



Developing Next Generation National Broadband Networks (NGNBN)

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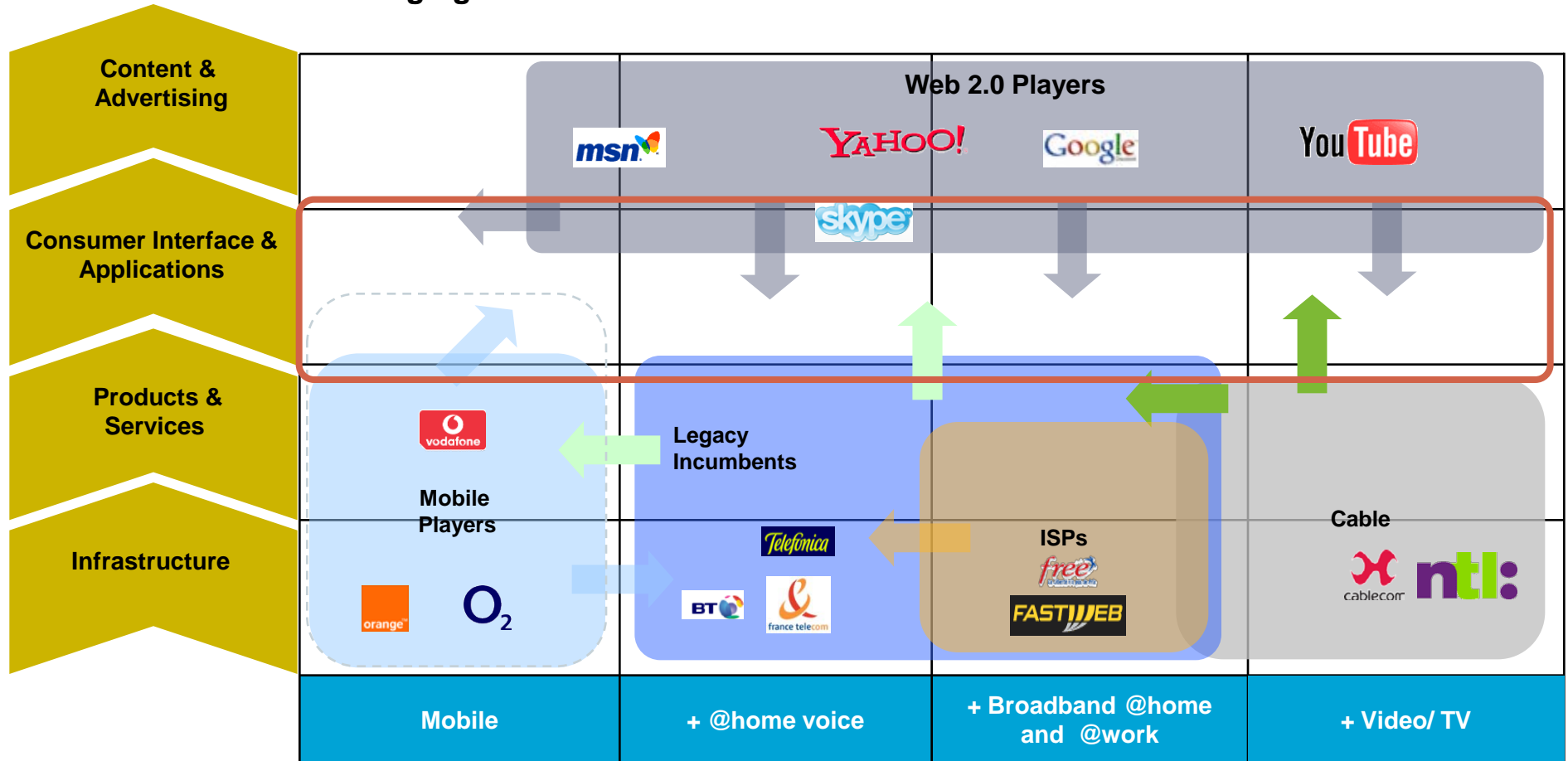
1. Assessing the Need for NGNBN

2. NGNBN Deployment Policies

3. NGNBN Key Challenges

Globally, new business models are emerging aiming primarily at capturing the end consumer interface



