NGN and the evolution of the electronic communications market

International Approaches

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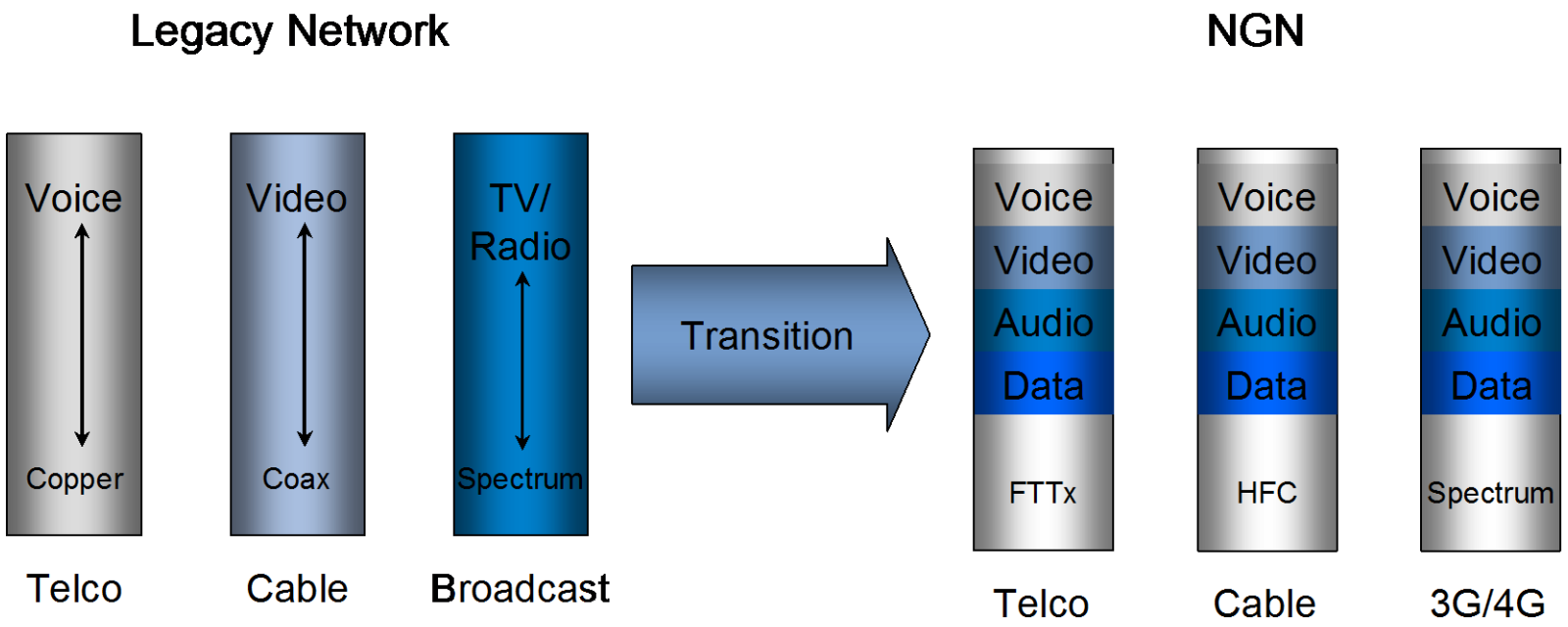
NGN and market evolution - International Approaches

- What changes with the migration to NGN?
  - NGN core, NGN access
  - Speed and cost of network access
  - Transmission medium independence
  - Shifts in the value chain
- How are different regions of the world dealing with the migration?

What changes with the migration to NGN?



- Historically, many networks delivered a single service.
- With NGN, any network can deliver (nearly) any service.

What changes with the migration to NGN? Regulation

- There are three primary reasons for regulation of electronic communications, all related to market failure:
  - Addressing distortions of competition, especially those caused by some form of market power.
  - Addressing social needs that the free market might not, typically because the social value exceeds the private value to parties that might otherwise invest.
  - Allocating scarce resources that are unique to each country.
- The move to NGN raises issues in all three areas.

What changes with the migration to NGN? Key changes

- In the value chain by which services are delivered to end-users.
- In the ability of different service providers (not all of whom are network operators) to compete with one another for the same services.
- In the speed and the character of network access, and thus in the ability to offer bandwidth-hungry services (e.g. video).
- In the degree to which distinctions of cable versus telecommunications, fixed versus mobile, wired versus wireless are relevant.
- In the ease with which certain public needs can be satisfied.
  - Access to emergency services.
  - Lawful intercept.
- In the ability of end-users (or software developers on their behalf) to create new capabilities in the end-user's device (e.g. PC), often without the active involvement of the network operator.

