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

Malaysia

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 700 MHz band

Agenda

Introduction and methodology

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

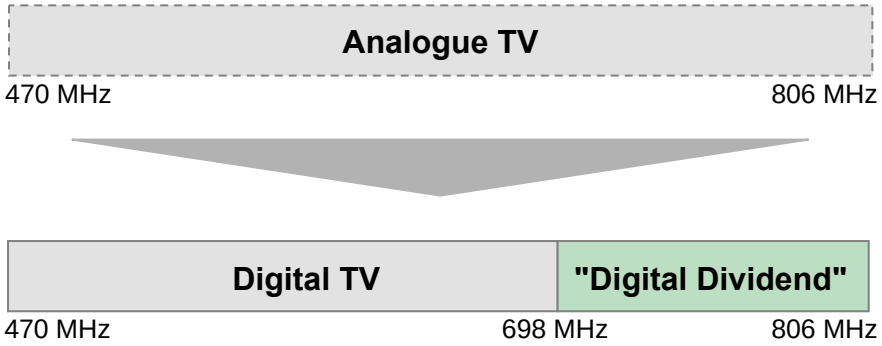
With digitalization, a large portion of the lower UHF band can be freed up...

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

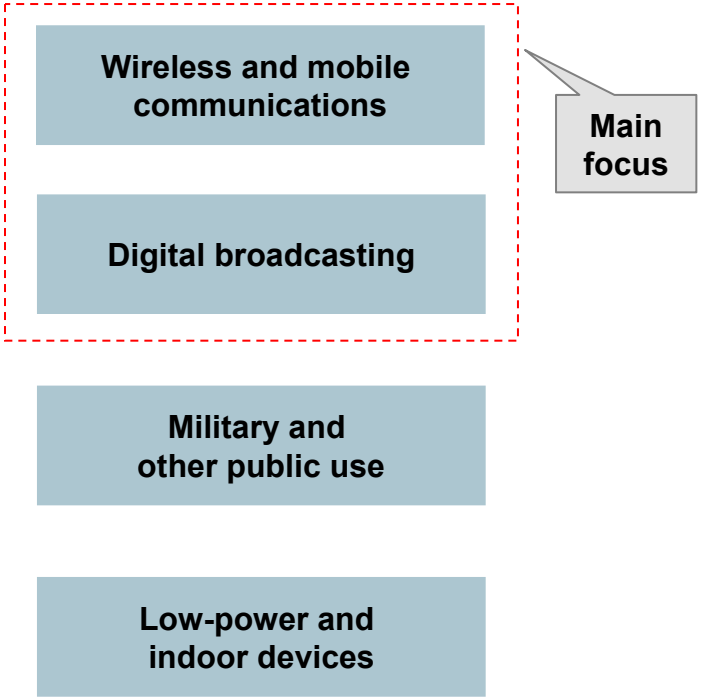
- For most of Asia Pacific, the 470-806 MHz[1] band is used to broadcast analogue television

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

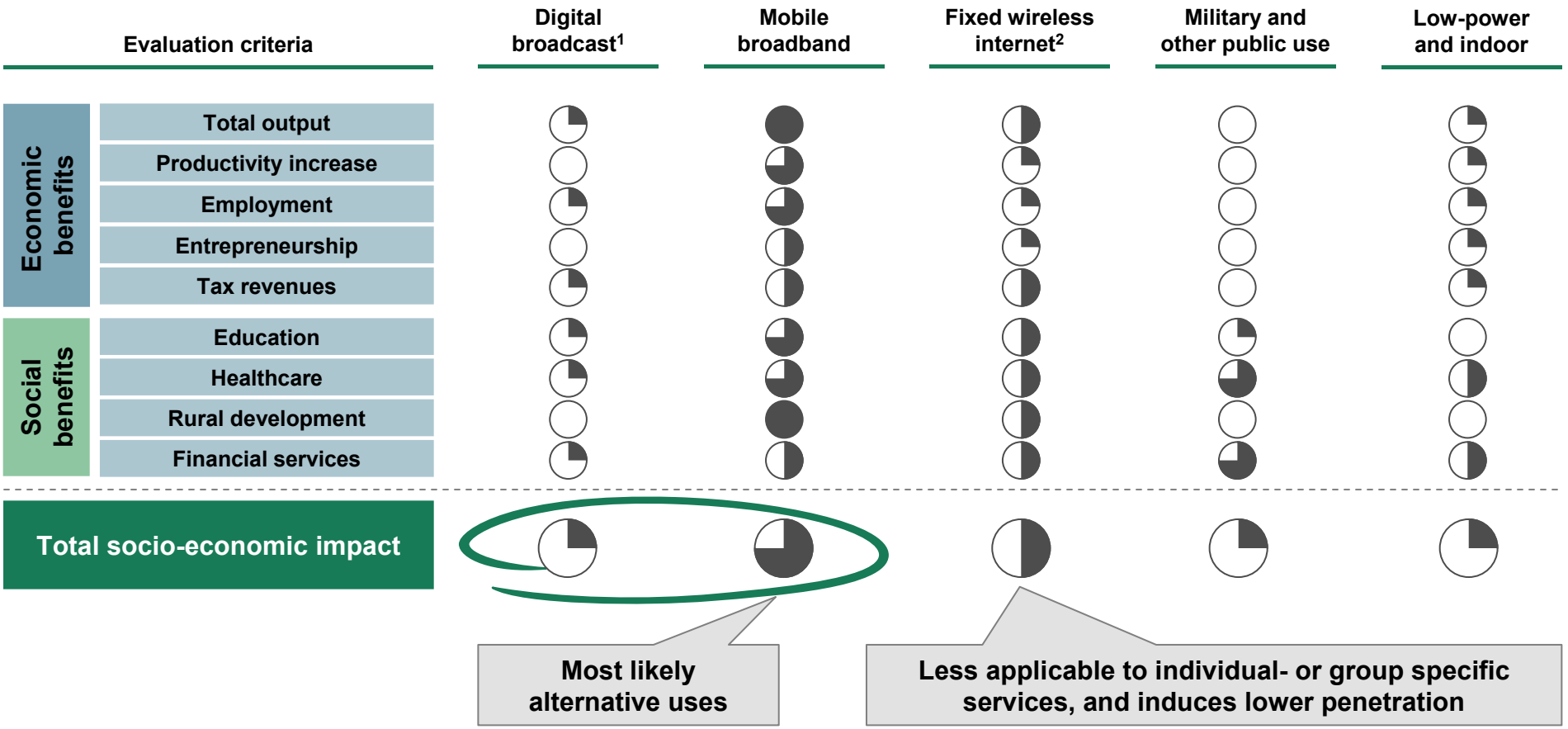


...presenting a "Digital Dividend" of alternative uses in the 698-806 MHz band[3], e.g.:



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

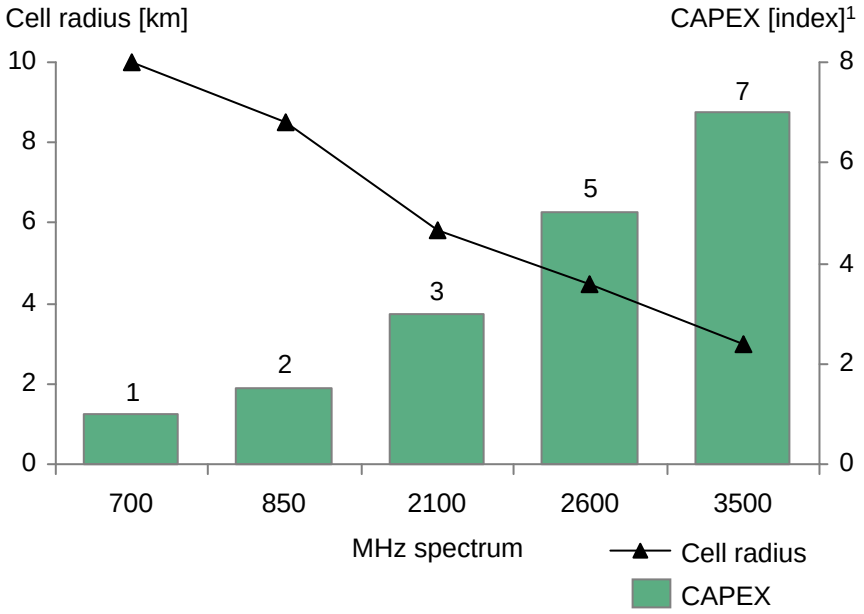
1. Extending number of channels beyond today's analogue which will be switched over 2. E.g. WiFi, WiMAX 3. Including emergency services, disaster warning and recovery
Source: Expert interviews; BCG analysis

... 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 ...

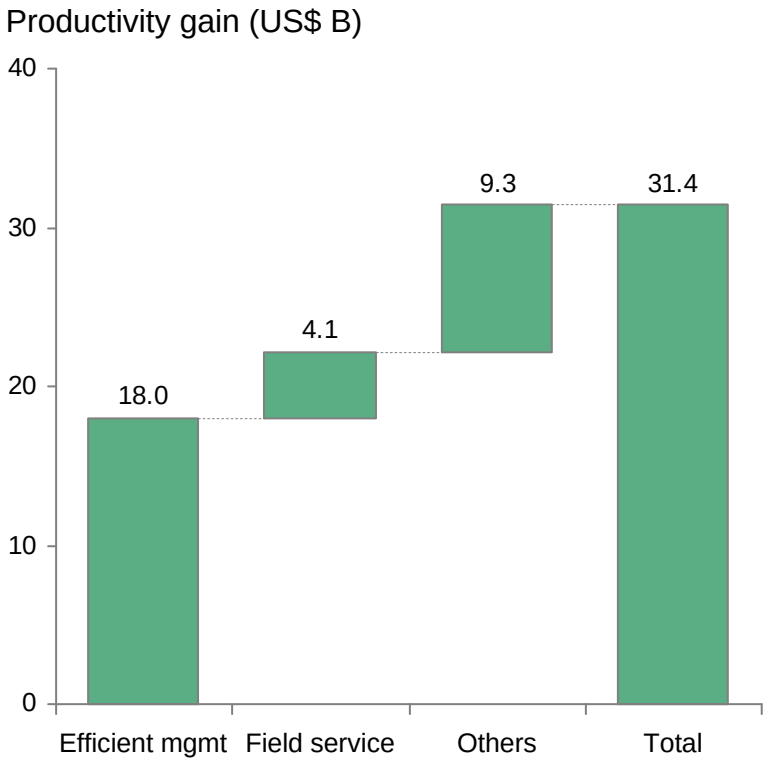
Infrastructure availability	**More rapid roll-out, with significantly larger rural footprint** • 700 MHz band has propagation characteristics highly suitable for rural and less densely populated areas	✓
Affordability	**Cost of service will be reduced, improving affordability for the poor** • Halving 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]



