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

Korea

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

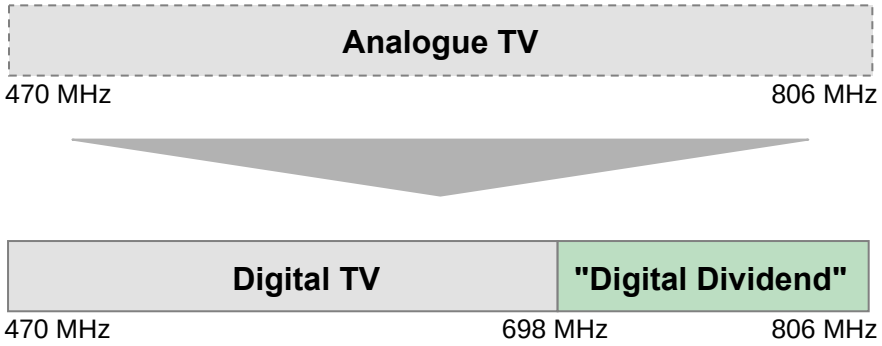
With digitalization, a large portion of the lower UHF band can be freed up...

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

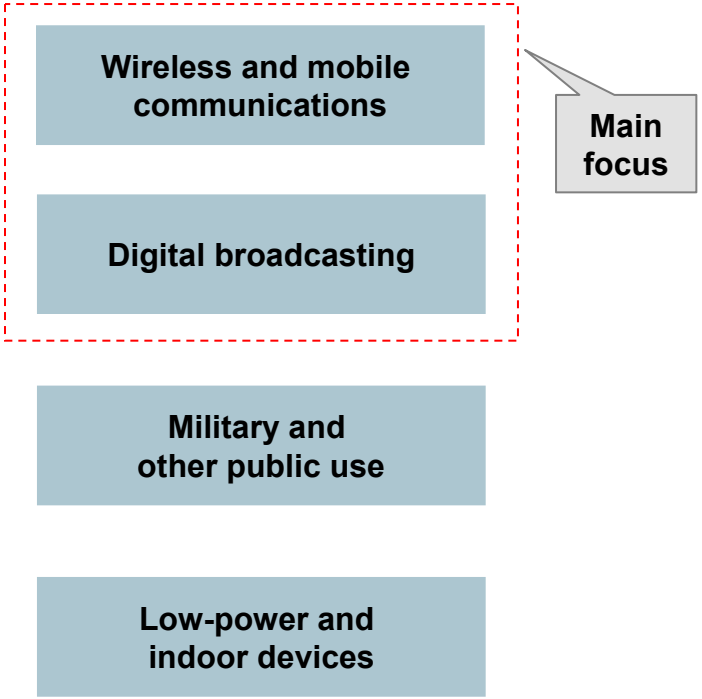
- For most of Asia Pacific, the 470-806 MHz[1] band is used to broadcast analogue television

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

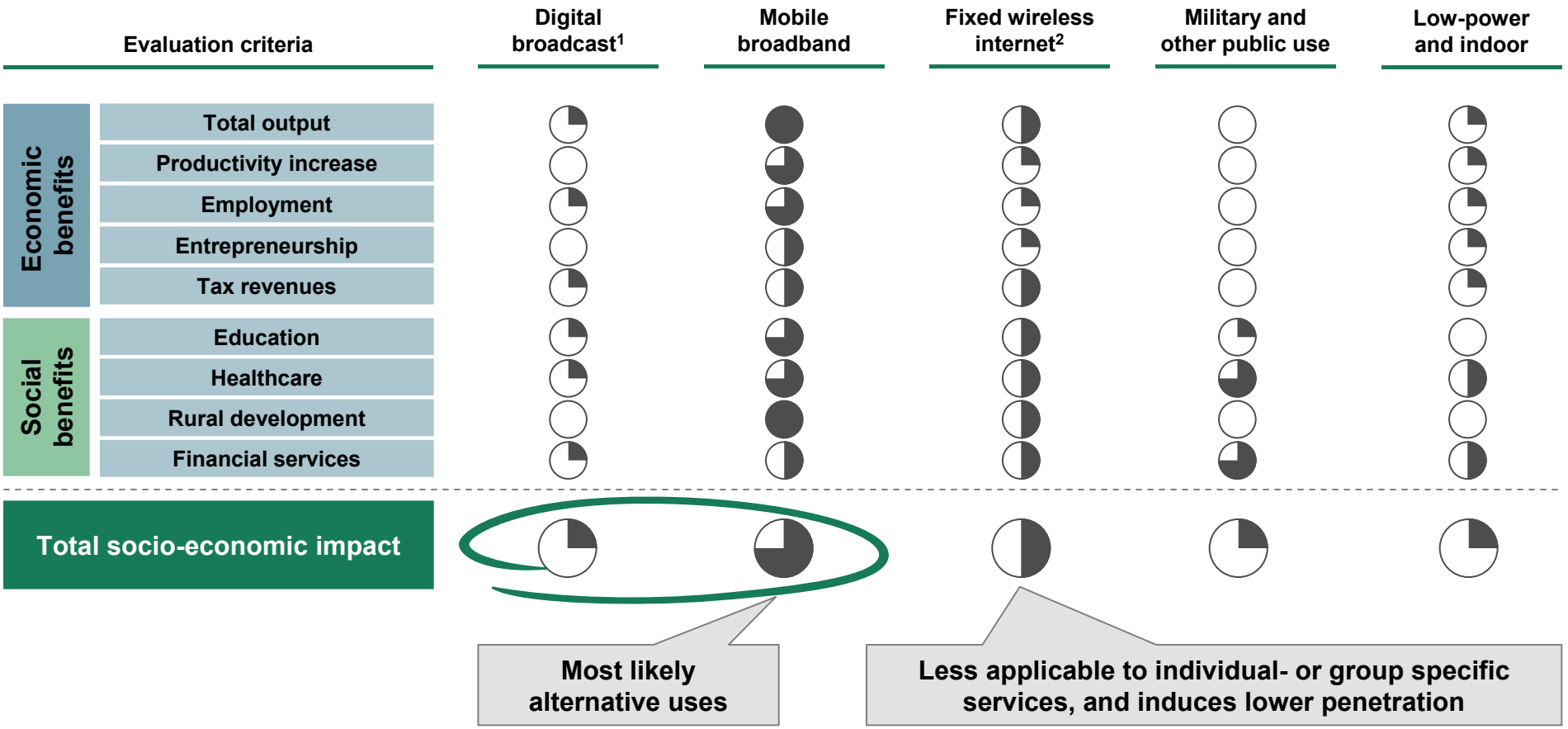


...presenting a "Digital Dividend" of alternative uses in the 698-806 MHz band[3], e.g.:



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

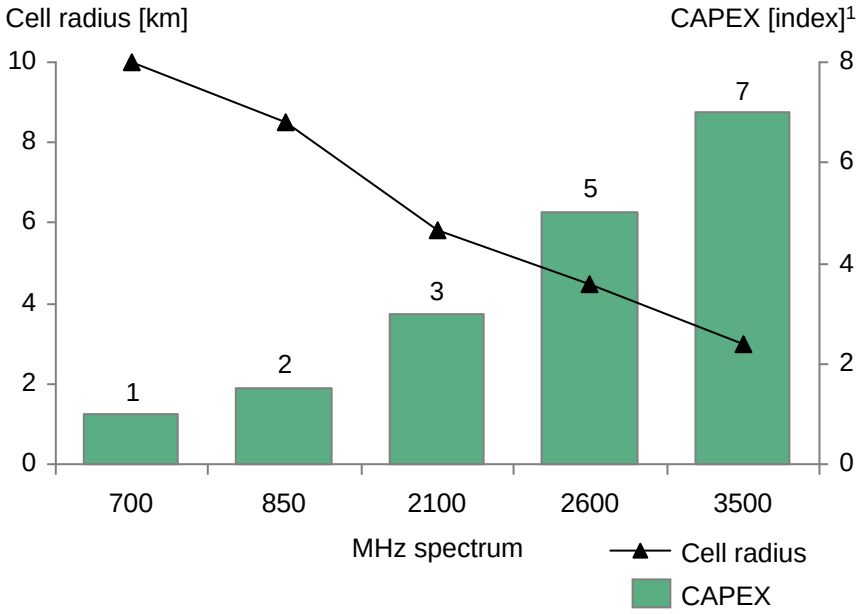
1. Extending number of channels beyond today's analogue which will be switched over 2. E.g. WiFi, WiMAX 3. Including emergency services, disaster warning and recovery
Source: Expert interviews; BCG analysis

... 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 ...

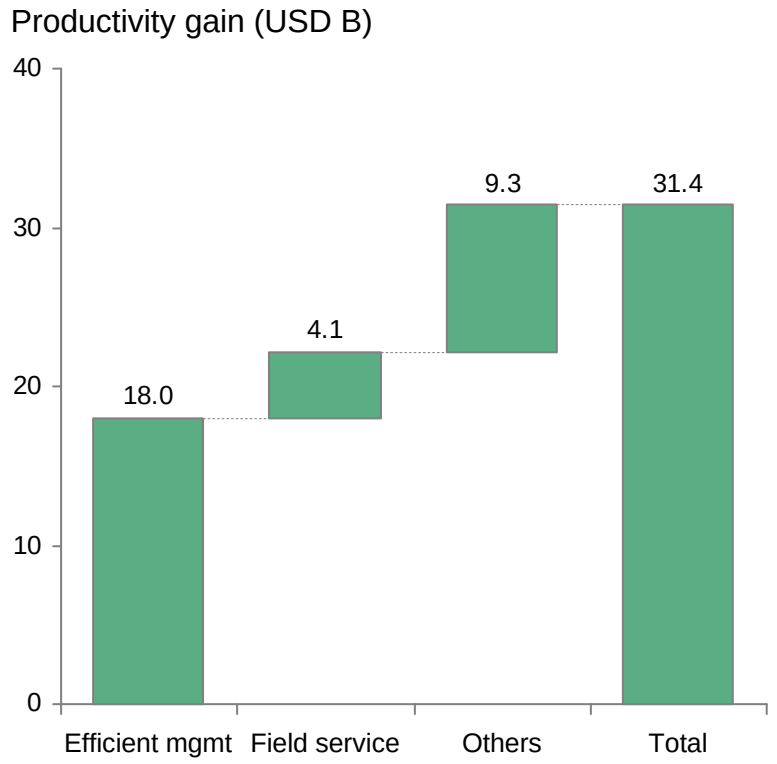
Infrastructure availability	**More rapid roll-out, with significantly larger rural footprint** • 700 MHz band has propagation characteristics highly suitable for rural and less densely populated areas	✓
Affordability	**Cost of service will be reduced, improving affordability for the poor** • Halving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