What changes with the migration to NGN? The nature of competition

- Much of regulation and public policy of electronic communications deals with market power (SMP).
- The shift to NGN implies changes in the value chain, and thus subtly alters market power.
- Implications for regulation?
  - New forms of competition emerge?
  - Old barriers remain?
  - New barriers emerge?
- Is the net change toward more competition, or less?

NGN core, NGN access

- Network operators migrate to NGN core versus NGN access for different reasons.
- NGN Core: Replace traditional circuit switches with IP routers and VoIP gear.
  - Efficiency gains from fully merging voice and data networks.
  - Accelerate time to market for new services.
  - Traditional switches are hard to find and hard to maintain.
- NGN Access (NGA): Drive fibre deeper into the network.
  - Far greater speeds, improved reliability
  - Ability to support new applications
  - Lower OPEX

  BUT
  - High cost of implementation
  - Limited willingness of consumers to pay (about €5 / month)

The Evolution to IP-Based Fibre

- There is a global trend to migrate access networks to high speed fibre optic using Internet protocol (IP).
- Different regulatory trends in different countries.
  - Technological neutrality, or technology-specific?
  - Is access regulation still needed?
  - What challenges does the migration to fibre raise for access remedies (especially ULL)?
- Different technologies raise different issues.
- Different countries are attempting different solutions.

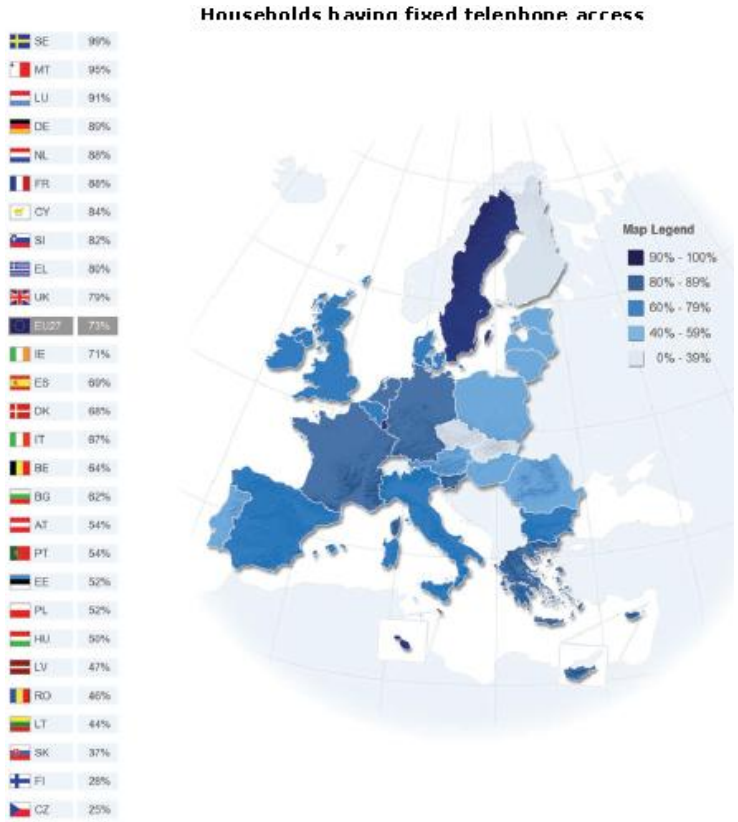
Challenges of NGA deployment

- Through the EU 2020 strategy, Europe seeks to achieve availability of 30 Mbps broadband to all Europeans by 2020, with half of all broadband consumers served at speeds of 100 Mbps or more.
- Consumers have only limited interest in NGA at present – incremental willingness to pay for ultra-fast broadband is only about € 5 per month, which is nowhere near enough to fund the initial investment needed in most parts of the national territory.
- Most estimates of the investment needed are in the neighbourhood of € 200 – 300 billion.

Network Type	Cost per home accessed [in €]					
	DE	FR	SE	PT	ES	**IT**
VDSL	457	n.v.	352	218	254	**433**
PON	2,039	1,580	1,238	1,411	1,771	**1,110**
P2P	**2,111**	**2,025**	**1,333**	**1,548**	**1,882**	**1,160**

Source: WIK (2008).

