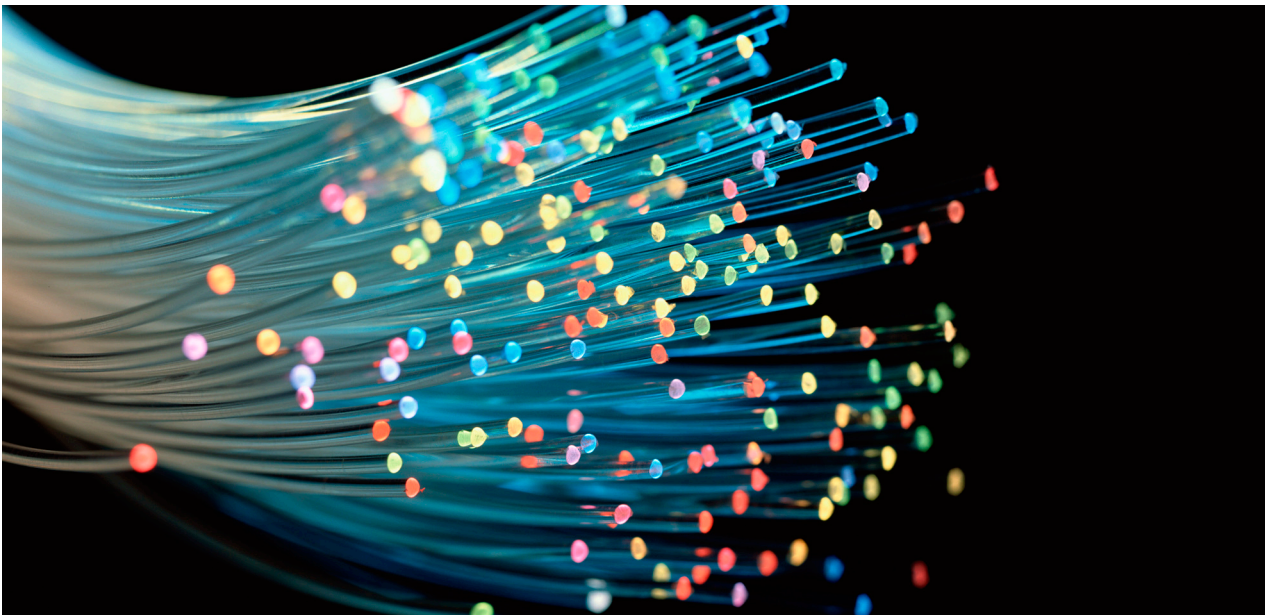


booz&co.



Digital Highways

The Role of Government In 21st-Century Infrastructure

Contacts

Beirut

Bahjat El-Darwiche

Principal

+961-1-985-655

bahjat.eldarwiche@booz.com

Dubai

Karim Sabbagh

Partner

+971-4-390-0260

karim.sabbagh@booz.com

Milind Singh

Senior Associate

+971-4-390-0260

milind.singh@booz.com

Düsseldorf

Roman Friedrich

Partner

+49-211-3890-165

roman.friedrich@booz.com

EXECUTIVE SUMMARY

Next-generation broadband networks promise much faster transfer of information, services, and benefits throughout a national economy, promoting overall growth, productivity, and prosperity. For that reason, public policymakers are seeking to stimulate or contribute significant investments to establish such networks. Yet the hurdles to deploying next-generation broadband are significant. Private investment in the sector hangs on greater certainty over revenue, regulation, and technology—and many telecom operators are not willing to move forward without support. Government policymakers can play a direct, indirect, or entirely passive role in reducing these hurdles and providing greater certainty and support for deployments. The policy choices they make will likely determine how much their nations benefit from deployment of next-generation broadband.

KEY HIGHLIGHTS

- Next-generation national broadband networks can significantly improve the way that consumers, businesses, and governments interact, spurring economic growth and productivity.
- Governments must play a role in the deployment of such networks to overcome the hurdles that cannot be addressed by the private sector: the magnitude of the investment, the models for generating returns, and the regulatory risks.
- There are three primary ways beyond traditional regulation for governments to get involved: investing in infrastructure, facilitating new business models, and stimulating demand.