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

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

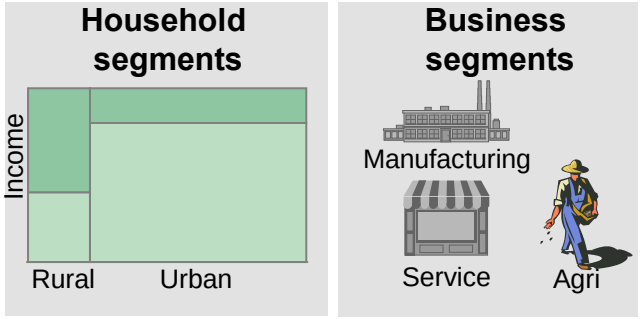


1. Based on 25% wireless BB penetration among enterprise users of telecom services

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

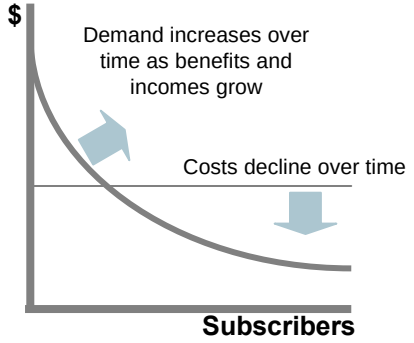
Cost-benefit analysis of businesses and households

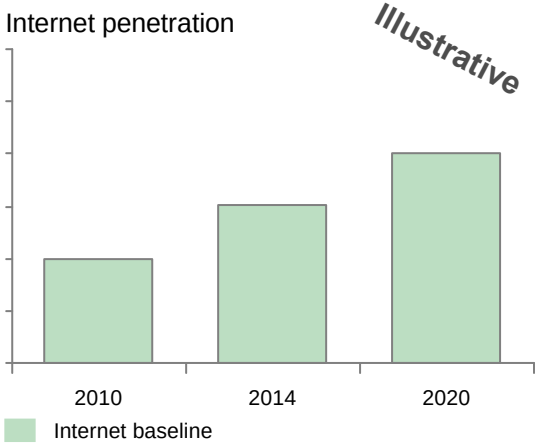


Benefits
- Increased profits for businesses
- Increased income/welfare for households

Costs
- Device
- Subscription/ access

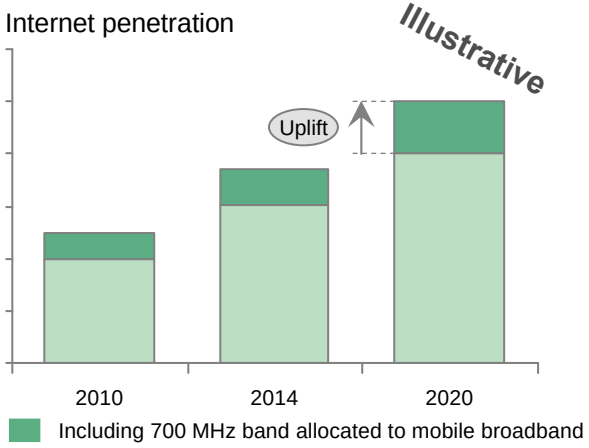
Baseline estimate for Internet penetration





Incremental effect of mobile broadband in 700 MHz band

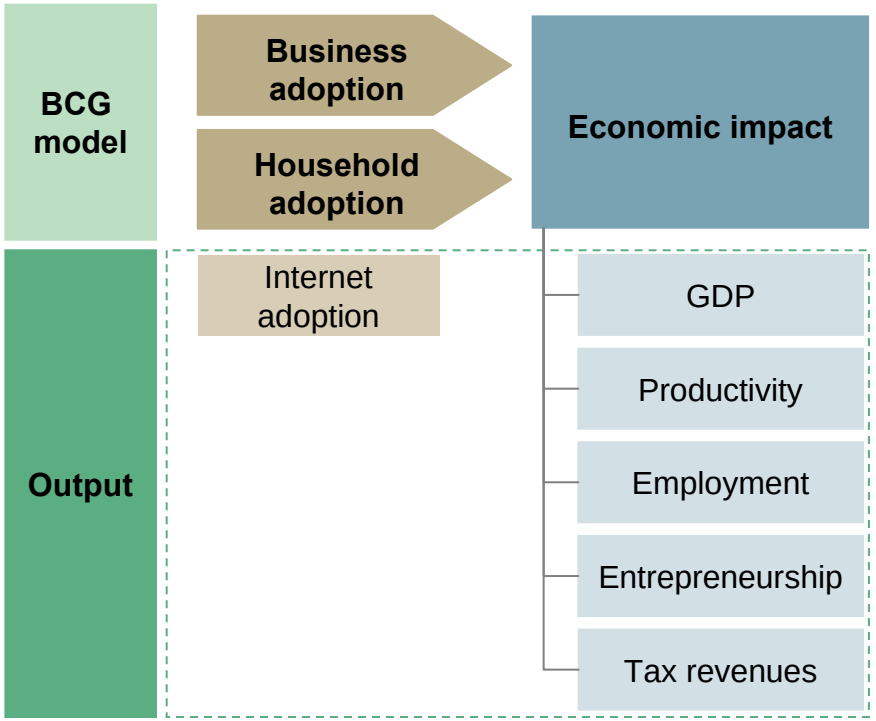
Mobile broadband in 700 MHz band will increase benefits and reduce costs
- Greater coverage and lower service costs will improve accessibility
- Economic benefits from increased productivity and rate of adoption
- Significant social and economic benefits in rural areas



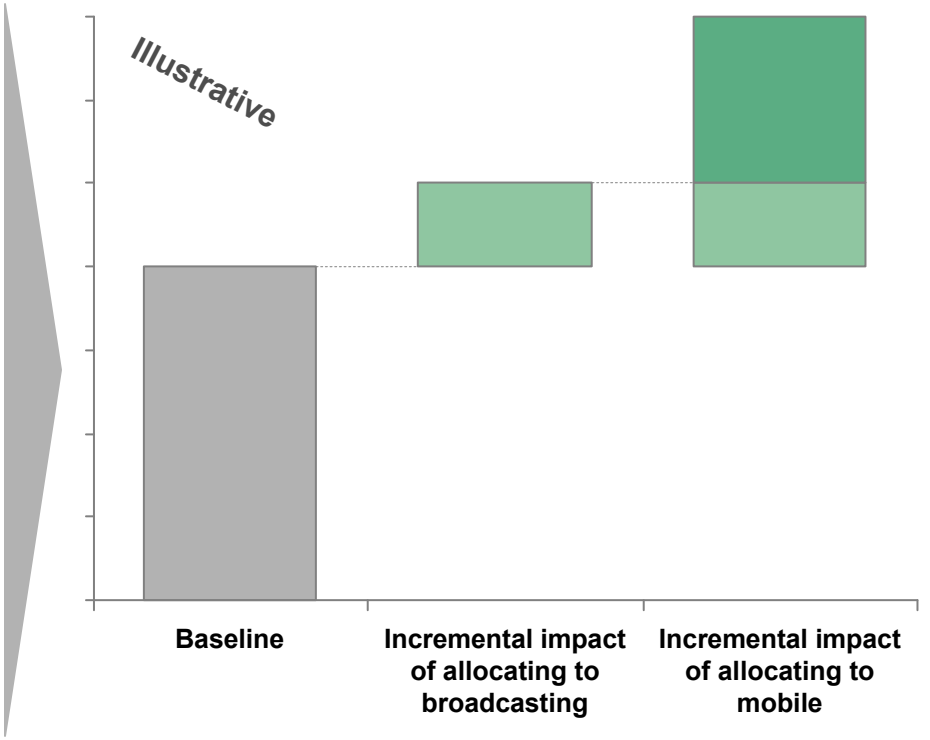
Note: Figures are illustrative

Adoption is translated into five economic factors...

Five economic factors are modeled...



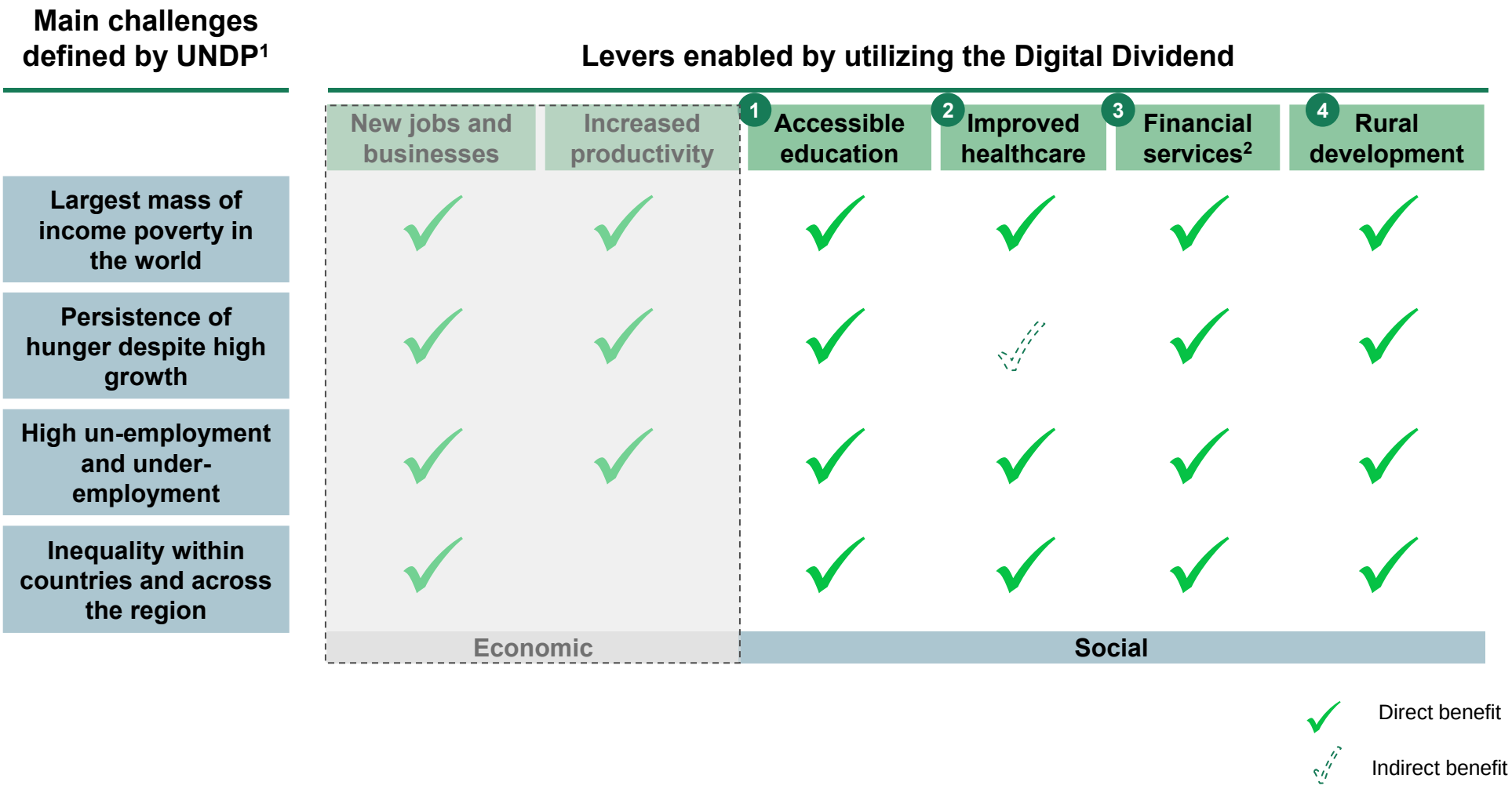
... to assess incremental value of allocating 700 MHz band to mobile