Challenges of NGA deployment



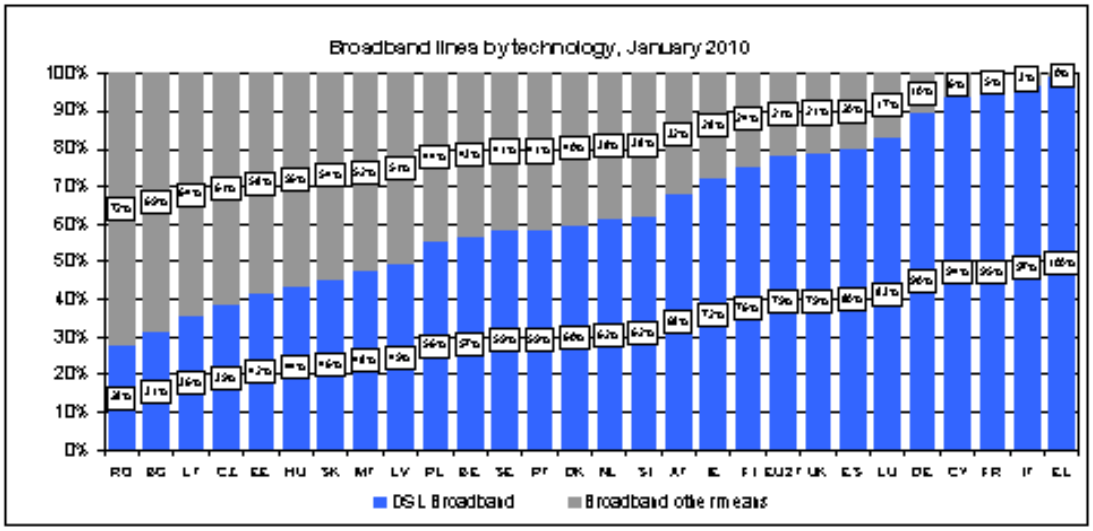
- The fixed network in former East Bloc countries is limited.
- Households with fixed telephone access:
  - PL 52%
  - HU 50%
  - RO 46%
  - CZ 25%

Source: Eurobarometer October 2010 (Nov-Dec 2009 data)

Challenges of NGA deployment

- 34% of households in the EU-27 as a whole receive television via cable.
- Cable plays a large fixed broadband role, not only in the Netherlands and Flanders, but also in many EU-12 Member States.
  - RO, MT, HU 64%
  - BG 62%
  - SI 54%

Source: Eurobarometer October 2010 (Nov-Dec 2009 data)



Source: 15th Implementation Report, Annex 2

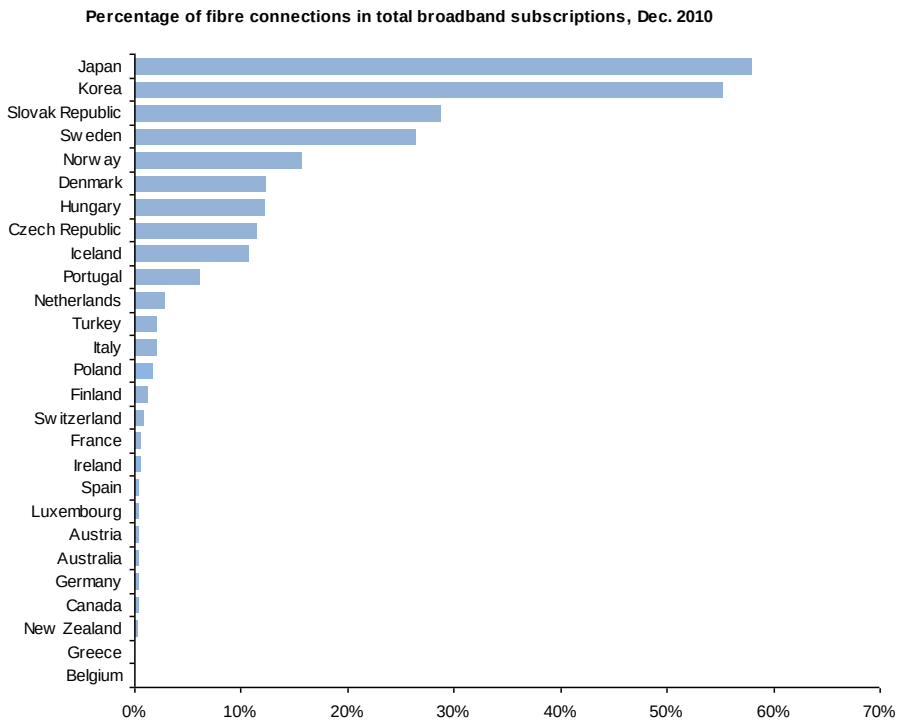
Challenges of NGA deployment: VDSL

- The VDSL first mover has often, but not always, been the incumbent.
- DSLAMs move closer to the customer.
  - MDFs may disappear; if they remain, they may no longer be an appropriate point for ULL.
  - There are far more street cabinets than MDFs.
    - About 40:1 in Germany.
    - About 10:1 in France.
  - Implies difficulties for ULL sub-loop competitors:
    - More street cabinets to connect to.
    - Fewer customers per cabinet.
    - Lack of ducts and access to incumbent cabinets.
- Opposing tendency: deploy VDSL only from the MDF.

Challenges of NGA deployment: FTTB/FTTH

- Practical challenges with building wiring.
  - Building owners do not want to re-wire twice.
  - Creates a severe monopoly within the building.
  - Implies large first mover advantages.
- Challenges in unbundling point-to-multipoint PON solutions.