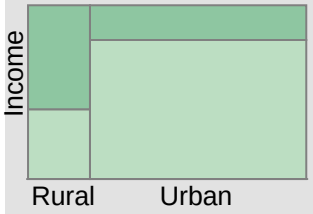
1. Based on 25% wireless BB penetration among enterprise users of telecom services

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

Household segments



Business segments

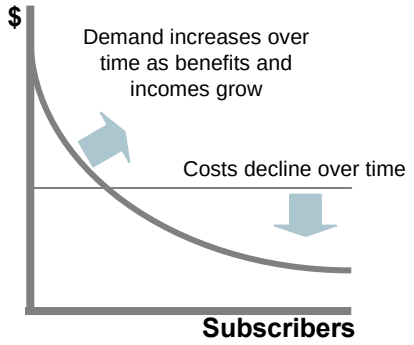


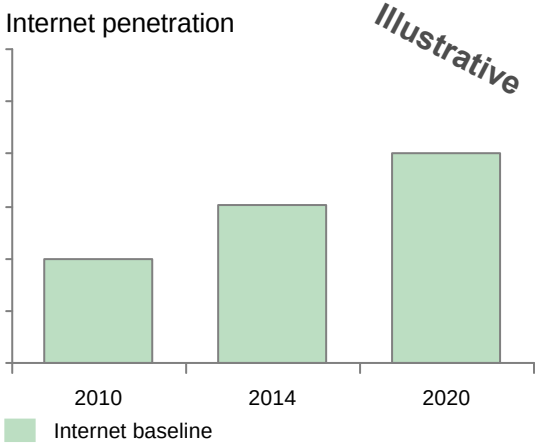
Benefits
- Increased profits for businesses
- Increased income/welfare for households

Costs
- Device
- Subscription/ access



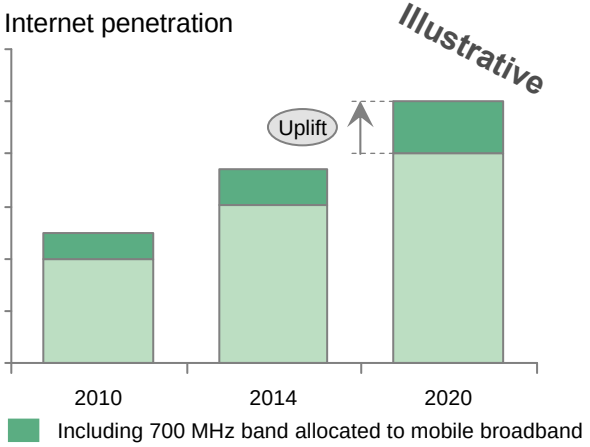
Baseline estimate for Internet penetration





Incremental effect of mobile broadband in 700 MHz band

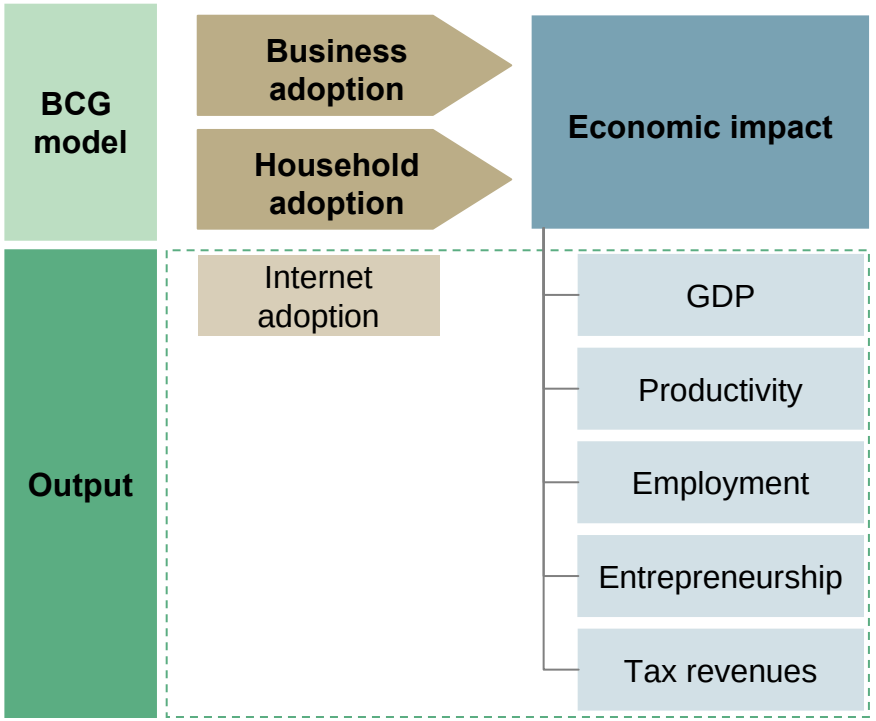
Mobile broadband in 700 MHz band will increase benefits and reduce costs
- Greater coverage and lower service costs will improve accessibility
- Economic benefits from increased productivity and rate of adoption
- Significant social and economic benefits in rural areas



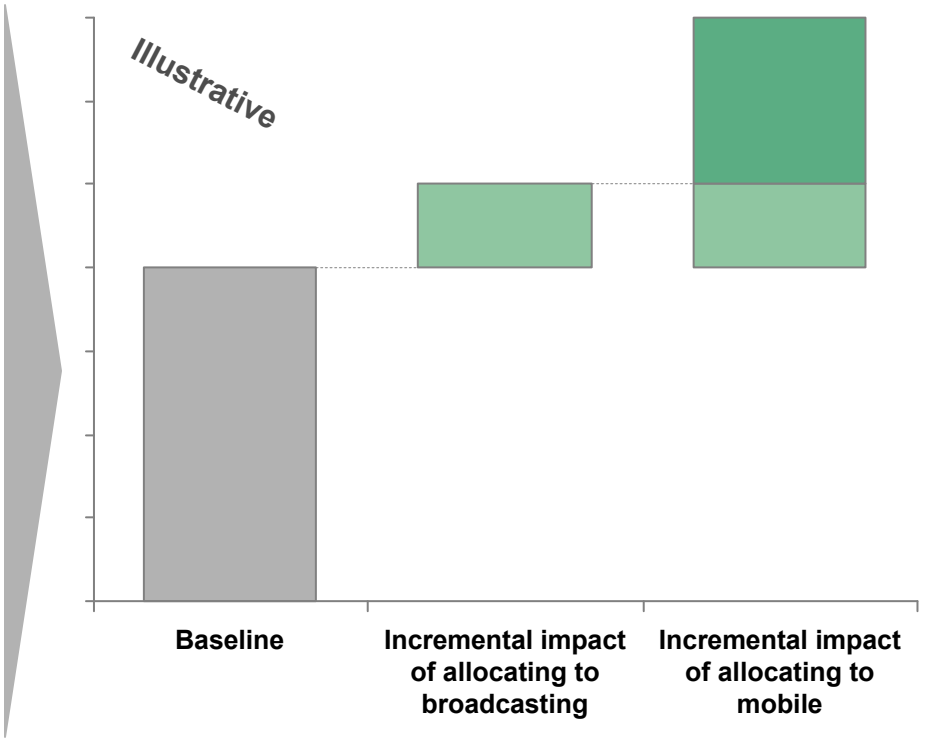
Note: Figures are illustrative

Adoption is translated into five economic factors...

Five economic factors are modeled...



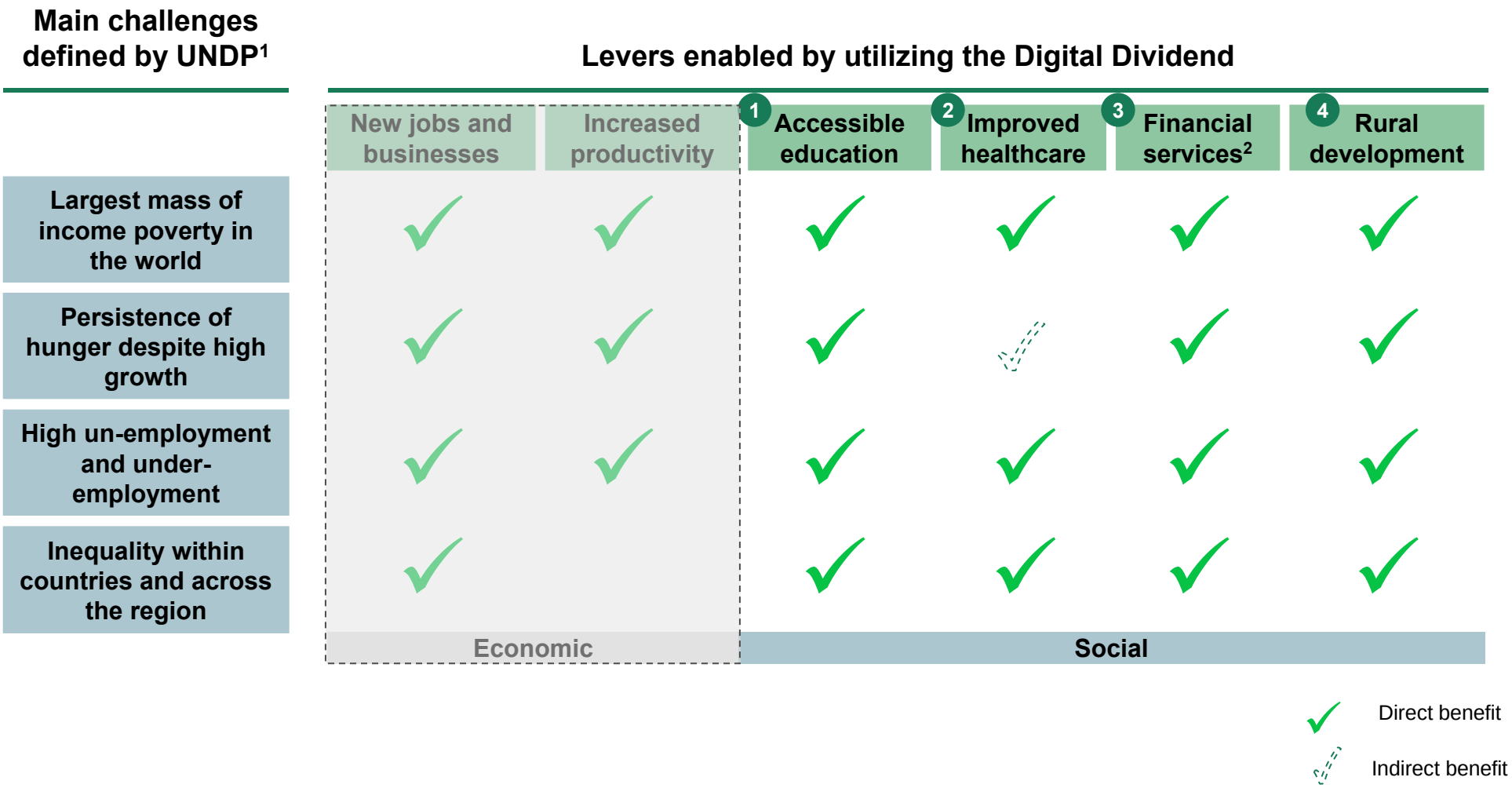
... to assess incremental value of allocating 700 MHz band to mobile



