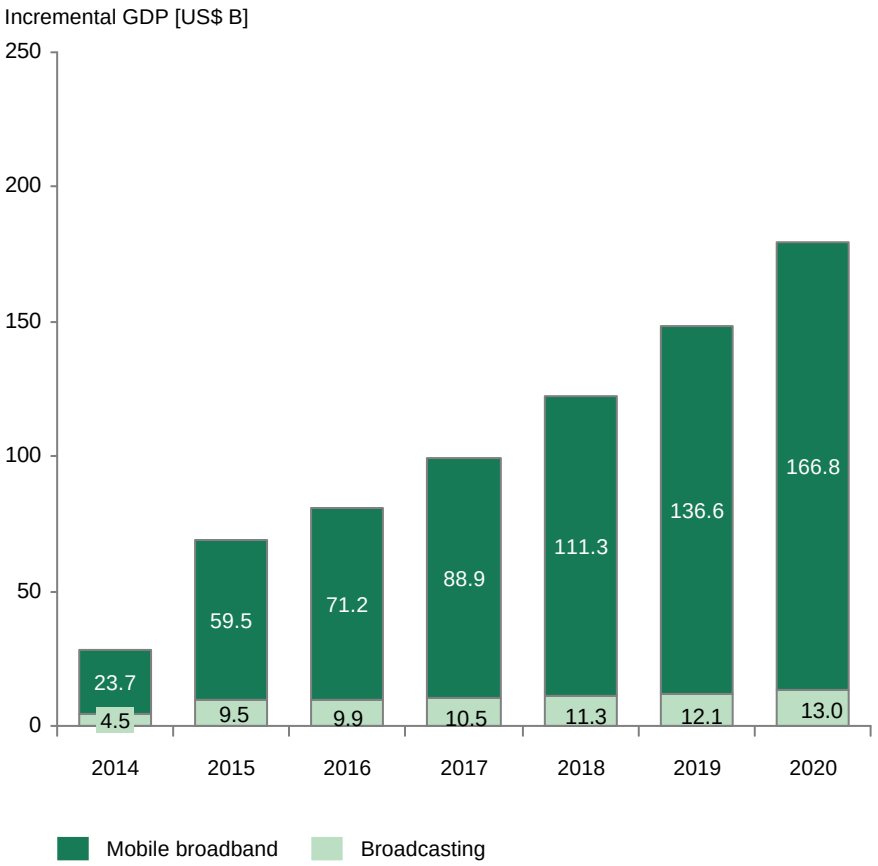
2.2M additional jobs created by 2020



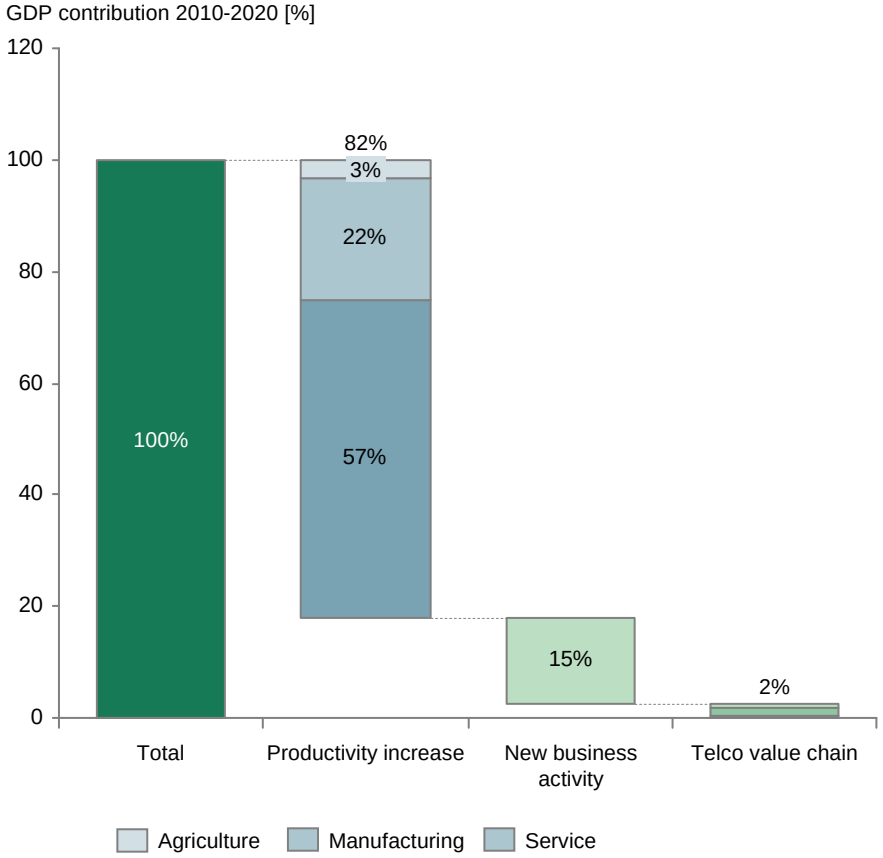
1. Incl. new independent businesses as well as new departments/units/business areas within existing firms
Note: NPV discounted by study country government security rates for each cluster; 1.5% for Korea, 2.8% for Malaysia, 4.0% for Indonesia and 5.0% for India
Source: Datamonitor; EIU; OECD; World Bank; National statistics units; BCG analysis

Total GDP will increase US$ 658B for the period 2014-2020[1]

US$ 657.9B increase in GDP (Net Present Value of US$501.6B)