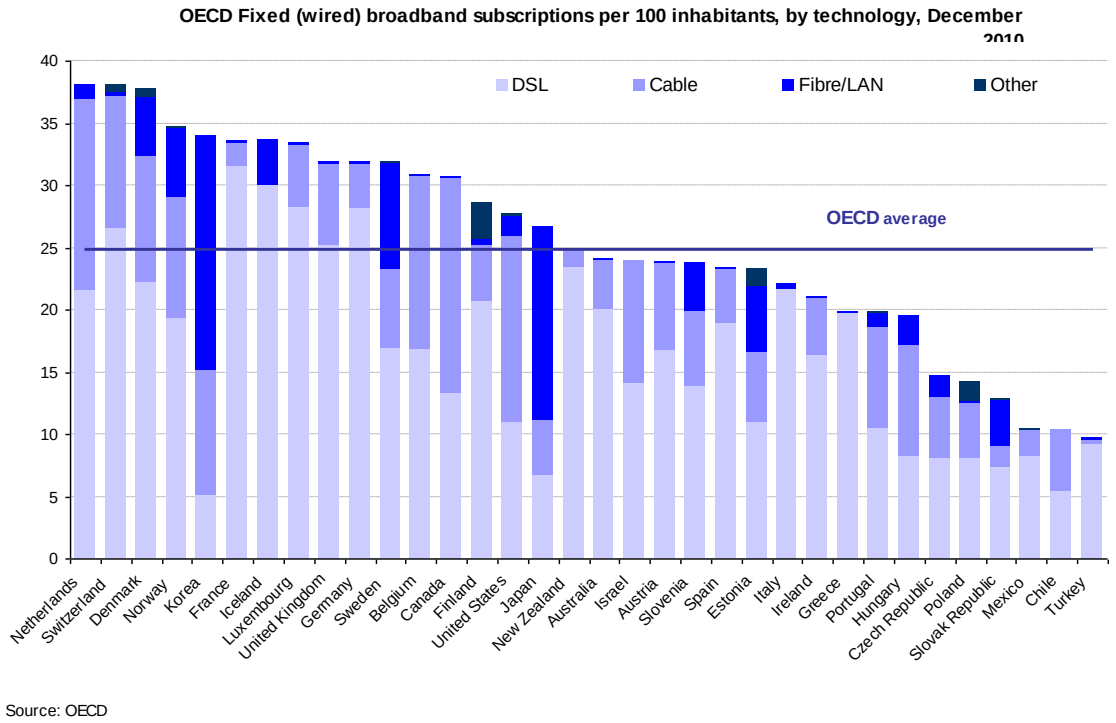
Deployment challenges of NGA deployment



Source: OECD 2011 Guide

- The difference between Japan and South Korea versus the rest is dramatic.

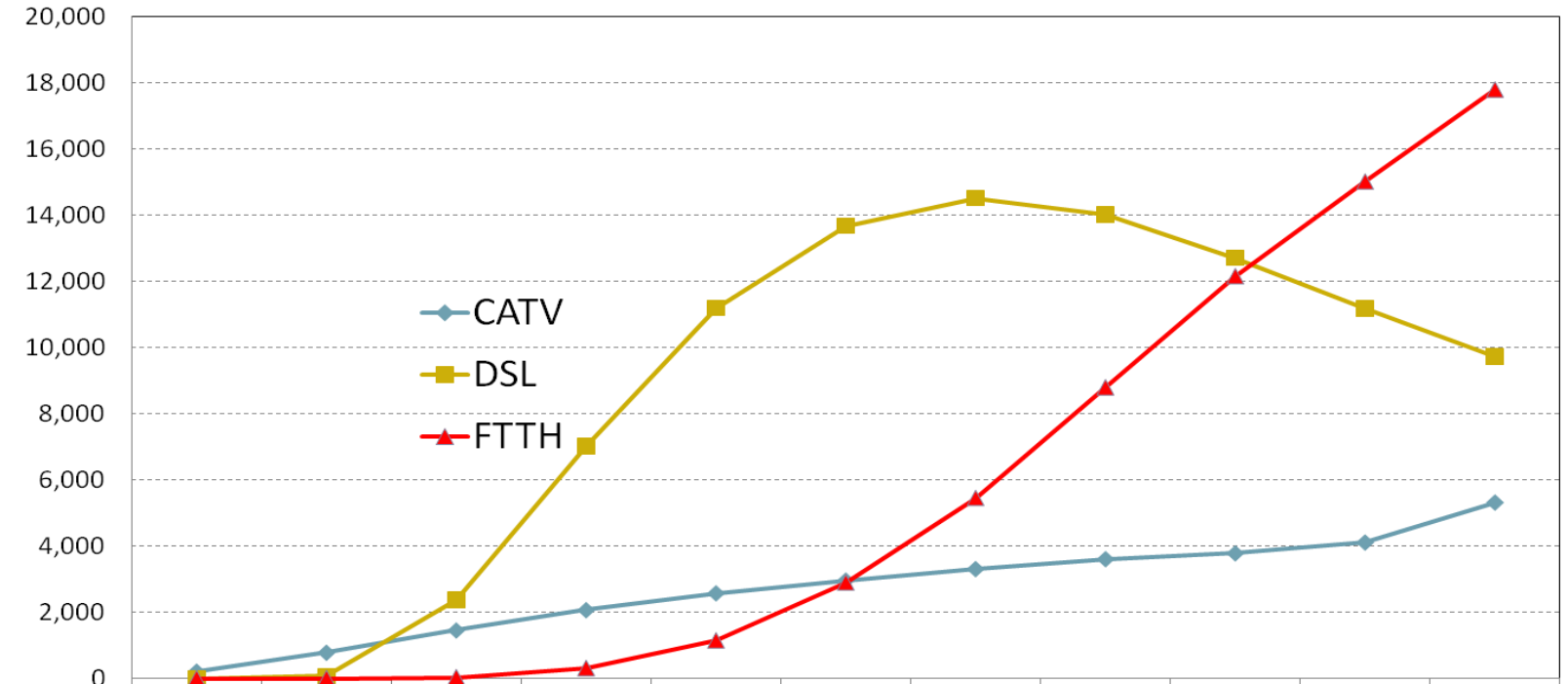
Deployment challenges of fibre-based NGA