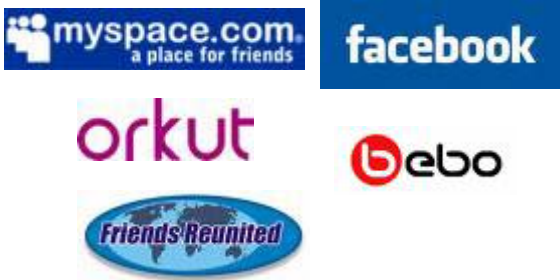



Emerging Business Models in the Media and Telecom Sectors



Numerous new services and applications are becoming widely used with significant higher bandwidth demand

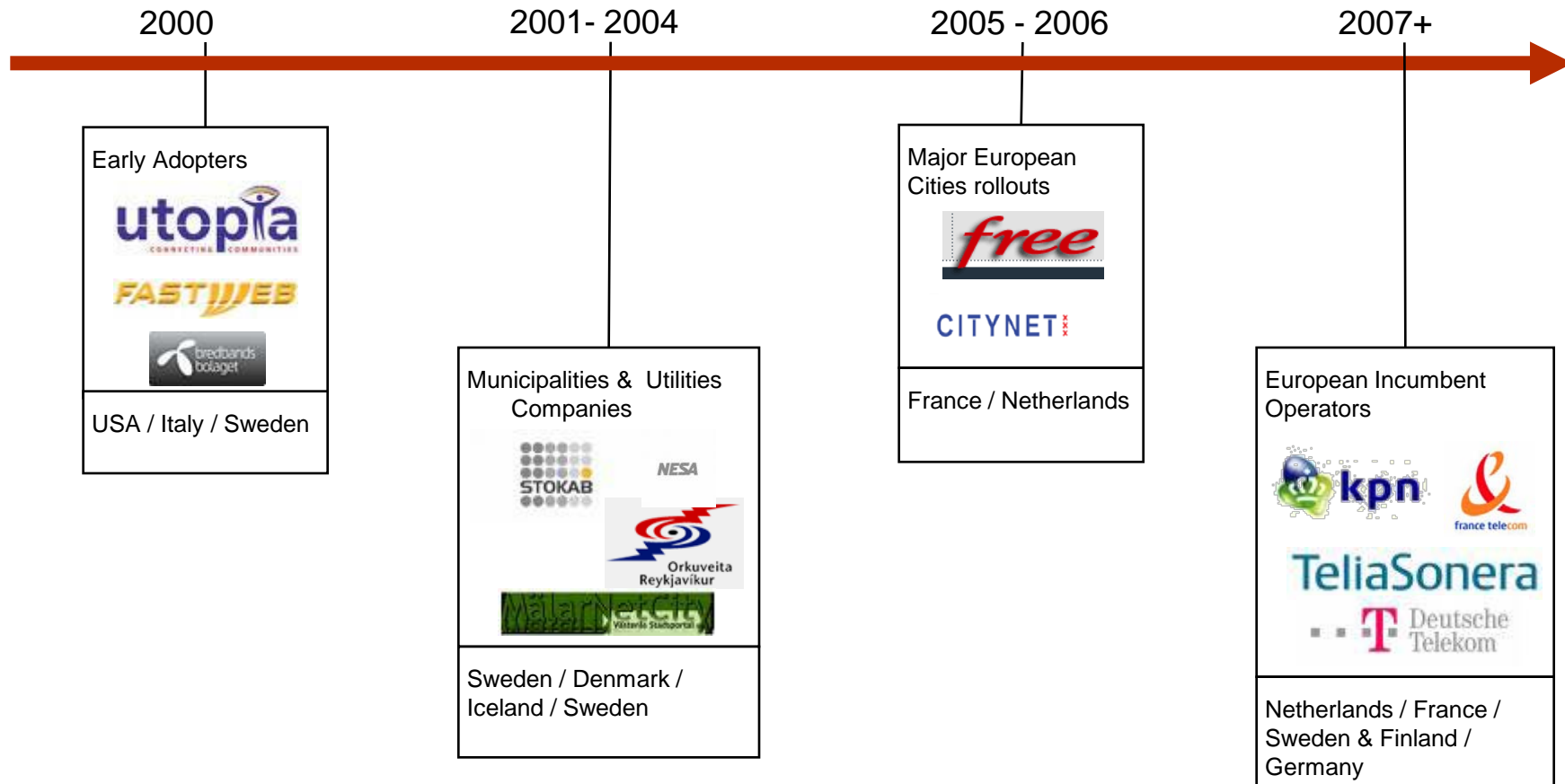
The copper network is pushed to its limits

