Broadband infrastructure: The regulatory framework, market transparency and risk-sharing partnerships are the key factors

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Deutsche Bank Research

26. May 2010

Broadband infrastructure

The regulatory framework, market transparency and risk-sharing partnerships are the key factors

May 26, 2010

On the issue of broadband infrastructure there is a marked discrepancy between rhetoric and reality. Set against the ambitious political objectives for broadband rollout – in Germany, for example, 75% of all households are to have access to speeds of at least 50 Mbit/s by 2014 – the amount being invested is still too low (see chart). This means that there is a need to gauge the ways that the infrastructure rollout can be speeded up in a competitive market environment. In so doing, care must also be taken to ensure that those rural areas with other infrastructural shortcomings do not find themselves falling further behind.

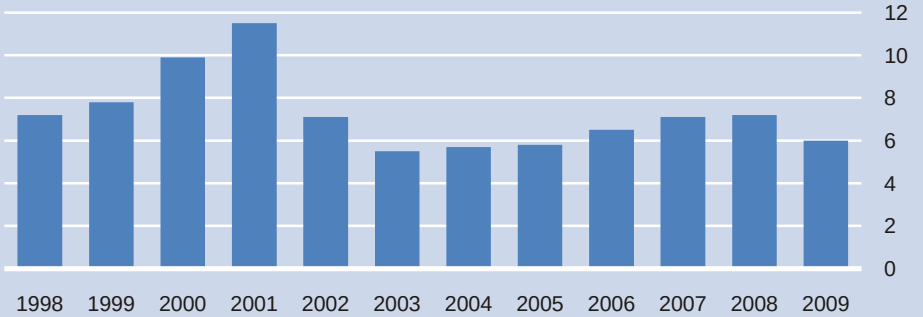
There are no standard solutions for business model and funding. The models currently used to fund infrastructure projects are extremely varied and differ significantly from one another with regard to the bearer of the entrepreneurial project risk and their capital structure.

Major differences between cost structures in conurbations and in rural areas. The debate about rolling out broadband all too often make insufficient distinction between the challenges of hooking up previously unserved rural areas and those of increasing the bandwidth of existing networks. These contrasting demands result in new network construction projects and network upgrade projects having differing business models and rates of development.

In urban agglomerations advanced networks are already being constructed. By contrast, there is no prospect of broadband being rolled out in unserved rural areas without subsidy programmes to assist private investors. In such cases the public sector should attempt to combine small-scale projects and enter into risk-sharing partnerships.

The public sector should also provide project assistance of a non-financial nature. For the telecommunication sector to flourish the financial assistance needs to be supplemented by the bundling of projects, risk-sharing partnerships, realistic rollout objectives, improved market transparency, new digital services and a regulatory framework that boosts investment incentives in a competitive environment.

Still too low given the ambitious expectations
Nominal fixed capex investment in German telecommunications market (EUR bn)



Source: BNetzA, 2010

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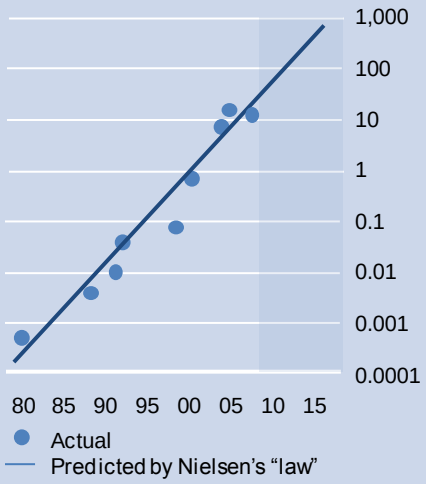
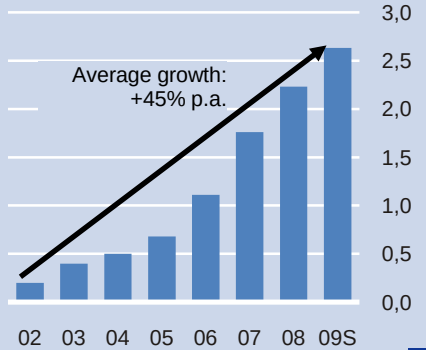
Nielsen's "law" fulfilled to date: +50% p.a.
Internet access speed, UK (Mbit/s)



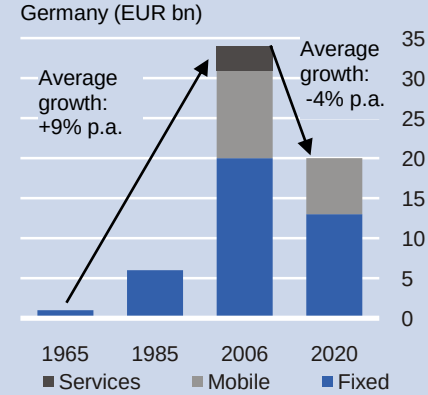
Source: FttH Council Europe, 2008 **1**

Growth uninterrupted
Volume of data transferred in German telecommunications market (exabytes)



Source: BNetzA, 2010 **2**

Sharp decline expected
Volume of telecommunications market, Germany (EUR bn)



Source: McKinsey, 2008 **3**

Advanced communications networks are a key factor in the international and regional competition to attract businesses. According to OECD estimates, broadband communication will contribute one-third to the productivity growth of highly developed countries by 2011. It can already be seen at present that companies worldwide are adopting new online business models and forms of communication. But in the private sphere as well, interactive Web 2.0 services, social networks, online games and Internet TV, for example, are enjoying ever-increasing popularity. All these "hyper-connectivity" services for business and private use are stoking the thirst for bandwidth. For example, Jakob Nielsen raised expectations with his Nielsen "law" of 1998 which states that the speed of internet access for users would in future also rise by an average of 50% p.a. (see chart 1). Estimates suggest that global IP data volume will probably quintuple between 2008 and 2013 and reach 700 exabytes p.a. (1 exabyte = 10^{18} bytes = 1 billion gigabytes); this corresponds to the data storage capacity of 200 billion DVDs. So although the new services will stimulate the economy they will also constantly increase the load on the existing fixed-line and mobile infra-structures because of their continually growing capacity requirements (see chart 2).