Source: OECD 2011 Guide

- The fraction of fibre-based broadband lines, however, is substantial in some countries – especially Japan and South Korea, but also Scandinavia, eastern European countries like Slovakia, the Baltic countries, and Russia.

Japan



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
CATV	216	784	1,456	2,069	2,578	2,964	3,310	3,607	3,782	4,111	5,315
DSL	0.2	71	2,379	7,023	11,197	13,676	14,518	14,013	12,711	11,184	9,735
FTTH	0	0	26	305	1,142	2,890	5,449	8,795	12,155	15,020	17,802

Presentation, Tatsuo Takita, InfoCom Research, 6 June 2011

Japan

- Japan has achieved an excellent fibre roll-out.
- Japan retains fibre unbundling requirements (copper unbundling was vital to in DSL adoption).
  - No significant use has been made of them; instead, competitive roll-out is facilities-based.
  - LLU pricing for GPON is for a service for 8 users; it is not cost-effective unless the competitor is assured of a high “take rate”.
  - For copper-based ADSL, competitors such as Softbank played a huge role in the Japanese market. For fibre, by contrast, NTT East and NTT West have reasserted market dominance.
  - The Ministry is looking to fix this. They are also considering possible functional separation of the NTT group.
- Ability to deploy fibre aerially can be important as a cost optimisation.

United States

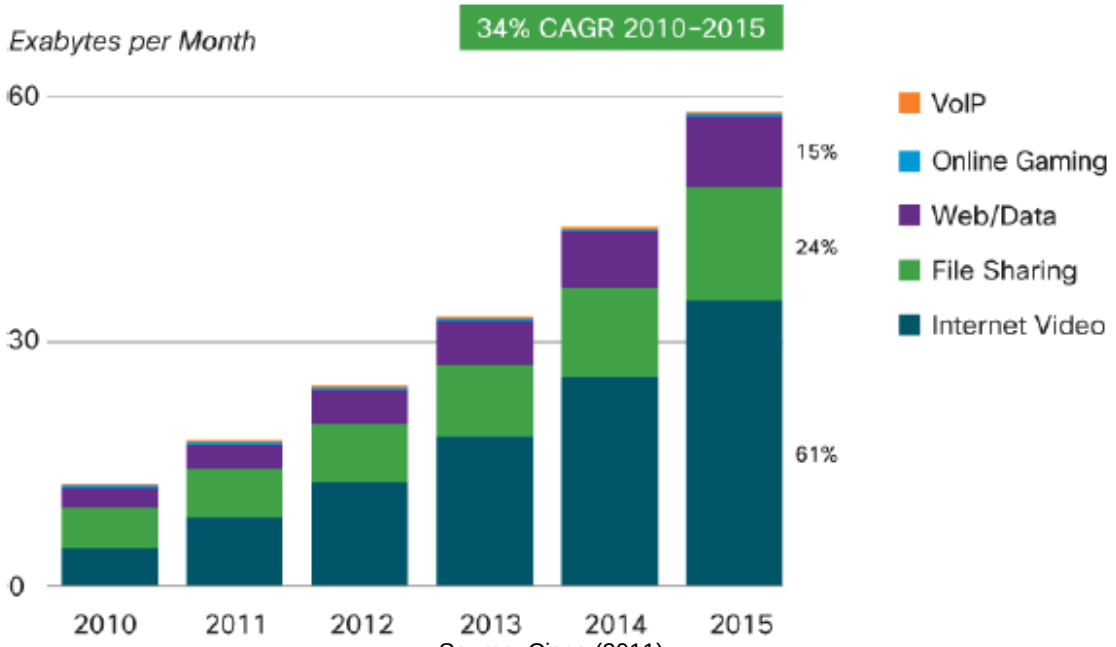
- In the US, cable operators enjoy a slightly larger market share of broadband than do telecoms firms.
- Many pro-competitive regulatory instruments were eliminated during the George W. Bush years. The FCC Triennial Review (2003) eliminated most LLU requirements for fibre. Results have been mixed at best.
- Overall, broadband deployment and adoption have been much slower than one might have expected, given the enormous head start that the US enjoyed, high disposable income, strong technological infrastructure and the widespread availability of cable.
- Withdrawal of pro-competitive regulation has largely wiped out intra-modal competitors.
- Lack of last mile competition has exacerbated net neutrality concerns.
- Fibre deployments are impressive, but selective. It is difficult to see how the US might get beyond “cream skimming” deployments.

