



Cost-benefit of high-bit rate broadband: is mobility more valuable than speed?

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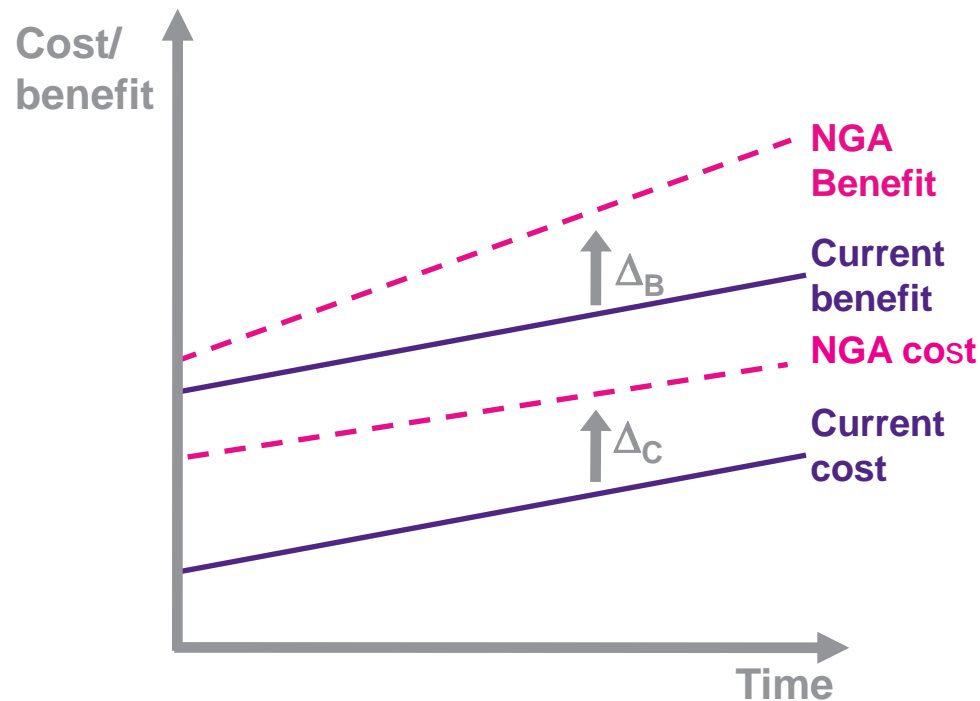
26 April 2010

WIK conference, Berlin

Study for UK Broadband Stakeholder Group (2008)

- **Focus was on developing a framework for assessing the costs and benefits of next generation broadband**
 - Focussed on incremental benefits versus broadband counterfactual
 - Focussed on fixed FTTH and FTTC (mobile discussed in Appendix)
 - Quantified some costs and benefits to illustrate methodology only
- **Identified the Internet as the “Killer app”**
- **Distinguished three categories of private benefit**
 - Saving time doing what one does now
 - Doing more of what we do now
 - Doing new things
- **Distinguished private benefits from wider social/external benefit**
 - Link to rationale for intervention

Focus on incremental impact of NGA



Is $\Delta_B > (\Delta_C + \text{option value of waiting})$?
Not is $B > C$?

Many studies consider benefit of NGA compared with no broadband

Distinguish private and “external” costs and benefits



Private	Wider economic	Wider social	Pseudo – not counted
<p>Private costs are the resource costs of next generation broadband valued in the market</p> <p>Private benefits include:</p> <p>(i) Saving time doing what one would do anyway</p> <p>(ii) Doing more of existing things</p> <p>(iii) New things and transformations</p>	<p>Non-appropriable private Externality</p> <p>Piracy</p> <p>Network effects</p> <p>Spill-over and virtual agglomeration</p> <p>Competition in telecoms sector and wider economy</p> <p>Resilience, adaptability and policy options</p> <p>Excess burden of taxation</p>	<p>Educated citizens</p> <p>Informed democracy and freedom of expression</p> <p>Cultural understanding</p> <p>Belonging to a community and inclusion</p> <p>Privacy</p> <p>Social capital, resilience and trust</p>	<p>Pseudo externalities</p> <p>Asset price changes (if already captured under private cost-benefit)</p> <p>Direct employment effects</p> <p>National “competitiveness”</p>

