

**By Raúl Katz**

# Investment, infrastructure and competition in European telecom

This article looks at the way in which the telecommunications industry investment framework of yesterday takes account of the technological developments, consumer preferences, and business models of tomorrow. It considers the investment framework changes necessary to ensure deployment of high-speed and ultrafast networks in Europe and additional needs. The research and discussion focus on the assessment of potential changes to increase the likelihood of reaching the goals of Europe’s Digital Agenda.

The Digital Agenda for Europe set a number of broadband targets:

- Bring broadband to all Europeans by 2013
- Access for all Europeans to 30 Mbps or above by 2020
- 50% or more European households with connections above 100 Mbps.

Several countries have incorporated these targets into their national broadband plans.

**Table 1 Targets in national broadband plans**

Country	25-30 Mbps	100 Mbps	Year
Austria		100%	2020
Czech Republic	30%		2015
Denmark		100%	2020
Estonia		100%	2015
Finland		100%	2015
France		100%	2025
Germany		75%	2020
Spain	98%		2020
Sweden		90%	2020
United Kingdom	90%		2015

An examination of the current deployment of three high-speed broadband technologies - fibre (FTTH), DOCSIS 3.0, and LTE - suggests that countries might not hit these targets. At the end of 2012, FTTH covered only 11% of the population, with a mere six million subscribers in the EU27 countries. Certainly some countries (such as France, Spain, and Portugal) experienced healthy growth rates nearing 36%, but other countries in this group witnessed growth rates as low as 7%. The EU27 demonstrated an average take up rate of 21%, with Scandinavia well ahead of this curve with 30%.

On the other hand, DOCSIS has experienced strong deployment rates, although the subscription rate hovers at 7.5 million subscribers. While more than two-thirds of European Internet-capable cable networks have been upgraded to DOCSIS 3.0, not all end users have the equipment necessary to adopt the technology.

In contrast, LTE covers less than 1% of total mobile subscribers. If forecasts hold true, by 2017, less than 20% of total mobile connections in the EU27 will have migrated to LTE. To put this number in perspective, LTE already accounts for roughly 28% of subscribers in South Korea and 8% in the United States. The lack of spectrum in the 800 MHz band hampers network coverage expansion, as existing spectrum bands used for LTE services (mainly in 2600 MHz bands) do not allow operators to deploy the technology efficiently outside major urban areas.

Reaching the targets will require a combination of technologies and not simply one technology “winning out.” Country-specific conditions and economic environments will determine the optimal balance of technology deployment. While most Member States could reach 50% coverage of 100 Mbps with the support of copper through vectoring and pair bonding (including phantom mode), countries with an existing cable footprint would benefit most from DOCSIS 3.0 to reach the same speeds. Rural areas, however, could benefit from LTE in the 800 MHz band, which could deliver 30 Mbps speeds.

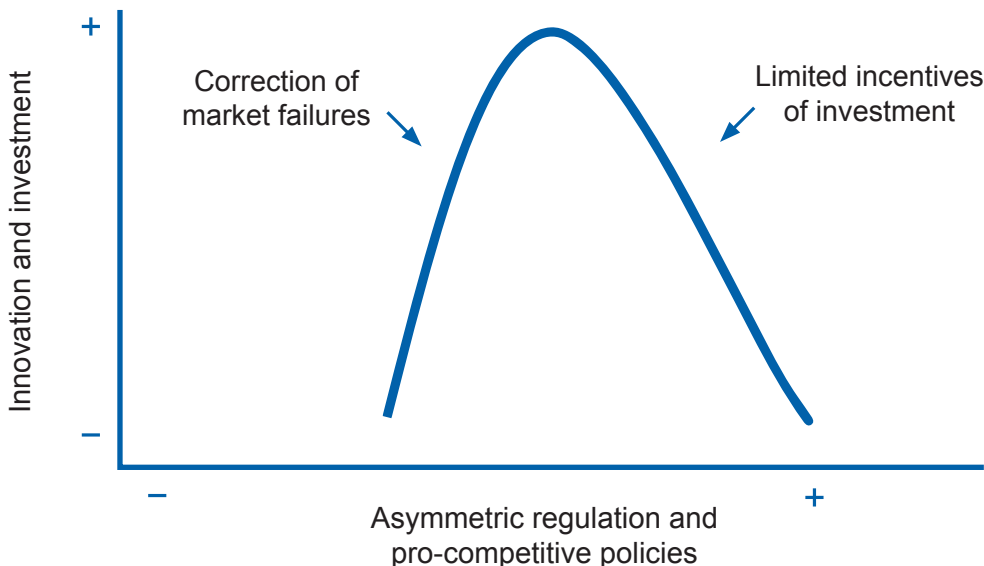
To understand the potential that public policy, regulatory, and management changes could have on driving the achievement of Digital Agenda targets, three themes are worth exploring.