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

Note: Graphs are illustrative

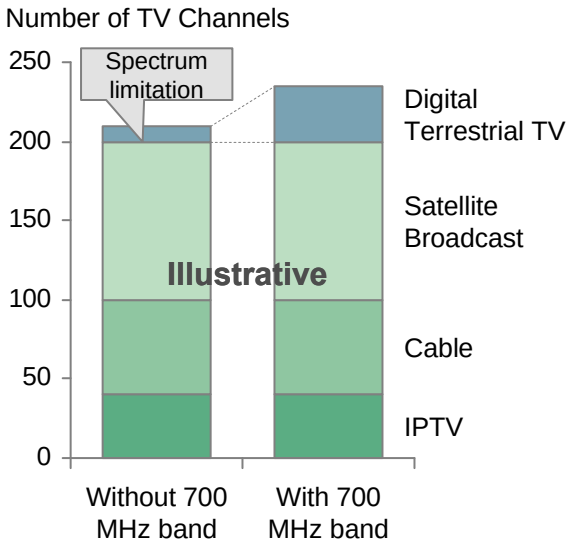
...and four social impact levers to help address the most important challenges across Asia Pacific[1]

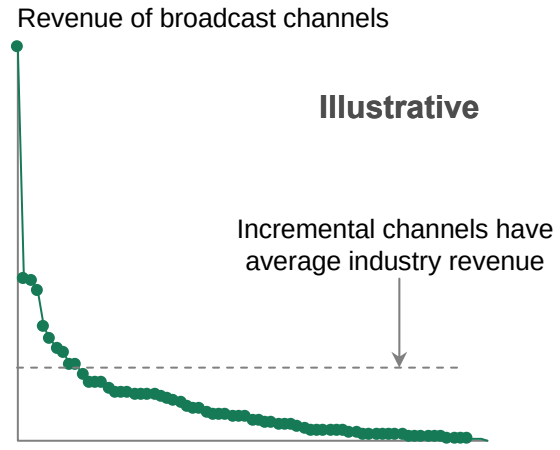


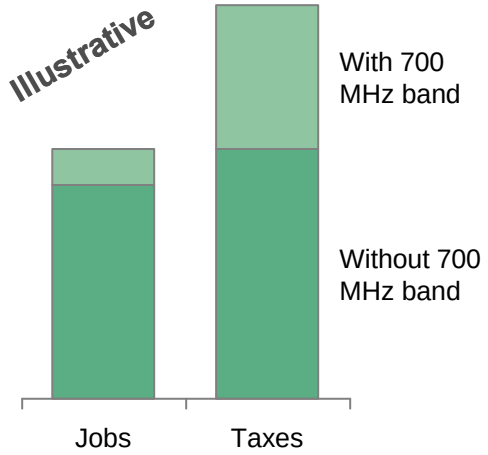
1. As defined by United Nations Development Programme (2009) 2. Including e.g micro-finance, micro-insurance and infrastructure for targeted financial aid from government and NGOs
Source: UNDP

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

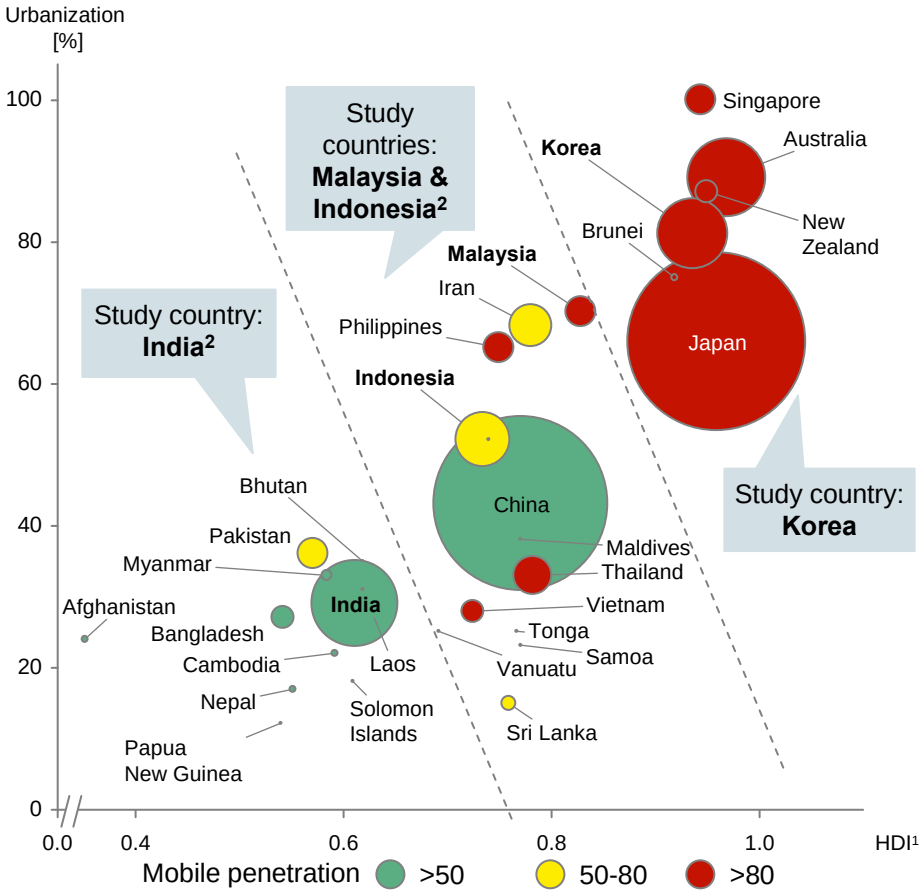
Rural-urban split

- 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

Agenda

Introduction and methodology

Adoption

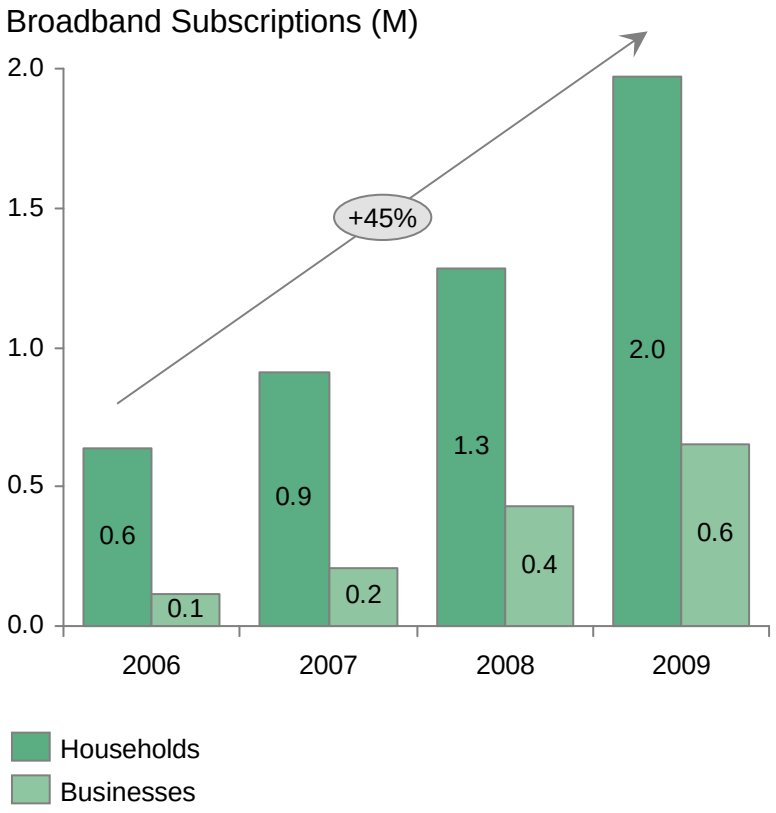
Economic benefits

Social benefits

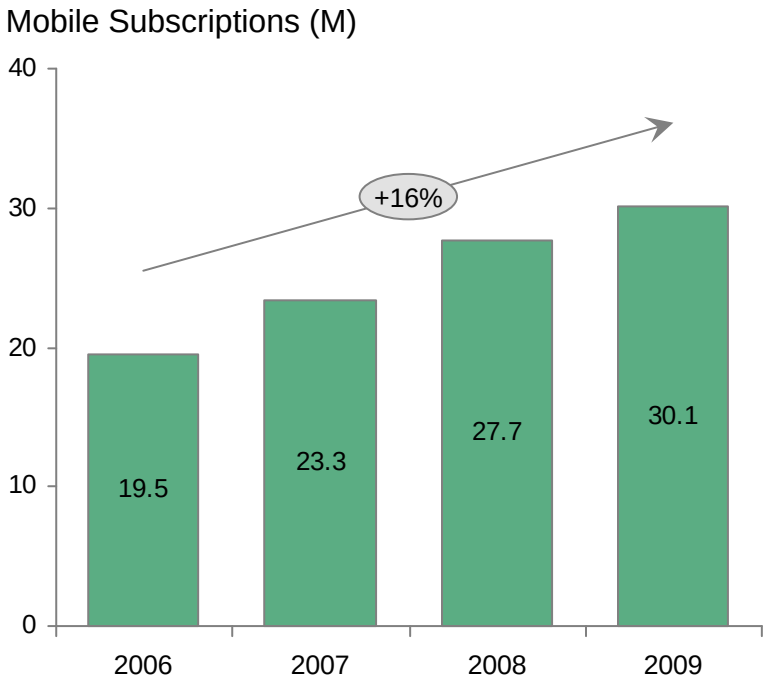
Implications for governments and regulators