Pressure is placed for fiber rollout

Voice over IP Services	P2P Applications	Social Networking
		
Online Gaming	User-Generated Content	Search Engines
		

Fiber deployments are starting to get traction from the major incumbent operators

Fiber Network Deployment



And significant numbers of deployments are implementing infrastructure sharing models

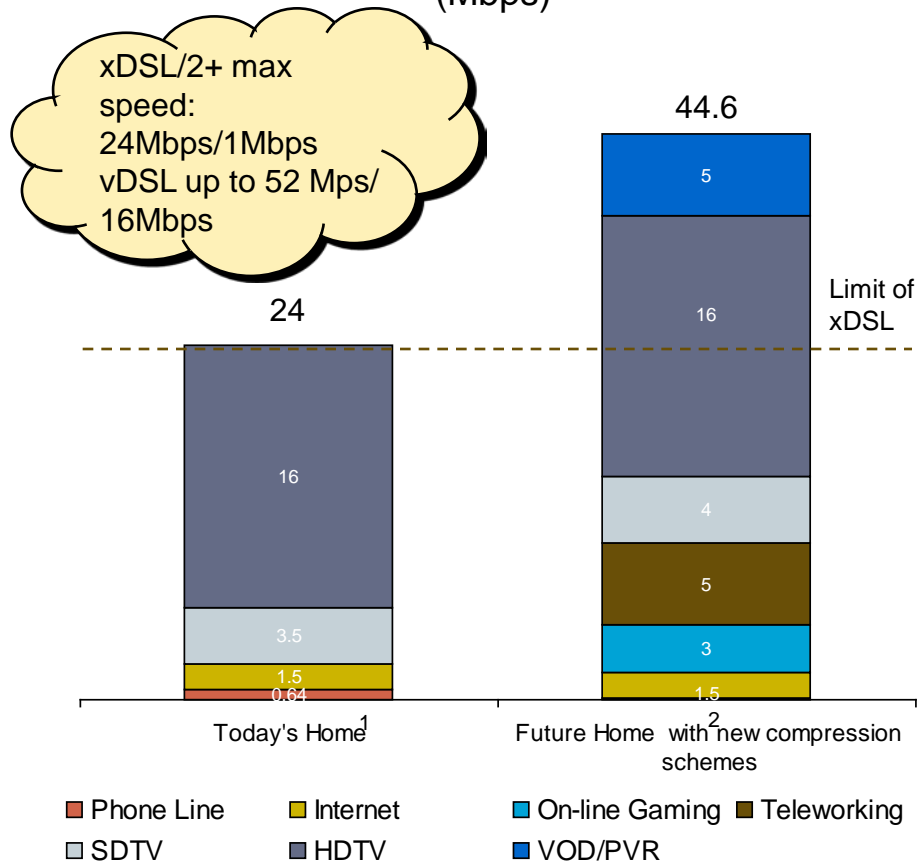
On one hand, consumers' new online patterns are driving the demand for higher bandwidth and faster internet

Consumer Drivers for High Speed Internet Networks

<p>Internet Usage</p>	<ul style="list-style-type: none"> ▪ Consumers are spending longer time online, and their quality and speed standards are increasing accordingly <ul style="list-style-type: none"> – Worldwide consumer media consumption on the internet has increased from 4.4 days per user per year in 2000 to 8.1 days in 2008 – xDSL is rapidly replacing dial-up services in most advanced internet countries, and in some countries, xDSL is being replaced by FTTx
<p>E-commerce</p>	<ul style="list-style-type: none"> ▪ Consumers and businesses are increasingly adopting the internet as a platform to procure products and services. e-commerce is expected to continue its strong growth from \$172 billion in 2005 to \$329 billion by 2010, representing 13% of the total US retail sales
<p>New Applications & Services</p>	<ul style="list-style-type: none"> ▪ Consumers are increasing the use of more sophisticated applications, like online gaming, social networking, P2P, VoIP, Web TV, etc. <ul style="list-style-type: none"> – In the US in 2006, at least once, 74% of internet users have used their internet connection to watch online videos – VoIP service revenues are expected to growth from \$15.8 billion in 2006 to \$47 billion by 2010 <ul style="list-style-type: none"> ▪ Skype delivered 3.9 billion minutes in Q2 2007

However, indicative forecasts reveal that xDSL will not be capable of meeting future bandwidth demand