Firstly, until now, the industry has focused on supply-side issues such as infrastructure deployment and high coverage rates. The pendulum must now swing to encompass demand-side issues, paying particular attention to such themes as the high-speed broadband value proposition, affordability and the lowering of costs, elasticity of demand, and the stimulation of adoption.

Secondly, it is critical to examine the effectiveness of state aid. An assessment of past and present experience indicates that the availability of subsidies and state-supported high-speed broadband deployment often detracts from the development of a robust business plan. The industry needs to consider this factor, examining where the numbers close and identifying potential strategies to increase uptake while avoiding the observed over-optimism in predicted customer uptake.

Finally, the role of regulation should relate to its impact on high-speed broadband roll-out, as regulatory intervention can delay target achievement in a number of ways. For one, there are risks of asymmetric regulation, particularly when involving an incumbent, which could raise the return on invested capital hurdle to an unsustainable level, thus discouraging the deployment of these technologies, particularly FTTH. Regulation could also hinder operators’ ability to squeeze as much as possible from the legacy infrastructure by the premature disconnection of copper networks, which will impair the use of vectoring technology.

### Figure 1 Regulation versus innovation and investment



### The effect of the policy variable: Competition

Admittedly, asymmetric regulation and pro-competitive policies can potentially address market failures relating to innovation and investment. Within competitive markets, consolidation increases incentives for innovation. While high levels of competition promote a greater focus on operating efficiencies and cost reduction, lower levels of competition reduce the possibility of innovation. However, research has also shown that there comes a point where the incentives to invest begin to decline and sector restrictions on foreign direct investment (FDI) result in a limited willingness to innovate, producing an inverted ‘U’ (see Figure 1). Unless we alleviate the regulatory pressure, especially in unserved areas, investments will not materialise.

To test the hypothesis that correcting for market failures can reach a point where it results in a negative outcome, a model was created that examines the rate of adoption on non-voice mobile services such as messaging, data and mobile broadband. The underlying assumption is that consolidation in competitive markets increases incentives for innovation. On the other hand, high levels of competition may focus in on operating efficiencies and cost reduction, which results in less innovation. The market then witnesses lower levels of competition as there are fewer players in the market to share in the revenues. Ideally, regulation should push the cost side of the equation, open the markets, and fragment the supply. Increasing innovation requires an agreement on an optimal level of consolidation. Additionally, the telecommunications industry sees sector-specific issues in the model. These issues can include the customer switching cost and the impact of churn on increased product differentiation. Examining regulator independence can show this impact and the potential to generate revenue.

The model results suggest that market concentration can have a positive impact on innovation. Consolidation offers operators a higher certainty of potential returns on investment, particularly when looking at wireless data development. Number portability is important and years of policy enactment of the portability decision is also important, not so much because churn rises, but because the threat of churn acts as a positive incentive for companies to start pushing product differentiation on mobile broadband in order to preserve their customer base. Regulatory independence appears not to have any impact, as market potential is the key. The first conclusion is that the issue of consolidation in the industry is important, and this might affect developments in Europe, particularly across borders.