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

Note: Graphs are illustrative

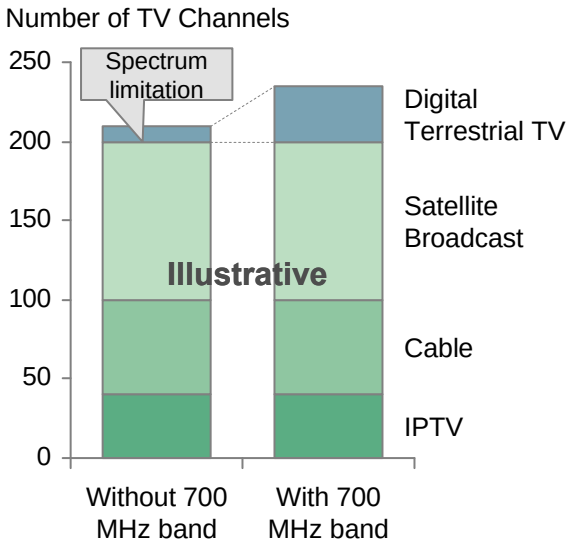
...and four social impact levers to help address the most important challenges across Asia Pacific[1]



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

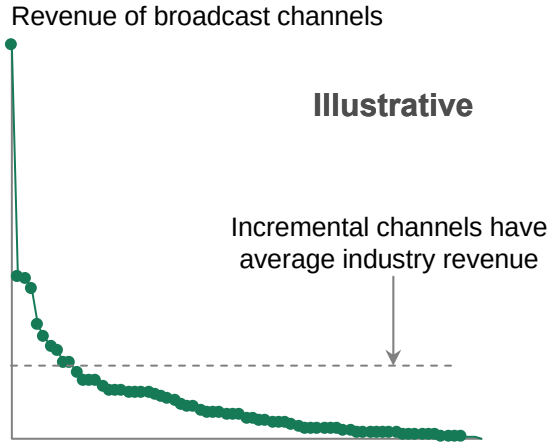
700 MHz band allows more TV channels...



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

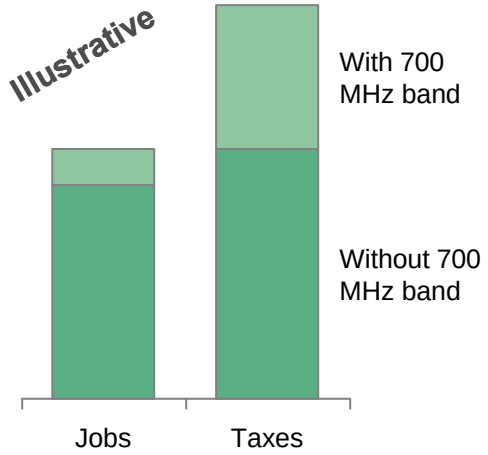
Generating revenue across supply chain...



Optimistic revenue assumptions: overall industry effect may be lower

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

As well as broadcast jobs and taxes



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

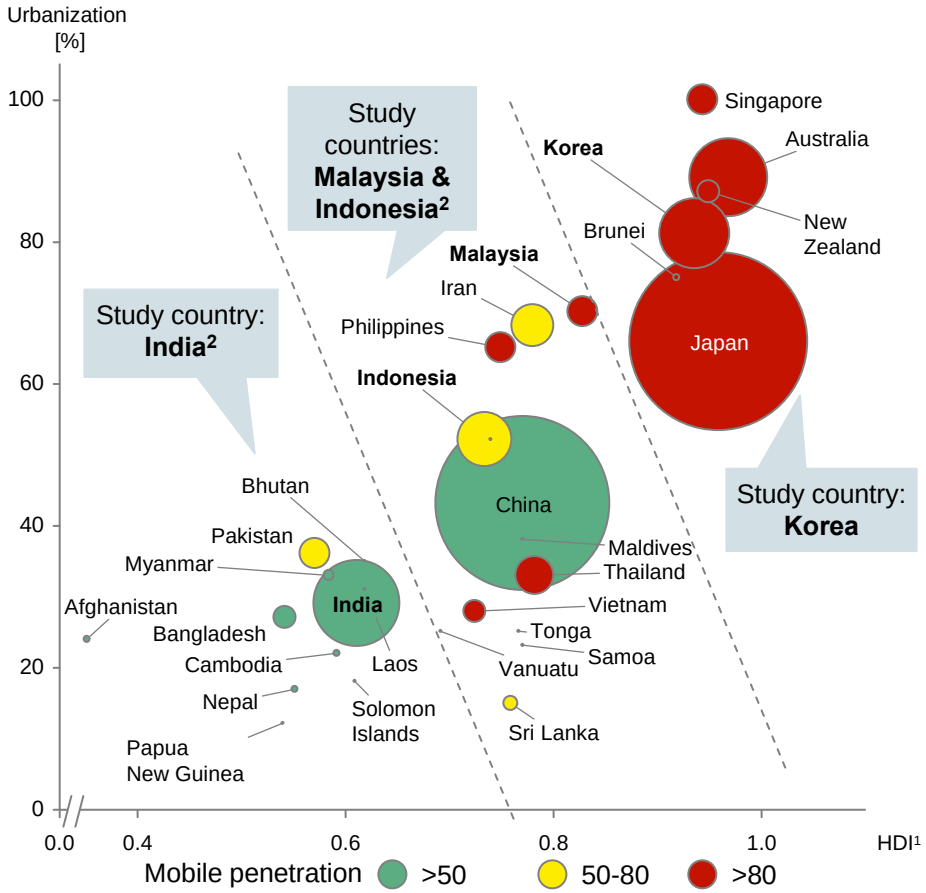
Rural-urban split

- 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

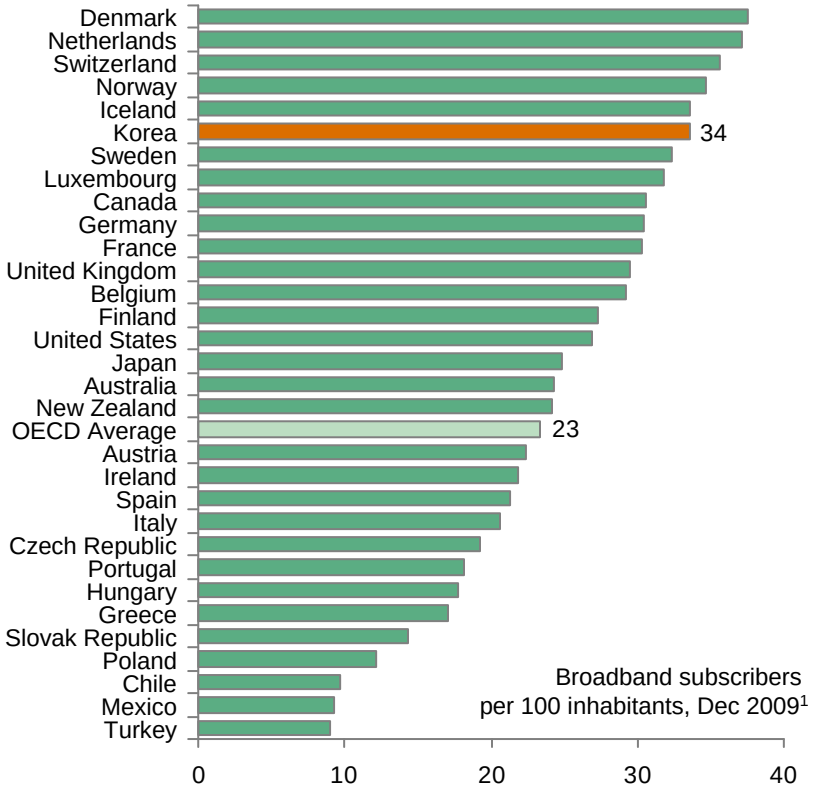
Economic benefits

Social benefits

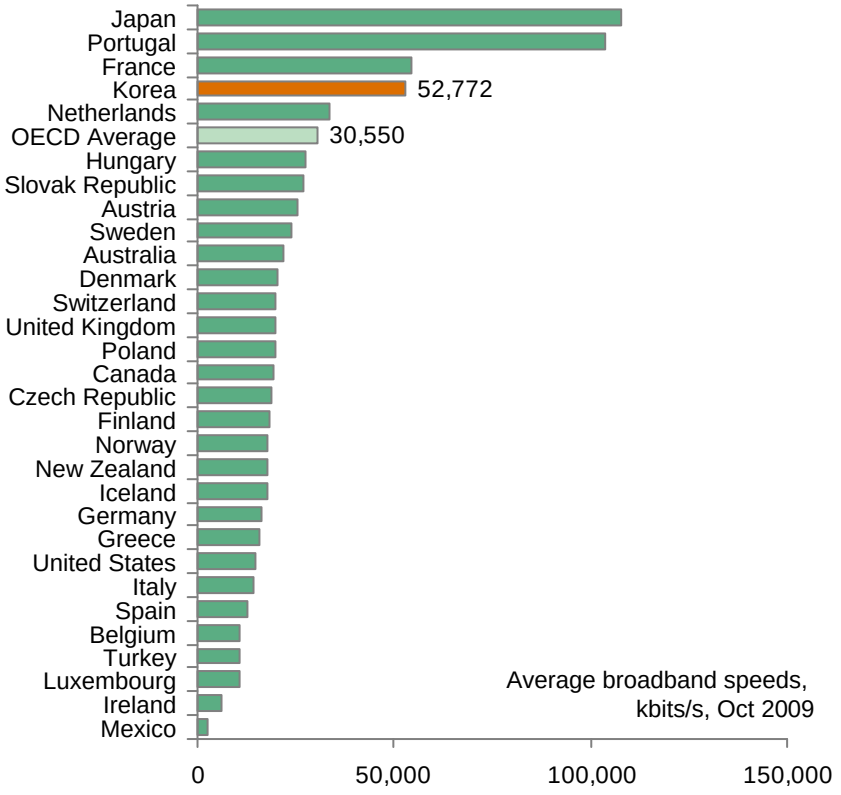
Implications for governments and regulators

Korea today: Fixed broadband penetration and speeds significantly above OECD average

Korea already has high broadband penetration



As well as high broadband speeds



HDI	Urbanization	Population
0.94	81%	48.8M

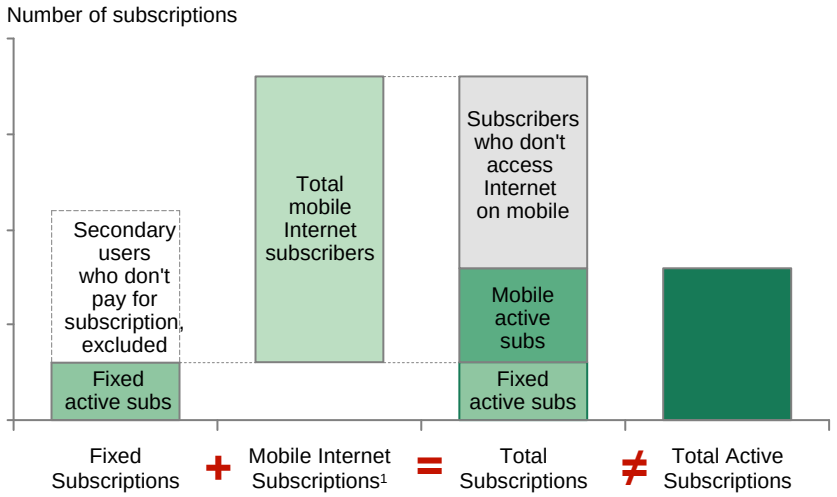
1. Fixed + (fixed wireless) broadband subscriptions
Source: OECD Communications Outlook; IMF; UNDP; CIA World Factbook; BCG Analysis