NEXT-GENERATION BROADBAND: A NATIONAL IMPERATIVE

In April 2009, Australian Prime Minister Kevin Rudd announced that the government would commit A\$43 billion (US\$30 billion) to building a broadband network across Australia, calling it “the single largest nation-building infrastructure project in Australia’s history” and promising it would play a role in “turbo-charging Australia’s economic future.” He likened it to Australia’s 19th-century cross-continental railroads—an investment that linked the nation’s sparsely populated inland to its coasts. Considering the economic stakes for Australia, which had lagged behind other nations in broadband access, Rudd said the nation had to bypass private bids to build the broadband network and fund the network through public spending.¹

That investment is merely the latest salvo in an international charge for

the economic growth that the telecom sector can generate: There has been a series of ever-larger government commitments to building national networks to support all of the entertaining and educational activities enabled by broadband. South Korea, Germany, Greece, Malaysia, Singapore, and the U.S. have all announced substantial government funding for network infrastructure development (*see Exhibit 1*). Rudd and dozens of other broadband enthusiasts argue that the nations that don’t join this battle risk getting dominated by those that do. As a nation communicates and shares information, so does it boost its economy and future prosperity. The job of building the next generation of broadband networks is therefore too important to be left at the mercy of investors’ willingness to enter an uncertain market.

The argument is compelling. Although market purists argue that only private industry, driven by the profit motive, will efficiently develop the infrastructure necessary to offer next-generation broadband, the hurdles to private investment in infrastructure remain imposing and the regulatory environment is far from assured. The business models of next-generation broadband providers are much

different from those of the traditional telecom sector. Those expected to make major investments in creating next-generation broadband networks on a national scale have no assurance of the kind of profitable return they have come to anticipate with previous communications technologies. With

the right policies, governments can address these issues.

Moreover, even if it were possible for private industry to build out the networks efficiently without government intervention or assistance, many government officials say this is a

responsibility that government must assume. To them, next-generation broadband is a form of long-term national economic investment, akin to building highways, supporting school systems, and building and protecting trade arrangements.

Exhibit 1
Government Commitments to Next-Generation National Broadband Networks

COUNTRY	DATE ANNOUNCED	TOTAL INVESTMENT (US\$ IN MILLIONS)	INVESTMENT PER CAPITA (US\$)
New Zealand	2009	840	205
Australia	2009	3,300 ¹	159
Singapore	2008	710	154
Portugal	2009	1,060	100
Greece	2008	1,030	92
Malaysia	2008	720	27
Ireland	2009	110	25
U.S.	2009	7,200	24
South Korea	2009	890	18
Germany	2009	200	2

¹ Based on an initial commitment of A\$4.7 billion, out of a A\$43 billion required investment; considering the plan to keep a 51 percent stake in the announced National Broadband Network Company, the Australian government's investment could go up to A\$21.9 billion.
Source: Regulator Web sites; press releases; Booz & Company analysis

WHAT NEXT-GENERATION BROADBAND COULD DELIVER

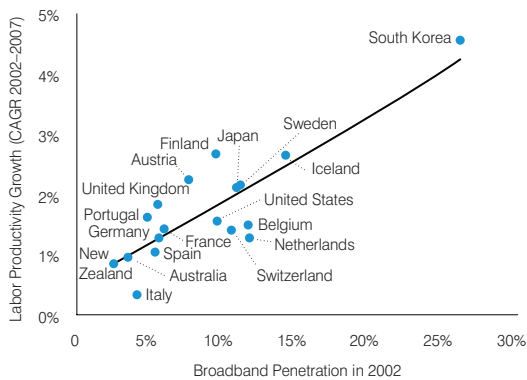
Broadband has fundamentally transformed the ways in which businesses, consumers, and governments function. For businesses, broadband has enhanced labor productivity, enabled innovation, and supported the creation of a new generation of entrepreneurs and business models. Some of the biggest success stories of this decade—YouTube, Flickr, and Skype—would not have been possible without broadband. For consumers, broadband has facilitated an information explosion—exponentially increasing the amount of information they can find, manage, and access—and allowed them to link to each other in ways that facilitate knowledge, social networks, and communal inclusion. For governments, it has enhanced opportunities for public health and education, enabled more

efficient public services, and provided a powerful boost to economic growth. Booz & Company analysis shows that 10 percent higher broadband penetration in a specific year is correlated to 1.5 percent greater labor productivity growth over the following five years. Countries in the top tier of broadband penetration have also exhibited 2 percent higher GDP growth than countries in the bottom tier of broadband penetration (see Exhibit 2).