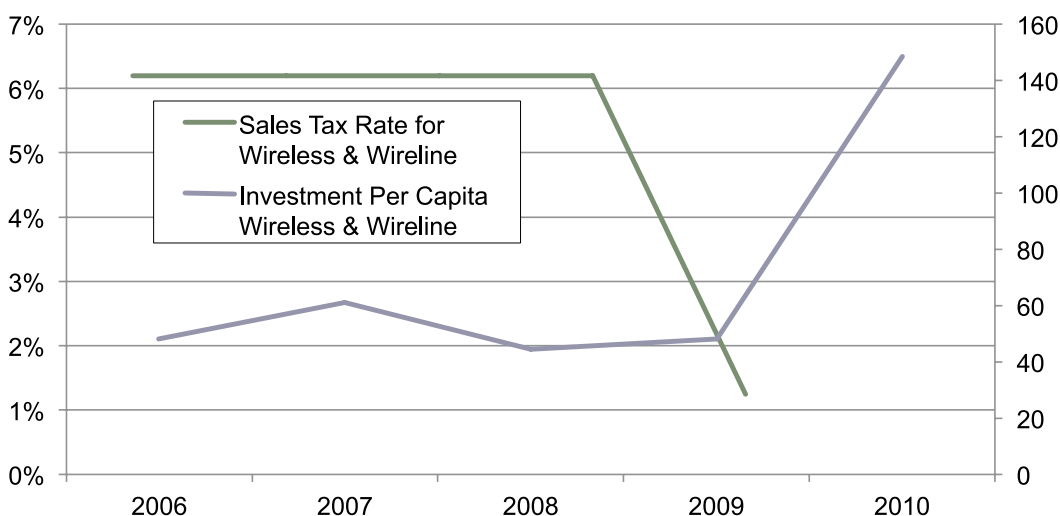
### The effect of the policy variable: Taxation

Fiscal policy is another key variable that could potentially affect the rate of investment in high-speed broadband. Data from the United States, for instance, show that unless the tax burden on equipment purchasing is reduced, broadband deployment will be limited.

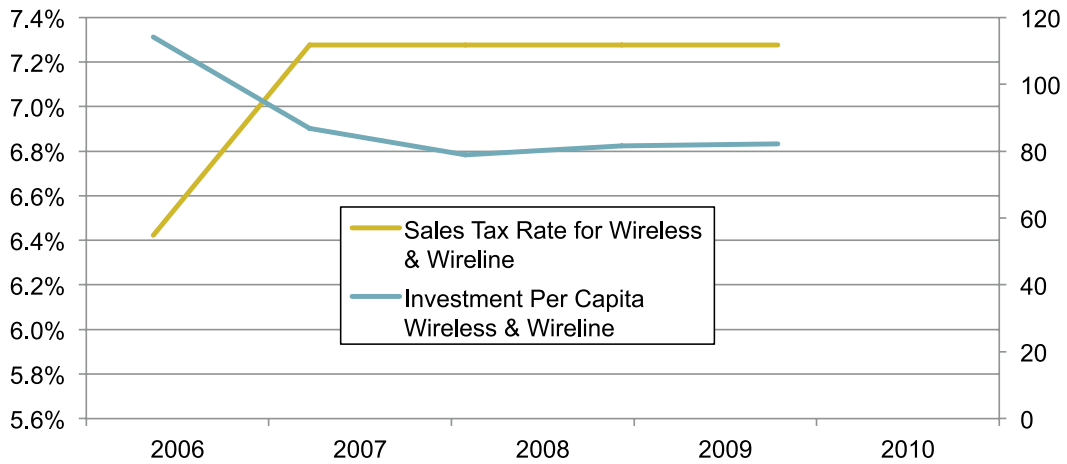
In 2010, US telecommunications and cable companies invested USD 42 billion in broadband, which equates to a per capita investment of USD 137, of which 66% (USD 28 billion) was on equipment subject to sales tax. Taxation on telecommunications equipment is not homogeneous across the country - 20 states and the District of Columbia do not tax telecommunications equipment while 19 states do not tax cable TV equipment.