Largely driven by productivity increase



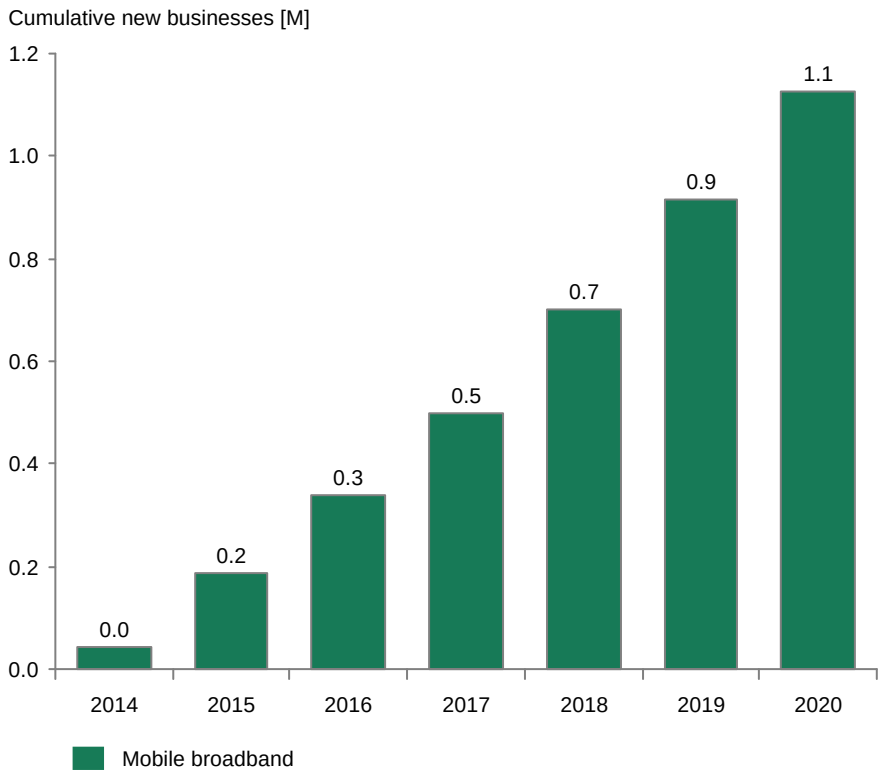
1. US$ 501.6B Net Present Value
Note: NPV discounted by study country government security risk-free rates for each cluster; 1.5% for Korea, 2.8% for Malaysia, 4.0% for Indonesia and 5.0% for India
Source: EIU; OECD; World Bank; National statistics units; BCG analysis

1.1M new business activities[1] could be created by 2020 if allocating 700 MHz band to mobile broadband...

Increased Internet penetration creates opportunities in new spaces ...

Website design	ICT training	e-commerce for existing businesses
ICT maintenance	e-job services	Online specialty stores
Education application	Agricultural trading	Programming
Online outsourcing	Entertainment content	Hardware / software reseller

… contributing to the generation of new businesses activities[1]



1. New business activities includes establishment of new independent businesses as well as new departments/units/business areas within existing firms
Source: KSH; EIU; MIT/CMU; BCG analysis

... along with 2.2M more jobs than if allocated to broadcasting

New business activity will drive job creation

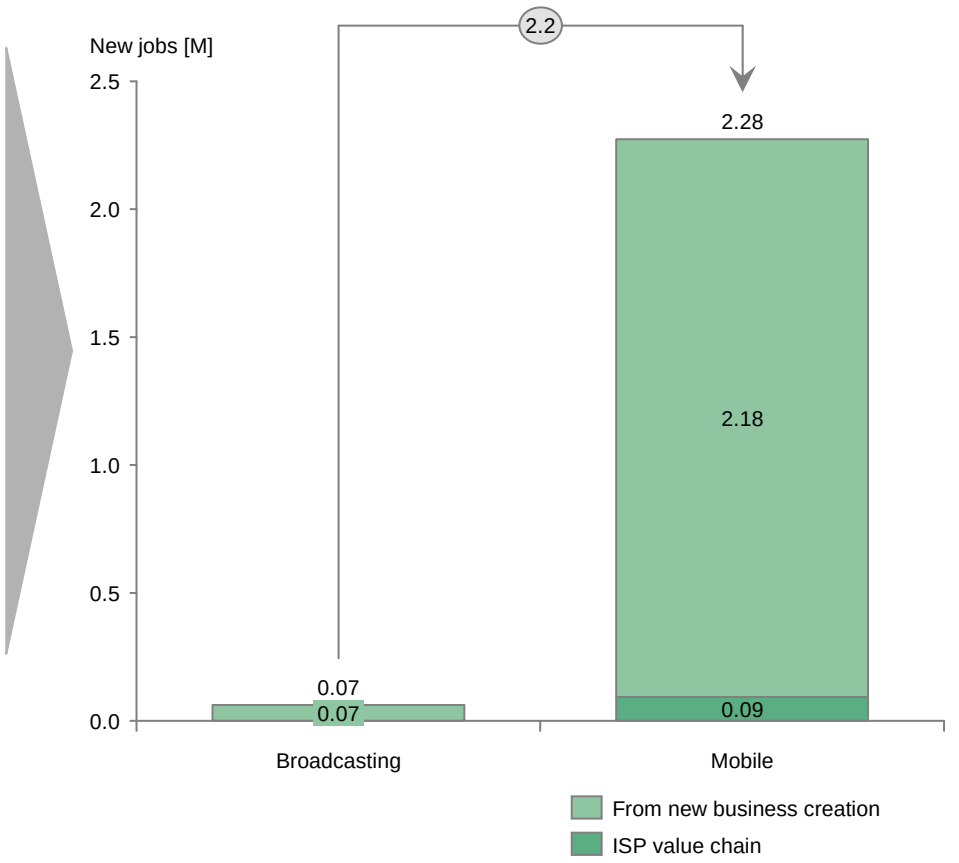
New businesses created as a result of 700 MHz band will create more opportunities for employment

- Diverse range of opportunities, from high-skilled technical roles to basic service functions, e.g., distribution of goods
- Significant portion should be created in rural areas, as 700 MHz band enables new business models

Although increased productivity in additional firms should spur further job creation, this is excluded from the analysis

- In line with general approach of making conservative assumptions where possible

2.3M jobs created from allocating to mobile, 0.07M from broadcasting



Source: KSH; NHH; EIU; CIA World Factbook; Manobi; OECD; EU; Deloitte; MIT/CMU; Pannon; Pareto; Screen Digest; BCG analysis

In total, mobile broadband in 700 MHz band could contribute additional US$ 103B[1] to government revenues for 2014-2020