Australia

- Australia has embarked on an ambitious plan, initially funded at $43 billion AUD, to provide an “NBN”:
  - Ultra-fast FTTH/FTTB to 93% of Australians; and
  - Fast wireless or satellite services to the rest.
- At one level, forward-looking and visionary.
- At another, potentially recreates the PTT.
- Australian government paid Telstra to shut down a functional cable television network so as to ensure the NBN business case.
- It is a bit early to judge the results, but on balance this seems to do more harm than good.

Shifts in Internet traffic – shifts in the value chain

- Voice drives revenue, but is a declining fraction of traffic.
- Concerns have been voiced in recent years over the explosion of video traffic over the Internet, and its implications for network cost.



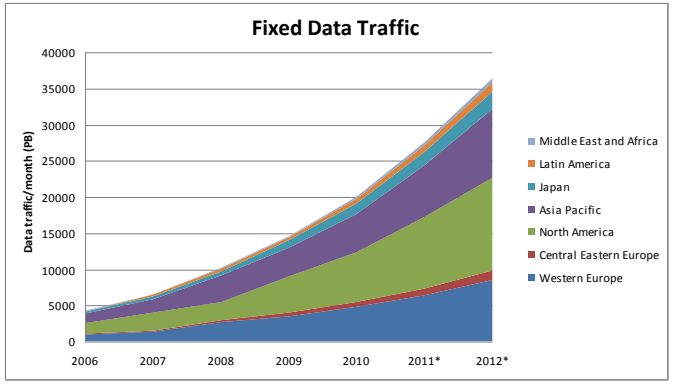
Source: Cisco (2011).

Network operators and content providers

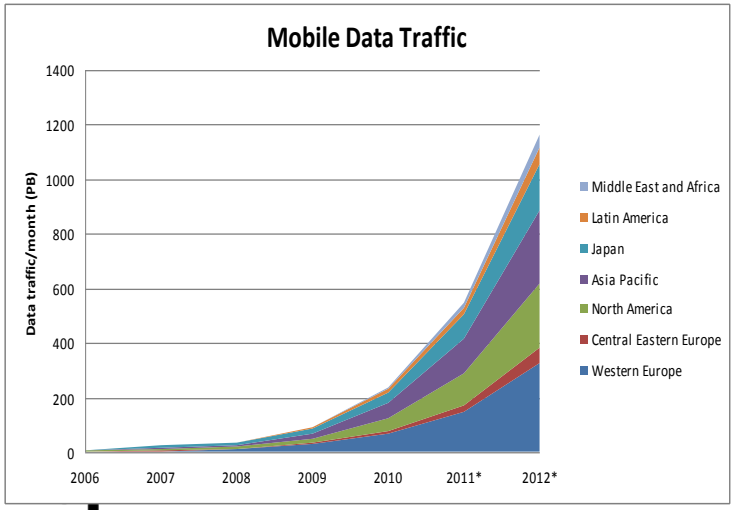
- An example of increasing tensions along the shifting value chain.
- A.T. Kearney (2010):

  "Internet traffic is exploding in an unprecedented way due to increasing use of video. Costs for network operators are sky-rocketing, even under existing technology and even without considering the huge investments needed for fibre-based Next Generation Access. Due to market defects, there is no way to make consumers shoulder the cost of the increased bandwidth; thus, it will soon become necessary for firms that provide content to pay for the network for the first time, much as content and advertising typically pay for over-the-air broadcast television."
- Intuitive? Satisfying? Plausible?
- Misleading or wrong in nearly every significant respect.