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

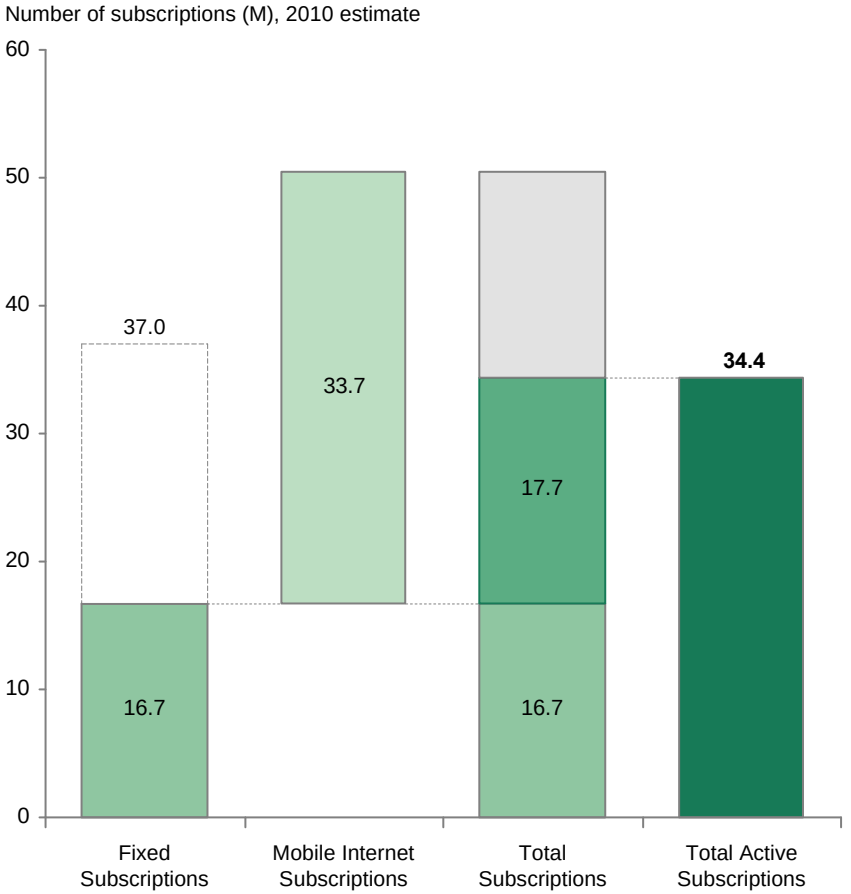
Internet statistics differ according to subscription vs usage

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

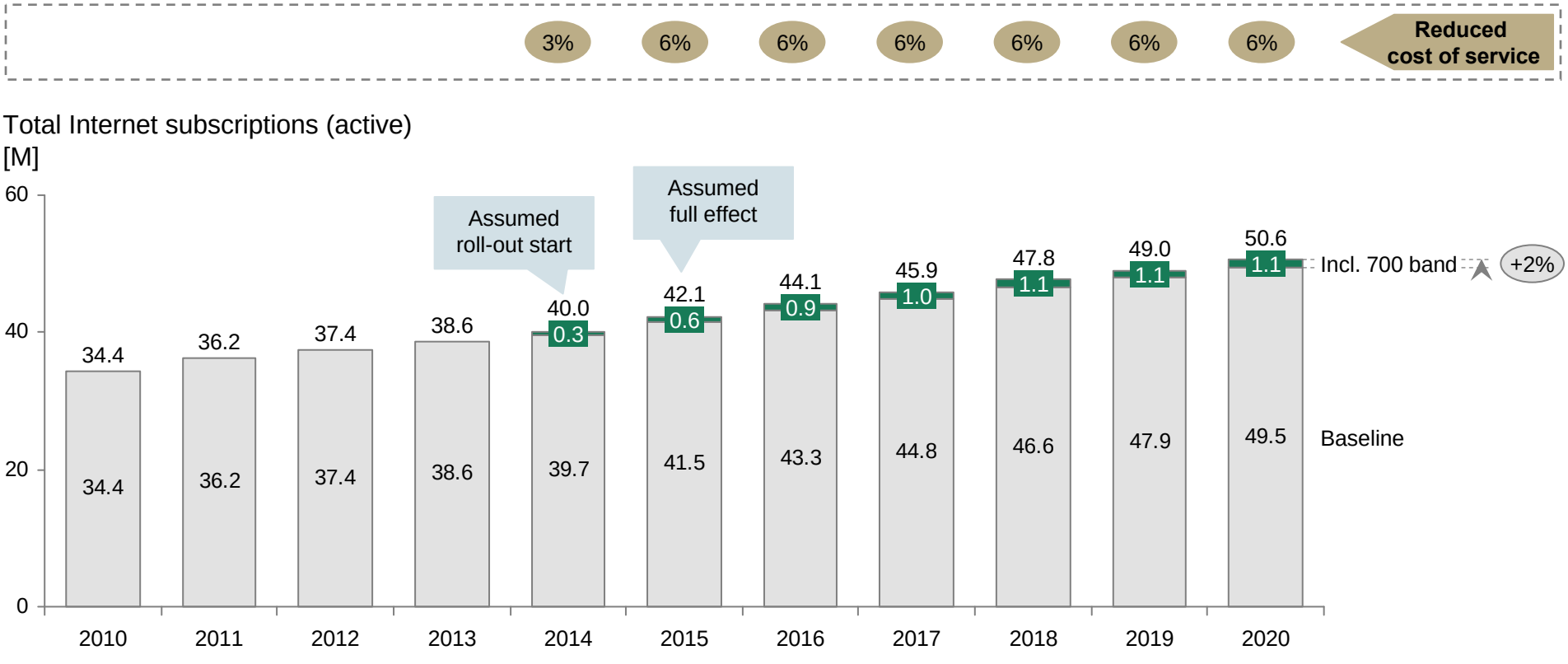


2010 baseline aligned with national and industry statistics



1. Includes dongles and other wireless data devices
Note: subscription numbers not explicitly quoted are estimates for illustrative purposes
Source: Korea Internet and Security Agency; BCG analysis

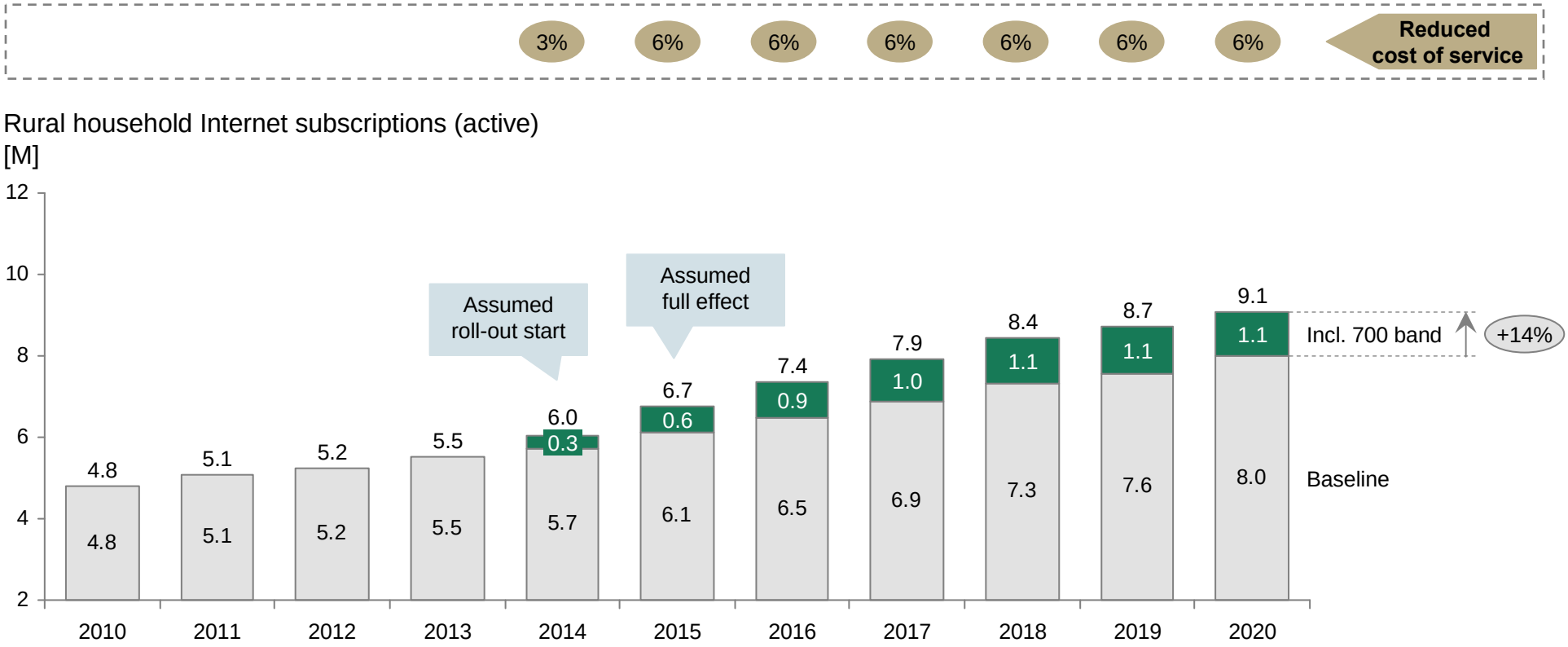
Overall Internet subscriptions expected to increase 2%, representing an additional ~2 subscribers per 100 population



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

Source: Korea National Statistics Office (KNSO); Internet Statistics Information System (ISIS); Euromonitor; Ovum; Business Monitor International (BMI); BCG analysis

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



Source: Korea National Statistics Office (KNSO); Internet Statistics Information System (ISIS); Euromonitor; Ovum; Business Monitor International (BMI); BCG analysis

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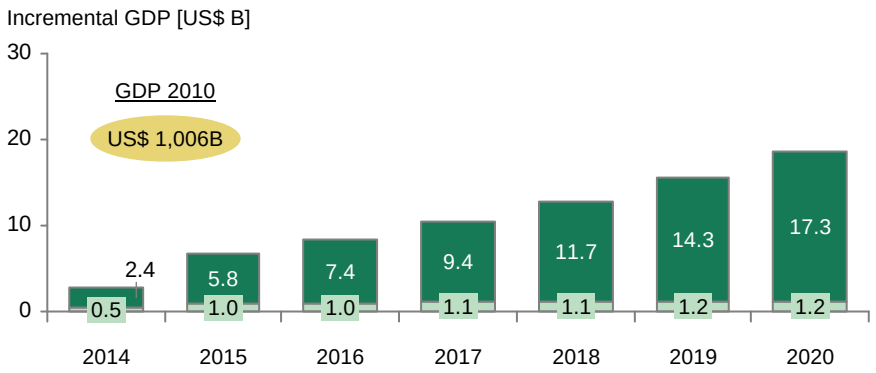
Economic benefits