Notes:

(i) Sub-categories under wider economic/social developed with fixed NGA in mind

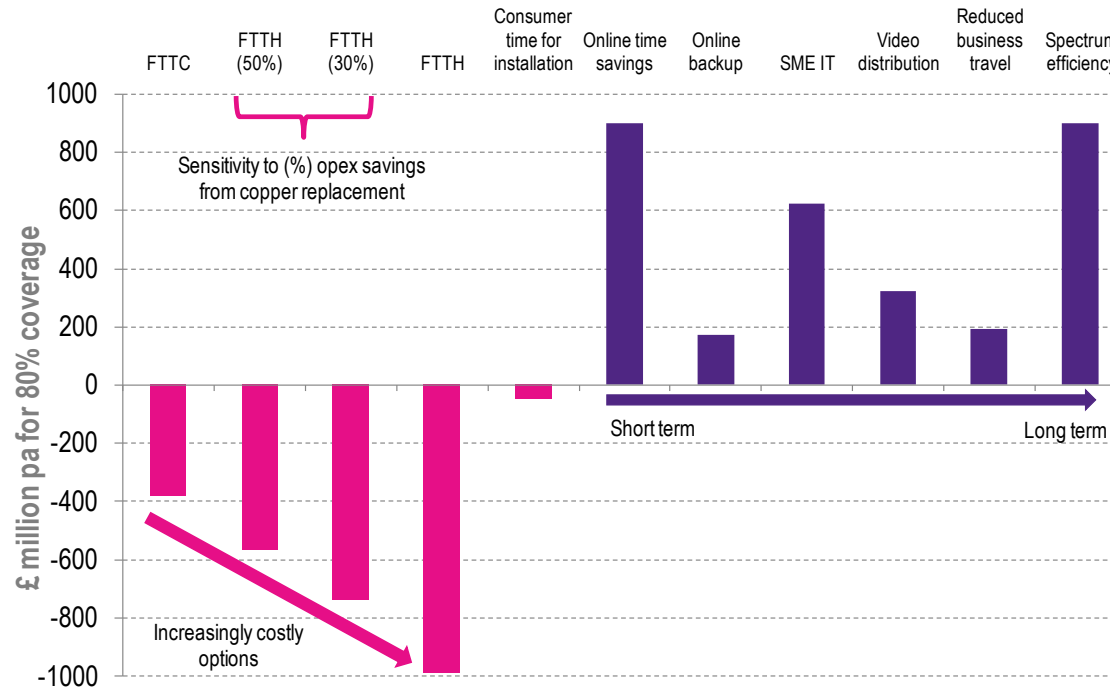
(ii) Direct employment effects tend to net off across the economy as a whole. NGA could impact on overall employment, but not necessarily unemployment, if it contributed to increased workforce participation. NGA could impact on unemployment if it lowered job search costs.

Some studies include ‘externalities’ which are not genuine externalities

Some costs/benefits we estimated



Indicative incremental annual costs and benefits



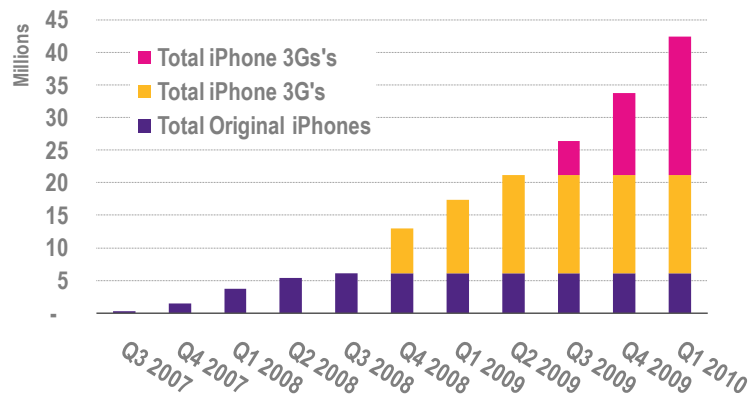
Note: spectrum efficiency gains should not necessarily be attributed solely to fibre. Satellite, and broadcast efficiency gains, will also facilitate spectrum reallocation to mobile broadband.