Network operators and content providers



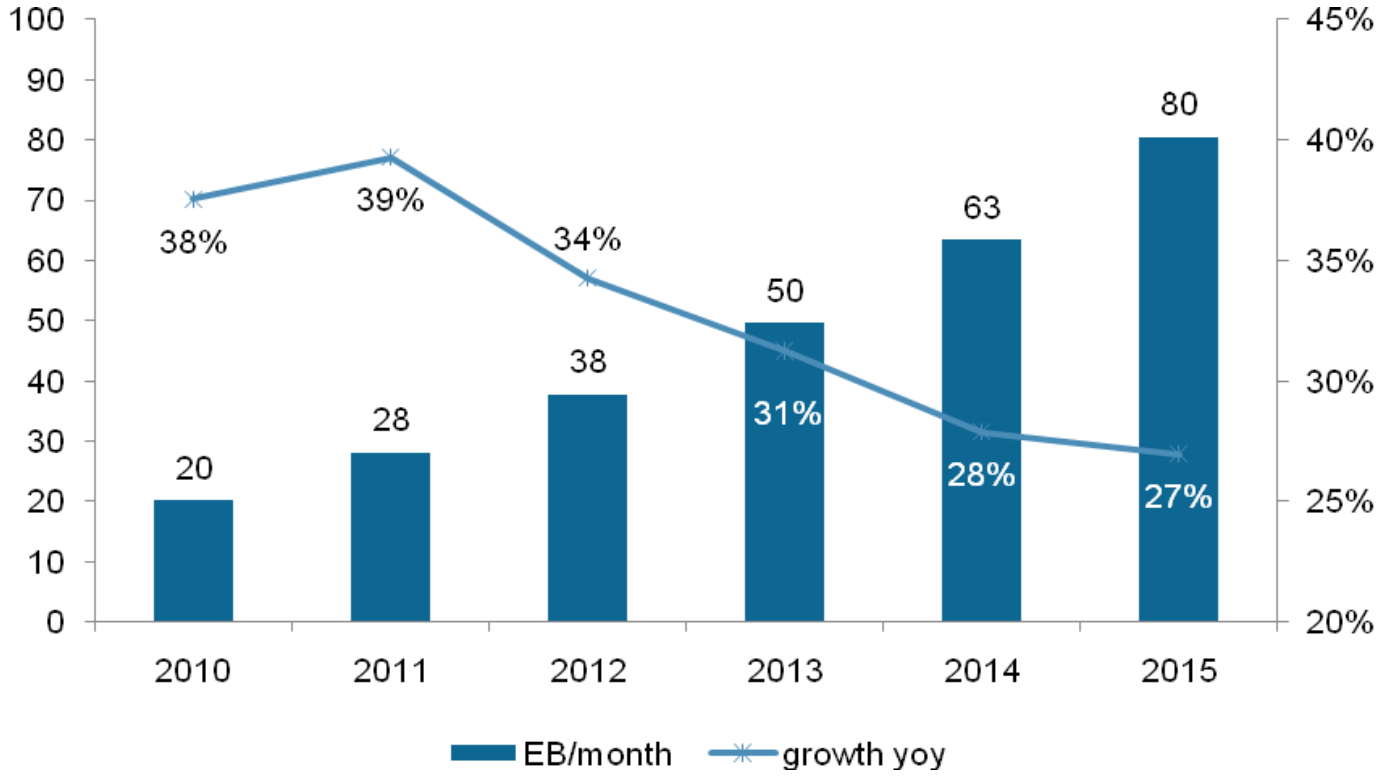
Traffic is indeed increasing in both the fixed and the mobile networks.



Source: Cisco (2011), WIK calculations.