Productivity benefits of mobile drive increased tax revenues for government

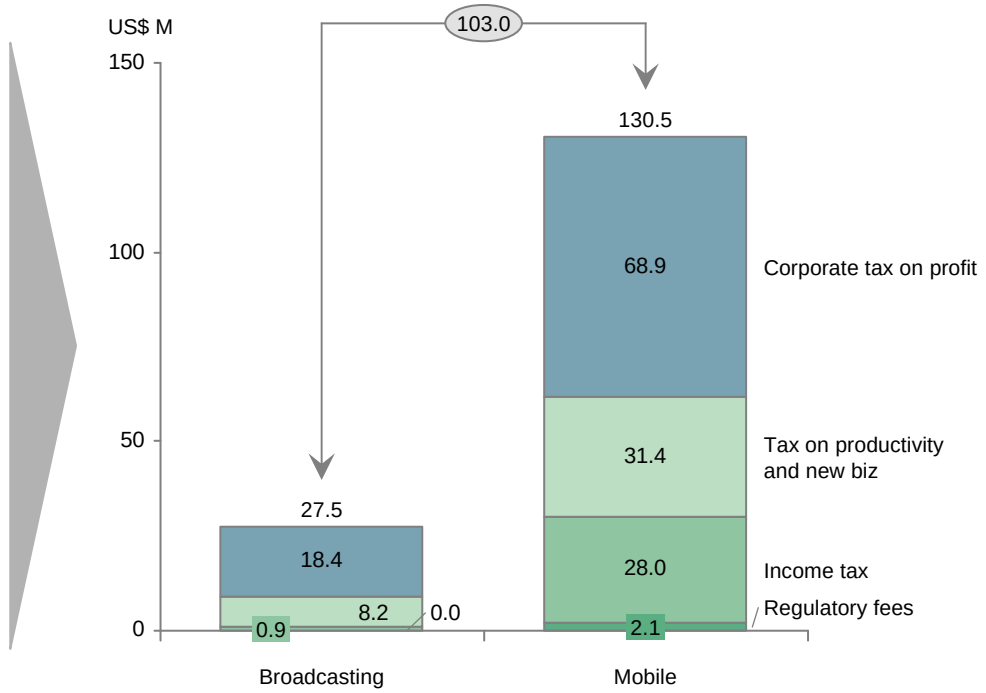
700 MHz band will increase productivity, and hence output, which will in turn increase government revenues

- Increased adoption by rural industries
- Greater adoption of mobile broadband to supplement fixed broadband

Incremental taxes from mobile broadband estimated to be 130.5B over 6 years

- Accrual from mobile broadband expected to be ~US$ 103.0B[1] more than from broadcast
- Incremental broadcasting taxes likely to be lower than the estimated US$27.5B, as some of the profits for the new channels will come at the expense of existing channels

US$ 131B tax generation from mobile, US$ 28B from broadcasting



1. US$ 76.0B Net present value 2010-2020

Source: EIU; CIA World Factbook; OECD; EU; Deloitte; Pareto; Screen Digest; BCG analysis

Agenda

Introduction

Adoption

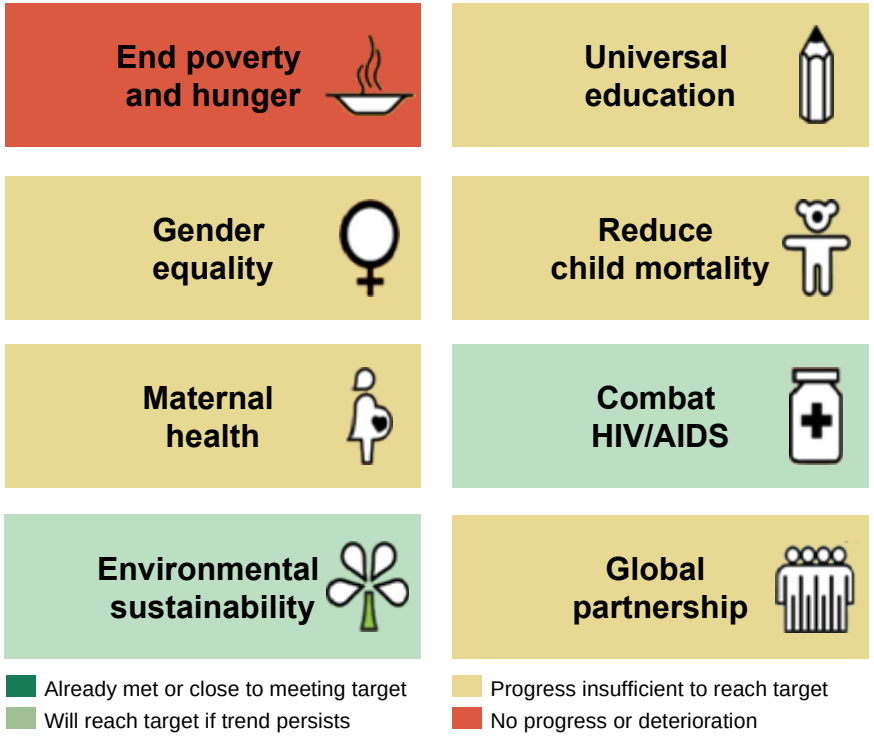
Economic benefits

Social benefits

Implications for governments and regulators

Asia Pacific has seen great socio-economic improvement recent years, but still face substantial challenges

Region needs traction to reach UN Millennium Development Goals



Current challenges as defined by UNDP[1]

Largest mass of income poverty in the world
- Houses the world's two largest populations, and 14 Least Developed Countries
- Highly exposed to economic crisis and natural disasters due to lack of financial protection

Persistence of hunger despite high growth
- Relatively low agricultural and manufacturing efficiency

High un-employment and under-employment
- Employment losses in crisis more severe than GDP effect
- Highly sensitive to export markets, with competitiveness driven by cheap labor