Despite this knowledge of the importance of broadband service there is a gulf between the desired and the actual state of the communications infrastructure in many countries. Given the ambitious political objectives for broadband the willingness to invest is still inadequate – also in light of the continued contraction in revenues in the traditional telecommunications business (see chart 3 and cover page). Since in several countries legal restrictions alone already restrict the scope for public-sector investment activity very considerably[1], ways now need to be found to advance broadband projects in a competitive environment.

Fibre-optic networks are a rarity in Europe

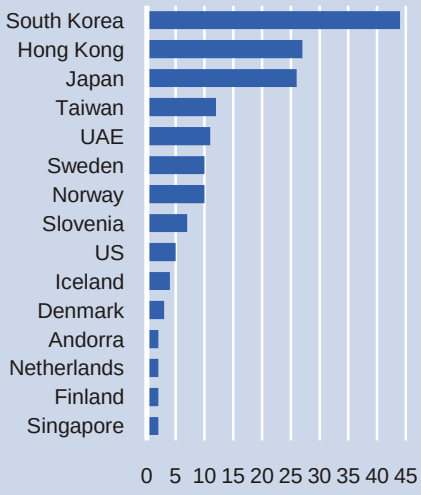
Broadband access differs very significantly around the globe. By mid-2009 Europe had just 2 million subscribers able to access the internet via Fibre-To-The-Home (FTTH); in North America, by contrast the figure was 7 million. In the Asia-Pacific region there are no fewer than 38 million FTTH users (see chart 4). By 2014 there should be more than 100 million households worldwide with FTTH – over 80 million of them in the Asia-Pacific region.

In terms of broadband penetration – for example on a per household basis – Europe thus lags a long way behind other major economic areas. This is also reflected for example in the statistic that there are currently still more than 1 million Germans who can make only very limited use of the internet – especially in rural areas with other infrastructural shortcomings (see chart 5). This restricted use is due to the fact that these persons cannot be provided at all with connections offering speeds of at least 2 Mbit/s – the minimum specification for user-friendly access to many modern broadband internet services.

The high-speed fibre-optic network right to the home is currently provided in Germany by only a few city carriers and municipal utilities (for example in Cologne, Munich, Schwerte and Norderstedt). By 2014 Germany's federal government wants 75% of

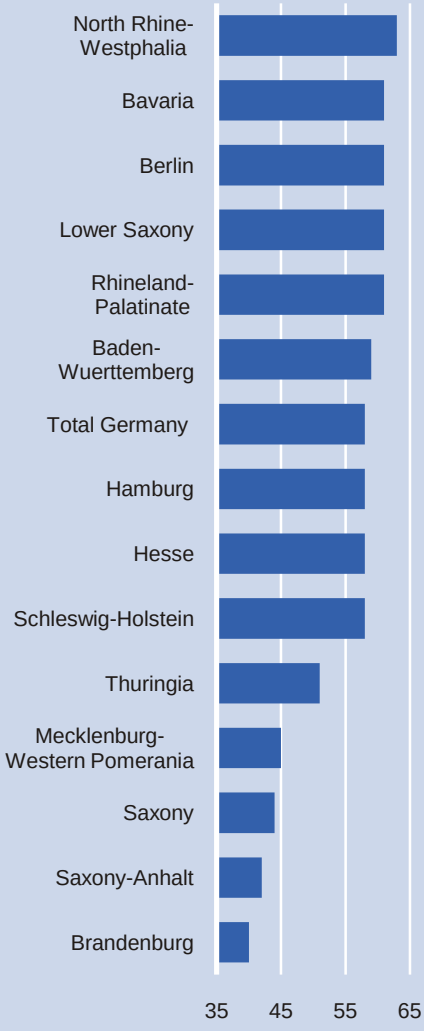
[1] In Germany, for example, the state is forbidden from acting as a supplier by the constitution. Furthermore, Germany can only provide very limited financial assistance for infrastructure expansion under European law.

European states are fibre-optic laggards
FTTH access per 100 households



As of Q4 2008
Source: Booz & Company, 2009
4

Clear east-west divide
Broadband connections per 100 households, Germany



*DSL, cable TV and other broadband technologies
As of Decenber 2008
Source: Bitkom/Eurostat, 2009
5

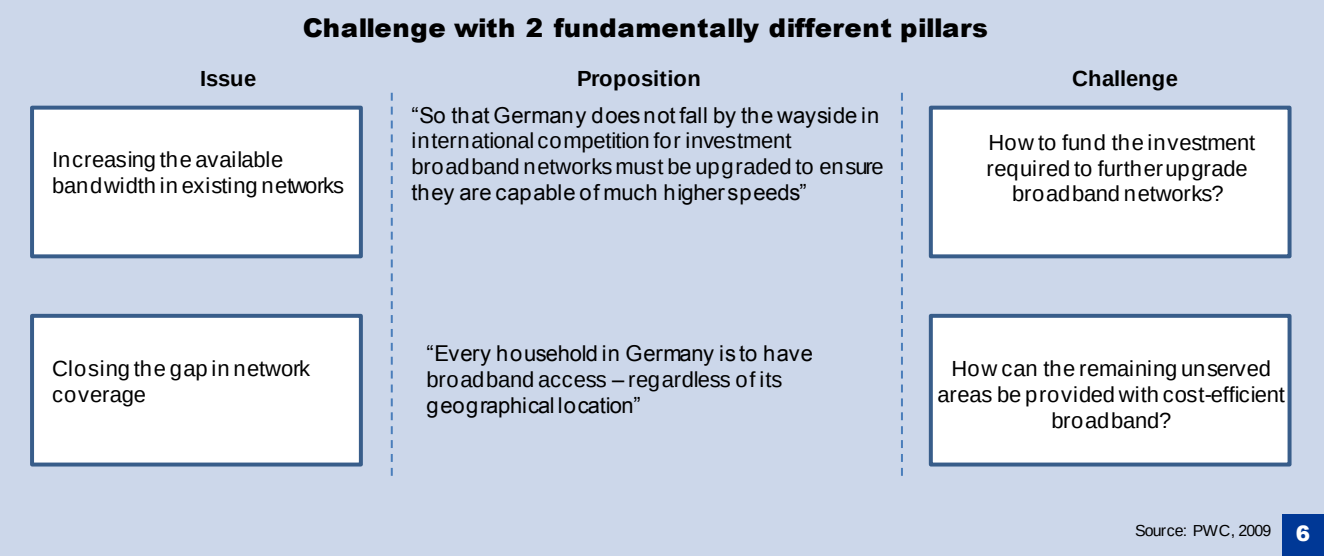
all households to have broadband connections offering speeds of at least 50 Mbit/s – ten times faster than the current average DSL connection. The federal government has divided its broadband strategy into 4 segments (utilisation of synergies in infrastructure expansion, a supportive spectrum policy, promotion of innovation-friendly regulation and provision of financial assistance). According to estimates made by the Wissenschaftliches Institut für Infrastruktur und Kommunikationsdienste (WIK), extending and upgrading the broadband network in Germany would cost EUR 40 billion for the conservative option and up to EUR 120 bn for the advanced option.[2] The public sector will provide a maximum of 1% of total capex as seed financing via a range of aid programmes (see box “Subsidy programmes available at various levels”, page 9). Since applications for this funding are made via municipal authorities, the latter will assume an important new role in the federal broadband strategy.