To understand the effect of equipment taxation, a study was conducted to examine the impact of lowering the tax rate and its effect on economic contribution.

**Figure 2 The effects of sales tax on equipment purchases in North Dakota**



**Figure 3 The effects of sales tax on equipment purchases in South Carolina**



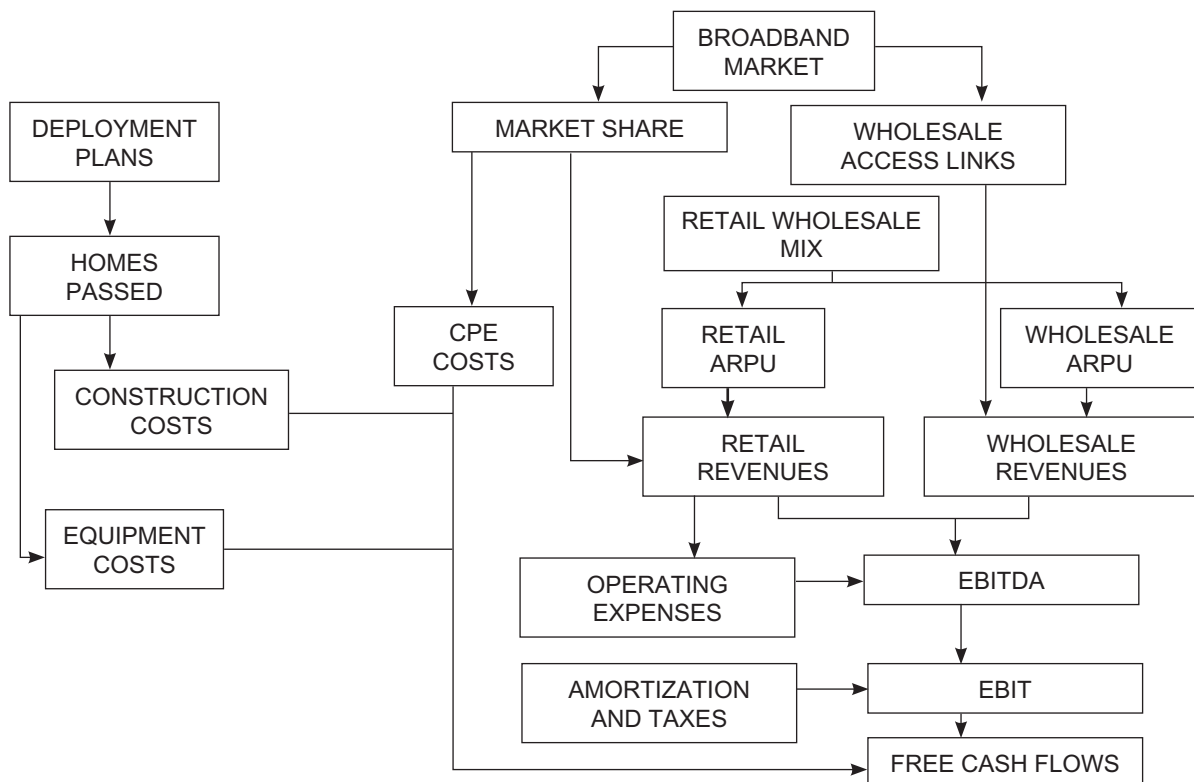
The state of North Dakota *eliminated* sales tax on equipment purchases in 2009 and broadband investment *increased* threefold. South Carolina, on the other hand, *increased* sales tax in 2007 and saw a subsequent *decline* in broadband investment. Clearly telecommunications and cable companies react to a reduction in the tax rate or, in the case of North Dakota, its elimination. It is important to remember that, for operators, CapEx in year two is driven to a large degree by the inertia of year one because networks require long-term planning.