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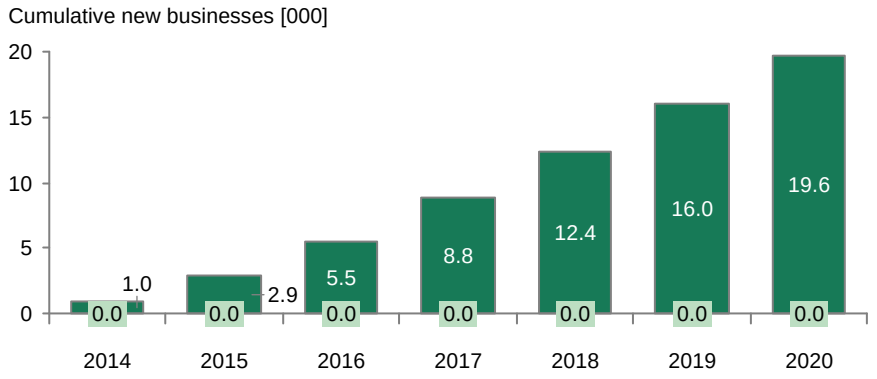
Implications for governments and regulators

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

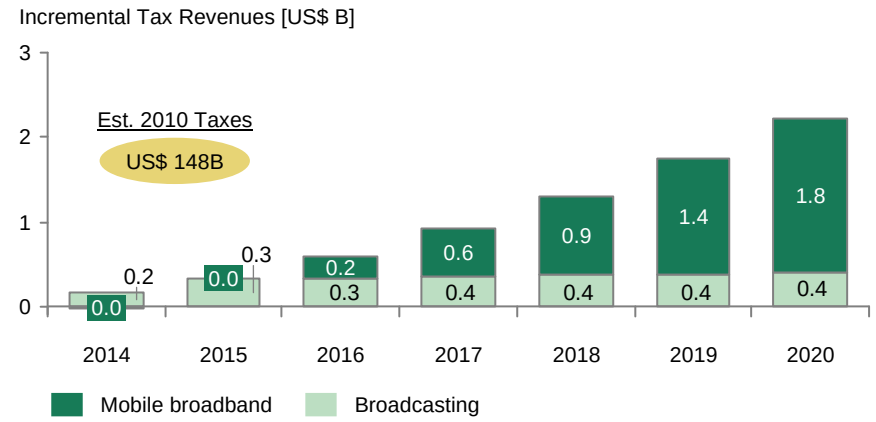
GDP increased US$ 68.3B 2014-2020 (US$ 59.8[1] NPV)



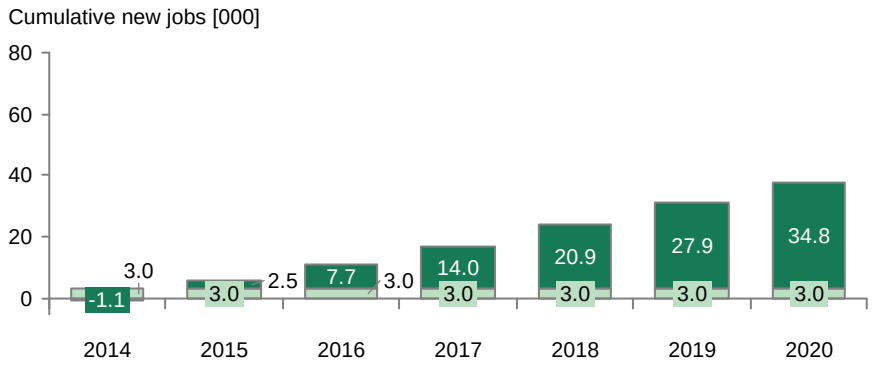
20K new businesses by 2020[2]



Government revenues up US$ 4.9B (US$ 4.2[1] NPV)



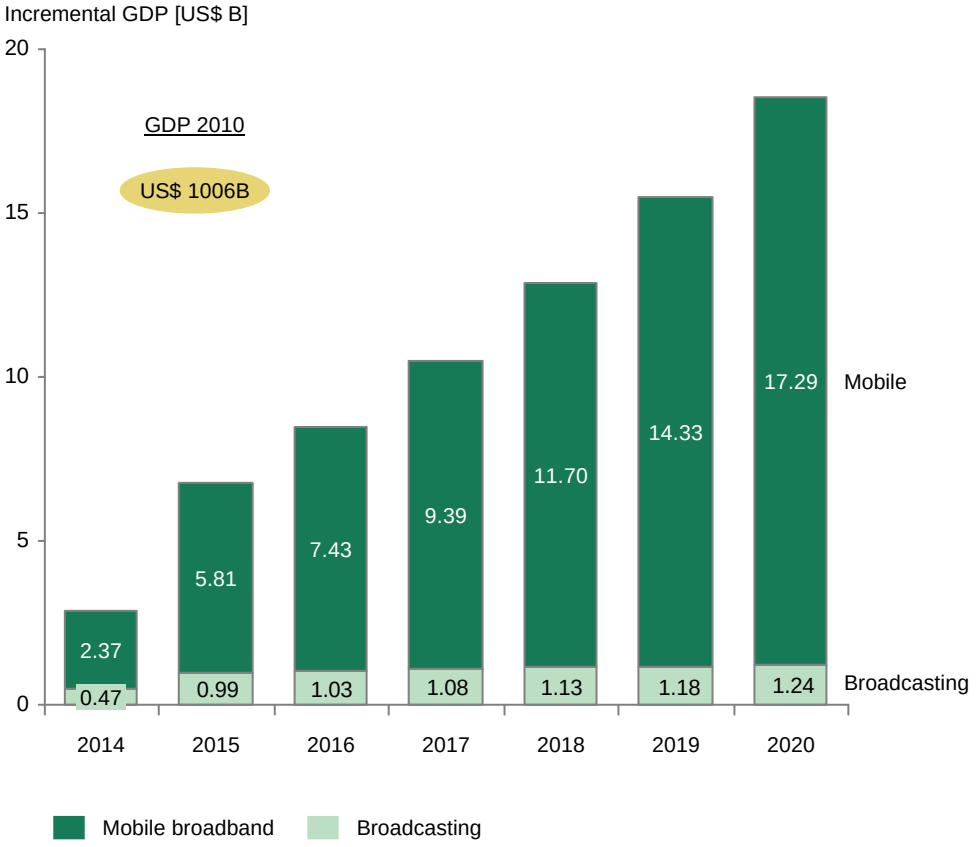
35K additional jobs created by 2020



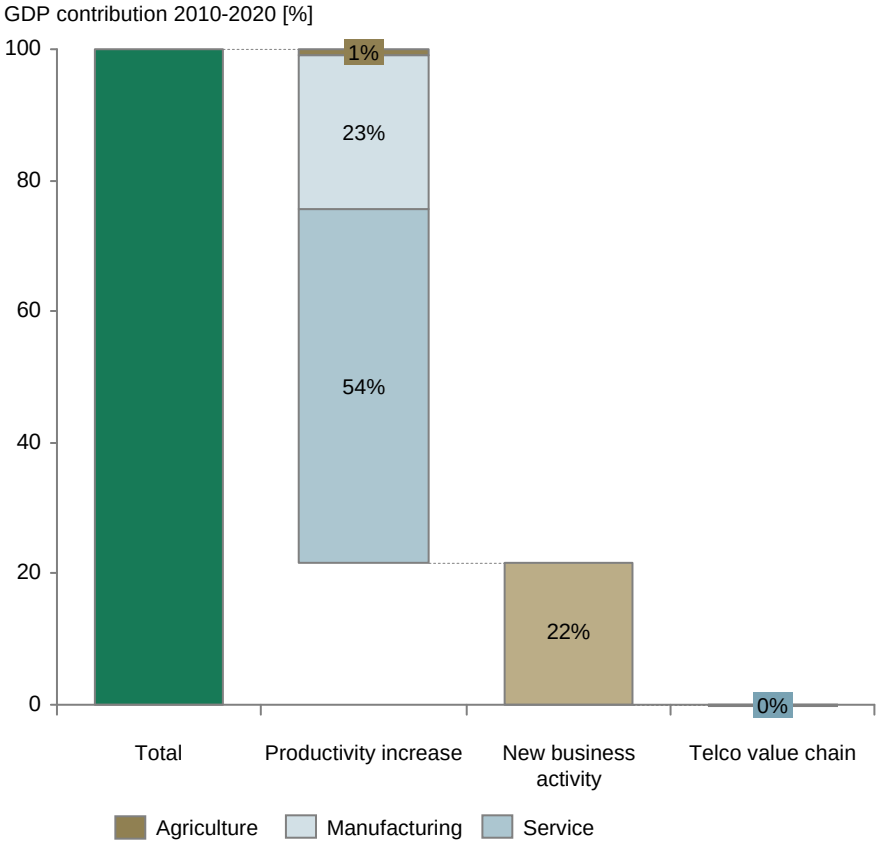
1. Net Present Value 2010-2020 based on discount rate of 1.5% 2. Includes establishment of new independent businesses as well as new departments/units/business areas within existing firms
Source: Korea National Statistics Office (KNSO); Internet Statistics Information System (ISIS); Euromonitor; Ovum; Business Monitor International (BMI); BCG analysis

Total GDP will increase US$ 68.3B for the period 2014-2020

US$ 68.3B increase in GDP for 2014-2020 (US$ 59.8B NPV[1]) ...



... largely driven by productivity increase and new business



1. Net present value 2010-2020 based on discount rate of 1.5%
Source: Korea National Statistics Office (KNSO); Internet Statistics Information System (ISIS); Euromonitor; Ovum; Business Monitor International (BMI); BCG analysis