Malaysia Today: Broadband access low as compared to mobile penetration

Broadband subs growing quickly



Mobile penetration rates >100%



HDI	Urbanization	Population
0.83	70%	28.3M

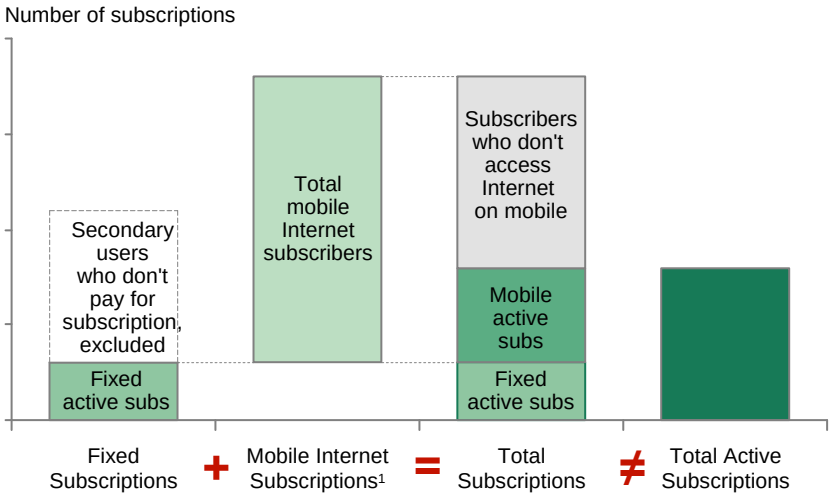
Source: Malaysia Communications and Multimedia Commission, UNDP. Statistics Malaysia

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

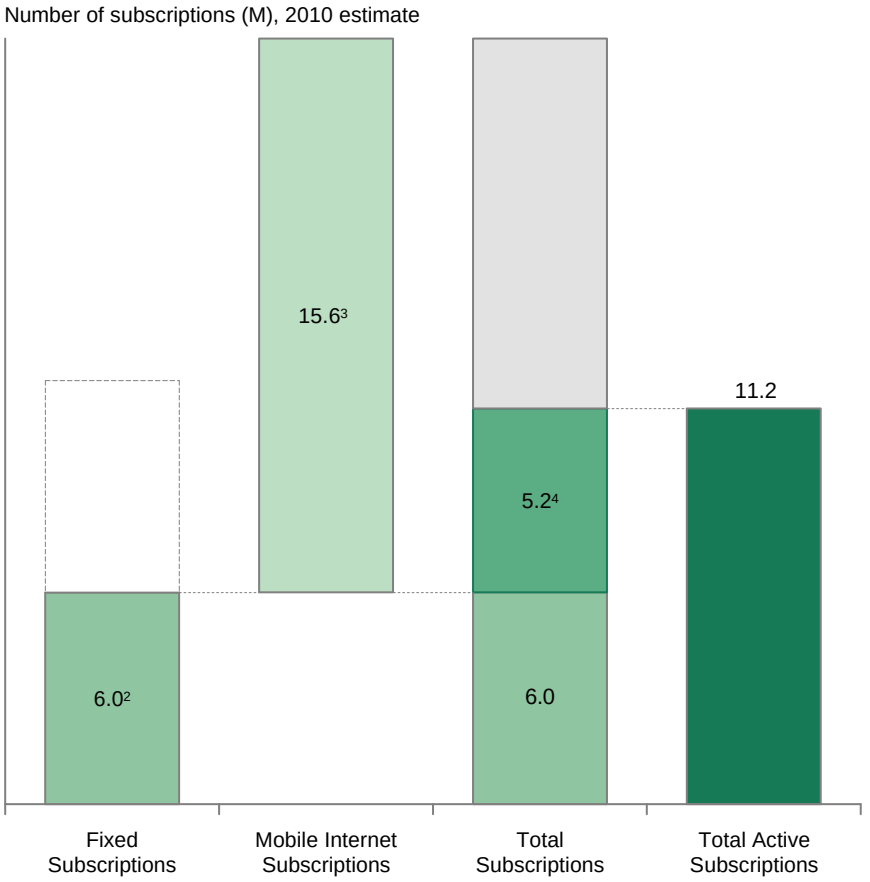
Internet statistics differ according to subscription vs usage

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

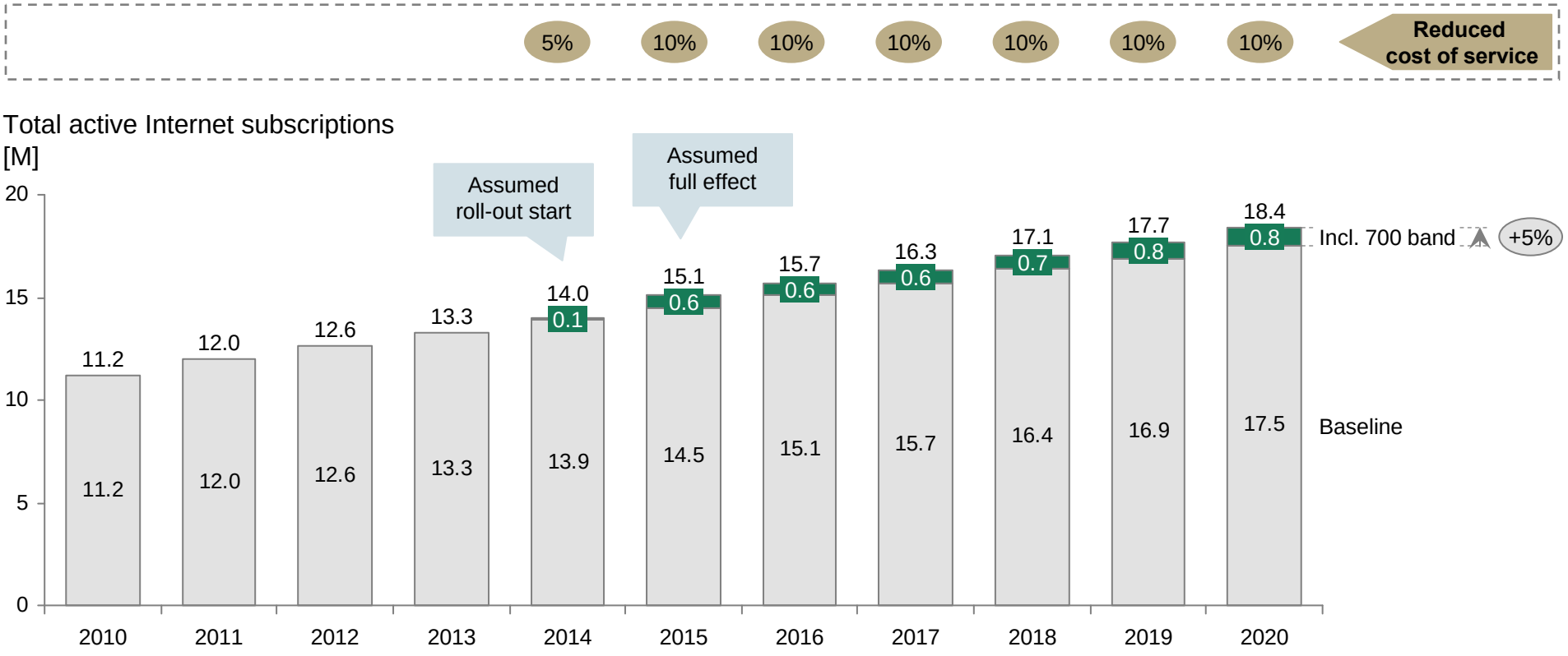


Baseline aligned with national and industry statistics



1. Includes dongles and other wireless data devices 2. 3.9M dial-up and 1.5M broadband in 2009, extrapolated at 2009 growth rate 3. BCG estimate 4. Extrapolated from 4.5M in 2009 as reported by MCMC
Source: ITU; BuddeComm; MCMC; BCG analysis

Overall Internet subscriptions expected to increase 5%, representing an additional ~3 subscribers per 100 population



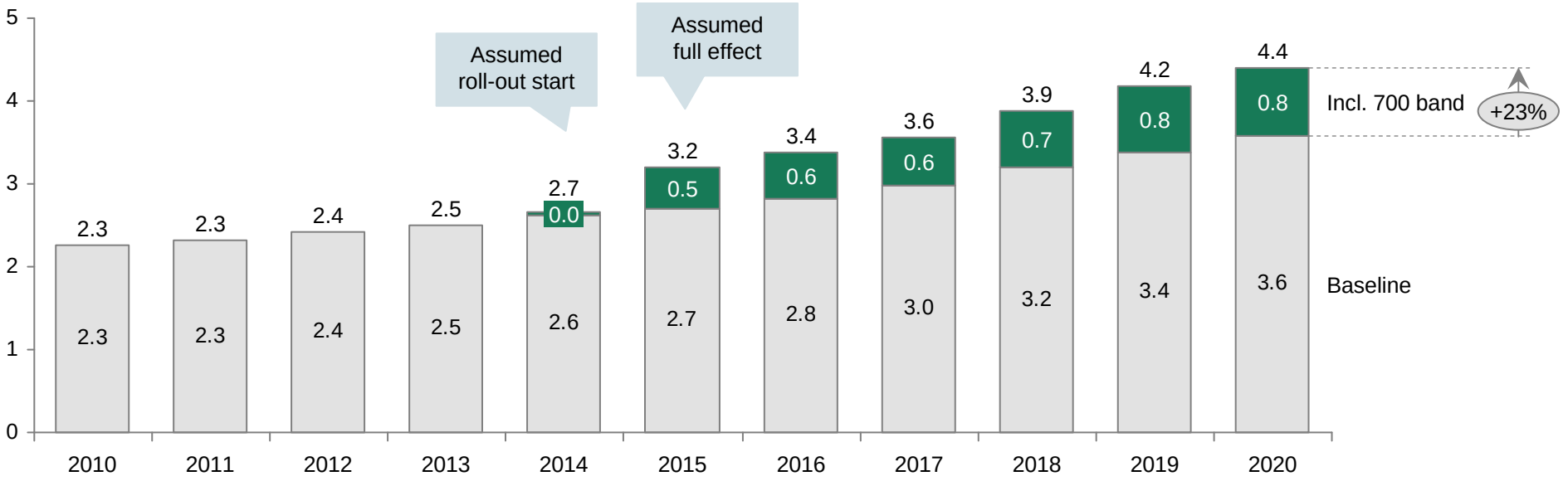
Additional uplift from improved quality of service in urban areas expected, but not included for conservativeness