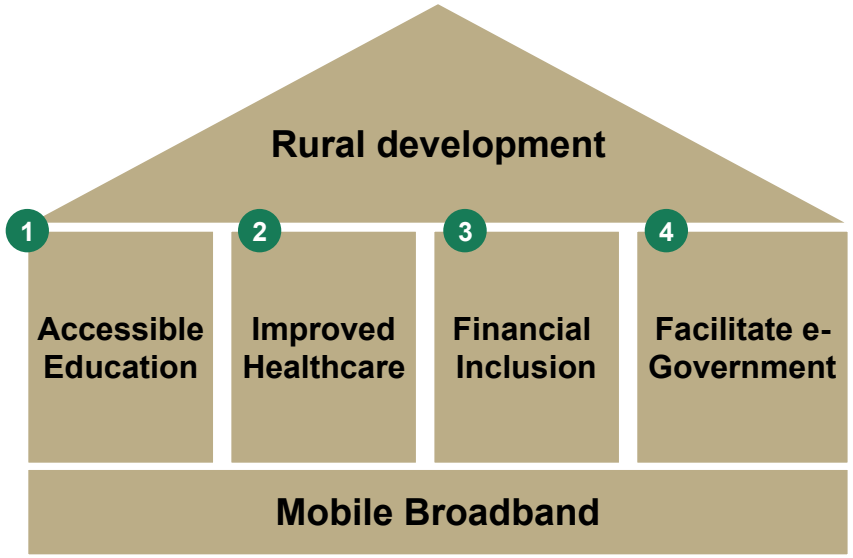
Inequality within countries and across the region
- Per capita income ratio of richest 5% and poorest 5% doubled from 1980 to 2005
- Women continue to be held back and disadvantaged

Empowering individuals and discriminated groups is a key success factor for sustained socio-economic improvement

1.UNDP Regional Bureau for Asia and the Pacific (2009)
Source: UNDP; World Bank

Mobile broadband has three social impact levers to help address the most important issues

Mobile broadband is a powerful tool for facilitating rural development...



... through accessible education, better healthcare and financial inclusion

1. **Accessible education to rural areas lacking adequate facilities, resources and teachers**
   - Provide access to low-cost resources
   - Improve gender and social parity by virtually putting education in the hands of students
   - Opportunities for higher education and languages

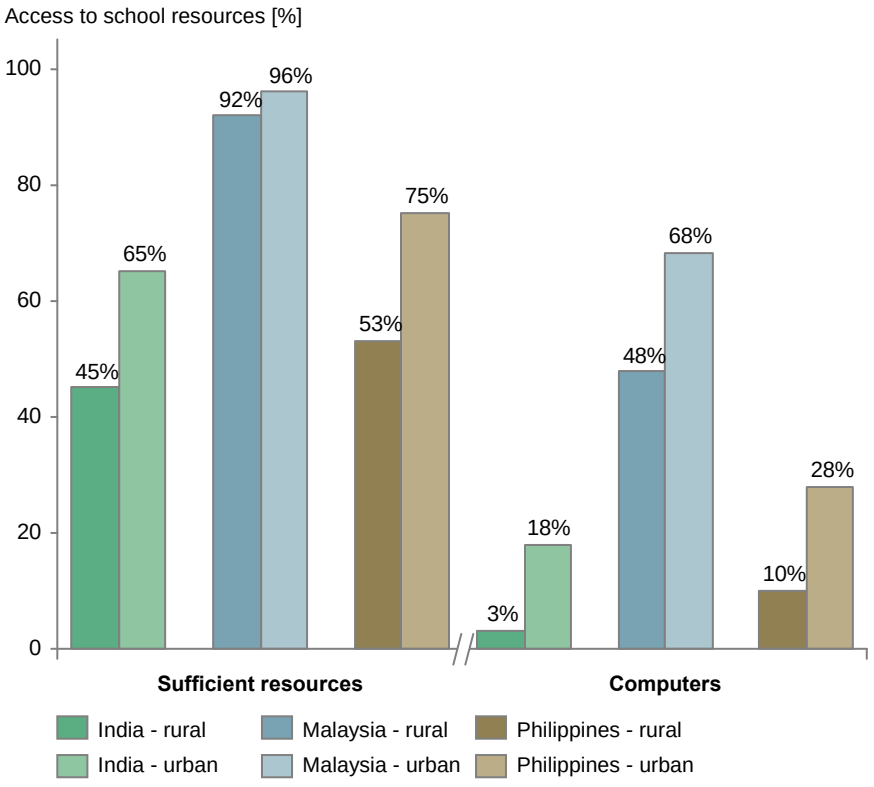
2. **Improved healthcare services for rural and under-privileged groups**
   - Provide tool for health education and awareness
   - Enhance healthcare provision
   - Increase efficiency of disaster response

3. **Provide much-needed financial intermediation to unbanked poor and rural areas**
   - Enable home-based entrepreneurship
   - Provide wide-access business platform
   - Increase access to banking and insurance services

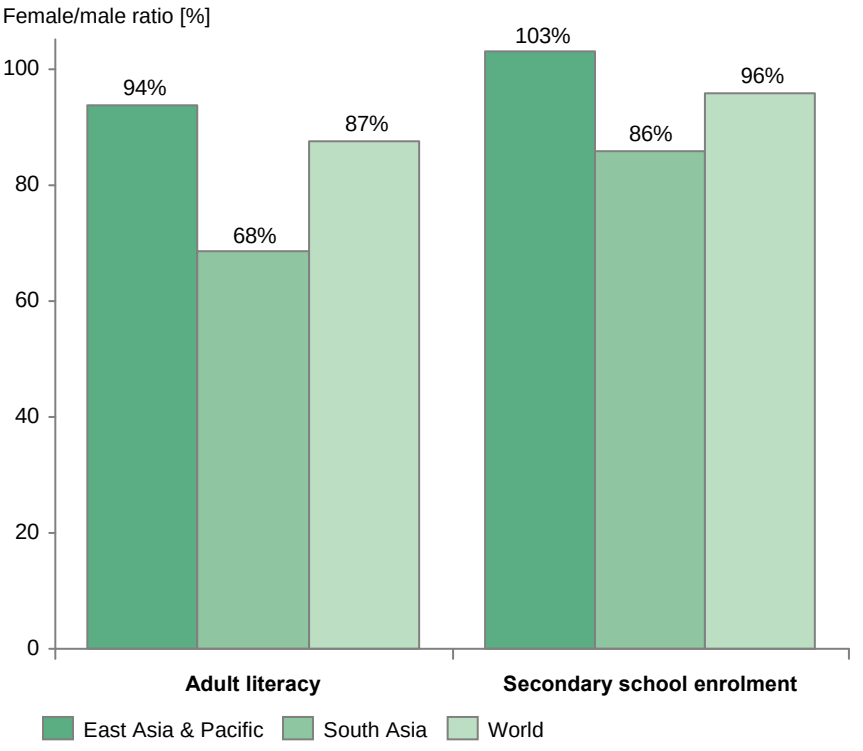
4. **Reduce bureaucracy and improve government interfaces towards businesses and consumers**
   - Reduce costs with traditional paper-based filing
   - Improve quality and availability of services