~0.4% and 0.8% 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

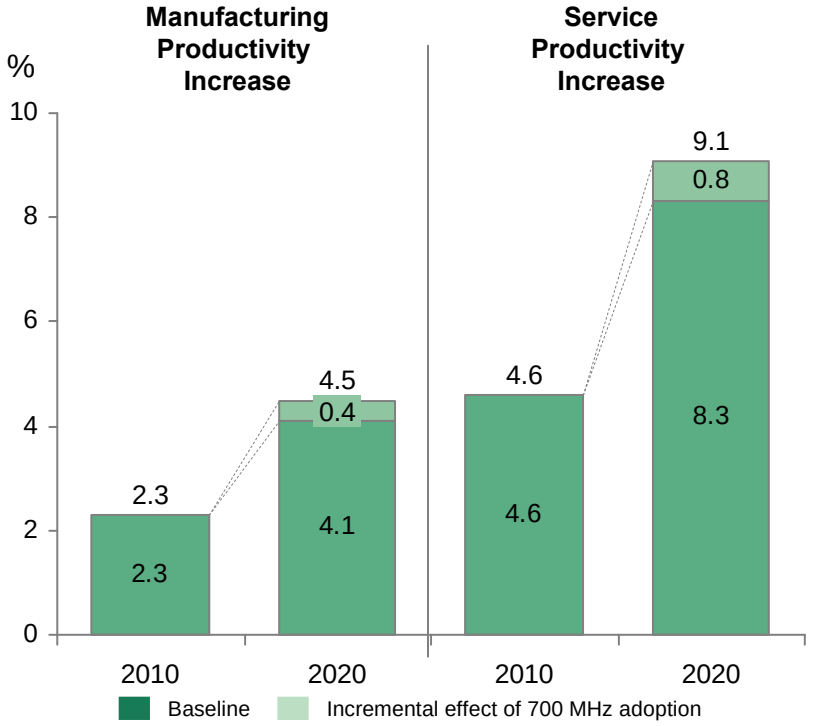
Internal process

- 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

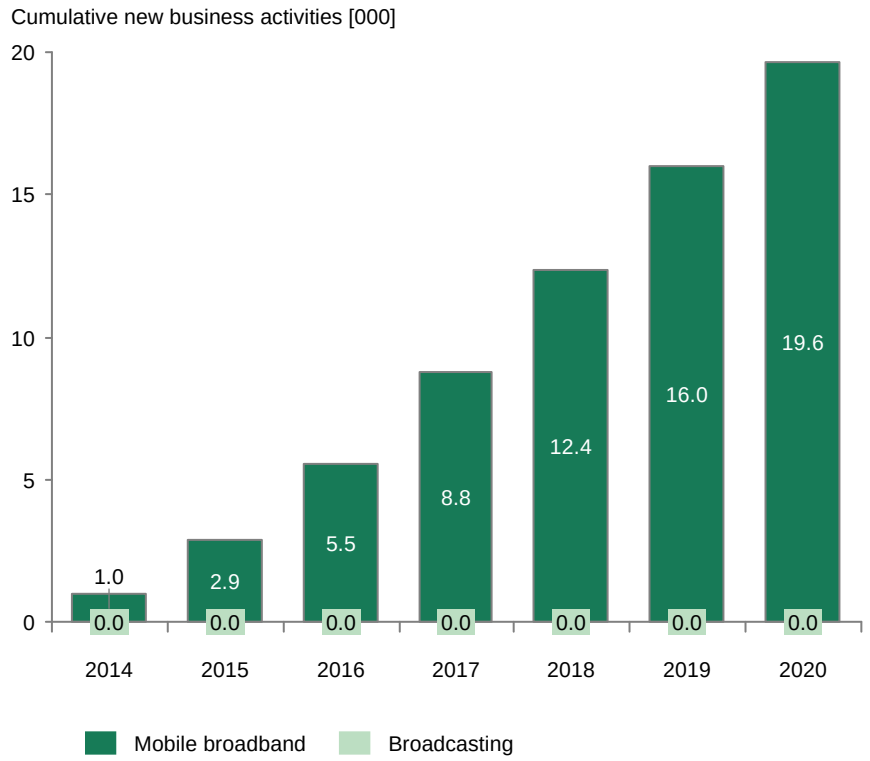
Source: Korea National Statistics Office (KNSO); Internet Statistics Information System (ISIS); Euromonitor; Ovum; Business Monitor International (BMI); BCG analysis

Allocation of 700 MHz band to mobile could result in 20K 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]



1. New business activities includes establishment of new independent businesses as well as new departments/units/business areas within existing firms
Source: Korea National Statistics Office (KNSO); Internet Statistics Information System (ISIS); Euromonitor; Ovum; Business Monitor International (BMI); BCG analysis

... and create ~35K additional jobs relative to broadcasting

New business activity will drive job creation

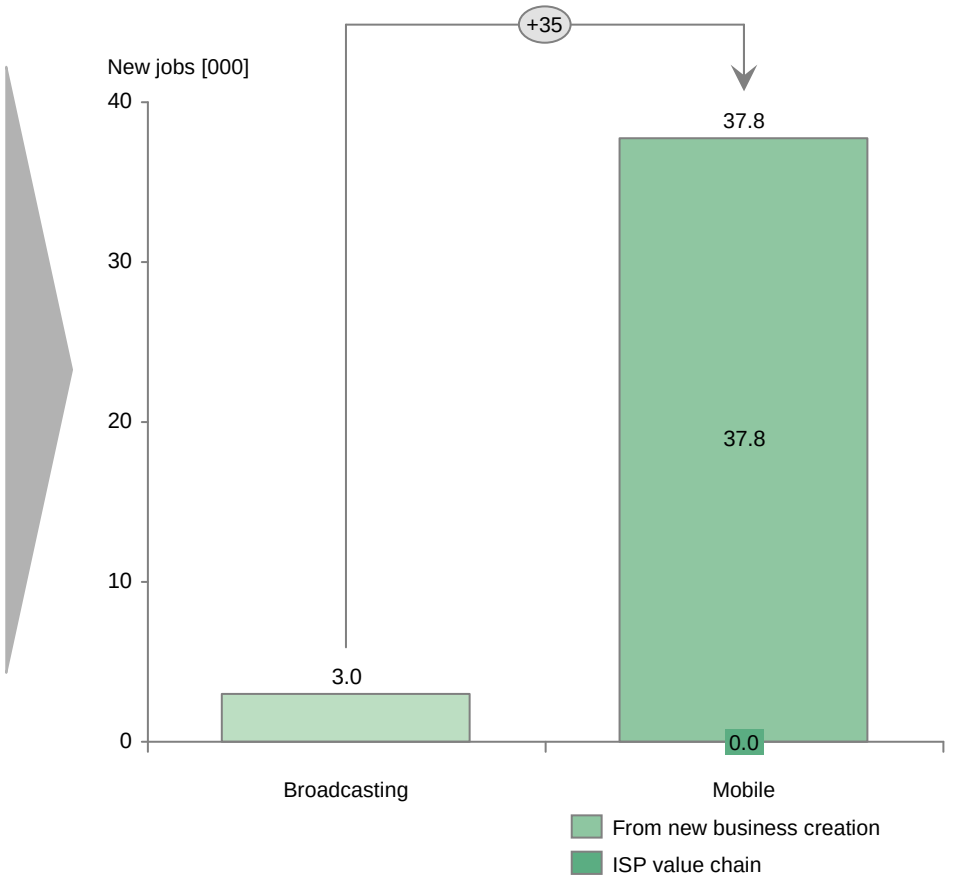
New businesses created as a result of 700 MHz band will create more opportunities for employment

- 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

~35K more jobs generated from broadband usage in 2020



Note: Rounded to nearest per thousand
Source: Korea National Statistics Office (KNSO); Internet Statistics Information System (ISIS); Euromonitor; Ovum; Business Monitor International (BMI); BCG analysis

In total, allocating 700 MHz band to mobile could contribute additional US$ 4.9B[1] to government revenues for 2014-2020

Productivity benefits of mobile drive increased tax revenues for government

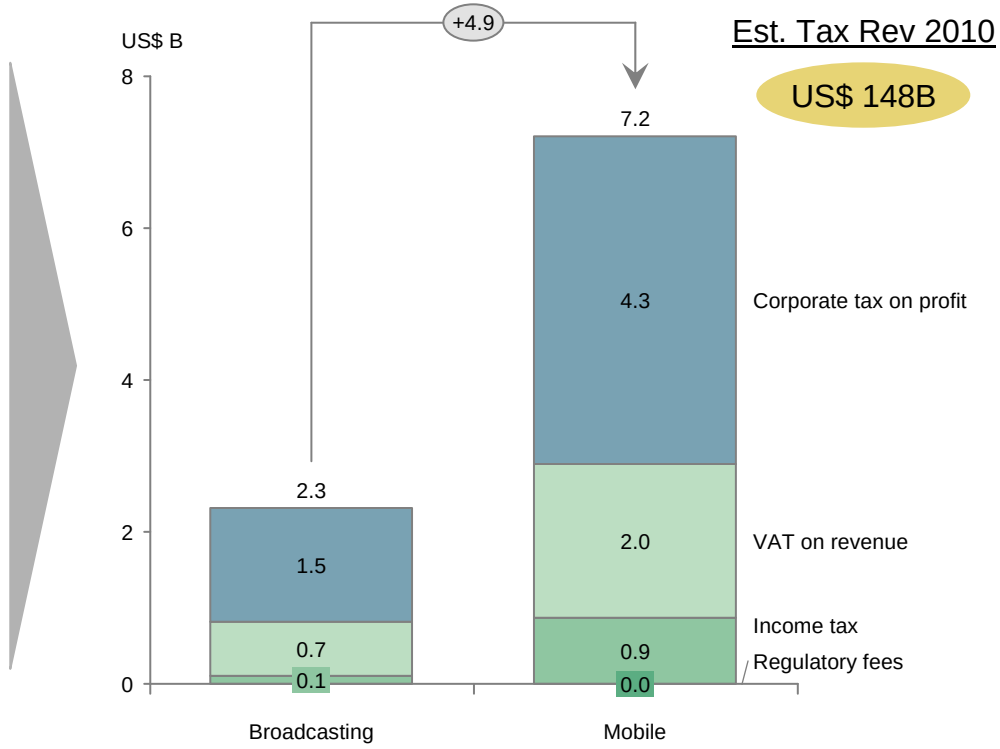
700 MHZ will increase productivity, and hence output, which will in turn increase government revenues

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

Incremental taxes from mobile broadband estimated to be US$ 7.2B over 6 years

- ~US$ 4.9B[1] more than broadcasting over the period
- Incremental broadcasting taxes likely to be lower than the estimated US$2.3B, 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$ 4.9B[1] for 2014-2020 period



1. US$ 4.2B Net Present Value

Source: Korea National Statistics Office (KNSO); Internet Statistics Information System (ISIS); Euromonitor; Ovum; Business Monitor International (BMI); BCG analysis

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Introduction

Adoption

Economic benefits

Social benefits

Implications for governments and regulators

Korea's rural population faces a vicious cycle of rural-urban inequality and migration

Industrial growth 1960s-1990s

Rural-urban inequalities

- Lower farm incomes relative to urban incomes
- Lower quality of life in rural areas

Rural – urban migration creates vicious cycle



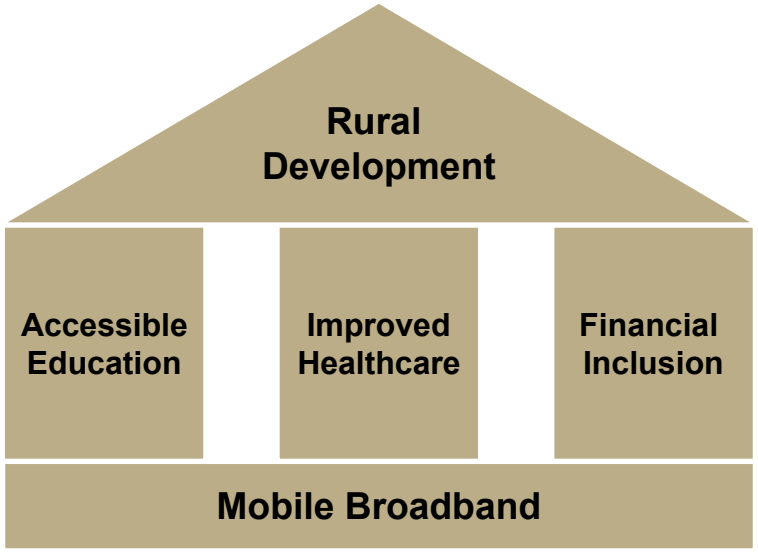
Rural challenges

- Labour shortages in farms
- Lower investment in technology, education, healthcare
- Aging rural population

Mobile broadband can help accelerate rural development, provide accessible education and improve healthcare

Mobile broadband can help address Korea's rural development challenges

Levers enabled by utilizing the Digital Dividend



Social goals as defined by Korea's Five-year Basic Plan for Rural Development[1]

✓ **Expanding welfare services**
- Improving basic facilities and welfare e.g. water, sewage, healthcare, health insurance
- Creating pleasant and liveable environments to encourage reverse flow of urban to rural migration; "rural longevity villages"