Forecasted Subscribers Bandwidth Demand (Mbps)



1) Today's home includes one phone, SDTV, HDTV and HSD service

2) Future Home includes two phones, two SDTVs, two HDTVs and additional applications

Source: Corning, Forbes and eMarketer, Business Wire

Observations
<ul style="list-style-type: none"> Theoretically the maximum speed that xDSL can support is up to 24Mbps (vDSL up to 52 Mbps at max distance 1,200 m) but depends on various factors, like distance of the connection to the local exchange Increasing popularity of high bandwidth-driven online applications <ul style="list-style-type: none"> Worldwide console and handheld online gaming subscribers is expected to reach 30 million by 2009 Media web continues to grow. The number of online video viewers is expected to reach 183 million by 2011

From the supply side, FTTx allows operators to effectively compete in the more content-driven market

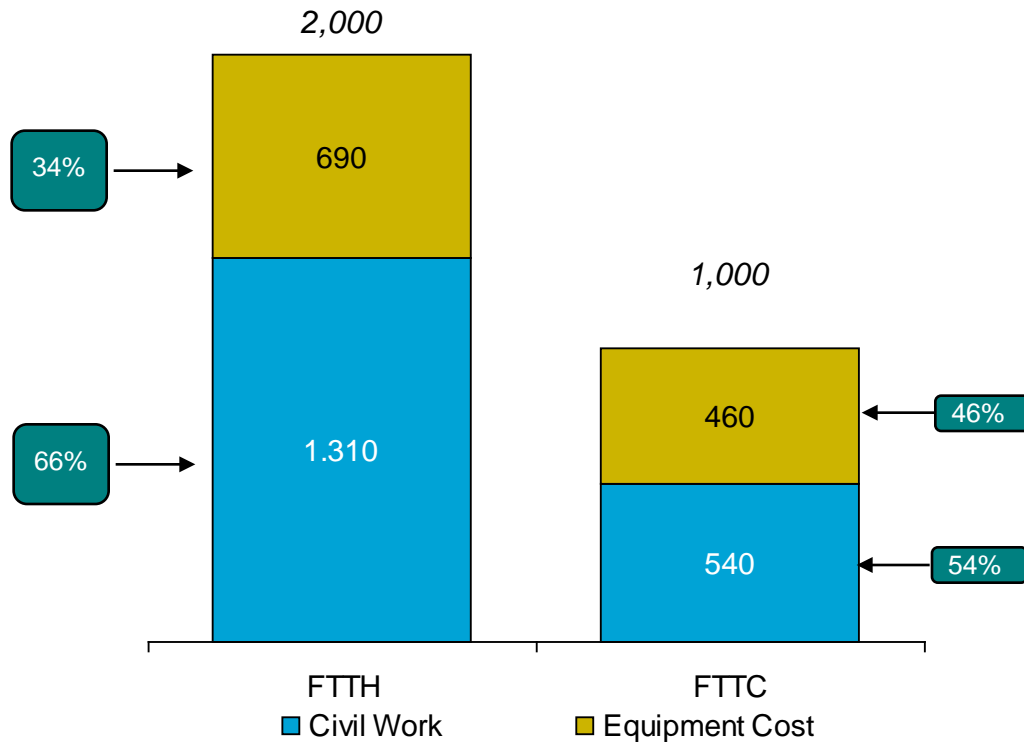
Supply Drivers for High Speed Internet Networks

Competitive Dynamics	<ul style="list-style-type: none"> ▪ Operators are deploying fiber networks to increase entry barriers and reduce the threat from new entrants ▪ In some markets, operators are using the fiber networks to differentiate their offering. In Japan, the level of speed for internet connection is one of the major consumer purchasing factors ▪ Telco's are leveraging the fiber network to effectively compete with cable companies. In the Netherlands, cable operators had 40% market share for internet access in 2006
New Services	<ul style="list-style-type: none"> ▪ FTTx deployment have enriched the infrastructure capabilities for operators to offer rich bundle propositions, including media-centric services (VoD, IPTV, HDTV) ▪ The majority of European and US incumbents are now offering IPTV services
Cost Reduction	<ul style="list-style-type: none"> ▪ Fiber networks' high Capex investment have significant rewards from the Opex perspective. KPN announced Opex savings of €0.85 billion by deploying its fiber network , and Verizon aims to save \$1 billion in Opex by 2010 with its FTTx deployment
Regulatory & Government Demands	<ul style="list-style-type: none"> ▪ Government initiatives and regulatory policies have communicated indicative measures to promote fiber deployment ▪ Japan and South Korea operators' received tax breaks and interest-free loans to deploy FTTx networks