Additionally, the econometric model showed that a reduction in sales tax does have a positive effect on investment both in terms of broadband deployment and in terms of economic well-being (not only in the construction of the networks, but also with more efficiencies in healthcare, financial services, etc.).

**Making FTTH work**

As supported by the model, this article argues that, unless some of the basic assumptions upon which the FTTH business case is made are changed, FTTH is unprofitable.

**Figure 4 The investment model for an FTTH business plan**



This is an investment model, with a classical structure of a business case. In effect it says:

- there are deployment plans and costs
- there is a market share to be taken
- there are average revenue per user (ARPU) revenues and operating costs
- after tax, one can look at the free cash flows and calculate a net present value (NPV) to see if money is being made.

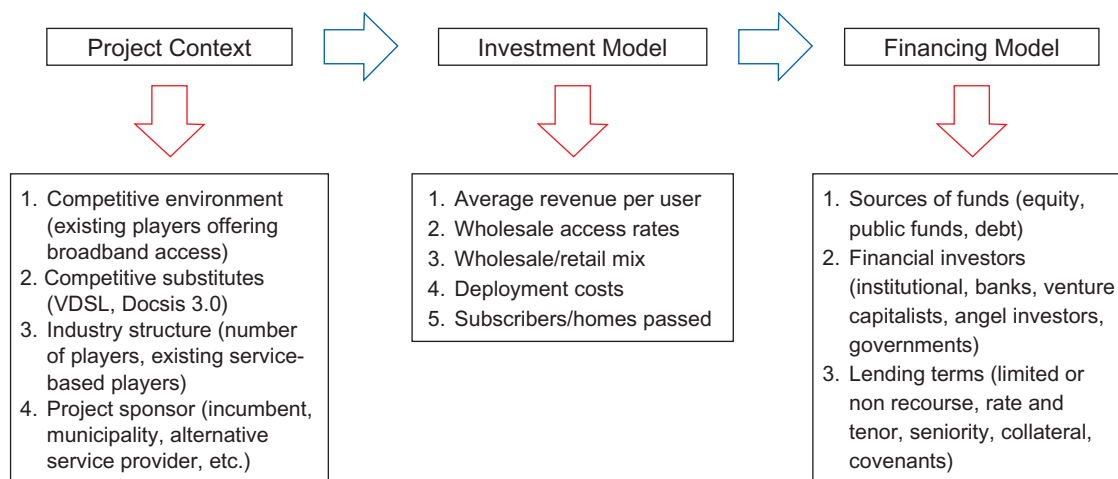
The assumptions made in the model allow for aspects such as capital investments and revenues to be adjusted.

Analysis demonstrates that the model is very sensitive to the uptake rate and retail output. Deployment occurs in areas where operators can maximize the uptake rate, which leaves out or creates unserved areas. Similarly, if it is not possible to capitalise on the ARPU, the net present value that the model predicts will drop. The deployment of fibre in areas where copper DSL is already offered requires an increase in fibre retail pricing to compensate for cannibalization; the model shows this increase to be approximately 15%. As a result, the operator must decide if it will raise prices, change the pricing structure, or add new services enabled by new infrastructure. The experience in Japan adds a note of caution. In this situation, customers did not perceive FTTH to offer better value than the copper-based services to which they had grown accustomed.

### NGN in low density areas

As Figure 5 shows, there are three main drivers of NGN project success. The project context has already been described, but the project sponsor is closely linked to the success of the project, especially in situations involving state aid. We need to understand why some projects fail on the NGA, municipal, or departmental level. Several factors were identified. There is sometimes limited support in negotiating financial terms with a lender syndicate. Independent of the subsidy these projects might receive, they sometimes have to negotiate with a bank or lender that requires a commercial rate. Also, since the project is treated as an infrastructure subsidy by central government, little attention is paid to the robustness of the business plan. Finally, there is the issue of competitive retaliation, whereby the build is based on state aid and proven demand. In this case, the incumbent enters, invests, and leaves the municipality with a stranded investment.