Significant social and gender inequalities in access to and quality of education

Up to 20% lower access to adequate schooling resources in rural areas



Large gender inequalities in access to and utilization of formal education



Source: PISA WIS-SPS database; World Bank Genderstats

Mobile broadband can bring improved access and quality of learning into the hands of rural and under-privileged students

Enhance learning opportunities via online tools

Rural users with basic devices can access online education tools

- Removes need to buy costly programs, (e.g., word processing tools, dictionaries, thesaurus, etc.)
- May allow basic distance education in remote locations

Educational applications installed onto smartphones encourage learning outside classroom

- Engages students with materials
- E.g., Project K-Nect in North Carolina- students were able to improve mathematics results by 30% using smartphones equipped with applications

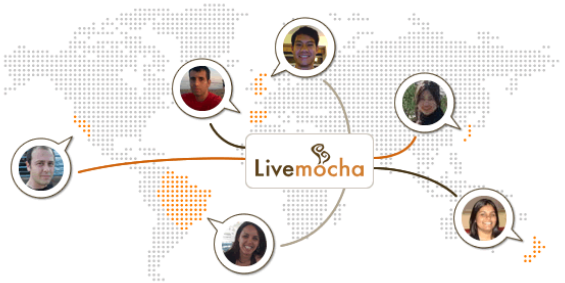
Improve English proficiency

Language becoming increasingly important with globalization

Online language programs offer accessible and affordable option to improve skills

- e.g., Livemocha- World's largest language learning community
- Free and paid online courses for 35 languages
- Practice directly with native speakers

Website matches members, who practice via voice chat



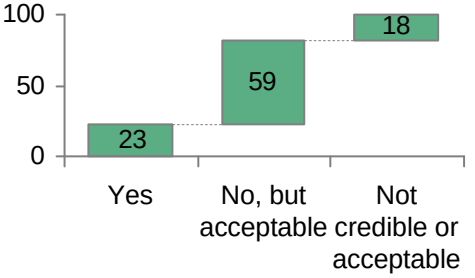
Increase opportunities for tertiary education

Tertiary education important for developing skilled labor force

Online degrees supplement formal institutions

- Becoming more common, and gaining acceptance by employers[1]
- Only opportunity for many due to cost constraints, need to work and look after family etc.

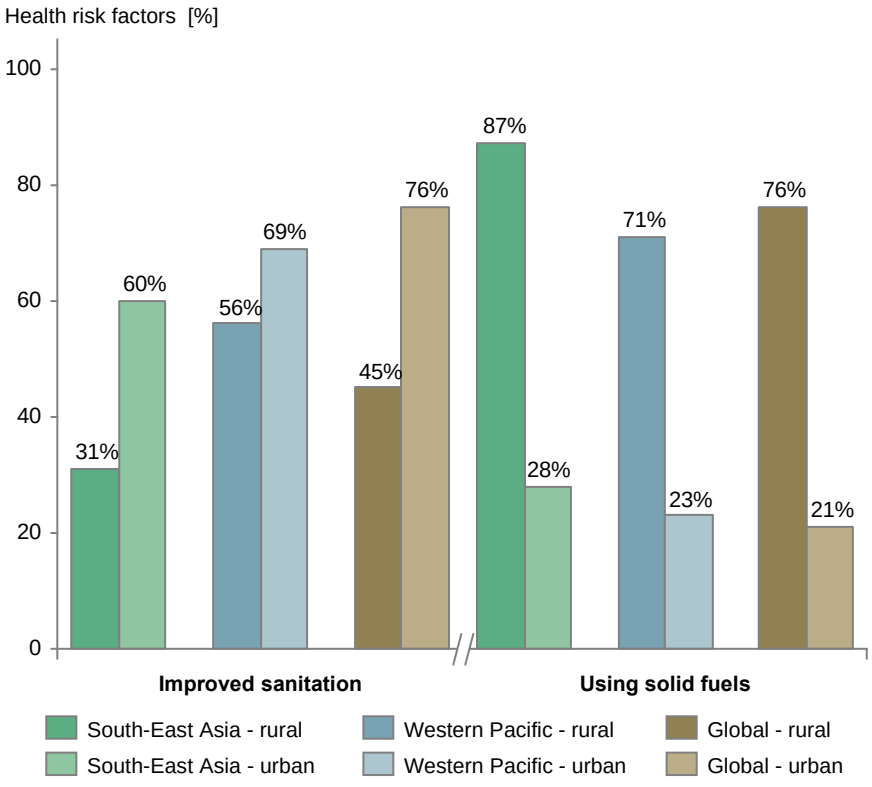
Is an online Bachelor's degree as credible as an offline one?



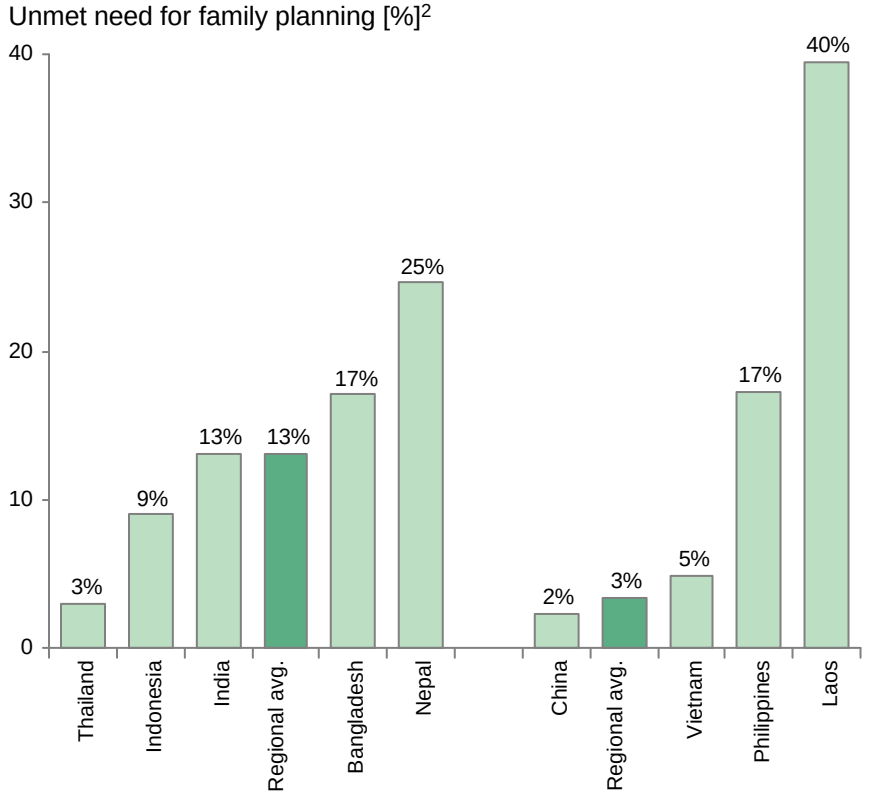
1. 2008 Vault Online Degrees Survey of 172 employers and hiring managers in various industries across the US.
Source: Livemocha.com websit;e; Project K-nect website