Make clear distinction between project goals

The global debates about broadband projects all too often make insufficient distinction between the challenges of hooking up previously unserved rural areas and those of increasing the bandwidth of existing networks (e.g. by changing over from copper wire to fibre-optic cable).[3] This differentiation is important because the contrasting challenges of projects to extend coverage and projects to upgrade networks result in different business models and thus also differing funding opportunities (see chart 6). Network upgrade projects aimed at boosting the available bandwidth are usually initiated by existing network operators that already have functioning business models and revenue streams. Based on this existing business a feasibility study is then conducted into funding the planned upgrade project. If the revenues from the existing business can additionally be utilised as collateral for the proposed capital expenditure, this further reduces the funding risk.

Unlike network upgrades, projects to roll out broadband to previously unserved rural areas have to contend with very many more imponderables. This is particularly the case since in keeping with strict market logic these unserved areas have hitherto failed to receive broadband precisely because the return on investment was seen to be too unappealing. Alone on account of the assumptions that have to be made about the future development of the putative new market, conducting a feasibility study into network expansion projects is a great deal more challenging than for upgrade projects. The high project risk typically associated with building a new network – allied to strictly limited potential profitability – is a major impediment to funding and thus to making rapid progress in bringing broadband access to unserved areas.

[2] See Doose, Anna Maria, et al. (2009). Breitband/Bandbreite für alle: Kosten und Finanzierung einer nationalen Infrastruktur. WIK Diskussionsbeitrag 300. Bad Honnef.
[3] See Kenny, Robert (2010). Optimal Investment in Broadband: The Trade-Off Between Coverage and Network Capability. The Vodafone Policy Paper Series. Developing Government Objectives for Broadband. Newbury.



Regulatory framework marks out the playing field

Key factors are technological advances, market conditions and telecommunications regulation

The huge capital expenditure involved in broadband projects means the outlay can probably only be recouped over an extended timeframe. With the longer amortisation period, however, the uncertainty surrounding the project also increases. This can be mitigated with a regulatory framework that boosts the planning certainty for competing investors and financiers.[4]

Pay sufficient attention to the complex issues

Experience shows that projects are particularly promising if they are based on a rigorously conceived business model geared towards the three key criteria of advanced technology, market conditions and telecommunications regulation together with their many facets. At the same time, the investment-promoting impact of, for example, the following factors is currently making them the focus of particularly intense debate:

From mobile communications via regional market dominance right through to BEREC

— Advances in mobile communications technologies: to what degree can broadband mobile technologies (e.g. LTE, the successor to UMTS) reduce the funding required to bring broadband access to unserved rural areas in the medium term?

— Technical standards: to what extent are new standards needed to guarantee non-discriminatory access to the new networks?

— Digital dividend: to what degree can the spectrum freed up by the introduction of digital terrestrial broadcasting facilitate the medium-term provision of broadband access to unserved rural areas?

— Universal service obligation: can a statutory basic level of service promote advances in telecommunication; and who is to bear the costs given the conflict between the envisioned ideal and re-monopolisation.[5]

— Open access: are there sufficient investment incentives where there is non-discriminatory access to new networks; will new offerings be created that can finance the expansion of the infrastructure?[6]

[4] See Fetzer, Thomas (2010). Regulierung der neuen Generation. Frankfurter Allgemeine Zeitung. March 3, 2010, p. 19. Frankfurt am Main.

[5] The EU universal service directive stipulates in article 32 that public money has to be provided for this.

[6] See ERG (2009). Report on Next Generation Access - Economic Analysis and Regulatory Principles. ERG (09)/17. Brussels.

— The weighting of service competition against infrastructure competition: to what extent can competition in the communication and data services segments be fostered by infrastructure competition?[7]

— Net neutrality: to what degree can the prioritisation of data traffic by network operators significantly bring forward the implementation of the proposed broadband projects?[8]

— Market analysis periods: how much are investors helped by extending the regulation periods (currently 3 years in Germany)?

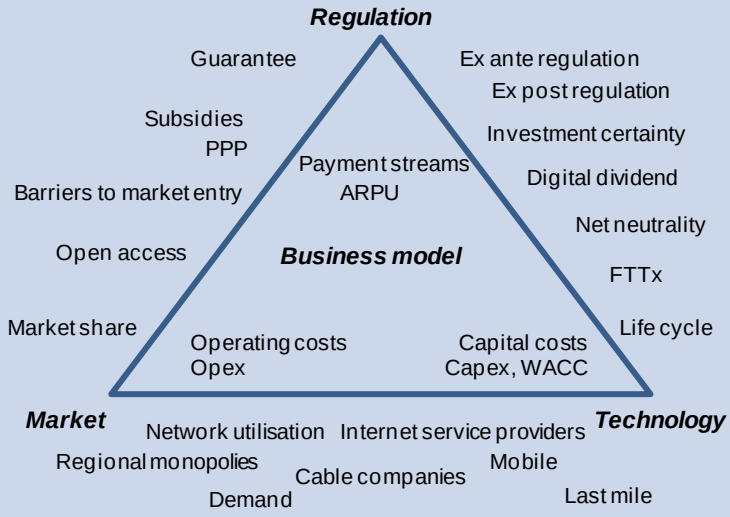
— Regional market clout: at how small a scale should a market be geographically defined given that the need for regulatory intervention has to be reconciled with the local participation of individual investors?