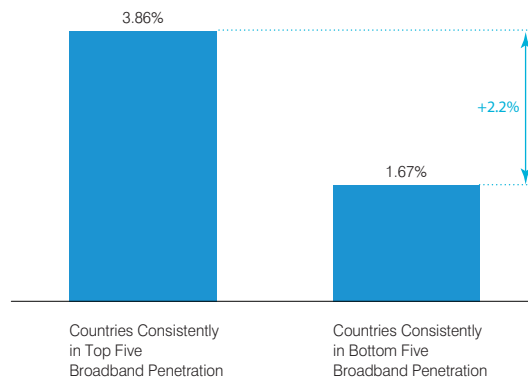
But not all broadband is created equal. Narrowband and first-generation broadband were fine for early applications. Now, consumers want more. They are seeking the virtual equivalent of real-life experience—virtual worlds and communities, in which they collaborate and interact with each other by creating and

Exhibit 2
Broadband Enables Economic Growth

CORRELATION BETWEEN PRODUCTIVITY GROWTH AND BROADBAND PENETRATION (OECD COUNTRIES)



CORRELATION BETWEEN AVERAGE ANNUAL GDP GROWTH AND BROADBAND PENETRATION (20 OECD COUNTRIES, 2002-2007)



Note : $Y = 0.1456X + 0.0044$; $R^2 = 0.7241$
Source: Organisation for Economic Co-operation and Development; Booz & Company analysis

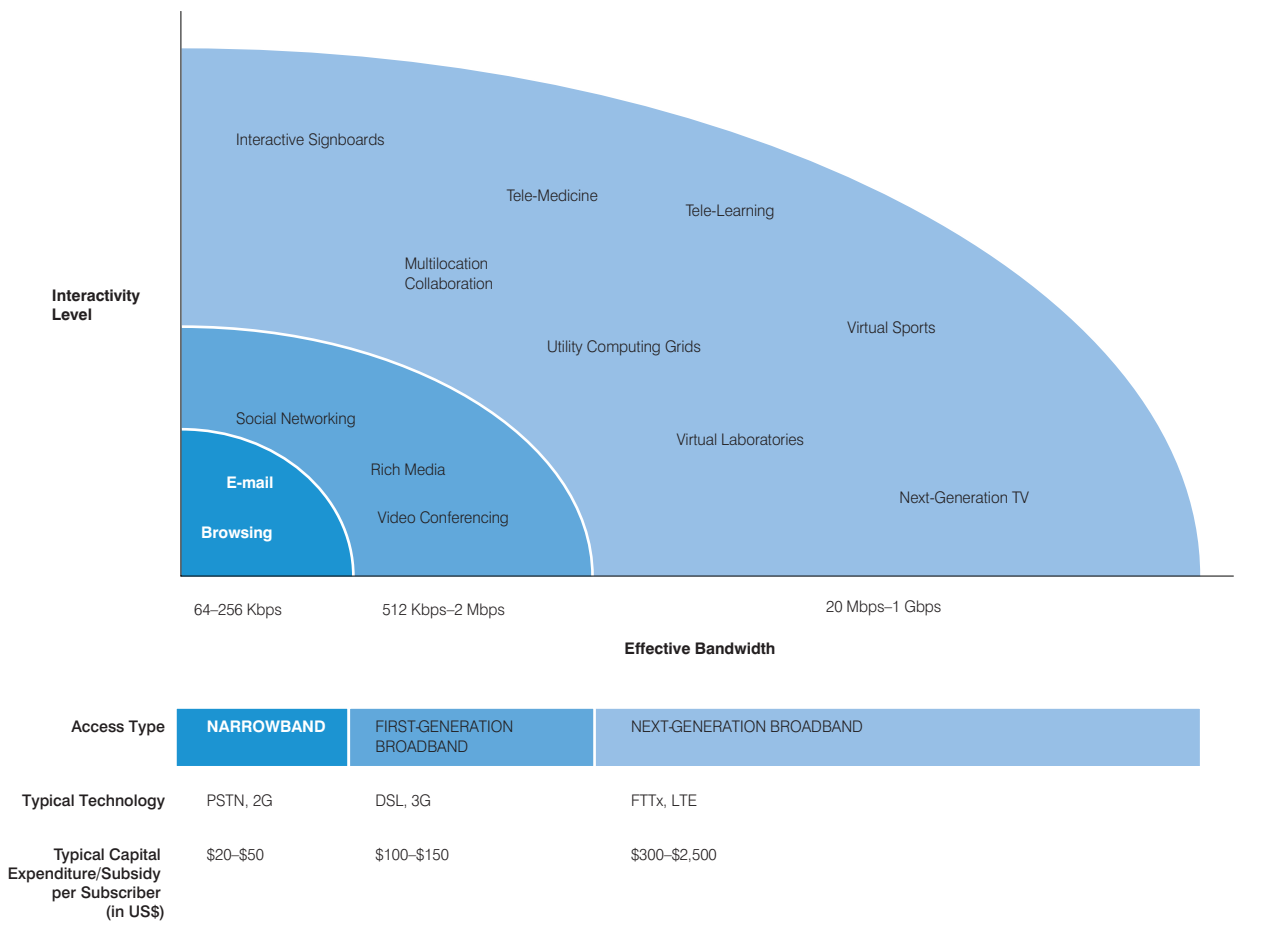
sharing content. Businesses are keen to leverage productivity-enhancing applications, such as cloud computing and tele-presence, which allows people to feel that they are immersed in a remote working environment. But these applications require far more capacity and capability than they enjoy with current versions of broadband. And innovators are seeking to explore applications and new markets for symmetrical high-speed