✓ **Improving education outcomes**
- Close gap between urban and rural schools

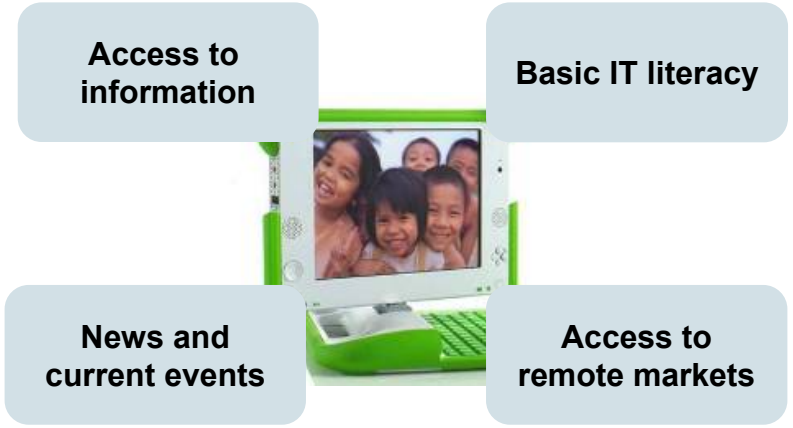
✓ **Promoting regional development**
- Aim to have >20% of population living in rural areas
- Promote rural tourism and green tourism

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

1. As promulgated by Korea's Ministry for Agriculture and Forestry
Source: Ministry website; Press search; BCG analysis

Although rural Korea already has good Internet infrastructure, 700 MHz broadband can create incremental benefit

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



In 2002, Korean government mandated Korea Telecom to provide infrastructure for at least 1Mbps connection to all villages by 2005[1]

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

Lower cost of 700 MHz band mobile broadband will increase connections in homes, especially for 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 for mobile broadband on 700 MHz band paves the way for high bandwidth applications

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

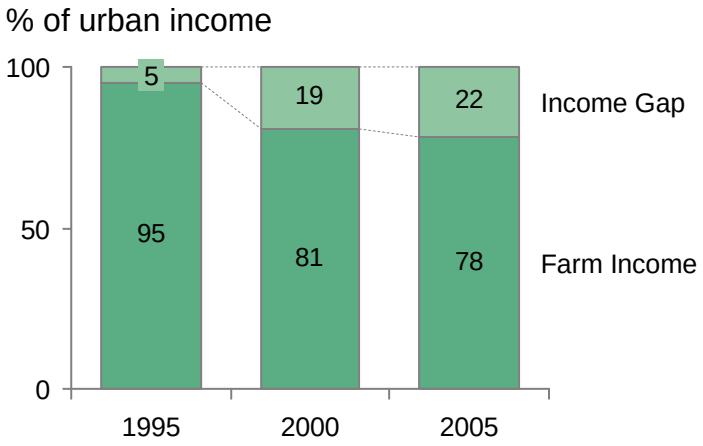
1. As a pre-condition to the privatization of Korea Telecom (now KT)
Source: Information Technology and Innovation Foundation (ITIF), Korea Information Strategy Development Institute; One Laptop per Child

Rural households in Korea remain economically disadvantaged

Rural incomes are lower than urban ...

Persistent income gap between urban and rural households

- For example, agricultural household income is 78% of urban household income[1]

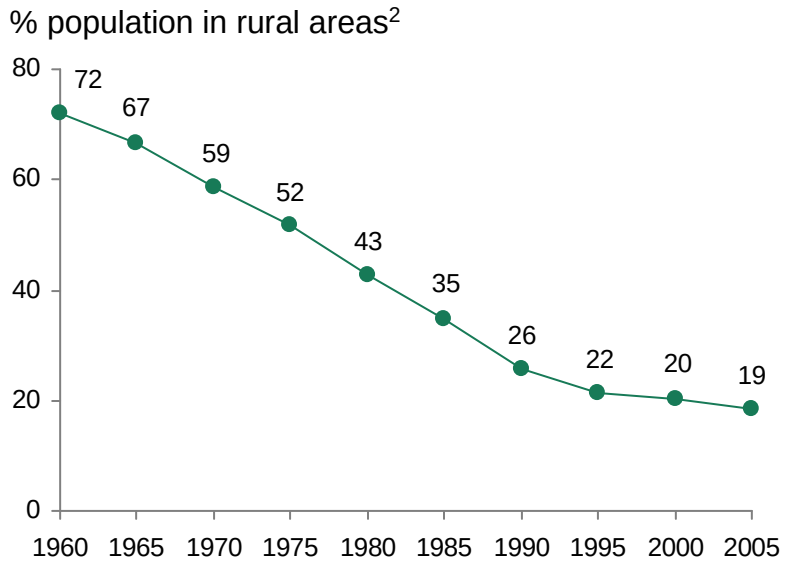


Lack of competitiveness of agricultural sector

- 62% of farms <1ha in size, thus unable to capture economies of scale[1]

... driving young people into cities in search of better opportunities

High migration rate from rural villages to urban townships



Aging population of rural settlements

- Average age of farmers increasing: >30% are 65 years old or more[3]

1. Evaluation of Agricultural Policy Reforms in Korea; 2. Based on Population and Housing Census; 3. In 2005
Source: OECD, KNSO

700 MHz band can accelerate rural development by increasing farm efficiency...

Mobile broadband applications can be applied to farm operations ...

Low cost field data acquisition and decision support

- Broadband phones can communicate wirelessly with sensors for temperature, solar radiation and moisture, such as FieldServer in Japan (cost: <US$300)[1]



... leading to higher yields and cost efficiency

Real-time data can be integrated with web-based Geographical Information Systems

- Optimal use of resources (water, fertilizer) and higher crop yields
- Dynamic decision support (e.g. pest identification)
- Video conferencing allows remote diagnosis from network of experts



Key challenge will be training farmers to adopt and leverage such technology

1. Successful IT for Agriculture and Rural Development
Source: Food and Fertilizer Technology Center; FieldServer

... and by diversifying income sources

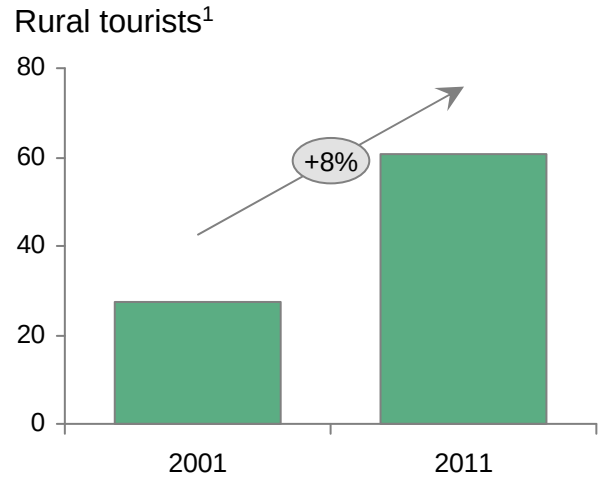
Broadband encourages home based entrepreneurship ...

Mobile broadband opens regional and global markets to global entrepreneurs

- Increases livelihood and opportunities
- Opens possibility for entrepreneurs to live in rural areas, thus helping to reverse rural population decline
- Innovative business models using high bandwidth, e.g. "virtual farming" through webcam, managing plantlets on behalf of urban people who then own the produce



... and provides marketing tools for rural tourism



Demand for Korean in-country tourists to increase at CAGR of 8% to 2011, growing market for rural tourism

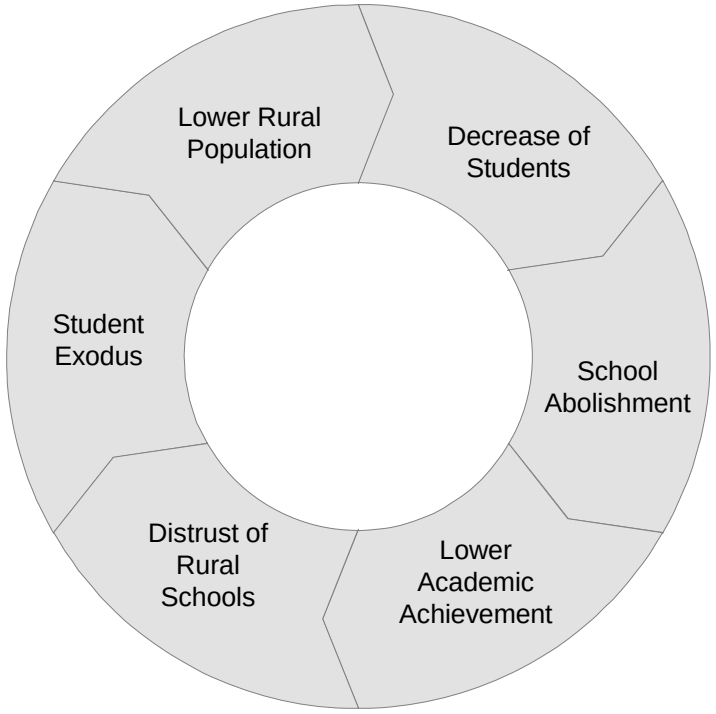
- 39% of rural tourism businessmen felt that web marketing was most effective as promotional channel[1]
- High bandwidth allows better online-customer service and innovative marketing schemes

1. 10% of the total demand for out-of-home leisure by Korean citizens

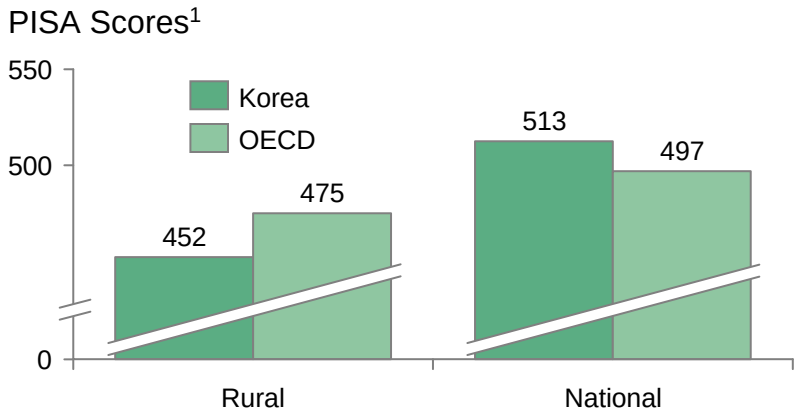
Source: Korean Rural Economic Institute; Intenrational Association of Agricultural Economists Conference; Press search

Rural education delivers relatively poor results in Korea

Vicious cycle of depopulation and lower academic standards



Underperformance compared to OECD average



Korean rural students do 4.7% poorer than OECD average for rural students

- Compared against the national averages, in which Korea as a nation performed 3.0% better

Small school sizes[2] imply that more state funds per student required for educating rural population

- 30.6% of rural schools are "small", compared to 0.7% of urban schools

1. OECD Programme for International Student Assessment, 2. Defined as having <6 classes
Source: OECD, Yonsei University

700 MHz band 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

- 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



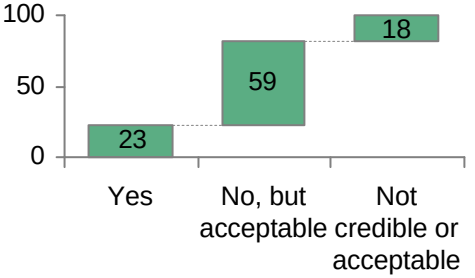
Increase opportunities for tertiary education

Tertiary education important for Korea 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.