The BSG study was focussed on fixed fibre, but framework is general

What do consumers want?

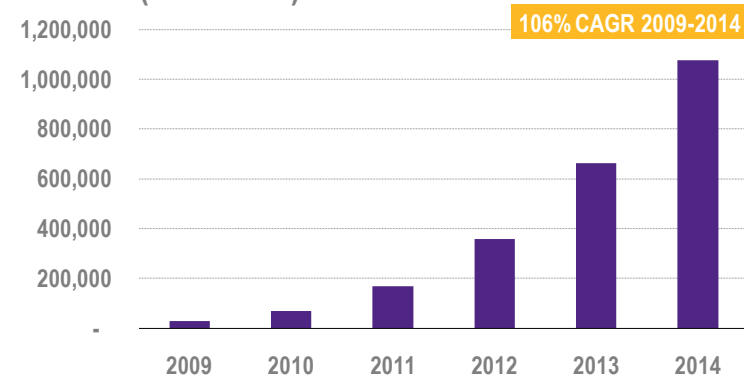


Total global number of iPhones sold



Source: Plum Consulting, Apple quarterly financial results

Western Europe - mobile data traffic forecast (TB/month)

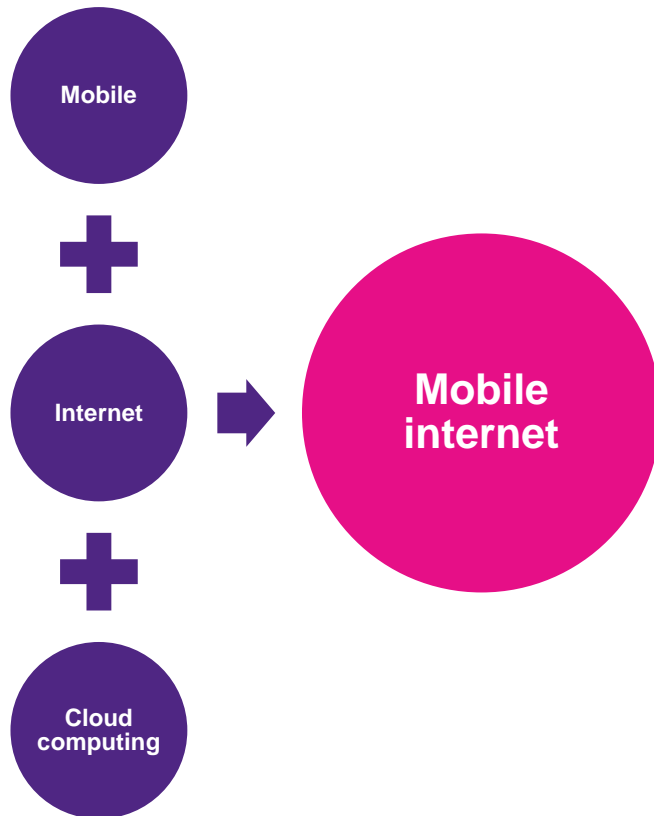


Source: Plum Consulting, Cisco

Pervasive mobile will “bring us back to behaviour patterns that were natural to us and destroy behaviour patterns that were brought about by the limitations of technology”
Risto Linturi, Wired, 1999

Shift to mobile internet use underway - will this lower WTP for fixed?

Why now - complementarity

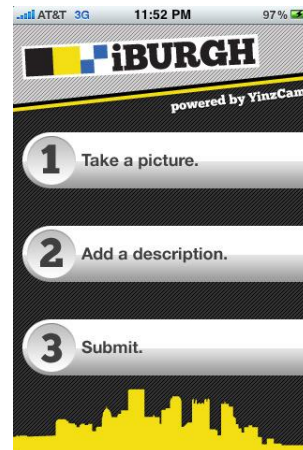


"Mobile broadband represents the convergence of the last two great disruptive technologies – Internet computing and mobile communications – and may be more transformative than either of these previous breakthroughs."