— Regionally differentiated end-user prices: how acceptable is it from a structural policy angle for regionally differentiated prices to reflect the differing cost structures?

— Spreading of the investment risk: to what degree are business models to be promoted that allow the investment risk to be shared between the network operator and the service provider?

— Cooperation between regulatory institutions: how should the newly created EU-level regulator BEREC (Body of European Regulators for Electronic Communications) position itself vis-à-vis national regulators – given the need to reconcile the political principle of subsidiarity with the harmonisation of the single European market?

Lots of factors influence the business model



Sources: LBBW Research, DB Research, 2009 7

The Digital Agenda for Europe, which the EU Council unveiled its "Granada Strategy" in May 2010, demand that all EU citizens should have basic broadband access by 2013; and subsequently that 50% of all EU citizens should even have access to broadband offering

[7] See Heng, Stefan (2008). Telecom regulation in the EU facing change of tack. Competition requires a clear policy line. Deutsche Bank Research. E-conomics 66. Frankfurt am Main.

[8] See Krämer, Jan and Lukas Wiewiorra (2009). Innovation through Discrimination?! A Formal Analysis of the Net Neutrality Debate. Karlsruhe Institute of Technology. Karlsruhe.

European legal framework is now being transposed into national law

speeds of at least 100 Mbit/s by 2020. To ensure the EU's competitiveness as a business location the new European legal framework for electronic communication published at the end of 2009 addresses the main issues (see chart 7). It is now up to the EU member states to find the appropriate means for transposing this EU legal framework into national law by mid-2011.[9] The German government has already presented the cornerstones of its amendment to the telecommunication act.[10]

Many variations in implementation

No standard solution for broadband projects on horizon

The marked differences in geographical and structural conditions mean that there is no standard solution in terms of either technology or business model and funding that could be utilised for every broadband project. The funding options are especially dependent on the company and project background, particularly the parameters of creditworthiness, maturity and collateral. The funding options differ considerably with regard to their organisational and financial structures. Furthermore, within the financial structure criterion the distinction must also be drawn between funding origin (external or internal funding) or, alternatively, the legal position of the investor (provider of equity or debt capital). According to this scheme of funding origin and legal status there are thus the following four types of funding:

1. Internal financing using borrowed capital (also: reserve-backed financing)
2. Internal financing using equity capital (own financing)
3. External financing with borrowed capital (credit financing)
4. External financing with equity capital (equity investment financing)

Creditworthiness, maturity and collateral are key factors

The internal financing option aims to fund company projects using retained company profits. With external financing, by contrast, the company receives project funding from external sources (e.g. via deposits, loans) that are not related to the company's value creation process. With regard to the legal position the equity financing option is based on the proprietors providing additional funding for their company (for example, via cash and non-cash stakes). With borrowed capital funding, conversely, it is persons who are not shareholders who inject capital into the company – mostly as loans.

With the organisational structure criterion, by contrast, the entrepreneurial risk resides at one extreme solely with a private-sector firm, in the other solely with the public sector. In the latter case besides public-sector projects that are solely financed via taxes such projects are also relevant where a local authority is the borrower and a local-authority energy supplier (for example, a municipal utility) acts as the operator.

The public-private partnership model

Between the two extremes of the exclusively public and the exclusively private assumption of entrepreneurial risk come all those forms of joint venture described as public-private partnerships (PPPs).

[9] Klotz, Robert and Alexandra Brandenberg (2010). Der novellierte EG-Rechtsrahmen für elektronische Kommunikation - Anpassungsbedarf im TKG. MultiMedia und Recht, MMR. Munich.

[10] See Federal Ministry of Economics and Technology (2010). Eckpunkte zur TKG-Novelle 2010. Berlin.

Wide variety of options for joint ventures between the private and public sectors

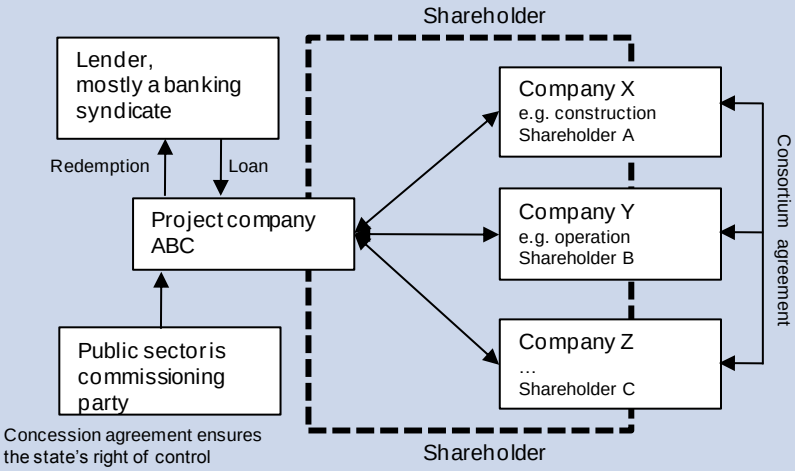
Many types of partnership

As is the case in other sectors (especially roadbuilding) the different administrative levels of the public sector (in Germany's case: federal, state and municipality) also enter into partnerships with the private sector to undertake infrastructure projects. In these infrastructure project partnerships the objective is to bring together the necessary resources (e.g. project knowledge, capital) in a joint venture and share the project risk. Since public-private partnership models are repeatedly proposed as an option for extending and upgrading the broadband network we intend to closely examine the practical options in this section.