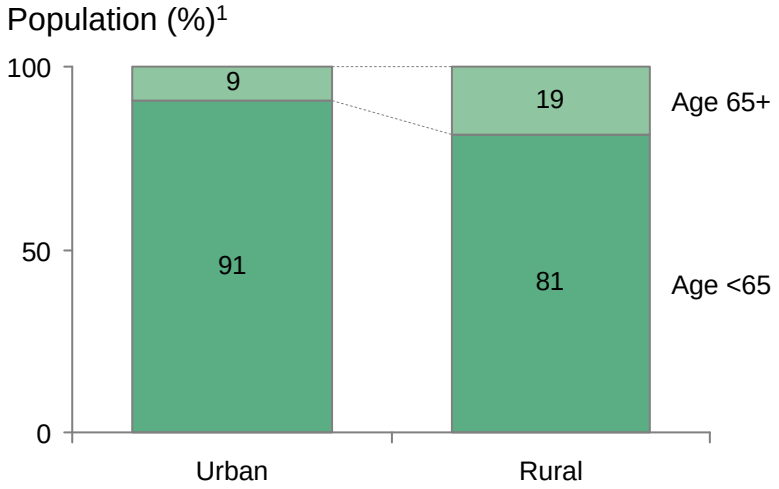
Is an online Bachelor's degree as credible as an offline one?



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

Rural healthcare challenges driven by aging population

Rapid aging of rural population and occupational hazards of agriculture

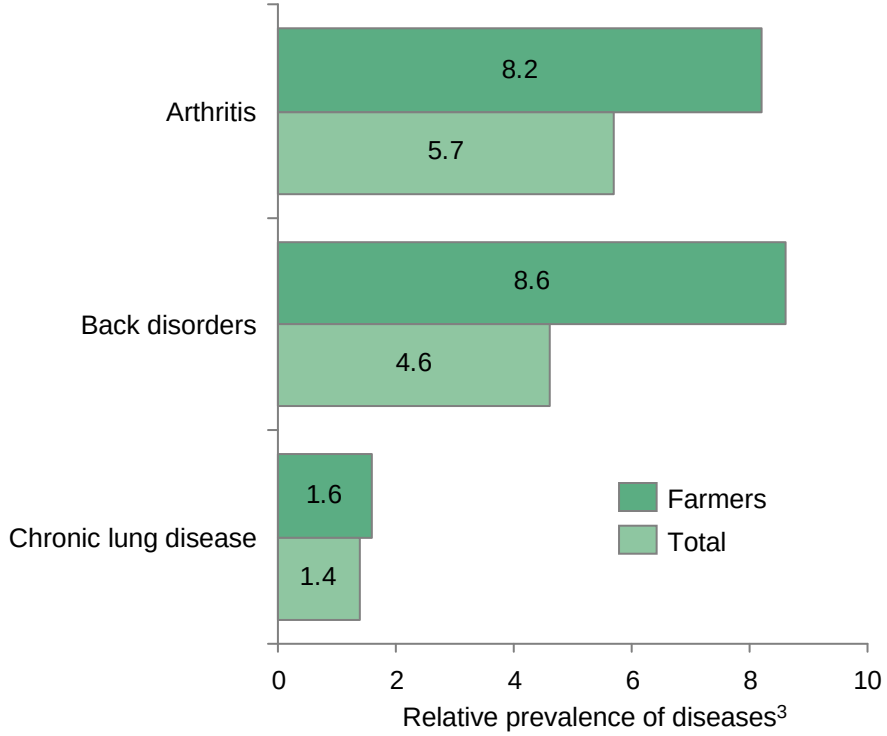


Rural areas have twice the proportion of residents aged 65 or older compared to urban

- Agricultural rural residents especially affected, with 30.1% of population age 65+[2]

Farmers exposed to pesticide poisoning, farm accidents, infectious diseases from animals

... result in unique healthcare challenges



Farmers have a greater incidence of joint and respiratory diseases, and see the doctor 37% more often compared to urban workers

1. Population distribution in 2005; 2. Population distribution in 2006; 3. Age and gender-adjusted prevalence of chronic diseases
Source: Korean National Statistical Office; Korea University Department of Preventive Medicine

700 MHz band can improve the quality of urban life by providing better healthcare services

Enhance rural healthcare provision standards

Ensure availability in underserved areas

- Critical information made available to poor and rural areas
- Improved access to governmental and NGO resources and services
- Especially important for "taboos" like HIV/AIDS and sexual health

Lifelong learning for health workers

- Enable doctors and nurses in rural areas to be informed of and trained in advances in medical science and treatments



Enable remote consultations

Increase access to specialist support and remote diagnosis

- "Ubiquitous Healthcare" offerings can be rolled out to rural areas by Korean companies e.g. KW Corp
- Virtual consultations to take place over website, facilitated by inexpensive webcams and rural broadband

Implement remote payment models for consultation/drugs

- Integration with insurance, pharmacy and e-payment services



Improve in-home monitoring systems

Home-based vital signs monitoring reduce clinic visits

- Simple sensors e.g.BP monitors, movement sensors can help elderly to live independently
- Wireless broadband connection improves mobility of monitoring systems

Improve compliance of medication regimes

- U.S. produced GlowCaps are containers that remind patients to take medication
- Wireless integrated to inform family/doctor about compliance, or re-order drugs



Source: UNDP; UNAIDS; KW Corp; Vitality

Mobile broadband in the 700 MHz band will improve access to e-government services in less-served rural areas

Korea already has one of the best e-Government services in the world...

Government 4 Consumer	• Online citizen participation portal • e-Voting system • Administrative Info and Disclosure • Online citizen services
Government 4 Business	• Tax service • Ubiquitous IPR management • e-Procurement • Paperless trade • e-Customs
Government 4 Government	• e-Document handling • Local e-Learning • On-nara BPS[1] • Computing & Information Agency dev't • Administrative Information Sharing

... but needs to reduce digital divide between urban and rural communities

700 MHz band mobile broadband would increase access to and uptake of e-Government in rural areas

- Putting broadband Internet into the hands of rural citizens would be a great catalyst for IT literacy
- Access would allow true rural e-Participation

Access to e-Government services could have large impact among rural citizens and businesses

- Reduce transaction costs and travelling time
- Improve access to public documents and information
- Increase public and community participation

Ubiquitous access to mobile broadband could also improve e-Inclusion among rural local governments

1. Nationwide information system for improving efficiency of governmental business procedures, enhance transparency in decision-making and effectively manage knowledge

Source: Ministry of Government Administration and Home Affairs; korea.go.kr; epeople.go.kr

Agenda

Introduction

Adoption

Economic benefits

Social benefits

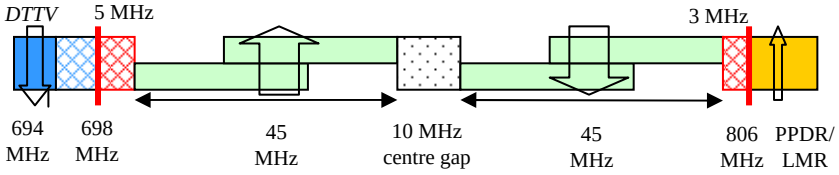
Implications for governments and regulators

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

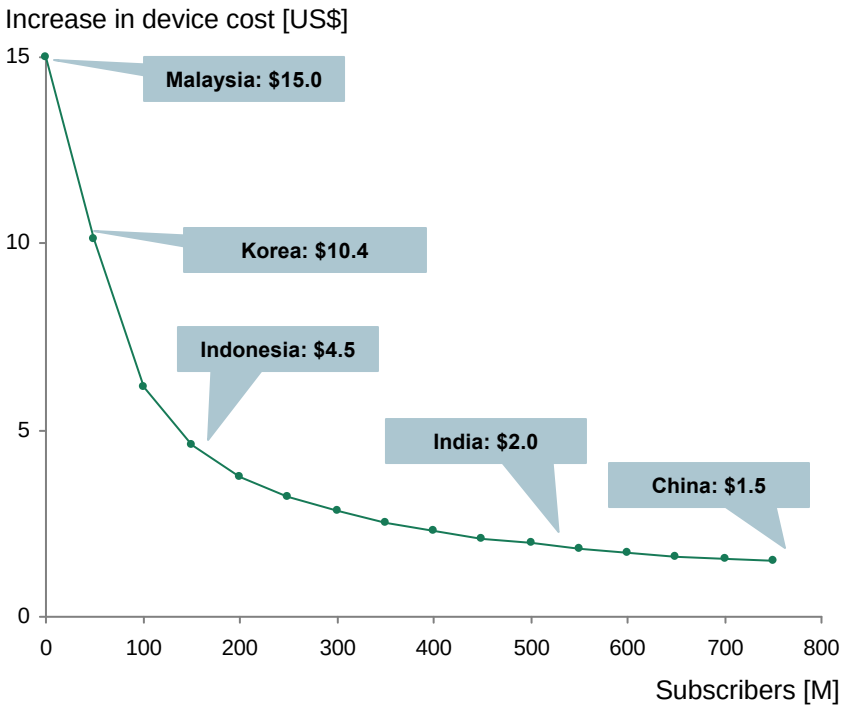
Non-harmonization will drive up cost of hand-sets and make them unaffordable to lower-income consumers

- 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

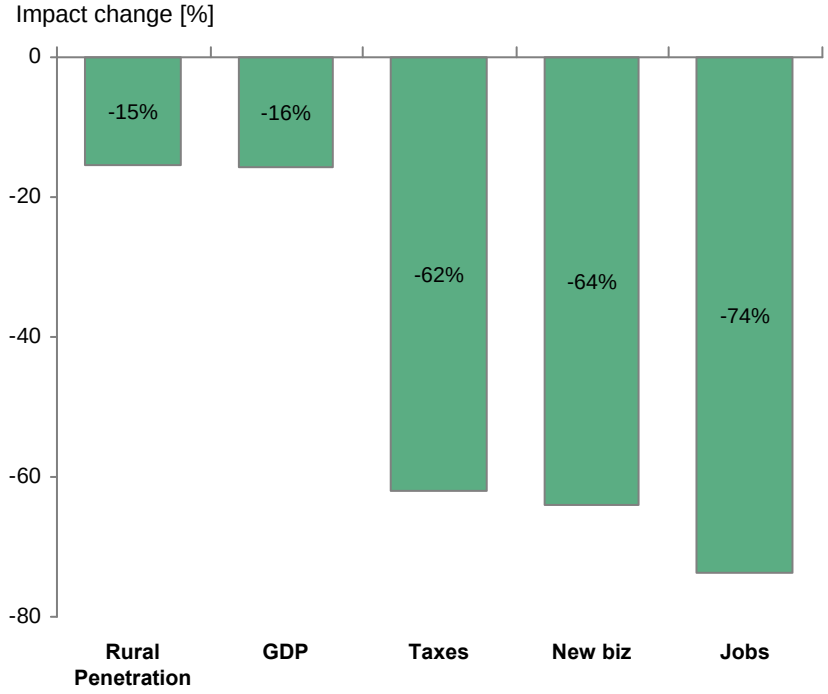
Source: 9th Meeting of the APT Wireless Forum (AWF-9); GSMA

Failure to harmonize spectrum would greatly reduce benefits

Non-harmonized spectrum could increase cost of handset US$10.40...



... reducing government revenues by 62% and new job creation by 74%



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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