Source: Malaysian Census, Malaysian Communications and Multimedia Commission (MCMC); Ovum; Euromonitor; CS Wireless Broadband; BCG analysis

Increase driven by rural households, the main beneficiaries of 700 MHz band



Rural active household Internet subscriptions [M]



Source: Malaysian Census, Malaysian Communications and Multimedia Commission (MCMC); Ovum; Euromonitor; CS Wireless Broadband; BCG analysis

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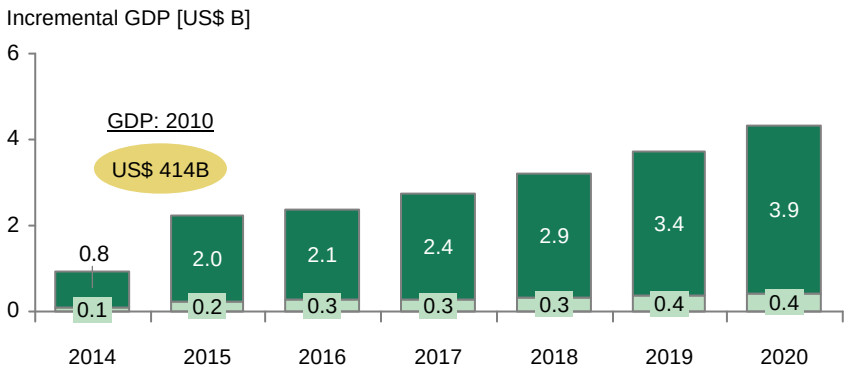
Economic benefits

Social benefits

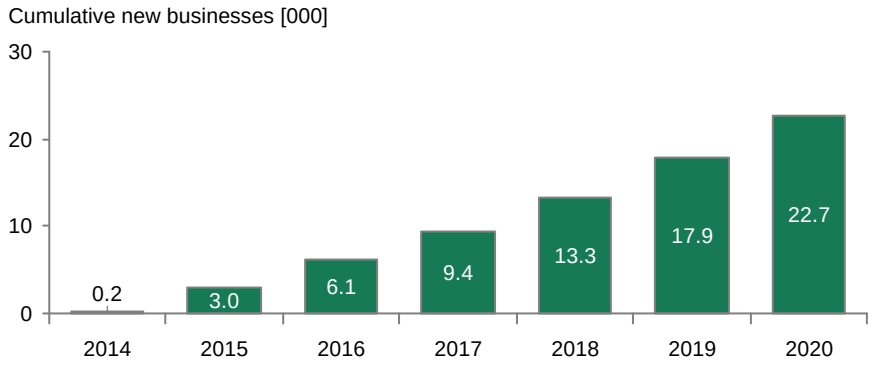
Implications for governments and regulators

Allocation of 698-806 MHz band[1] to mobile will have significant incremental economic benefits over broadcasting

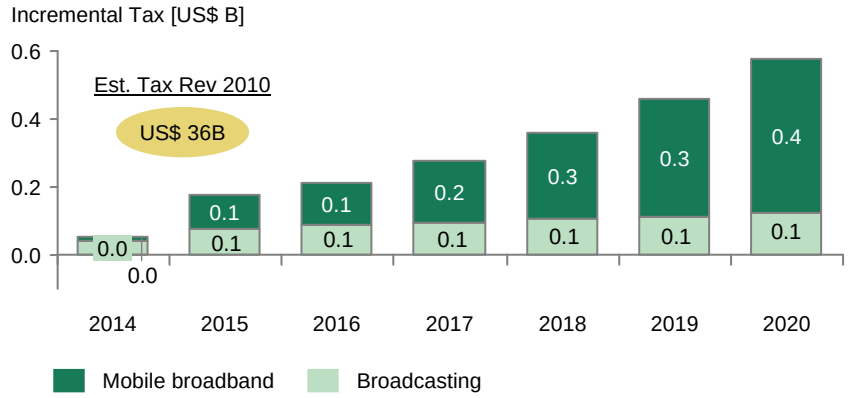
GDP increased US$ 17.5B 2014-2020 (US$ 13.8B[2] NPV)



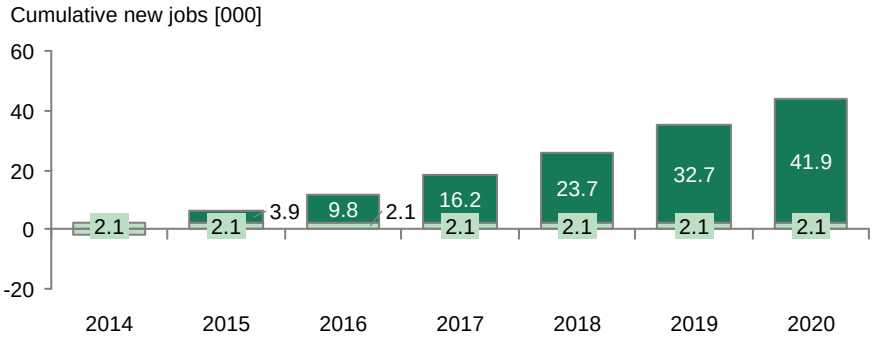
23K new businesses by 2020



Government revenues up US$ 1.5B (US$ 1.1B[2] NPV)



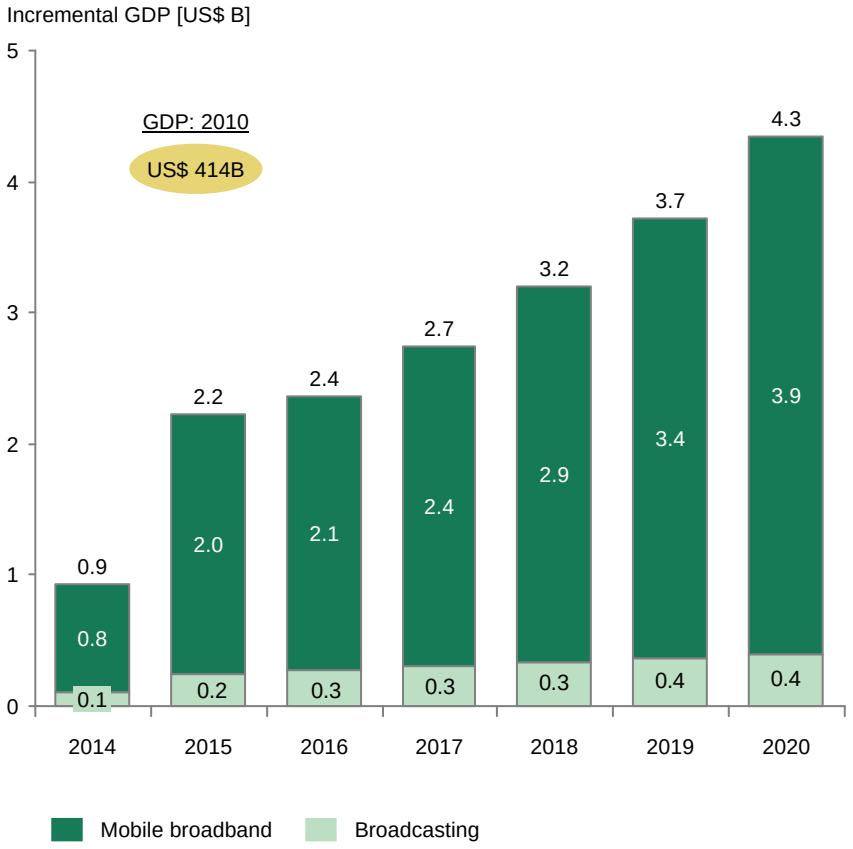
42K jobs created by 2020



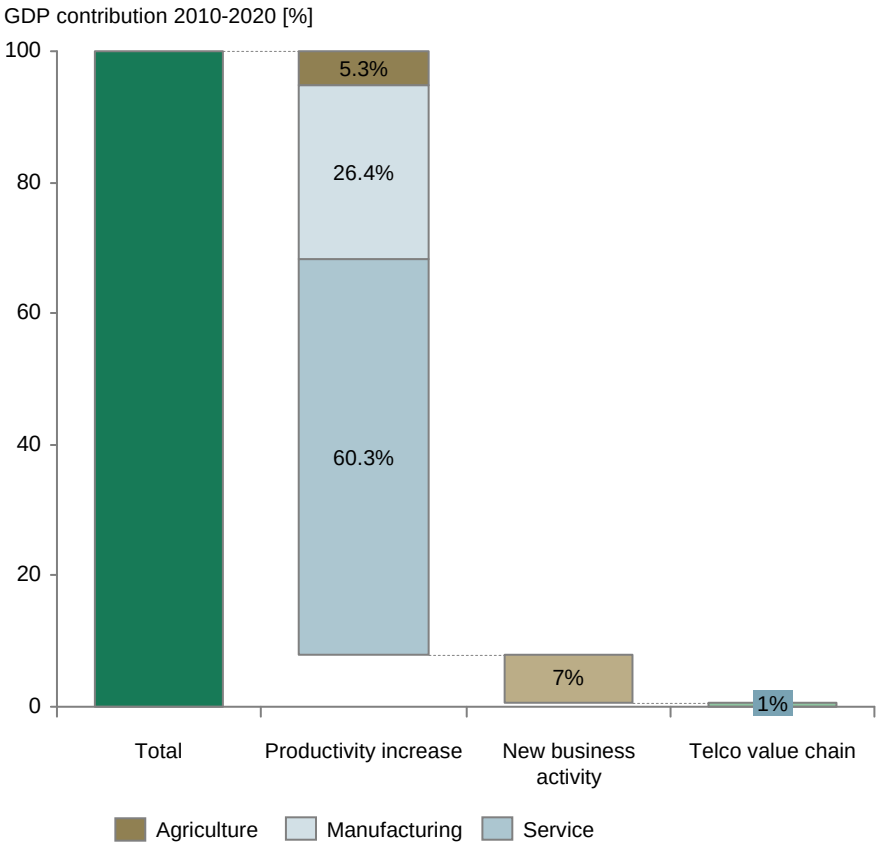
1. Referred to as 700 MHz band 2. Net present value for 2010-2020, based on 1-year Government securities rate of 2.8%
Source: Malaysian Census, Malaysian Communications and Multimedia Commission (MCMC); Ovum; Euromonitor; CS Wireless Broadband; BCG analysis