The models for privatisation of public functions implemented in other sectors of the economy can be placed in the following three categories:[11]

1. Formal privatisation (organisational privatisation)
2. Functional privatisation (privatisation of a function or issuing of a concession, facility management model)
3. Material privatisation (privatisation of public capital)

Functional privatisation: Public sector retains control



Source: LBBW, 2009 8

Formal privatisation: Public company bears responsibility

Ownership remains in public hands

With formal privatisation a public company (such as a municipal utility) undertakes the construction and operation of the communications network. For this purpose a wholly state-owned public company is often either newly established or is spun off from an existing public company (example: Deutsche Telekom AG following the spin-off from Deutsche Bundespost in January 1995 and prior to its flotation in November 1996). In most cases the company, which remains in public ownership, introduces commercial profitability criteria. These are intended to help increase the economic efficiency of the public company.

[11] See Alfen, Hans Wilhelm et al. (2006). Privatisation options for the German motorway network. Deutsche Bank Research. Current Issues. Frankfurt am Main.

Functional privatisation: Sovereign duty remains in the public sector

In law, the activity remains a public-sector responsibility

With functional privatisation a private company is granted a concession to plan, construct, fund, maintain and operate the network for limited period (see chart 8). The concession for the network segment is offered via a competitive tendering process – often with the promise of start-up funding from the public purse. In law, the sovereign task remains in public hands. Experience shows that projects based on the model of functional privatisation are particularly promising if the lines of responsibility are clearly defined at the management and execution levels.

Material privatisation: Ownership is transferred to a private company

Public sector sells shares

In the case of material privatisation the state sells its ownership rights to private companies. Majority ownership of the communications network (or parts of it) then lies in the hands of a private company.

Even though material, functional and formal privatisation have hitherto still played a minor role in the actual extension and upgrading of the broadband network the partnership models nevertheless represent important alternative options that should be considered more closely in the policy debate concerning future projects.

Demand for GAK funding varies

GAK funding requested (EUR m), 2008-2013

Saarland	0.1
Hesse	0.8
Rhineland-Palatinate	0.9
Thuringia	0.9
Saxony	0.9
Saxony-Anhalt	1.0
Schleswig-Holstein	1.0
North Rhine-Westphalia	1.1
Mecklenburg-Western Pomerania	1.3
Brandenburg	1.4
Baden-Wuerttemberg	1.6
Lower Saxony	2.4
Bavaria	3.1
Total	**16**

Source: PORTEL.DE, 2010 **9**

Excursus: Subsidy programmes available at various levels

Over and above the public-private partnership option, the state is also involved in extending and upgrading broadband networks via subsidy programmes. Looking at these programmes should make it clear that simply on account of their low volume of funds relative to the total capital investment required that public-sector subsidies can merely help to kick-start private investment but certainly cannot completely replace it. The EU, federal and state programmes for funding broadband projects in Germany, for example, are as follows (see Pötschke, Dieter (2009). Fördermittel Land, Bund, EU. In Federal Ministry of Economics and Technology. Fourth National IT Summit. Breitband der Zukunft. Beiträge zur Umsetzung der Strategie der Bundesregierung. Berlin.):

EU funding programmes: Extra momentum following the summit

Since the Broadband Summit in 2007 the European Commission has stepped up its funding of broadband. For instance, the EU has provided funding for broadband projects from the "European Agricultural Fund For Rural Development" (EAFRD) and the "European Regional Development Fund" (ERDF) to kick-start broadband projects in structurally weak areas. For funding projects in Germany alone EAFRD had EUR 1.5 bn at its disposal in 2009 and will be able to provide EUR 750 m in 2010 and EUR 750 m in 2011. ERDF will make EUR 24 m available for broadband projects in the period 2007 to 2013.

Federal funding programmes: Support from a variety of directions

Since 2009, broadband projects have also been funded via the "Gemeinschafts-aufgabe Verbesserung der regionalen Wirtschaftsstruktur" (GRW); this regional support initiative is to provide EUR 60 m for broadband projects by 2013. Funding will be given for up to 90% of the profitability gap of the project (arithmetical difference between the costs of an investment and the resulting revenues based on market end-user prices).

In addition, the Federal Ministry for Food, Agriculture and Consumer Protection (BMELV) expanded the "Gemeinschaftsaufgabe Verbesserung der Agrarstruktur und des Küstenschutzes" (GAK) agriculture and coastal protection programme to include broadband projects in 2008. Once a municipality has lodged an application this programme can fund up to 90% of the profitability gap of a broadband project in a rural area, up to a maximum of EUR 500,000 per project. Initially the GAK programme provides annual ring-fenced funding of up to EUR 16 m from federal and state budgets (see chart 9). The budgeted GAK funds were not spent in full in 2008 and 2009. As proposed by the state governments these unspent amounts

can now be carried over to subsequent years. Furthermore, the EU now allows co-financing via EAFRD. With 50% co-financing from EAFRD this means that up to EUR 33 m will be available in Germany. It is planned to increase this funding to EUR 50 m.

In Germany's Konjunkturpaket II stimulus package the federal, state and local authorities have earmarked a total of EUR 13 bn for state and local authority investments in education (65% of the whole budget) and other infrastructure (transport, hospitals, urban planning, measures to boost energy efficiency, information technology). A small fraction of this is thus also intended to help finance the proposed broadband projects – the expected amount is EUR 150 m.

***Länder* subsidy programmes: Germany's states follow suit**

The first German states to support broadband projects via subsidy schemes were Schleswig-Holstein (2007), Bavaria (2008) and Baden-Wuerttemberg (2008). Other states are currently following suit and utilising the experience that has been gathered. For example, Baden-Wuerttemberg subsidised investments in passive fibre-optic networks and with grants of up to EUR 750,000 per project. In Rhineland-Palatinate, by contrast, between 60% and 90% of material and construction costs (but up to a maximum of EUR 300,000 per project) can be subsidised, depending on the financial strength of the local authority (see Federal Ministry of Economics and Technology (2010). Möglichkeiten der Breitbandförderung: Ein Leitfaden. Berlin).