**Figure 5 Three drivers of NGN project success**



Therefore, organisations benefiting from state aid should consider the context of the project slated for deployment, the investment model, the use of profit, the financing model and source of funds, the investors, and the lending terms.

Municipalities can finance fibre deployment in a variety of ways.

While the direct subsidy model can finance deployment, it encourages an on-going reliance on state aid. As a result, the product may never stand on its own merits. Another model, local investment, impacts local taxes because the money is borrowed and has to be repaid. If the debt cannot be serviced, there is the risk of bankruptcy. The private credit financing and public/private credit financing models obviously require commercial rates. Then there are also public/private partnership models (PPP). No single model works in all situations, and the selected financing models must fit local conditions (see Table 2).

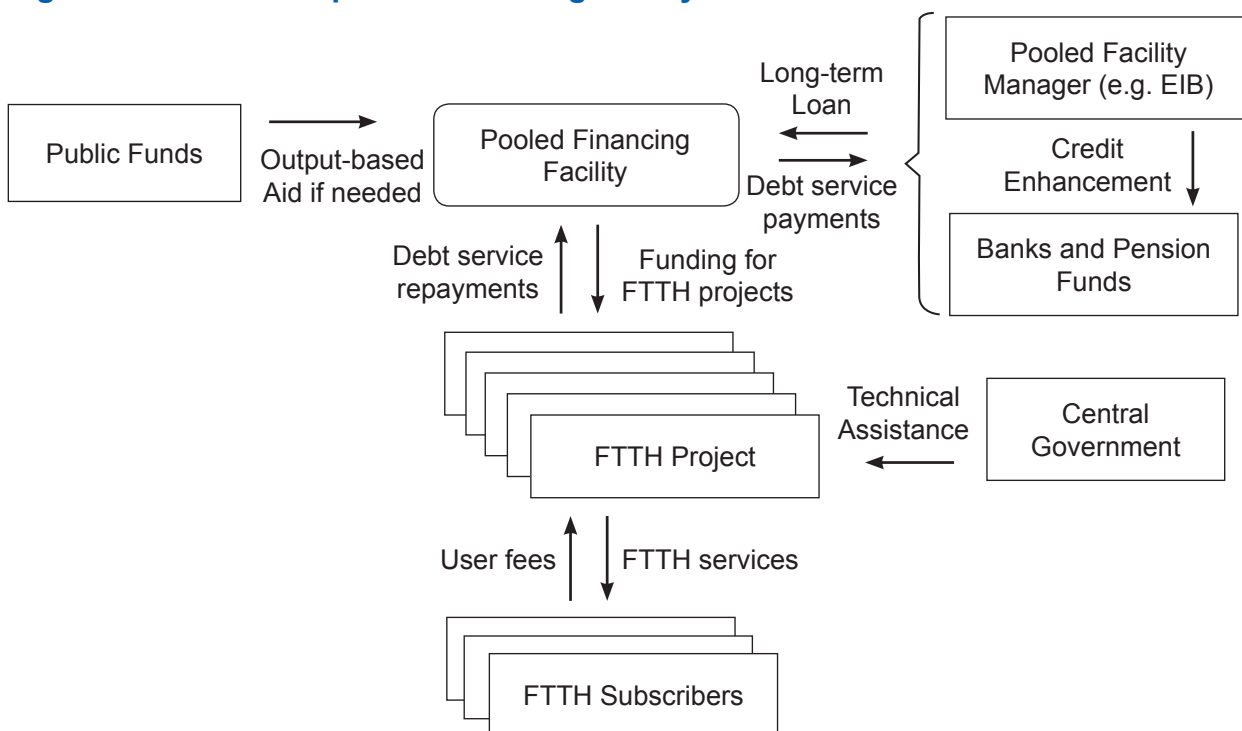
In urban and suburban environments such as Stockholm or Amsterdam, the municipality as an investor has a good business case. Where you have enough density and enough demand, the municipality can step in and the numbers look good. In rural areas, however, PPPs work best, particularly for credit financing. There are a number of possible funding schemes, such as a joint venture funded from the cash flows of the incumbent and even cost sharing models. This selection requires a long-term perspective to ensure success.