Health education and access to basic services can substantially empower women and rural inhabitants

Large urban-rural divide in understanding of health risk factors



Substantial need for information on family planning and maternal health



2. Women who are fecund and sexually active but not using any method of contraception, and report not wanting any more children or wanting to delay the next child
Source: WHO Regional Office for South East Asia; WHO World Health Statistics 2010; BCG analysis

Mobile broadband can facilitate service delivery and improve individual health and wellness

Enhance healthcare provision to rural areas

Increase access to specialist support and remote diagnosis by augmenting "medical assistant program"

- "Medical assistants" go to field to meet patients and run samples, dispense medication, etc.
- Diagnosis offered by doctors in urban hospitals via e.g. camera-enabled smartphones or webcams
- Increasing reach and reducing cost of treatment

E.g., ClickDiagnostics' mobile telemedicine

- Patient data and images transmitted via mobile broadband to remote doctors who perform consultations
- Facilitates e.g. tele-dermatology and radiology, as well as prevention, treatment and follow-up of TB, HIV/AIDS and maternal health





Increase access to critical health education

Facilitates training of rural healthcare workers

- Educate community healthcare workers, doctors and nurses on advances in treatment
- Medical assistants and healthcare workers being empowered with remote diagnostics will over time learn what advice to give for a range of typical symptoms

Ensure availability of critical disease information in underserved areas

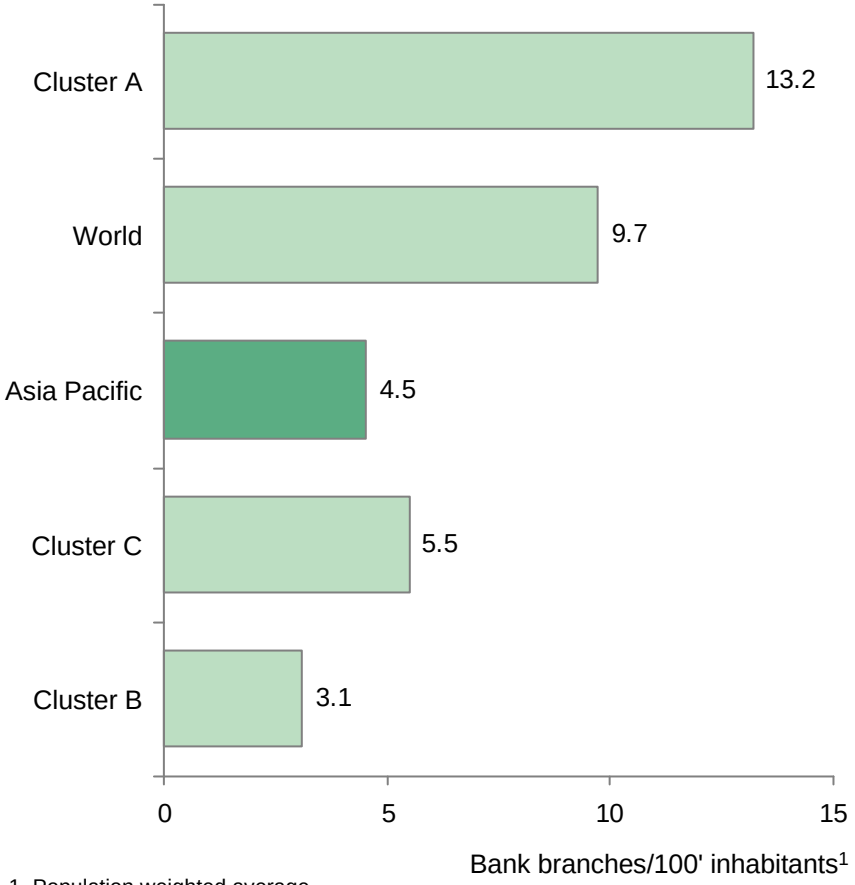
- Critical information made available to rural areas
- Especially important on "taboos" like contraception, maternal health and HIV/AIDS
- e.g., UNAIDS tapping into social networking sites (e.g., Facebook, Youtube) to spread outreach information on HIV/AIDS



Source: BCG Research; Press search; Journal of Health Informatics in Developing Countries; UNAIDS; ClickDiagnostics; Digital Opportunity

People across Asia Pacific largely underserved by financial services, hampering entrepreneurship and aid distribution

Bank branch density for most countries is only 30%-50% of the world average[1]...