Operators' decision to deploy FTTx requires a strong business case to justify high investments

Indicative Prices

Estimated Access Deployment Cost per Subscriber¹
(bIn US\$ Dollars)



Observations
<ul style="list-style-type: none"> Fiber cost per country differs substantially, due to the differences in regulatory mandates, digging regulations and labour costs The majority of the FTTx cost is driven by the labor expenditure. In some markets, labor costs can be as high as ~70% of a FTTH rollout Equipment cost is expected to continue to drop for the next 5 years Verizon expects to reduce its current ONT² transceiver cost from approximately \$150 to \$50 by 2010

Financial burden to deploy fiber network has driven operators and new players to implement infrastructure-sharing agreements

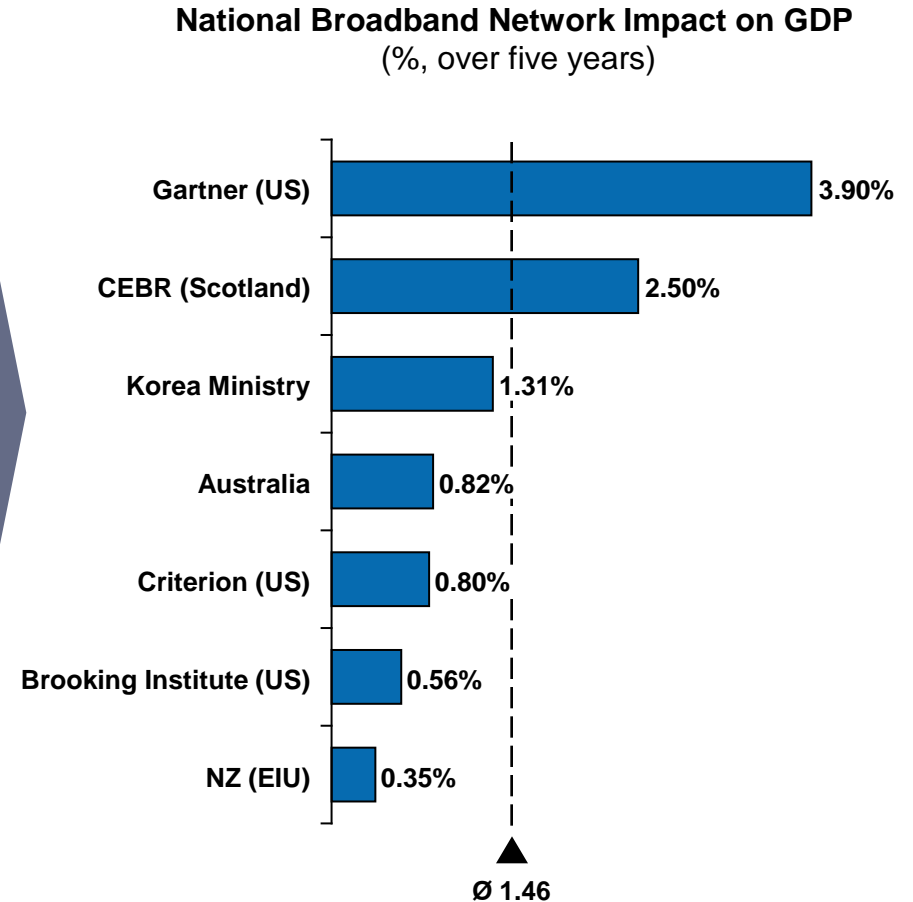
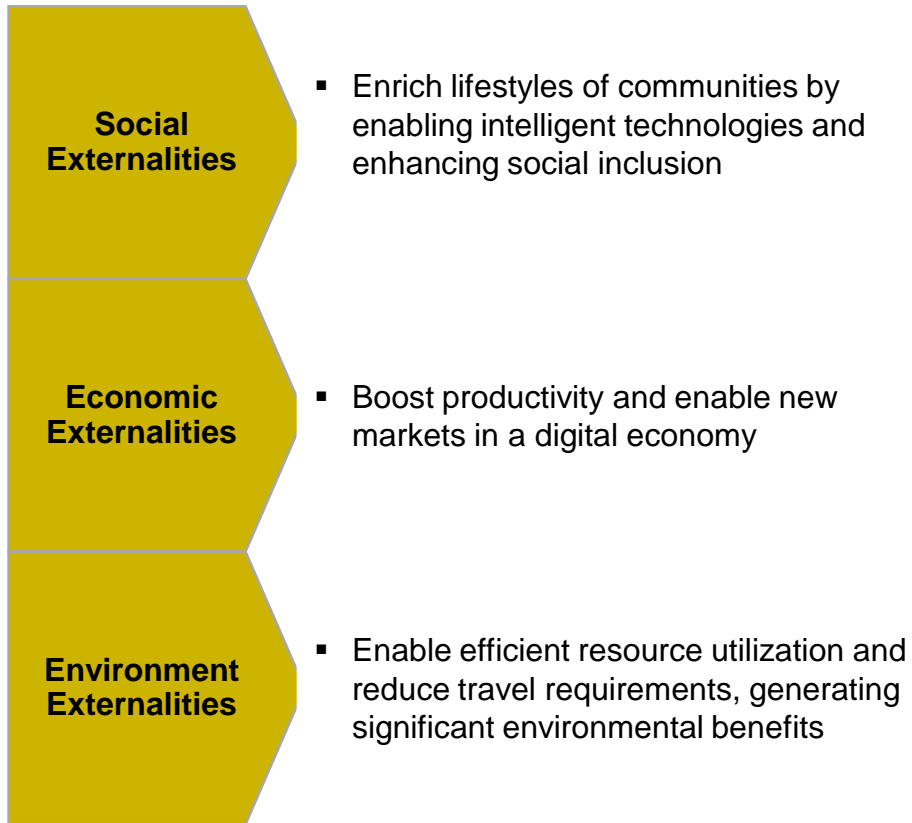
(1) Include all costs related to the network deployment to pass and connect a home