Intellectual game: Private equity funding of broadband projects

Critically assess the options involving private equity

Given the benefits yielded by private-sector investments in infrastructure in related economic areas (e.g. buildings, roads, power grids) the possibility has been raised repeatedly of funding the proposed network extension and upgrading projects with private equity from individual or institutional investors. Given that this idea has been floated again and again this section will attempt to investigate under which conditions this funding model could actually be utilised for the broadband.

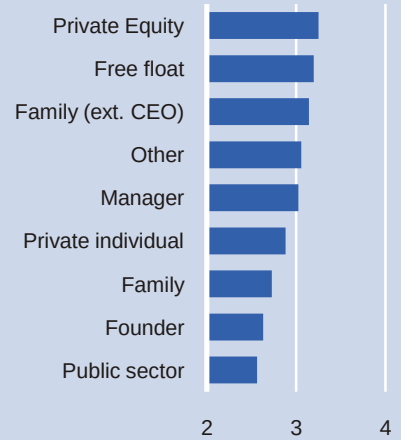
Private equity is a form of funding that can basically be used in all sectors. This is shown for example by the fact that in 2008 the portfolios of German private equity funds contained 6,400 companies that employed a total of 1.2 million people. The volume of private equity investments worldwide totalled USD 2.5 trillion in 2008. The private equity sector consists of two segments: venture capital and buyouts. The buyout segment constitutes 80% of total European private equity volume.[12]

The basic private equity business model is built on the following three foundations:

1. Boosting profitability by operational and strategic restructuring of portfolio companies (see chart 10)
2. Raising return on capital by increasing the leverage of the portfolio company
3. Valuation uplift at portfolio companies

This outline of the principal mechanisms of private equity funding indicates that an infrastructure fund would only invest in the broadband market if in a stable regulatory framework the value of the portfolio company could be boosted considerably in the medium term via improved funding conditions and more efficient processes. These conditions are much more critical for telecommunication than for other infrastructure segments. The inherent uncertainty in the system is one important reason why private equity funding of broadband projects has hitherto not really played a role and will

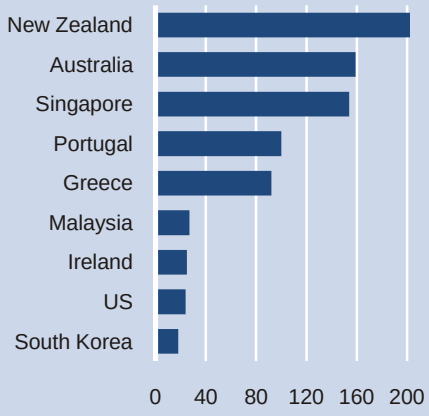
PE gets good grades
Average rating of the management by the main owner



Rating scale from 1 to 5 (best practice)
Management unchanged for at least 3 years
Source: Bloom et al, 2009
10

[12] See Meyer, Thomas, 2009. Private Equity: Obituaries are premature. Deutsche Bank Research. E-conomics 71. Frankfurt am Main.

Public-sector funding very high in Oceania
Proposed public investment in NGN per inhabitant (USD)



As of Q2 2009
Source: Booz & Company, 2009
11

probably continue to be utilised in only isolated exceptional cases going forward.

Countries devising ambitious objectives for extending and upgrading networks

All around the globe governments are attempting to accelerate the rollout of advanced communications networks (see chart 11). In most cases they are setting very ambitious goals with regard to network performance and coverage. The considerable costs associated with fulfilling these objectives are largely incurred in carrying out the civil engineering work required to expand the network. This cost structure results in the competitively organised market for extending networks being concentrated in densely populated urban areas as they offer investors more appealing return prospects relative to connection costs. In turn, the conclusion that can be drawn from this is that in sparsely populated rural areas the nationwide extension and upgrading of advanced communications networks can only rarely be a commercially viable proposition. This inherent commercial downside puts rural areas, which are also poorly served with other infrastructure, at risk of falling even further behind in their development.

Excursus: Countries interpret their roles very differently

Based on how different countries see their roles, there is a wide range of policy programmes for extending and upgrading broadband networks worldwide (see charts 12 and 15):

Australia: Government forging ahead

For years neither the incumbent nor alternative network operators managed to make significant progress in developing the proposed broadband projects in Australia. With the “Fibre-To-The-Premises” programme the Australian government intends to provide 90% of households with access to a transfer speed of 100 Mbit/s. The remaining 10% of the 7.5 million households of the sparsely populated continent are to be provided with speeds of at least 12 Mbit/s via terrestrial or satellite radio links. The “Fibre-To-The-Premises” programme is timetabled to take 8 years and as a consequence will bring about the complete separation of network operation from the provision of services. Initially, government bonds are to be issued to fund the capital expenditure of EUR 26.5 bn. A majority state-owned company is already busy dealing with the implementation of the broadband projects. According to the plan, this state-owned firm is then to be privatised 5 years after accomplishing its broadband targets.

Finland: The “last mile” requires input from subscribers

The Finnish government has developed a two-stage, technology-neutral plan for its broadband projects. Before the end of 2010 everyone across the entire nation is to be granted the enforceable right to access a universal service with at least 1 Mbit/s and an attractive end-user price. By 2015, the second stage is then to ensure that 99% of households and companies are provided with access speeds of up to 100 Mbit/s within a radius of 2 km. End-users themselves have to pay to physically bridge this “last mile”.

The costs of constructing a high-speed communications network for the commercially less attractive unserved rural areas containing 120,000 households (4% of the population) are expected to total EUR 200 m; this does not include the costs of the last 2 km that subscribers there will also have to shoulder. Together, Finland and the European Union will fund up to two-thirds of the capital expenditure for the high-speed network. Finland plans to finance its broadband programme via receipts from the auction of the digital dividend and a temporary additional broadband charge levied on telecommunications companies from 2010 to 2015.