**Table 2 NGN financing models have to be selected carefully**

		Geographic mix		
		Urban	Sub-urban	Rural
Financing strategies	Municipal/Regional	Municipality as an investor		Public/private credit financing
	Public/Private Partnerships			Public service delegation
	Operator-funded	Incumbent funded Joint venture Multi-fibre		Cost sharing model
	Operator-funded and public policy stimuli		Public funding programme	

This article recommends the creation of a pooled financing model for smaller municipalities, many of which likely require a maximum of USD 6 million each to deploy fibre. Several lenders would assume pro rata exposure to each of the projects, which would be majority-owned by public sector sponsors, although the private sector could have an ownership stake. The target size of each pooled facility would be USD 20 million, sufficient to handle 5 or 6 small NGN projects, and would be ring-fenced. It would have support from a public lender, which would provide credit enhancements such as loan guarantees equal to 50% of the total amount and projects could apply, through the pooled facility, to receive output-based aid from public funds. Each project would be structured using a project finance approach and project sponsors would develop the NGN projects with technical and operational assistance provided by government entities. By ring-fencing the lending, service revenues coming from the fibre would pay for the debt incurred by the municipality.

**Figure 6 Structure of pooled financing facility**



This model has been used extensively in public project financing, and it would be interesting to see how it worked for NGA.

### The NGN value proposition for the end user

Examination of emerging markets shows a number of variables at play in terms of non-adoption of broadband in homes (Table 3).

**Table 3 Stages of broadband adoption**

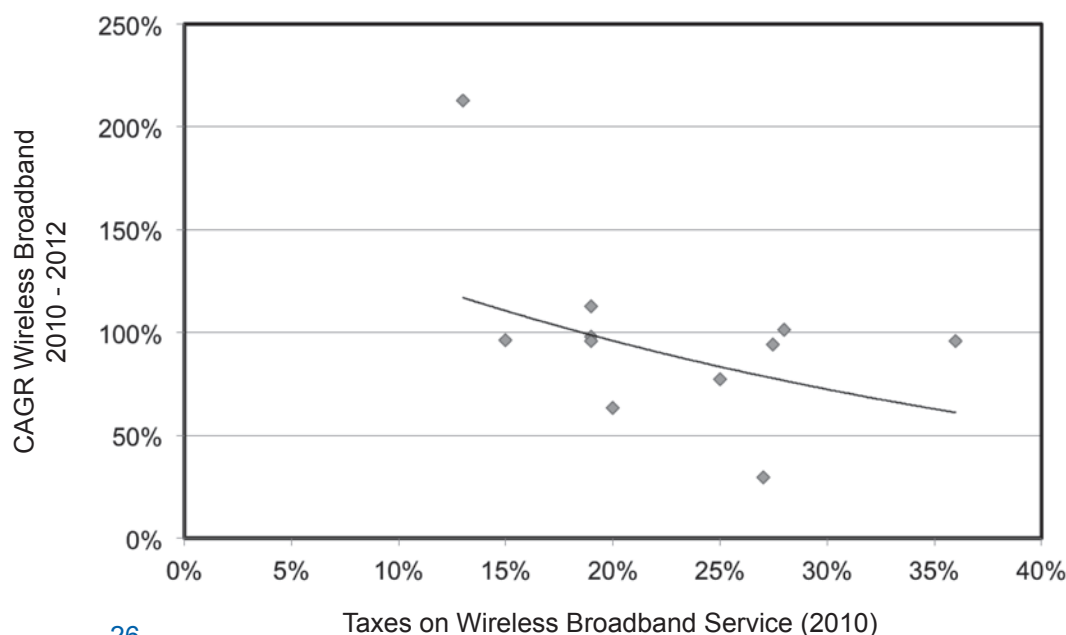
	Stage 1	Stage 2	Stage 3
Broadband population adoption	=< 3%	3-20%	>20%
Ownership of access devices (e.g., computers, smartphones)	Low adoption	Medium adoption	High adoption
Availability of web applications and services	Very low	Limited	High
Factors driving non-adoption	Service coverage	Affordability	Digital literacy Cultural relevance