Total GDP will increase US$ 17.5B for the period 2014-2020

US$ 17.5B increase in GDP for 2014-2020 (US$ 13.8B[1] NPV)



... largely driven by increase in business productivity



1. Net present value 2010-2020 based on 1-year Government securities rate of 2.8%
Source: Malaysian Census, Malaysian Communications and Multimedia Commission (MCMC); Ovum; Euromonitor; CS Wireless Broadband; BCG analysis

~0.3% and 0.6% additional uplift in manufacturing and service firms' productivity due to greater rural adoption

Internet enhances productivity in a range of business operations

Suppliers

- Integrated supply chain reduces lead time & stock levels, as well as optimize logistic and cash management

Customers

- Online services can improve customer satisfaction, reduce costs
- E-commerce and online marketing increase selling opportunities

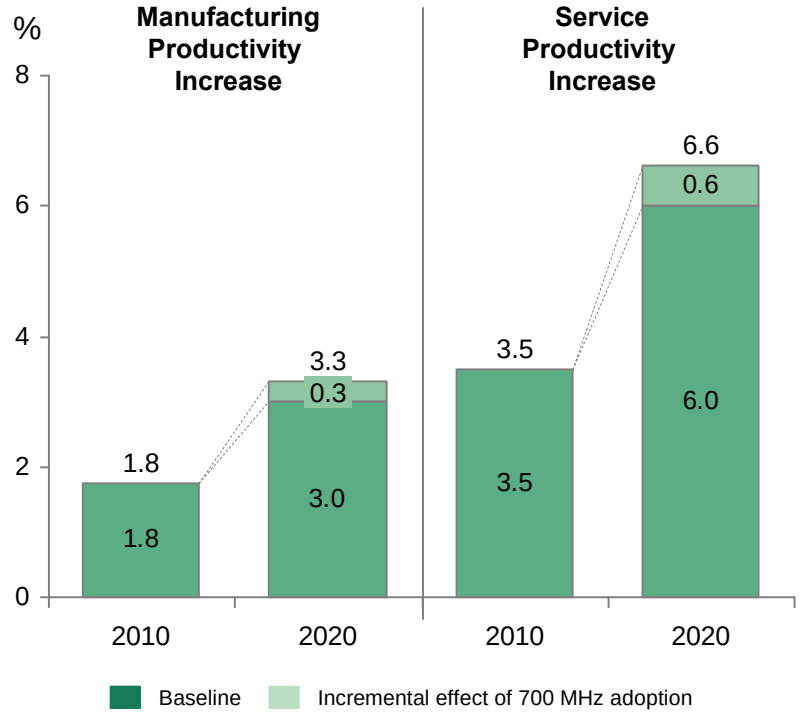
Internal process

- Intranet & email aids knowledge sharing within organization
- Streamline process saves time & allows employees to focus on core activities

3rd party transaction

- Electronic transaction with 3rd party such as banks and government saves travel time and improve efficiency for companies

The 700 MHz band's potential to increase rural adoption will spur additional gains



No productivity increase expected from allocating Digital Dividend band to broadcasting

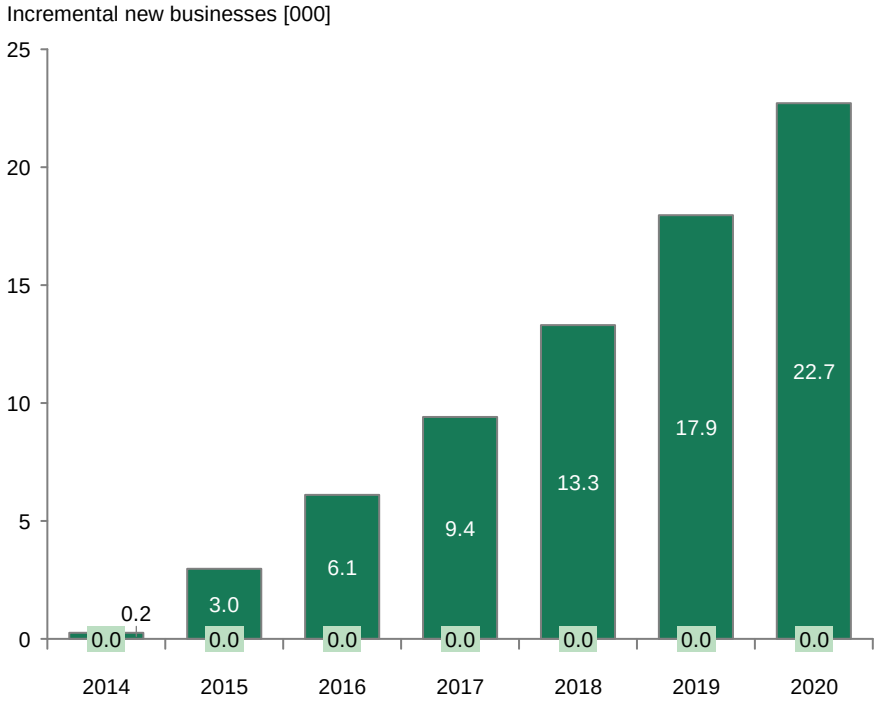
Source: Malaysian Census, Malaysian Communications and Multimedia Commission (MCMC); Ovum; Euromonitor; CS Wireless Broadband; BCG analysis

Allocation of 700 MHz band to mobile could result in 23K new business activities[1] by 2020...

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. New business activities includes establishment of new independent businesses as well as new departments/units/business areas within existing firms
Source: Malaysian Census, Malaysian Communications and Multimedia Commission (MCMC); Ovum; Euromonitor; CS Wireless Broadband; BCG analysis

... and create 42K additional jobs relative to broadcasting between 2014-2020

New business activity will drive job creation

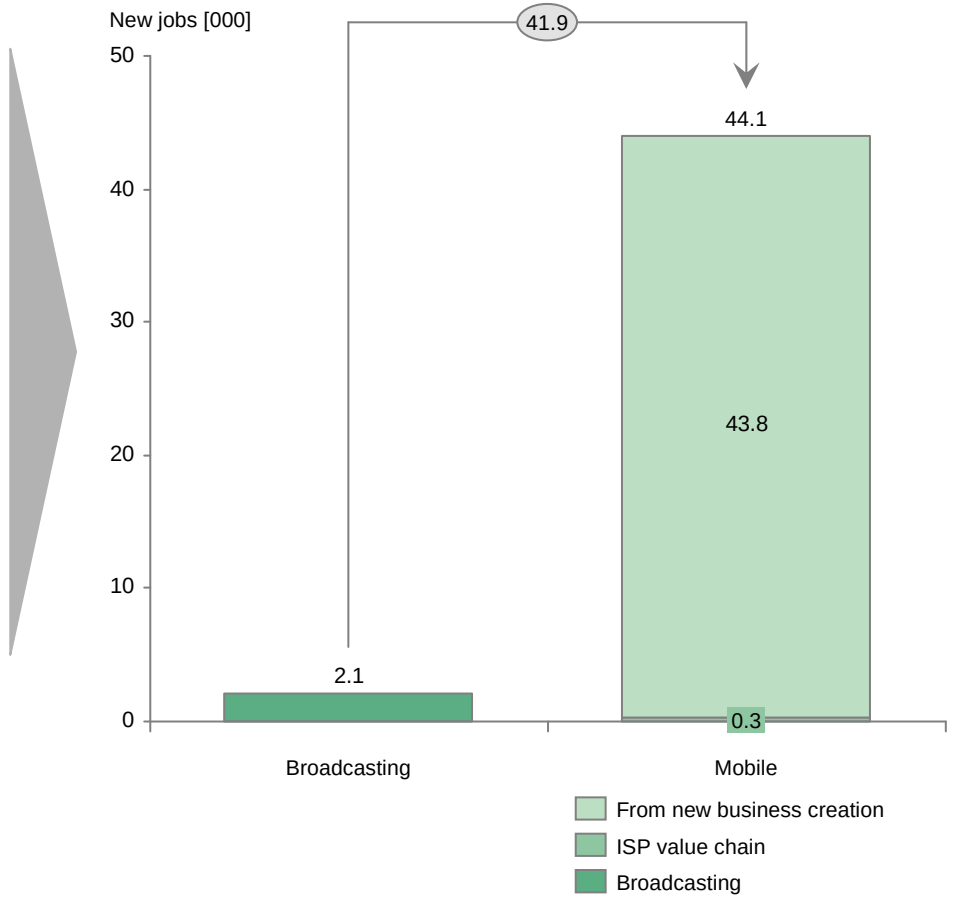
New businesses created as a result of 700 MHz band will create more opportunities for employment

- 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

42K jobs more created by 2020 compared to broadcasting



Note: Rounded to nearest per thousand
Source: Malaysian Census, Malaysian Communications and Multimedia Commission (MCMC); Ovum; Euromonitor; CS Wireless Broadband; BCG analysis

In total, allocating 700 MHz band to mobile could contribute additional US$ 1.5B[1] to government revenues 2014-2020