(2) Optical Network Terminal

Source: UBS Report

Overall, NGNBNs are increasingly recognized as essential for national competitiveness and social development

NGNBNs Benefits



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Regulatory uncertainties and challenging financials have hindered NGNBN optimal deployment to date

NGNBN Deployment Inhibitors

Regulators

- Lack of clarity on NGNBN regulation model
- Existing regulatory tools such as LLU not viable on NGNBN
- Announcement around infrastructure separation
- Open access and net neutrality considerations

Incumbents

- Nation-wide deployment hindered by challenging financials
- High risk investments as a result of regulatory uncertainty

OLOs¹

- Differentiation based on services and applications rather than infrastructure
- Challenging business case of NGNBN deployments in the absence of an effective infrastructure sharing model

¹ Other Licensed Operator










Three distinctive models are identified, regarding the development of NGNBN

NGNBN Development Models

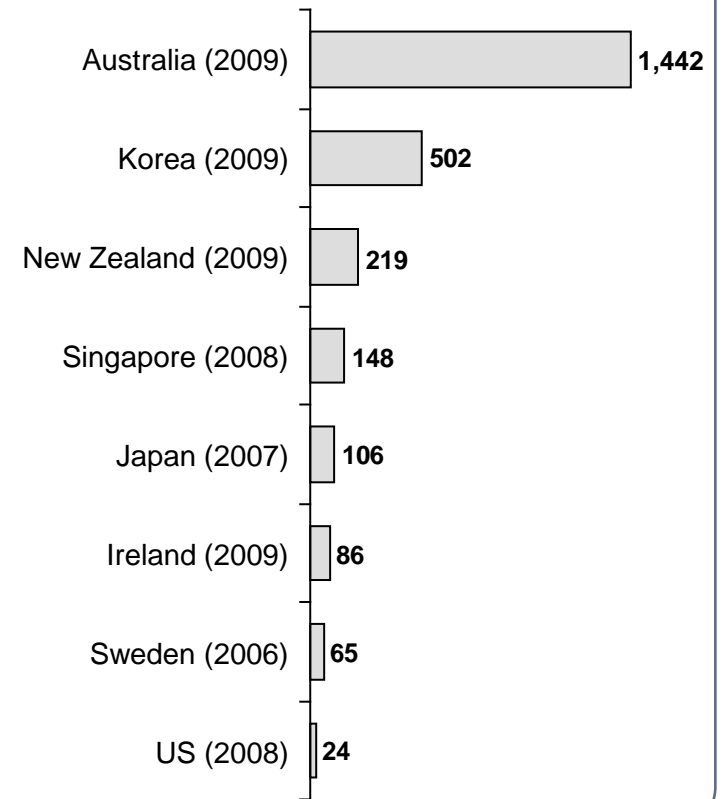
	Description	Benefits	Drawbacks
<p>1</p> <p>Commercial - Led</p>	<ul style="list-style-type: none"> Incumbent operator takes the lead to deploy fiber access networks Examples: KPN-Netherlands 	<ul style="list-style-type: none"> Fast and effective networks deployment, focusing on market segments where demand really exists 	<ul style="list-style-type: none"> Creation of a new fiber monopoly Possibility of new “digital divide” within country
<p>2</p> <p>Government - Led</p>	<ul style="list-style-type: none"> Government is mandating who and how NGNBN will be deployed Examples: Telekom Malaysia, Malaysia 	<ul style="list-style-type: none"> Strong political willingness and financial support Ensure nationwide NGA networks deployment 	<ul style="list-style-type: none"> Lack of relative expertise Possibility to raise anti-competitive concerns, when selecting operator to develop NGNBN
<p>3</p> <p>Public Private Partnerships (PPP)</p>	<ul style="list-style-type: none"> Both government and private entities co-fund NGNBN development Examples: Singapore, New Zealand, Greece 	<ul style="list-style-type: none"> Open and competitive approach for all players to get involved Nationally coordinated effort, targeting to maximize coverage 	<ul style="list-style-type: none"> Implementation difficulties (execution timing, decision making) Possibility of investment duplication, in case there are delays