networks, in which all devices can send and receive data at the same rates and which represent a significant increase in demand over current broadband networks (see Exhibit 3). For instance, the applications that support tele-medicine and distance learning require speeds of up to 100 megabytes per second (Mbps) versus the 4 to 6 Mbps required for standard applications such as e-mail, document transfers, basic uploading and down-

loading of work files, and Web-based teleconferencing.

The bottom line is that next-generation broadband, where it is available, has shown stakeholders how it feels to drive on the highway—but broadband networks over most existing infrastructure are still obeying city-street speed limits. Next-generation networks, by comparison, would enable access speeds up to 30 times

Exhibit 3
Pushing Beyond Broadband's Current Capacity



Source: Booz & Company analysis

higher than current networks. That speed comes with a hefty price tag, however—around 10 times that of current networks’ investment costs.

Is the payoff worth the price? A lot of policymakers think so. Australia’s Rudd and others who have put forward their own plans consider next-generation national broadband networks (NGNBNs) projects to be equivalent to infrastructure investments and other major projects. Such high-speed networks, by being accessible and affordable to all citizens, can have a transformative impact on

a country. Furthermore, because networks are open and equally accessible to application and service providers, they make NGNBN services more affordable and boost innovation.

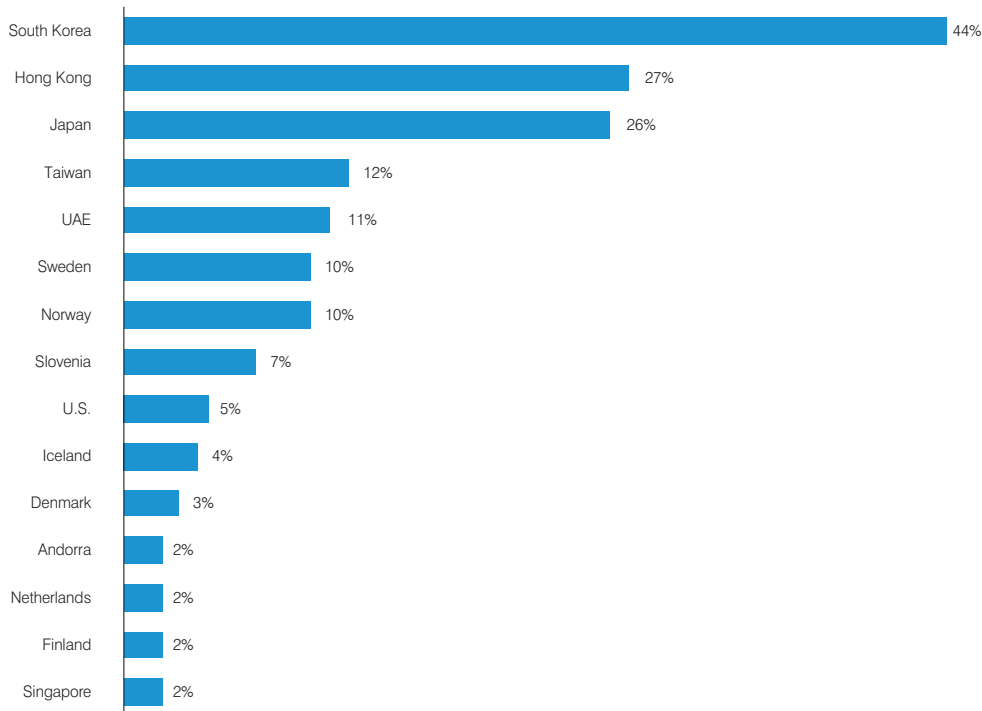
Another issue is that nations that intend to deploy Long-Term Evolution networks (LTE) for their wireless services in the next two to three years will need to have the high-speed fixed network in place to support it. LTE will require mobile stations at closely spaced intervals, and high-speed fiber will need to reach all of these stations in order to

enable high-speed mobile service.

The problem is that the rhetoric and ambition behind next-generation broadband are not yet matched with investor willingness to put money on the line. Despite consumer and business demand for applications, despite the desire for increased national competitiveness, and despite political willpower, NGNBN deployments to date have been limited. Although the technologies have matured, very few countries have yet been able to drive the adoption of a next-generation national network (*see Exhibit 4*).