FCC National Broadband Plan, 2010

Our analysis should go beyond fibre to include mobile broadband

Mobility, location awareness & sensors facilitate 'social' applications



Fibre to the premise cannot do these things

Technology “is stuff that doesn’t work yet”



- **Keyboard/mouse first**
 - => Browser => URL => Application
- **Complex**
 - Slow start
 - Learning curve, idiosyncratic problems, deterioration over time
- **Vulnerable**
 - OS vulnerable to viruses etc
- **Connectivity separate**
 - Separate purchase of fixed line broadband contract and set up costs
- **High cost, inflexible payment**
 - Software, broadband & support, contract

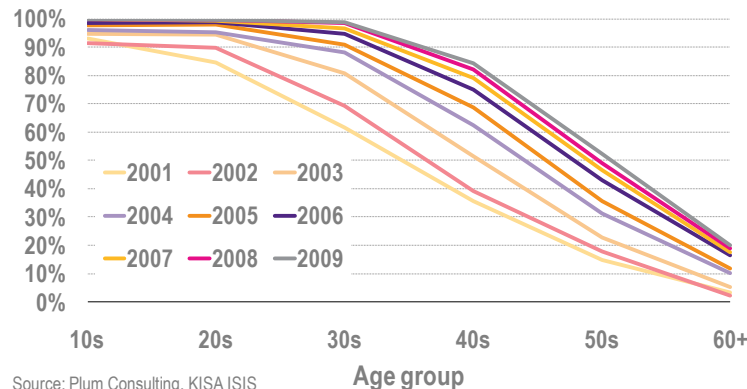


- **Screen first – multi-touch**
 - => Application
- **Simple (complexity concealed)**
 - Almost instant on
 - Intuitive, problem free and predictable, stable over time
- **More secure**
 - OS more secure
- **Connectivity included**
 - Wireless connectivity purchased & cancelled at any time from device
- **Low cost, flexible payment**
 - Low cost apps & connectivity, pre-pay