The economic downturn triggered Governments to intervene and invest

NGNBN - Government Investment Recent Announcements

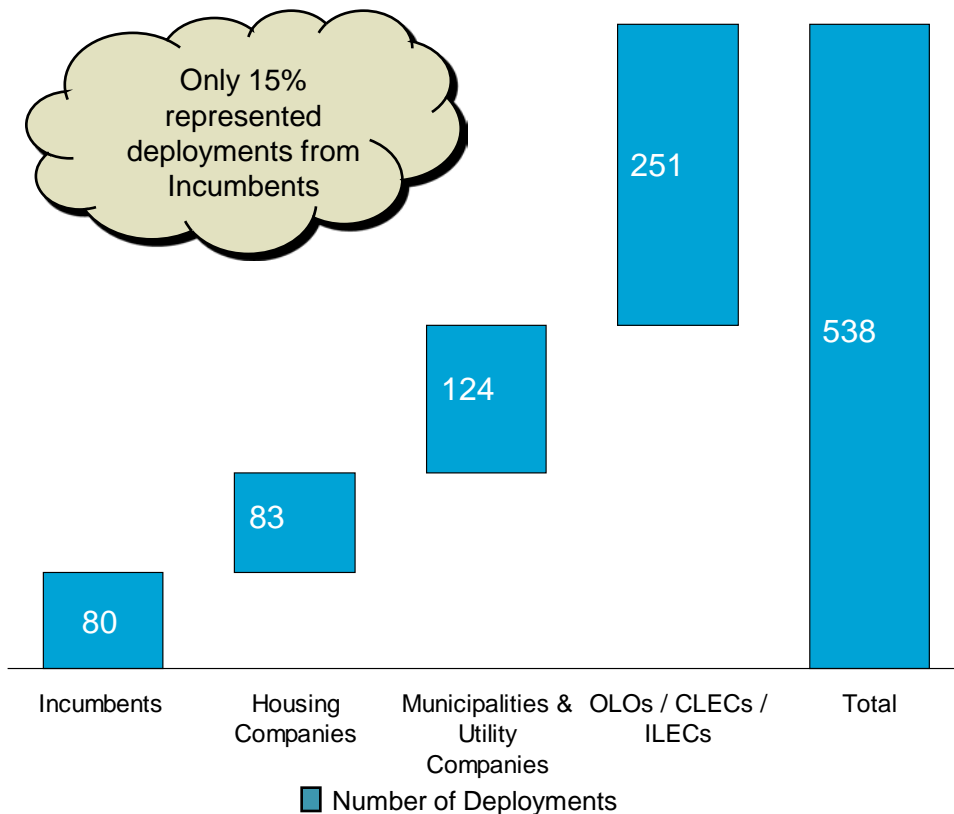
Australia		Australia is spending USD 30 Billion in building a high speed nationwide broadband network
Korea		Korea's recent government plan aims to achieve 1Gbps connection in 2012 requiring USD 24.6 Billion over next 5 years (120 K jobs)
Singapore		Singapore has introduced a multi-tier NBN network model and invested USD 600 Million
Japan		Japan has initiated the u-Japan (Ubiquitous Japan) project in 2007 and invested USD 13.6 bln ("Zero Broadband Areas Elimination" policy)
USA		USA has allocated USD 7 Billion to high speed broadband access in its economic recovery package
Malaysia		National Broadband Plan launched in 2004, aims to have 75% of households penetrated by 2010
New Zealand		In 2009 the New Zealand government pledged USD1.5 Billion to provide fiber to the home network for all citizens
Sweden		By 2005 national broadband infrastructure reached 98% of the population, with 100% high speed coverage by 2008
Greece		Greek government pledged USD 2.82 Billion in 2008 to provide broadband fiber access to 2 million households