Productivity benefits of mobile drive increased tax revenues for government

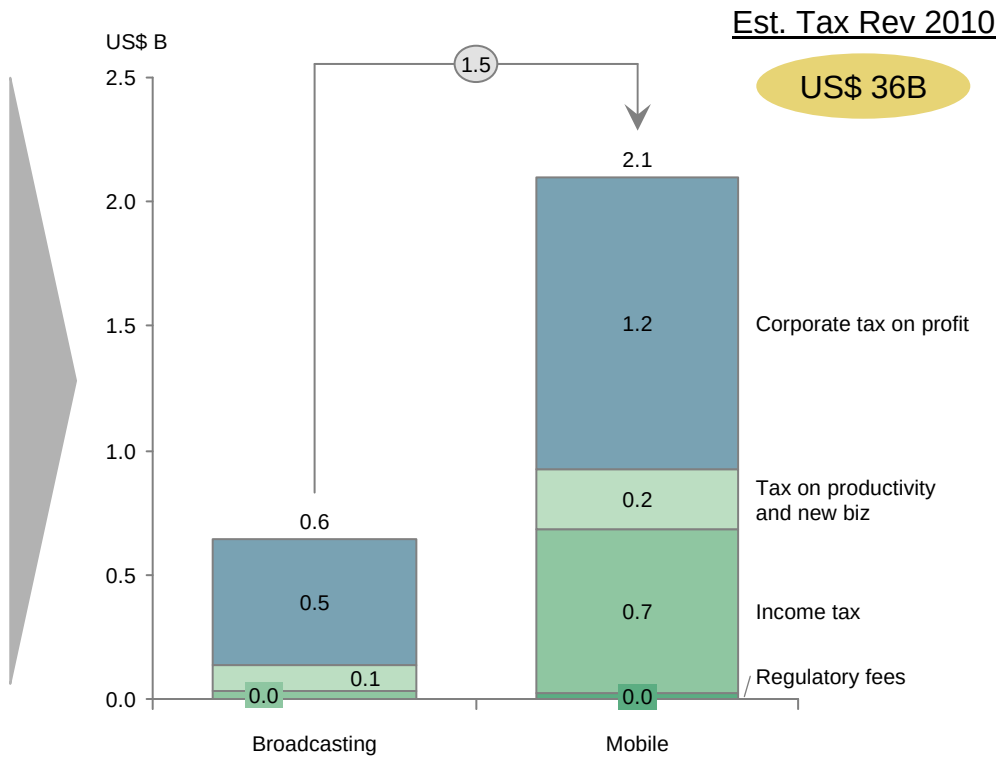
700 MHz will increase productivity, and hence output, which will in turn increase government revenues

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

Incremental taxes from mobile broadband estimated to be 2.1B over 6 years

- Accrual from mobile broadband expected to be ~US$ 1.5B[1] more than from broadcast
- Incremental broadcasting taxes likely to be lower than the estimated US$0.6B, as some of the profits for the new channels will come at the expense of existing channels

Net benefit over broadcasting expected to be ~US$ 1.5B[1] for 2014-2020 period



1. US$ 1.1B Net present value discounted at 1-year Government Security rate of 2.8%

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

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Implications for governments and regulators

700 MHz band based mobile broadband can significantly improve social benefits from Internet access

While general Internet access already brings advantages to a community...

- Access to information
- Basic IT literacy
- News and current events
- Access to remote markets



... 700 MHz band based mobile broadband will bring greater benefit

Lower cost will increase connections in homes, especially in low income and rural communities

- Enables Internet access for disadvantaged groups (e.g., women and elderly)
- Opens the possibility of home-based micro-entrepreneurship via Internet

Higher potential speed paves the way for high bandwidth applications

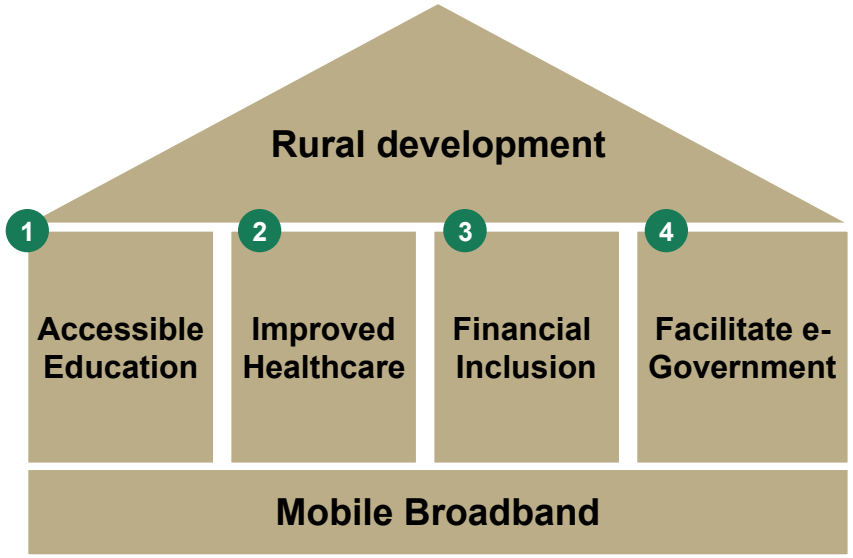
- Rich content and visualization engines

700 MHz band for mobile has the potential to create a step change in how people use, and benefit from, the Internet

Source: One Laptop per Child

Mobile broadband can help address Malaysia's most important social development challenges

Levers enabled by utilizing the Digital Dividend



Main social goals as defined by the Tenth Malaysian Plan:

- **Inclusiveness and equity (1Malaysia)**
  - Enable all communities to fully benefit from the wealth of the country
- **Revamp the education system to significantly raise student outcomes**
  - Close gap between urban and rural schools
  - Increase tertiary education enrollment
- **Transform healthcare to improve quality**
  - Provide universal access, including to hard to reach rural geographies
- **Elevate the livelihoods of the bottom 40% of households**
  - Bridge urban-rural divide
  - Raise skills to increase employability
- **Reduce bureaucracy and improve government interfaces**
  - Improve interfaces to businesses and consumers

Empowering individuals and underprivileged groups is a component of sustained socio-economic improvement

Source: Tenth Malaysian Plan, Malaysian Government

Mobile broadband can also facilitate key entry point projects as outlined in the Economic Transformation Programme

Serving Tomorrow ✓

MY Creative Content
- Give consumers more and better choice while preserving Malaysia's culture and heritage

1 Malaysia Payments
- Enable 'unbanked' Rakyat and SMEs to enjoy convenience and savings of cashless transactions

Connecting 1 Malaysia
- Enhance Rakyat's productivity and provide ubiquitous connectivity, i.e. always-on, everywhere, all devices

Pushing Boundaries ✓

E-Learning
- Prepare our future labour force for a knowledge-based economy

E-Healthcare
- Improve the convenience and quality of healthcare while reducing costs and errors

E-Government
- Increasing the accessibility, speed, and transparency of government services



Enhancing Foundation ✓

Broadband for All
- Ensure broadband availability for all users

Extend Reach
- Extend broadband reach to sub-urban and rural locations

Regional Network
- Address capacity issues of international connectivity



Mobile broadband can help Malaysia achieve ambitious Communications, Content and Infrastructure targets

Source: Digi: Summary of NKEA & CCI Projects; Malaysian Economic Transformation Programme; 1Malaysia

Mobile broadband can help address key issues in education

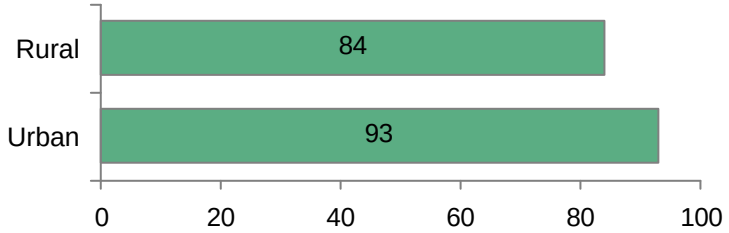
Most benefit to rural regions, which lag behind urban areas in quality of education, retention rates

Key challenges in rural education

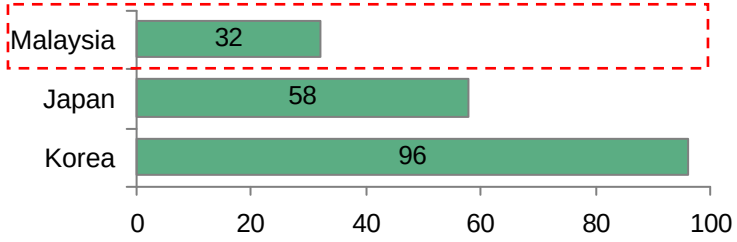
Rural schools face resource constraints

- Lack of qualified personnel to teach specialized subjects; Lower access to out of class resources (e.g., libraries)

Lower English proficiency in rural areas (2000)



Relatively low tertiary education enrollment compared to regional leaders (2005)



700 band for mobile enhance education



Access to interactive, educational learning tools for rural households

- Encourage learning and engagement with materials outside of classroom



Improvement of English proficiency via online tools

- Provides opportunity to learn from native speakers



Higher enrollment in tertiary education

- Online courses could increase access to tertiary education
- Especially for women with families and in remote areas

Source: EIU, General Report of the Population and Housing Census; Press Search

Mobile broadband can improve quality and access to educational opportunities for rural areas

Enhance learning opportunities via online tools

Rural users with basic devices can access online education tools

- Reduces need to buy costly study aids/programs (e.g., word processing tools, dictionaries, thesaurus, etc.)

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

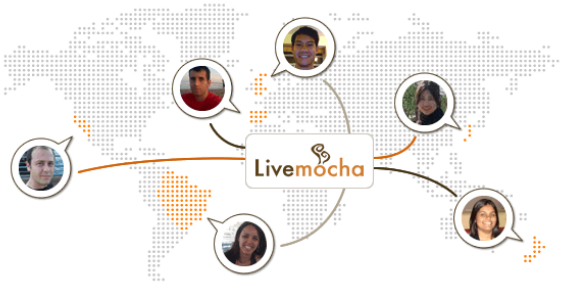
Improve English proficiency

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



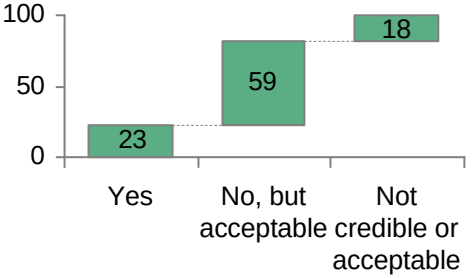
Increase opportunities for tertiary education

Tertiary education important for Malaysia for developing skilled labour 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?