1. Population weighted average
Source: National Bank Regulator surveys

... with bank and insurance services out of reach for many

Limited financial cushioning available for people most in need of it

- Personal emergencies like sickness or injury, death of the breadwinner, theft
- Natural disasters, war, flood, fire or draught
- Pursuing entrepreneurship opportunities

Lack of financial infrastructure also hampers entrepreneurship and aid distribution

- People want to create own businesses, but lack financial platform
- National social programs now often product subsidies instead of targeted cash transfer
- NGOs and microfinance operators have difficulties reaching the most needy
- Large potential in remittances from family and friends who have moved to the city or abroad

Mobile broadband can improve economic and employment opportunities for rural areas

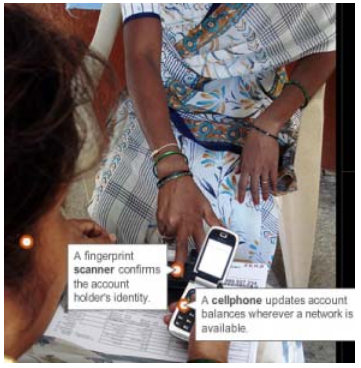
Increases access to banking and insurance services

Internet-enabled mobile terminals can bring banking to those who need it the most

- Convenient, safe and low-cost way of saving money; can be as important as financial aid
- Access to credit for entrepreneurship

Micro-insurance can bring much needed protection against frequent financial shocks

- By using mobile accounts, transaction costs and credit risk for insurers can be reduced



Enables home-based entrepreneurship

Mobile broadband opens regional and global markets to home-based entrepreneurs

- Increases livelihood potential and opportunities
- Opportunity to sell goods and services to global marketplace
- e.g., Etsy allows individuals to sell handicrafts to global market

Potential to participate in global labour/service outsourcing

- Broadband enables rural areas to work remotely on outsourced IT work (e.g., website coding and development, data entry)



Provides access to basic business and financial tools

Broadband allows small businesses to access online tools

- e.g., inventory planning and accounting software available online for fraction of retail price

Broadband allow individuals to improve financial literacy

- Wealth of on-demand information
- Mint.com allows online budgeting tracking

Smartphone apps allow better individual financial management

- Online mortgage sites allow rates search



Source: BCG Research; Press Research; Source for Change; State Bank of India

Broadband-enabled services could greatly increase efficiency of government services at national and regional level

Asia Pacific has large potential to implement e-Government services

Reduce costs with traditional paper-based filing
- Large staff required to store/manage documents
- High transportation and postal expenses of documents if stored at different locations
- High cost of paper, printers, cartridges, etc

Improve quality and availability of services
- Free up resources to provide high-quality service
- Reduce red tape and processing times
- Improve national competitiveness

Canada's eGovernment services one of best worldwide, generating high user satisfaction

Created in 2005 to improve the delivery of government programs and services to Canadians
- Faster, easier and more convenient access

Serves over 32 million Canadians from all walks of life, and across the country
- Including rural, remote, and northern locations

Offers single-window access to a wide range of Government of Canada programs and services for citizens

In 2007-2008 alone, following services provided (list not exhaustive)
- Processed 1.4M requests for Social Insurance Numbers
- Received and reviewed 270K passport applications
- Posted more than 1M job ads
- Hosted 26.6M visits to the Service Canada Web site
- Reached 250K Canadians in remote communities
- Investigated over 770K cases of possible fraud

700 MHz band mobile broadband can improve reach, quality and cost of governmental services

Source: servicecanada.gc.ca website; BCG analysis

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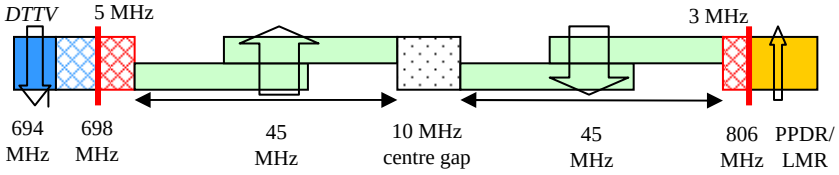
Implications for governments and regulators

Allocation of sufficient and harmonized spectrum has been assumed in the analysis of socio-economic benefits

Sufficient bandwidth needs to be allocated to mobile

2 x 45 MHz needed to provide sufficient bandwidth for effective rollout

- APT harmonized UHF bandplan for IMT within the 698-806 MHz band
- Lower guard-band between 698-703 MHz and an upper guard-band between 803-806 MHz



Adequate bandwidth will facilitate competition between operators, enhancing efficiency and consumer choice and price benefits

Harmonization of spectrum across region necessary to reap full benefits

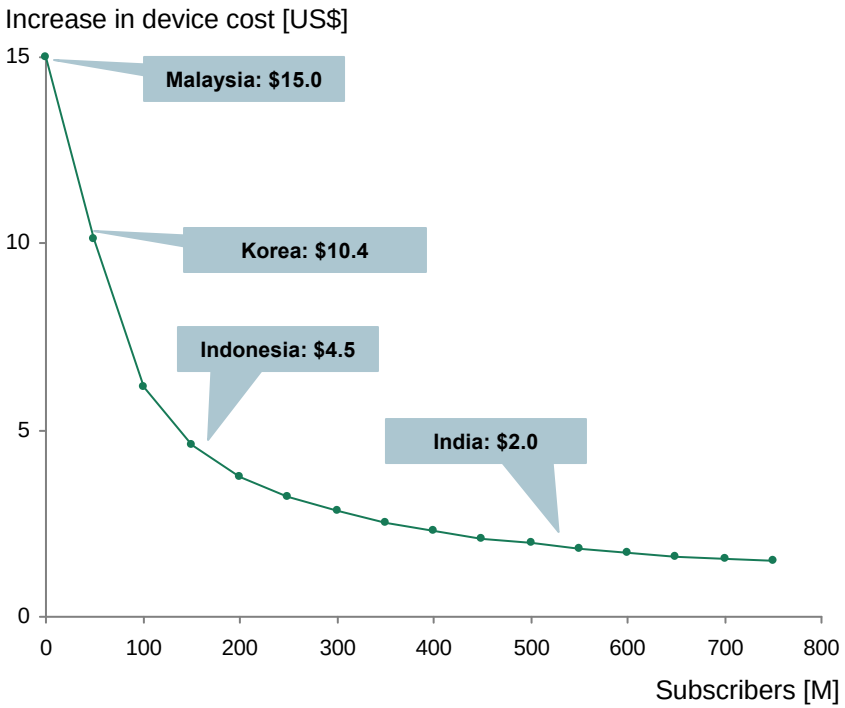
Non-harmonization will drive up cost of hand-sets and make them unaffordable to lower-income consumers

- Lack of frequency harmonization can drive up terminal costs, as providers will not be able to enjoy economies of scale
- Small un-harmonized markets risk being marginalized by equipment manufacturers
- Harmonization will reduce cross-border interference and facilitate improved usage quality