United Kingdom: Extra levy to do the trick

The British government has devised a two-stage technology-neutral broadband strategy. In the first stage a universal service obligation is to ensure that by 2012 the entire population has nationwide access to the internet with a minimum speed of 2 Mbit/s. The British government plans to provide EUR 230 m in subsidies for

first-stage projects. During the second stage the government expects free-market competition to result in two-thirds of all households having access to advanced high-speed networks by 2017. In order to increase coverage to 90% the UK government intends to provide funding from the public purse. The subsidies required for the rollout to unserved rural areas in the second stage of the British broadband strategy is estimated at EUR 190 m. The subsidies are to be funded via a “Next Generation Fund” levy and administered by Ofcom, the telecoms regulator.

Japan: Broadband has long been an issue

Since as far back as the late-1990s Japan has recurrently offered incentives for extending and upgrading broadband infrastructure. Overall, the infrastructure is correspondingly well developed. Since 2006 progress has been made in the changeover from copper wire (DSL) to fibre-optic cable (FTTH). All the same, the challenges in rolling out broadband to unserved rural areas is particularly clear there as the population density is especially low – 10% of the population live on 90% of the land area. Back in 2006 the Japanese government set a target that the entire country was to have broadband access by the end of 2010. Furthermore, 90% of the population should even have access to a high-speed network. Japan plans to provide cheap loans, guarantees, low business taxes and subsidies to enable this objective to be achieved. The costs of Japan’s broadband projects come to EUR 60 bn.

Sweden: Universal service fund is the starting point

The Swedish broadband strategy is divided into three stages. In the first stage a 2 Mbit/s service is to be made available nationwide by the end of 2010. In the second stage at least 40% of households are then to have access to 100 Mbit/s by the end of 2015. In the third stage coverage is then to rise to 90% of households by 2020. Furthermore, Sweden intends to boost broadband demand itself with digital e-government, e-health and e-learning service offerings. The broadband strategy gives equal treatment to fibre-optic, cable and wireless technologies.

For the first stage of the broadband strategy the Swedish government intends to set up a universal service fund that will receive contributions from all telecommunications companies. This fund is to provide EUR 100 m for rolling out 2 Mbit/s services to hitherto commercially unviable areas. In the second stage of the broadband strategy the public purse is to provide a further EUR 24 m to fund the installation of infrastructure in rural areas between 2010 and 2012. Besides providing direct financial assistance the Swedish government hopes that market momentum will make a contribution stimulated by public-sector measures (from the speeding up of regulatory decision-making, via the spectrum allocation arising from the digital dividend right through to tax breaks for innovators).

South Korea: Universal service to achieve nationwide coverage

Thanks to a number of broadband programmes South Korea is today a leader in terms of broadband access. The current programme is now aimed at expanding network coverage and in addition considerably boosting the speed of the existing network. For instance, the government obliged the market leader to provide broadband access as universal service. This obligation also includes the demand that all regions be provided with a minimum of 1.5 Mbit/s. In addition, the fixed network is to achieve speeds of 100 Mbit/s nationwide by 2012 and subsequently as much as 1 Gbit/s – at least in major conurbations. In this connection a next generation communications network is to be built that combines fixed and mobile technologies.

This upgrading of the communications network in the next 5 years will probably cost around EUR 25 bn. South Korea plans to provide direct subsidies totalling EUR 1 bn for the proposed broadband projects. South Korea is hoping that offering tax incentives and cheap loans to private investors will persuade them to stump up the lion’s share of the capital expenditure.

USA: FCC heavily involved

In the US, programmes like the Broadband Technology Opportunities Program (BTOP) or the Broadband Initiatives Program (BIP) are aimed at improving broadband access in rural areas. In the American Recovery and Reinvestment Act a total of EUR 7 bn is set aside for this purpose. These funds are disbursed in agreement with the US regulatory authority, the Federal Communications Commission (FCC) and the Ministry of Agriculture. The FCC intends to publish the details of the programme. On top of this, a broadband atlas, drawn up by the FCC, is to ensure market transparency and in addition facilitate investment in this area by private sector companies.

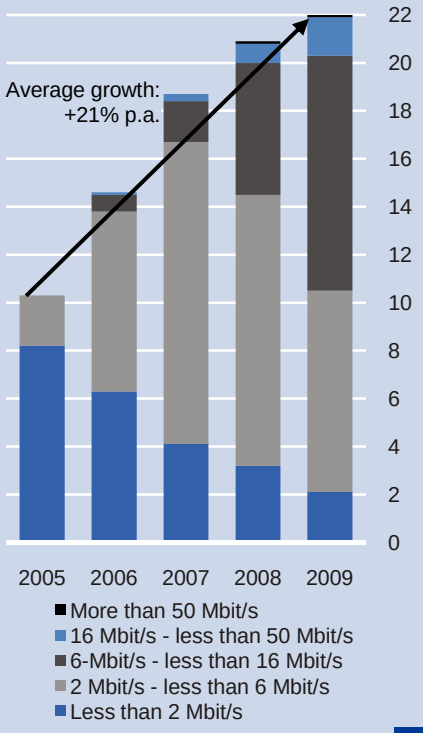
Countries define roles differently

	State sees itself as …		
	… financer of infrastucture	… owner/ operator of infrastructure	… demand stimulator
Australia	yes	yes	-
Germany	partly	-	-
Finland	partly	-	yes
United Kingdom	partly	-	-
Japan	-	-	yes
Sweden	-	-	yes
South Korea	partly	-	-
US	partly	-	-

Sources: WIK, DB Research 2009 12

Connections with less than 2 Mbit/s losing significance

DSL connections by downstream bandwidth, Germany (million)



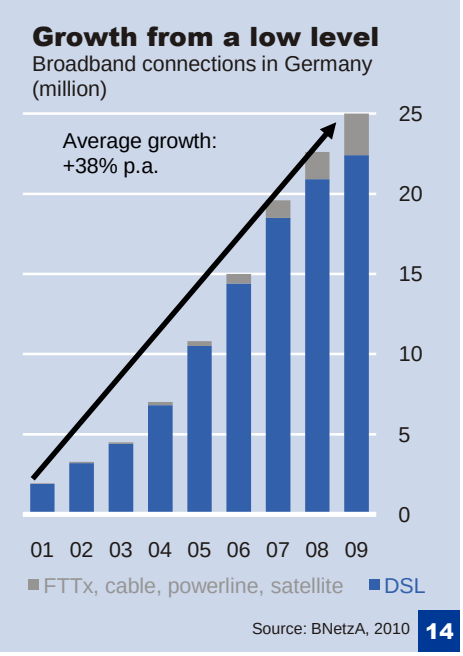
Source: Dialog Consult/ VATM, 2009 13

Strategy should keep an eye on competition

On an international comparison of communications networks the countries with large public-sector subsidy pools have better systems in place at present than those that refrain from providing financial assistance. However, the international comparison should not tempt observers to jump to the conclusion that the road to privatisation and deregulation of the entire telecommunications sector embarked upon over a decade ago should now be completely abandoned in favour of the faster extension and upgrading of broadband networks. After all, it is much more important for a broadband project to be based on an investment strategy that delivers sustainable long-term infrastructure development than to achieve excellent ratings in topical international comparisons by granting huge subsidies.