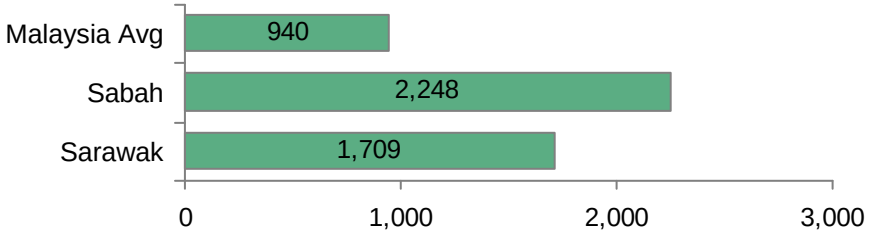
1. 2008 Vault Online Degrees Survey of 172 employers and hiring managers in various industries across the US.
Source: Livemocha.com websit;e; Project K-nect website, Vault Online

Mobile broadband can improve healthcare delivery and general wellness in Malaysia

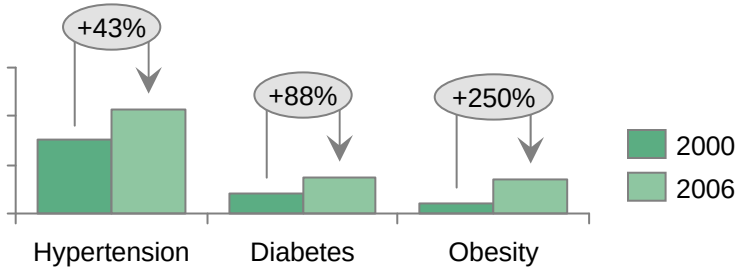
Key issues in Healthcare

Lack of doctors and specialists in rural areas

- Public hospitals especially stretched
- Doctor-patient ratio, 2009:



Prevalence of key chronic diseases increasing (2000-2006):



Spread of infectious diseases still a problem

- Re-emergence of tuberculosis and HIV/AIDS in region

Broadband can enable health outcomes



Streamlined service delivery to rural areas

- Augment existing telemedicine initiatives, often hampered by unreliable connections



Applications for health and wellness tracking

- Allows individuals to take control of personal well-being through smart tools



Disease tracking

- Improve collection and analysis of health information
- Allow for better tracking and warning of diseases and epidemics

Source: EIU Health indicators data, Malaysian national statistics (10th National Plan), WHO Doctor-Patient Ratios

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

Enhance healthcare provision to rural areas

Increased access to specialist support and remote diagnosis

- Tele-consultation increases reach and reduces cost of treatment
- e.g., Malaysian telemedicine initiatives within Multimedia Super Corridor, or the linkup of Tawau Hospital with the much larger Queen Elizabeth hospital in Sabah for remote consultations

Mobile broadband can augment telemedicine initiative

- Increases bandwidth and allows field consultations



Provide tools for health and wellness planning

Specialized applications can augment current e-health initiatives such as MyHealth Malaysia, e.g.,

- Mobile application allow users to track personal health stats (weight, blood pressure, etc.)
- Smartphone apps provide on-the-go-nutritional information
- Cloud-based health e-applications design tailored health programs (e.g., fitness regiments, medical reminders, etc.) based on age, weight, health conditions



Increase efficiency of healthcare and disease tracking

Timely transfer of information essential to combating disease

- e.g., Alerta Disamar is a disease surveillance system used in Peru through mobile Internet technology providing experts with real time information on disease outbreaks

Improve collection and analysis of health information

- Disseminate information to health professionals, policy makers and
- e.g., Phones for Health gathers patient data via mobile systems and allows policy makers to make worthwhile healthcare investments

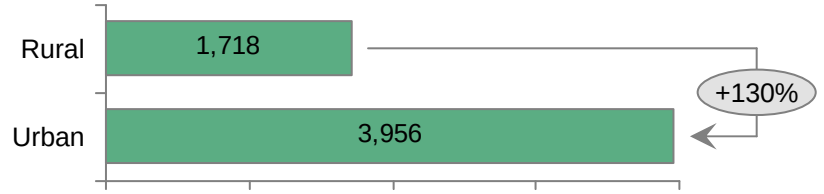


Source: BCG Research; Press search; MyHealth.gov.my; NDP; UNAIDS; OneWorld; Phones for Health; Alterta Dismar website

Rural Malaysians have fewer employment opportunities, driving increased urban-rural income disparities

Key issues with rural development

Large income gap between urban and rural households (average monthly income, 2004)**:**



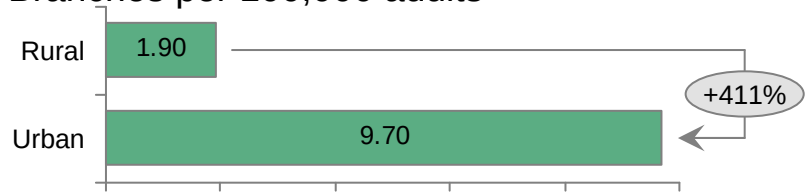
Limited financial literacy in rural areas

- Basic knowledge of financial options limited for both individuals and small businesses

Lower levels of financial service access in rural areas

- Lower savings and insurance adoption rates
- Fewer banking options, branch locations available as compared to urban counterparts

Branches per 100,000 adults



Mobile broadband to enhance access to financial tools



Enables household entrepreneurship opportunities

- Access to global and regional markets increases employment opportunities



Access to basic financial literacy and business planning programs

- Allow for low cost access for individuals and small businesses



Banking/insurance services via mobile enables savings, insurance adoption

Source: National Bank Regulator surveys; Malaysian National Yearbook of Statistics 2006; Press Research; BCG Previous Case Work; CGAP Financial Access, 2009; HSWC

Mobile broadband can improve economic and employment opportunities for rural areas

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 budget tracking linked to smartphones

Smartphone apps allow better individual financial management

- Online mortgage sites allow rates search



Increases access to secure, convenient banking services

Mobile broadband allows access to more secure online banking

- Mobile banking applications/ downloadable proprietary applications offers superior customer interface and array of advanced services not available via basic SMS services (e.g., portfolio tracking, insurance policy/pension plan management)
- More secure connection than SMS as information can be encrypted
- Transaction costs much lower than traditional branch network



Source: State Bank of India, Mint.com, Mobile Marketing Association; HSWC; BCG Research

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

Malaysia has significant scope 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

Agenda

Introduction and methodology

Adoption

Economic benefits

Social benefits

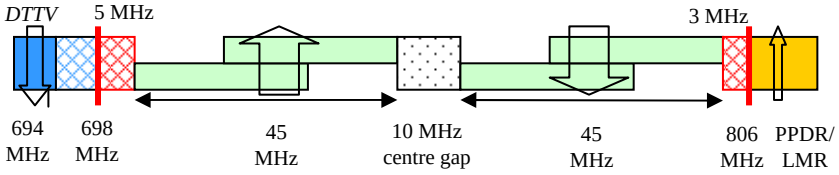
Implications for governments and regulators

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

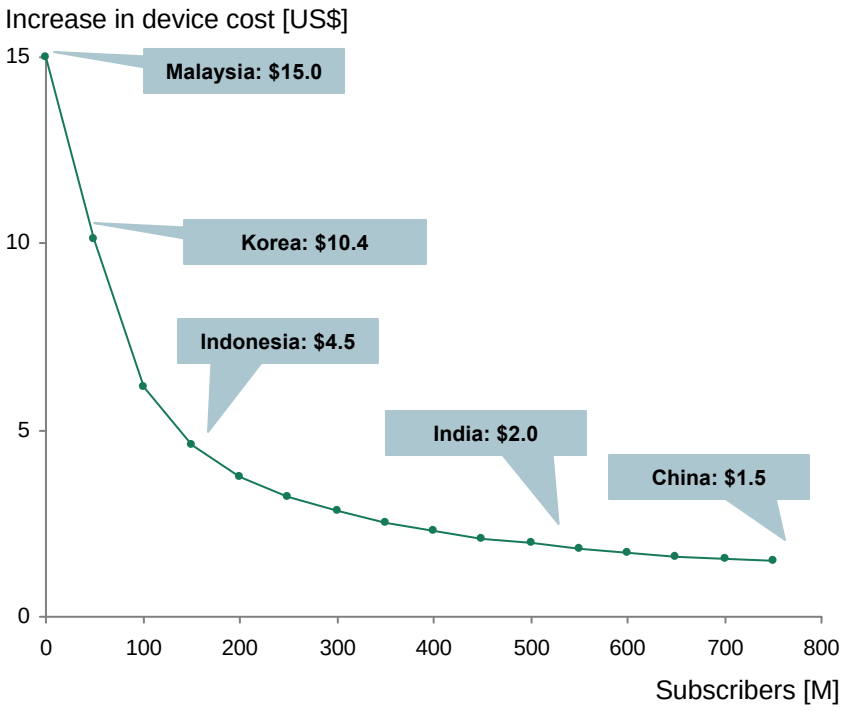
Non-harmonization will drive up cost of hand-sets and make them unaffordable to lower-income consumers

- 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

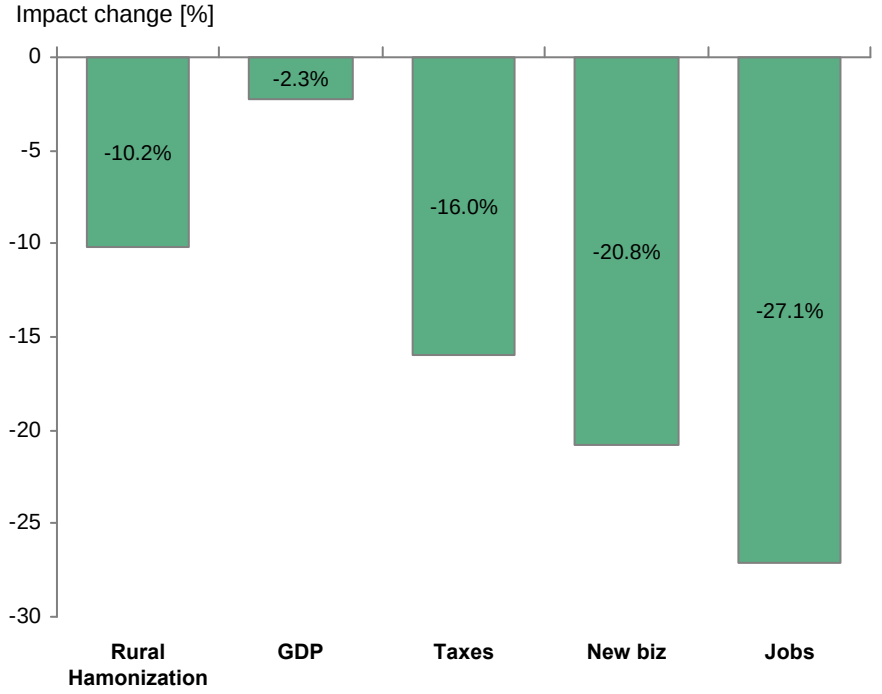
Source: 9th Meeting of the APT Wireless Forum (AWF-9); GSMA

Failure to harmonize spectrum would greatly reduce benefits

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



... reducing governmental revenues 16% and new job creation 27%



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

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