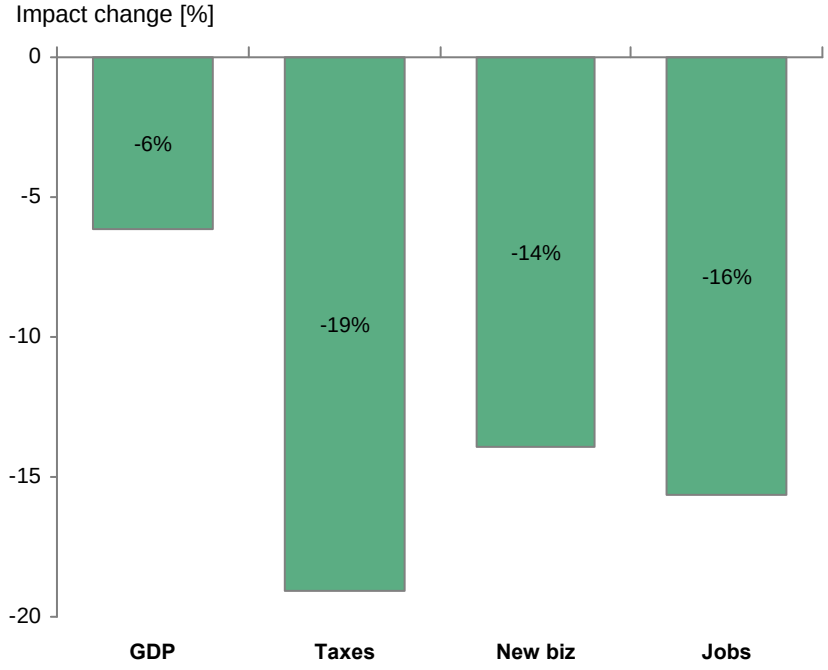
Source: 9th Meeting of the APT Wireless Forum (AWF-9); GSMA

Failure to harmonize spectrum would greatly reduce benefits

Non-harmonized spectrum could increase cost of handset US$2-15 ...



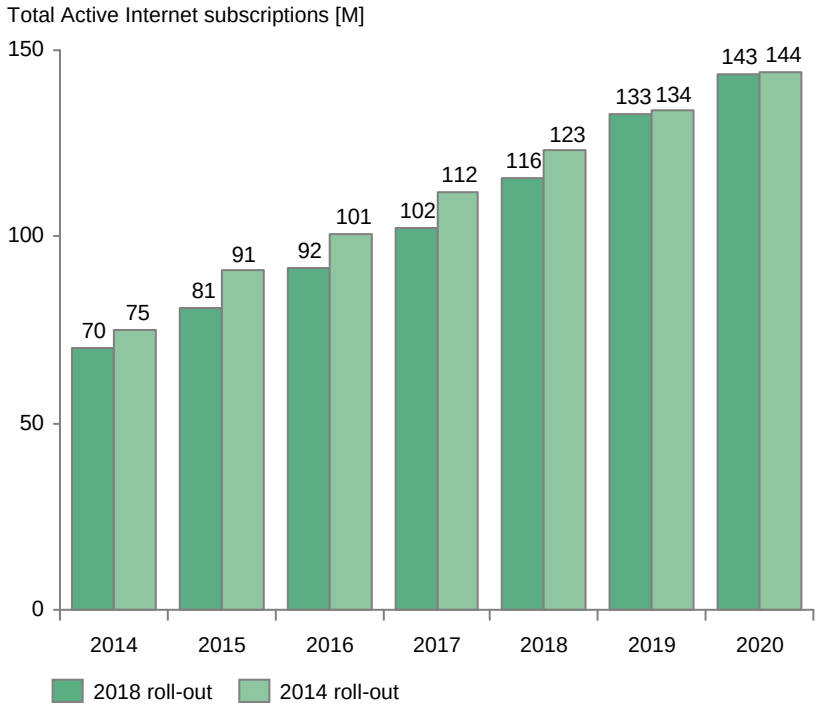
... reducing taxes impact by 19% and new job creation by 16%



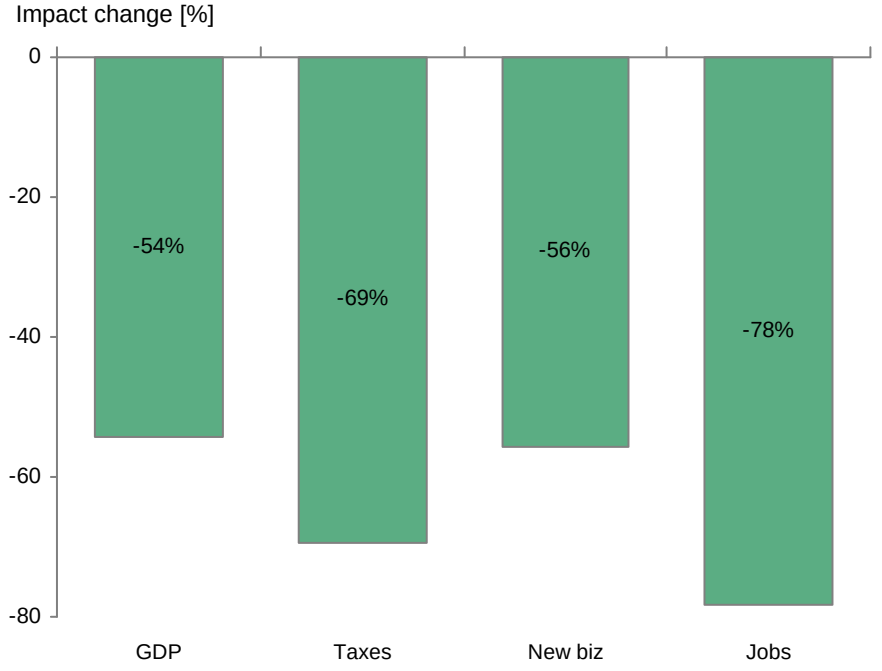
1. Based on interpolation of analysis results by RTT, which assumes a market like China with 80M handsets sold per year will increase prices US$ 1.5, up to US$ 15 for markets with 8M handsets
Source: RTT; GSMA

Postponing digital switch-over until 2018 would also have significant impact, e.g., Indonesia

Postponing roll out of mobile broadband from 2014 to 2018 could...



... reduce governmental revenues 69% and new job creation 78%[1]



1. GDP and taxes 2010-2020 NPV, new business and job creation 2014-2020 cumulative
Source: BCG analysis

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