As can already be observed today, advanced communications networks are being built (more or less quickly) in the densely populated conurbations under free-market conditions. There, data transfer capacity is being expanded without any public subsidies and without a universal service obligation (see charts 13 und 14).[13] In contrast with this ray of hope in conurbations, however, experience also shows that unserved rural areas will not witness any significant increase in broadband access for the foreseeable future without state subsidy programmes for private-sector investors. In these hitherto unserved regions the relevant administrative levels of the public sector (in Germany's case: federal, state and municipality) should start by merging smaller-scale projects (also across administrative boundaries), enter into risk-sharing partnerships with the private sector as necessary and participate in rolling out broadband via PPP models. Since the state's entrepreneurial decision-making is fundamentally no better that that of private-sector companies, it should not seriously curtail its budgetary decision-making scope regarding broadband infrastructure with this huge investment volume and thereby neglect important public duties in other infrastructure areas outside the telecommunications segment.[14] Especially as the importance of subsidies programmes and regulatory intervention in the debate about their impact on the extending and upgrading of broadband networks is all too often overrated. Ultimately the reintroduction of a

[13] See Reynolds, Paul et al. (2008). Reforming Universal Policy. GSM Europe.
[14] See Fredebeul-Krein, Markus (2010). Wirtschaftskrise: Staatliche Förderung von glasfaserbasierten Breitbandnetzen? Wirtschaftsdienst, 90,2. Hamburg. p. 113.



monopoly by the back-door of broadband expansion and upgrading would serve neither the telecommunications sector nor the economy as a whole. Equally, the public sector can help to further advances in telecommunication over and above the afore-mentioned measures of bundling projects and initiating PPP models by taking the following actions:

— Setting realistic targets for the expansion and upgrading of networks that do not raise any counterproductively excessive expectations among customers;

— Providing essential market information about existing infrastructures (conduits, networks, etc.) and potential demand of possible investors[15];

— Offering its own digital services in the e-government, e-health und e-learning segments that promote the interest of firms and private individuals in digital services, thereby also facilitating the start of other private-sector digital services and on top of this giving a general boost to broadband demand;

— Further enhancing investment incentives in the regulatory framework; e.g. with regard to market analysis periods, net neutrality, regionalisation or the sharing of investment risk.

Conclusion: The key factors are the regulatory framework, market transparency and risk-sharing partnerships

Broad range of projects

The differing geographical and structural conditions mean that there is no standard solution in terms of either technology or business model and funding that could be utilised for every broadband project. The uncertainty associated with projects to roll out broadband to hitherto unserved areas is structurally higher than for projects to increase the bandwidth of existing lines. In line with the diversity of broadband projects the basic funding options with regard to the two criteria of organisational and financing structures are also extremely varied.

The real challenges lie outside urban agglomerations

Around the globe countries are attempting to forge ahead with the expanding and upgrading of advanced communications networks. In most cases they are setting very ambitious goals with regard to technology and coverage. The specific cost structure for broadband projects, however, results in the competitive market for network upgrading being focused on densely populated urban areas. The reason for this is that in these areas the expected return relative to connection costs is more appealing to the investor. Densely inhabited regions are thus now getting advanced communications networks (more or less rapidly) – without any state subsidies being disbursed or a universal service obligation being imposed. By contrast, the rollout of broadband to unserved rural areas will not progress decisively for the foreseeable future without public subsidy programmes for private investors. In these hitherto unserved regions the public sector should start by merging smaller-scale projects and entering into risk-sharing partnerships where necessary.

Prevent return to a monopoly

In taking this action, however, it should be clear that a return to a monopoly structure would ultimately benefit neither the tele-communications sector nor the economy as a whole. Nonetheless, the public sector can significantly promote advances in tele-communication by merging projects, entering into risk-sharing

[15] See Czernich, Nina et al. (2009). Regulatory Framework for Next Generation Access Networks across Europe. CESifo DICE Report 1/2009. Munich.

partnerships, setting realistic broadband targets, providing essential market information, offering digital services itself and, on top of that, enhancing investment incentives with a regulatory framework in a competitive environment.

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Broadband projects worldwide highly diverse

	Broadband programme	Service details	Estimate of investment expenditure	Tackling unserved areas	Alternative technology
Australia	New NBN	≤ 100 Mbit/s for 90% by 2018; up to 12 Mbit/s for the remainder	yes	yes	yes
Germany	Federal government broadband strategy	1 Mbit/s nationwide by 2010; ≥ 50 Mbit/s for 75% by 2014	yes	yes	yes
Finland	National Broadband Strategy	1 Mbit/s for 100% by 2010; 100 Mbit/s for 99% by 2015	yes	yes	yes
United Kingdom	Digital Britain	2 Mbit/s as a universal service by 2012	yes	yes	yes
Japan	Next Generation Broadband Strategy 2010	"Ultra high speed" for 90% by 2010	yes	yes	yes
Sweden	Breidbandsstrategi för Sverige	100 Mbit/s for 40% by 2015; for 90% by 2020	no	yes	yes
South Korea	Ultra Broadband Convergence Network	100 Mbit/s for 14 million users by 2012; then Gbit/s upgrade	no	no	yes
US	Programme to be drawn up	Still unclear	no	yes	yes

Source: WIK, 2009 15