Government Spend Per Capita On Broadband (USD)



Additionally, non-traditional telecom companies are getting more involved in fiber networks deployments

Number and Type of Companies Deploying Fiber Network in US and Europe, 2007



Observations

- In US compared to Europe, cable operators have gained substantial market share in the broadband market
- Demand for advanced services, such as HDTV, P2P, gaming, exchange of video content are driven higher bandwidth demand in USA compared to Europe
- It is forecasted that there will be more than 40 million and 25 million IPTV subscribers in the US and Europe respectively, by 2012
- Regulatory and Government support has been one of the major drivers for fiber deployments around the world
- Additionally, increased interest from local authorities to attract ICT investment to the region or city

(1) Other license operators (2) Competitive Local Exchange (3) Incumbent local exchange companies

Source: IDATE, ECTA, Telegeography and Corning

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In this context, two questions are challenging key policy makers and ICT stakeholders

NGNBN Key Challenges

Policymakers / Regulators

- What policies and regulations are needed to overcome the current NGNBN investment deadlock, while preserving the telecom market liberal economy?

Incumbent Operators

- What business models should enable traditional telcos to build a viable NGNBN, while addressing regulatory requirements?

Key issues - policymakers and regulators

Key Issues (1/2)

- **Demand Drivers** - What consumer, business, government, and public ICT applications will be enabled by the deployment of next generation national broadband networks?
- **Socio-Economic Impact** - What impact would wide access to next generation broadband applications have on end-users, the telecom sector, society and the economy? What externalities (network, “prosumer”, competitiveness, and regional) should be taken into account?
- **Requirements** – What type of network infrastructure and deployment plans are needed to accelerate the offering of these applications and the fulfillment of desired socio-economic benefits?
- **Enablers** - To what extent can traditional market forces and existing policies and regulations drive the effective deployment of next generation national broadband networks?
- **Strategies** – What stimulus could national broadband policies use to accelerate deployment and uptake? Supply-side stimulus? Demand-side stimulus?

Key Issues (2/2)

- **Industry Re-structuring** – To what extent will next generation national broadband networks policies drive the restructuring of the telecom industry and the de-layering of vertically integrated business models?
- **Government Role** - What role should the government play in the deployment of next generation national broadband networks? Facilitator? Investor? Regulator? What type of intervention should governments have?
- **Policy** - How should telecom policies evolve to accelerate the build-up of high-speed, ubiquitous national broadband networks and enable the development of digital-societies? To what extent should open access become the norm?
- **Regulation** - What are the key considerations for effectively regulating next generation national broadband networks and measuring related socio-economic impacts?

Key issues - incumbent operators

Key Issues (1/2)

- **Technology** - What technologies are likely to support national broadband networks deployment over the coming 3-5 years? What are the associated financial, technical, and operational advantages and disadvantages?
- **Competitive Dynamics** – How is the competitive landscape for deploying and leveraging next generation national broadband networks evolving, and what pressure does this raise on incumbent network operators?
- **Business Case** – To what extent can incumbent operators build a positive business case for next generation national broadband networks investments, in light of market, regulatory, and technology trends?

Key Issues (2/2)

- **Business Models** – What business models are emerging for the deployment of next generation national broadband networks and in what cases are they most relevant?
- **Separation Considerations** – In what cases should incumbents proactively consider infrastructure separation?
- **Making Separation Work** – How could incumbent operators effectively manage infrastructure separation challenges?