While coverage plays a critical role in adoption, affordability is critical at stage two where there is 3-20% penetration. Above the 20% penetration mark, literacy and cultural relevance become important due to the value provided. The demand gap stems from a mixture of structural and socio-economic factors as well as drivers for adoption such as affordability. Overcoming the affordability obstacle requires a reduction of the costs of access to the service and devices as well as a reduction in taxation for the end user. The price elasticity of broadband plays a particularly important role in the early stages of development.

While elasticity curves may not necessarily apply to NGA (i.e. that dropping prices increases adoption), mobile broadband studies show that more sophisticated services demonstrate higher elasticity. With a mobile broadband plan with a cap of 5GB, elasticity particularly on dongles is proportionally higher than at lower levels of service.

In regards to taxation, as Figure 7 shows, not only should taxation of equipment purchasing be cut, but taxes on end user purchasing should also be reduced. Studies support the argument that a continual increase in taxation on the end user results in an unsustainable industry.

**Figure 7 Taxation versus adoption of data services**



Digital literacy and relevance of services and applications also drive uptake. It is vital that applications with high network effects are introduced and services with high social and welfare impact are launched. As other studies have shown, it is also important to deliver locally relevant applications and content.

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## Events Diary

### • May 2013

WSIS Forum 2013  
13-17 MAY  
Geneva, Switzerland  
[www.wsis.org/forum](http://www.wsis.org/forum)

ITU World Telecommunication/ICT  
Policy Forum  
1-15 MAY  
Geneva, Switzerland  
[www.itu.int/WTPF](http://www.itu.int/WTPF)

### • June 2013

IIC: Telecommunications and  
Media Forum  
12-13 JUNE  
Istanbul, Turkey  
[www.iicom.org](http://www.iicom.org)

CommunicAsia 2013  
18-21 JUNE  
Singapore  
[www.communicasia.com/](http://www.communicasia.com/)

2013 IAMCR Conference  
25-29 JUNE  
Dublin, Ireland  
[www.iamcr2013dublin.com/](http://www.iamcr2013dublin.com/)

### • July 2013

ITU 13th Global Symposium  
for Regulators (GSR)  
3-5 JULY  
Warsaw, Poland  
[www.itu.int/gsr13](http://www.itu.int/gsr13)

### • September 2013

TPRC41  
27-29 SEPTEMBER  
Arlington VA, USA  
[www.tprcweb.com](http://www.tprcweb.com)

### • October 2013

IIC International Regulators Forum  
7-8 OCTOBER  
London, UK  
[www.iicom.org](http://www.iicom.org)

IIC Annual Conference  
9-10 OCTOBER  
London, UK  
[www.iicom.org](http://www.iicom.org)

International Telecommunications  
Society  
20-23 OCTOBER  
Florence, Italy  
[www.itseurope.org](http://www.itseurope.org)

### • November 2013

African Media Leaders Forum  
6-8 NOVEMBER  
Addis Ababa, Ethiopia  
[www.africanmedialeadersforum.org](http://www.africanmedialeadersforum.org)

ITU Telecom World 2013  
18-21 NOVEMBER  
Bangkok, Thailand  
[www.itu.int/TELECOM](http://www.itu.int/TELECOM)

### • January 2014

Pacific Telecommunications Council  
20-23 JANUARY 2014  
Waikiki, Hawaii  
[www.ptc.org](http://www.ptc.org)

### • March 2014

World Telecommunication  
Development Conference 2014  
31 MARCH-11 APRIL  
Sharm-el-Sheikh, Egypt  
[www.itu.int/en/ITU-D/Conferences/  
WTDC](http://www.itu.int/en/ITU-D/Conferences/WTDC)