Exhibit 4
Few Countries Have Extensive Networks of Fiber to the Home or Business

FTTH/B HOUSEHOLD PENETRATION, TOP 15 COUNTRIES
(Q4 2008)



Source: FTTH Council; Booz & Company analysis

THE UNCERTAINTY HAMPERING NGNBN GROWTH

For all NGNBNs' promised benefits, their deployment is not only expensive for operators, it's also highly risky. It remains an open field of competition, in which the rules are unclear, the risks unknown, and the payback uncertain.

Investments in NGNBNs are not only front-loaded, but also irreversible—as first-generation broadband operators found in the

early 2000s. And partly because of that experience, investors have held back on providing funds until they understand the business model and the extent of the regulatory, technical, and operational risks. Operators are asking three questions—and government policymakers are wise to consider them before moving forward with their own plans: How much will this really cost? How will we capture revenue from the networks? And how will the networks be regulated?

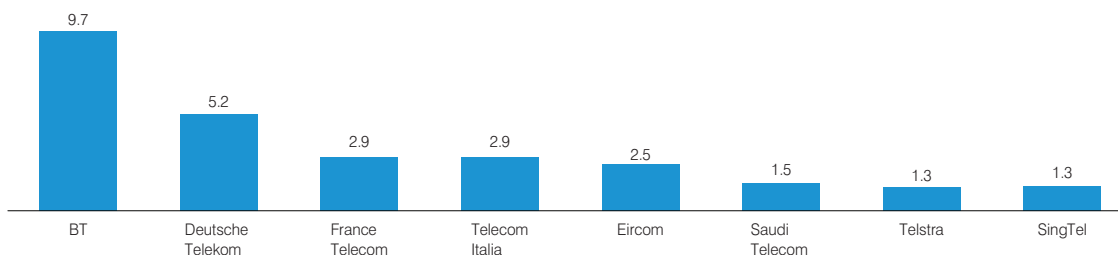
Magnitude of Investment

A NGNBN may represent the single largest infrastructure investment ever made by a telecom operator, and the current economic climate is dissuading such major investment decisions. The costs of deploying

NGNBNs rise exponentially with increasing coverage, with the costs of serving rural markets twice as expensive as the costs of serving urban areas. Although operators may still be considering tactical urban deployments of next-generation networks, they are reluctant to consider nationwide deployments, particularly in light of the current economic crisis. The cost of deploying a NGNBN in major markets could be up to 10 times the EBITDA of an operator's national business (*see Exhibit 5*). Although the telecom industry has been more resilient than many industries during the economic downturn, it has faced the same challenges in accessing capital. Given this outlook, it is no surprise that operators are unwilling to commit