Persistence of non-adoption

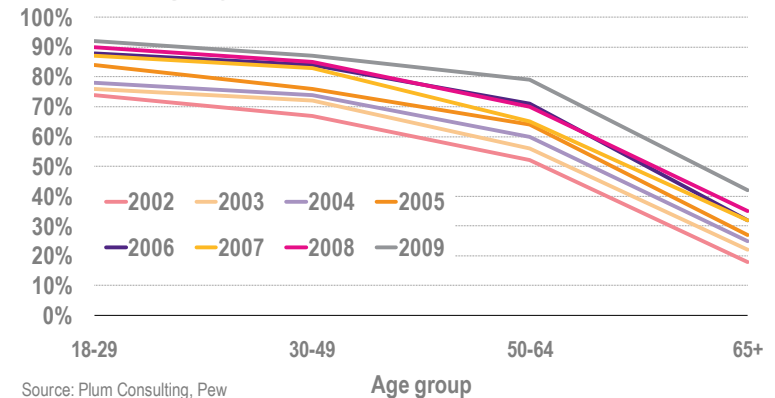


% of Individuals in Korea who have used the Internet in the last month, by age



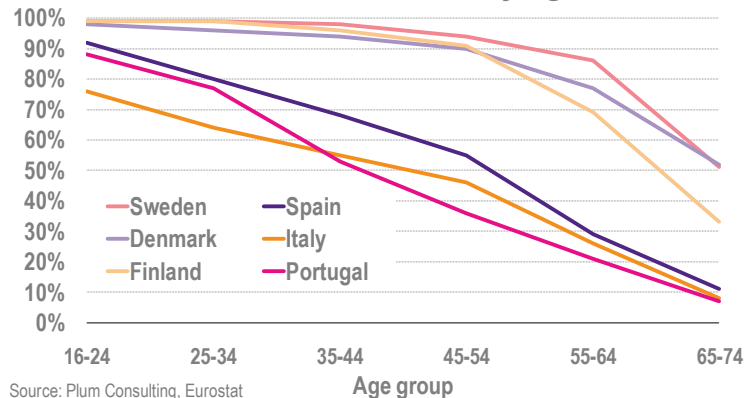
Source: Plum Consulting, KISA ISIS

% of Individuals in the US who use the Internet, by age



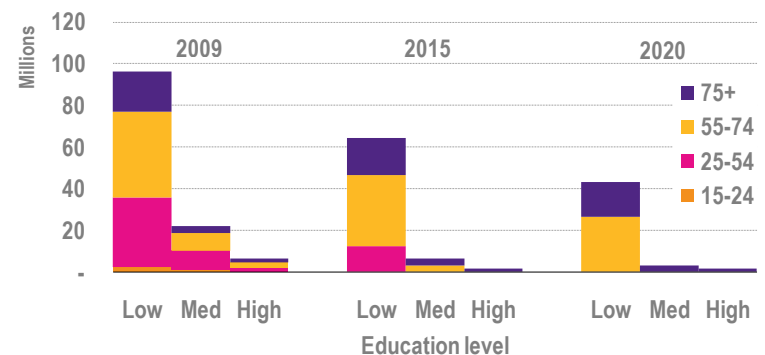
Source: Plum Consulting, Pew

% of Individuals in 2009 who used the Internet in the last three months by age



Source: Plum Consulting, Eurostat

Non-Internet Users in the EU15 by age and education level reached

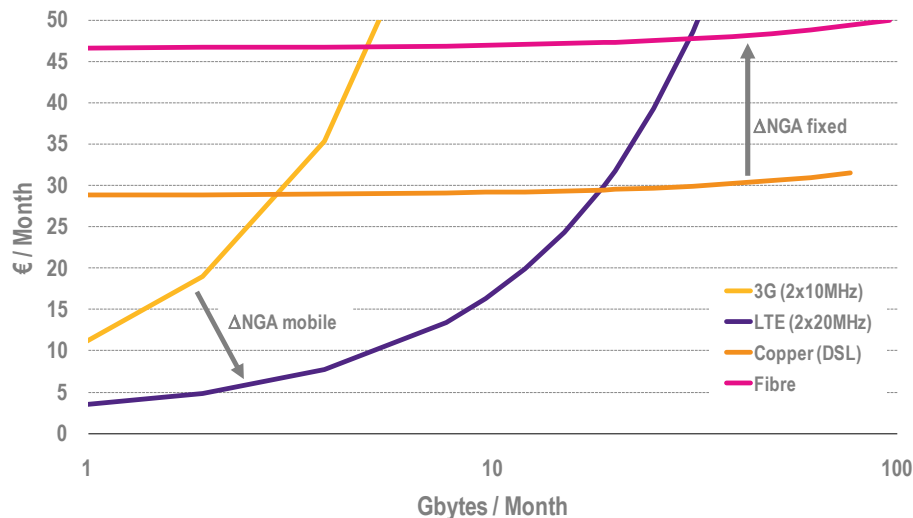


Source: Plum Consulting, OECD, Eurostat

Cost functions for fixed & mobile



Incremental costs of broadband



Source: Plum cost modelling, Analysys Mason, European Commission

Fibre upgrade raises cost

Large fixed cost, \approx zero traffic cost

- Near infinite capacity
- Price discrimination required to offer low user tariffs
 - which regulation may prevent

LTE upgrade lowers cost

Low fixed cost, high per GB cost

- Capacity limit in practice
- Cost based low user tariffs

Fixed & mobile have fundamentally different cost functions & upgrade economics

Is mobility & affordability more valuable than speed?



		Current		Next	
		Copper (DSL)	3G	Fibre	LTE
Premise	Download speed				
	Upload speed				
	Capacity & resilience (at reasonable cost)				
Wide area	Mobility, personalisation Location aware & sensor rich: navigation, local & visual search, augmented reality				
Social value	Health monitoring, employment search, civic applications (location & camera) Internet adoption: affordability, ease of use				

Will wireless contribute greater “external” social benefit?

Four priorities consistent with maximising private & social value

Widen options to include mobile

- High revealed private WTP
- Large “external” social benefits?

Facilitate retirement

- Legacy copper & broadcast networks
- Legacy USO policy

Reallocate spectrum to mobile

- Including further UHF spectrum
- Incentive based or administrative?

Develop new metrics

- Include mobile broadband
- Include internet based services

Think mobile/spectrum first - fibre will follow where efficient

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