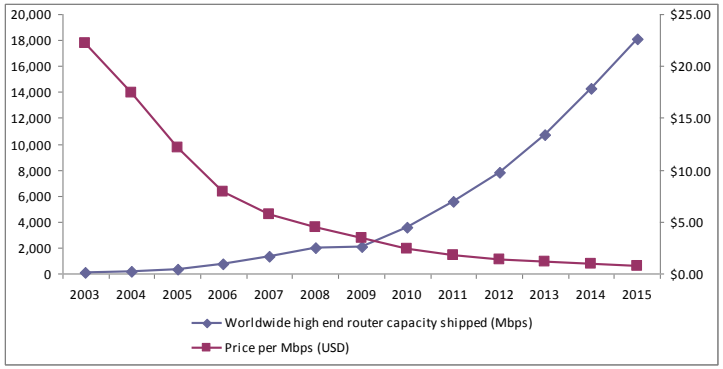
Network operators and content providers

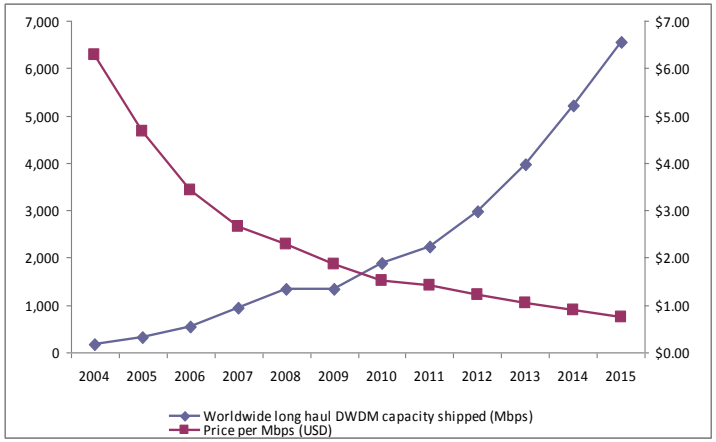
- However, the rate of growth in percentage terms is declining over time.



Source: Cisco (2011), WIK calculations.

Network operators and content providers





Here we have the shipment quantities in Mbps and the price per Mbps (USD) for high end routers and for long haul DWDM optoelectronic equipment.

These are among the key cost drivers for Internet core and aggregation networks.

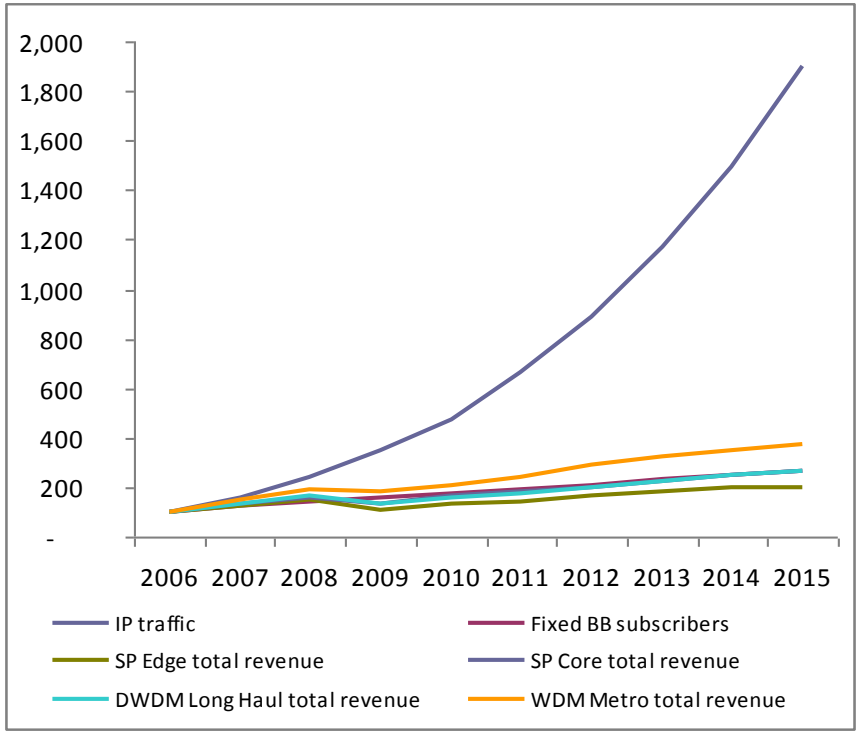
The growth in shipments generally tracks the Cisco projections.

The growth in *shipment volume* does not equate to a growth in *costs*, because the decline in unit costs is nearly in balance with it.

Source: Dell'Oro (2011), WIK calculations.

Network operators and content providers

- The trend in broadband prices tracks with subscribership and with aggregate equipment costs, not with the volume of traffic.



Source: Dell'Oro (2011), Cisco (2011), WIK calculations.

Comparisons and Concluding Remarks

- Different approaches in different countries:
  - Maintenance of effective procompetitive remedies (EU)
  - Functional or structural separation (UK, New Zealand)
  - Maintenance of ineffective remedies (Japan)
  - Massive intervention (Australia)
  - Radical deregulation (United States)
- Complex effects in each case on:
  - inter-modal competition
  - intra-modal competition
  - investment

Comparisons and Concluding Remarks

- Countries differ from one another on multiple dimensions:
  - Availability of alternative last mile infrastructure, notably cable television,
  - Demography,
  - Geography (topology),
  - Physical infrastructure (ducts, aerial),
  - Societal and governmental attitudes toward industrial policy.
- For now, a one size fits all approach to NGA deployment would appear to be premature. There is no “silver bullet”.

Comparisons and Concluding Remarks

- In terms of NGA deployment, far too little attention is being paid to cable and other *alternatives* to fibre-based solutions.
- I have not covered interconnection challenges today. The general European emphasis on lowering call termination rates so that they are not higher than real cost is appropriate as we move to NGN.
- The current argument between network operators and content providers is a distraction. There appears to be no market defect. Fixed broadband prices are stable or declining because relevant overall costs are stable or declining, *despite* the growth in traffic.

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