Exhibit 5
Deploying a NGNBN Would Require a Significant Investment from Operators

SIMULATION OF NGNBN DEPLOYMENT CAPEX/NATIONAL EBITDA



Note: EBITDA and capital expenditure are for national operations. Calculations are based on 2008 EBITDA.
Source: Company annual reports; Booz & Company analysis

significant capital to NGNBNs. And even if the economy and credit market were more settled, the technology itself still isn't: Competing wire-line technologies have investors reluctant to place significant bets on just one. Until a clearly superior technology presents itself, uncertainty will continue to hinder commitment.

Capturing Revenue

Operators' reluctance to spend billions of dollars on a new network is justified: Those that stand to profit from next-generation broadband, either through services or applications, don't have to build the network. That fundamentally disrupts the traditional revenue model of telecom, whereby an operator would invest significantly to build out the infrastructure and draw value from its networks over a period of 15 years or more.

Telecom operators are experiencing significant competitive pressure from players in adjacent industries. Cable companies in the U.S. and U.K. are among the top three providers of broadband services. In the U.K., Virgin claims to be the only true next-generation network broadband operator, offering speeds of up to 50 Mbps. Additionally, operators are facing competition from application providers like Skype—arguably the

largest voice service provider in the world today, with more than 400 million registered users. Skype's capital expenditure per subscriber to provide voice services is US 2 cents, in comparison to US\$1,500 to \$2,500 per subscriber spent by a traditional operator to deploy a NGNBN. Increased competition and new business models are fragmenting revenue streams, reducing the amount that network operators can capture. This is inhibiting investments in NGNBNs, with operators resisting efforts to make the network open to other providers.

Perhaps most critically, consumers have now become accustomed to inexpensive, bundled, flat rates to make voice calls and consume data. Simultaneously, the emergence of advertising-supported online applications such as YouTube, Facebook, and Google has consumers now expecting online services to be either free or extremely cheap. In such an environment, it is very difficult for the operators of NGNBNs to convince customers to increase their household budget for telecom.

Regulatory Risks

Whether NGNBNs can generate returns depends in large part on the regulatory regime governing

the related products and services. However, in most countries, NGNBN regulatory regimes are still being defined. This major source of uncertainty is delaying investments in NGNBNs. Although governments defined an elaborate and robust regulatory regime for first-generation broadband networks, their regulatory tools, which include local loop unbundling and interconnect regimes, may not apply to NGNBNs.

The vendor community is divided on the ability to offer local loop unbundling products on NGNBNs, and regulators are exploring alternate products like duct and fiber sharing. Regulators are attempting to define a new regulatory regime for NGNBNs that supports a smooth transition from the current regulatory base while protecting the investment of alternate operators in first-generation broadband networks.

While regulators attempt to define a new regulatory regime, operators are uncertain of their ability to monetize their investments in NGNBNs. This is further dissuading NGNBN investments. Market forces alone can't resolve these regulatory issues, and policymakers may need to proactively address these issues to resolve the deadlock.

CHOOSING THE RIGHT DEGREE OF GOVERNMENT INVOLVEMENT

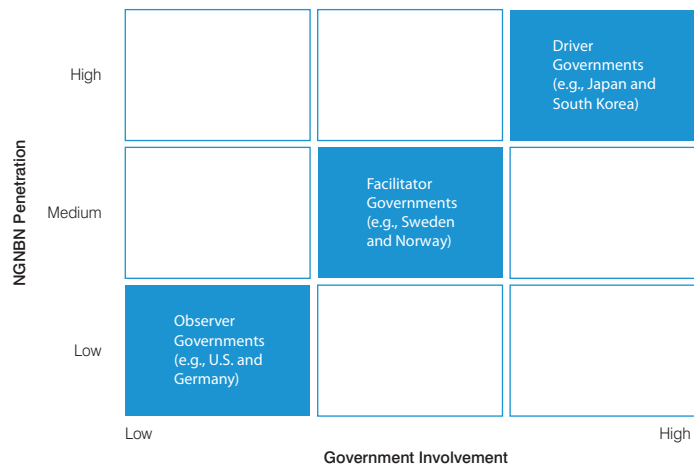
Critics of governmental involvement and investment in private-sector infrastructure often say that the government is ill-trained to understand market dynamics, productivity-boosting possibilities, and some of the other features of private business. Although that may be true, there are also market weaknesses delaying the deployment of the networks that are needed to meet market demand. This is a situation suited for public policymakers; with the right focus and use of resources, they can break down the barriers to next-generation broadband infrastructure development.

To date, government response to the market's need for NGNBNs has taken three distinct forms: Some policymakers have chosen to drive the process actively, some have chosen to facili-

tate private-market solutions, and some have chosen to step back and observe market challenges and jump in only when absolutely required (see Exhibit 6).

Driver governments, like those in Japan and South Korea, have taken the most direct and active role by proactively steering the private sector as it deploys NGNBNs. This active involvement has come in the form of financial support, on both the supply and demand sides, and has included the introduction of new business models to accelerate deployment. For instance, South Korea has generated demand by requiring all buildings to be designed to enable high-speed broadband connections, as well as by rating buildings as first, second, or third class based on whether they

Exhibit 6
How Government Involvement Drives NGNBN Penetration



Source: Booz & Company analysis

provide access at speeds of 100 Mbps, 10 to 100 Mbps, or 10 Mbps. The government has also spent \$24 billion to construct a national high-speed network, which service providers could use to provide broadband services to about 30,000 government and research institutes and approximately 10,000 schools.²

Facilitator governments, like those in Sweden and Norway, have helped by enabling the deployment of NGNBNs, predominantly by establishing local municipal networks. However, they have refrained from undertaking large investments on either the supply or demand side. For example, Sweden allocated \$250 million in grants to rural communities

to build local broadband networks, both in towns and in the surrounding countryside, and another \$250 million in tax relief for building such networks. The grants were limited to those communities that did not yet have broadband providers, and the procurement process had to be open and operator-neutral. Moreover, municipalities had to provide at least 10 percent of the cost of building the network, with government support limited to a one-time subsidy for five-year contracts.³

Observer governments, such as those in most of Western Europe and North America, have relied on market forces to bring about the deployment of NGNBNs. For some

nations, this wasn't even a choice: Until recently, European commission laws forbade members to subsidize incumbent operators—a provision that, in practice, often resulted in the prohibition of investment in network infrastructure.

If the goal is to deploy NGNBNs as quickly as possible, driving the process is clearly the best option. Those nations that have adopted “driver” policies have much higher penetration rates. Although this approach may involve some risks, the current economic downturn and market fundamentals may well leave no other reasonable option, especially if having a next-generation broadband network is a matter of national interest.

Nations that have adopted “driver” policies regarding their NGNBNs have much higher penetration rates.

FINDING THE RIGHT ROLE AS A DRIVER

Governments have three levers beyond traditional regulation for building out NGNBNs (see Exhibit 7). First, they can encourage the creation of new business models that would push the industry to move from its current vertically integrated approach to

more risk-efficient multilayer models. Second, as in the case of Australia, they can invest directly in building out network through direct ownership, public-private partnerships (PPPs), or concessions. Finally, governments can choose to stimulate NGNBN service demand through end-user subsidies or training programs.

These levers are not linear nor mutually exclusive: Governments can choose to employ one or all of them. For example, the Singaporean government decided to first introduce new business models for NGNBNs. However, it recognized that new

business models alone would not bring nationwide coverage in an acceptable time frame, so it decided to provide a grant to the industry to ensure nationwide deployment.

The choice of lever depends on the government's objective in deploying a NGNBN and the market obstacles that it must overcome. Two factors primarily determine the best option for governments to accelerate NGNBN deployment:

- The expected coverage if driven solely by market forces

Exhibit 7
Government Involvement Levers



Source: Booz & Company

- The proportion of the population that would be able to afford next-generation services offered by the market, without government involvement

The ideal, of course, is universal coverage with uniformly affordable access (see Exhibit 8). Once governments have assessed where their networks fall short and what levels of coverage and affordability they are prepared to accept, they can determine which one or more of these levers will help them attain those goals.

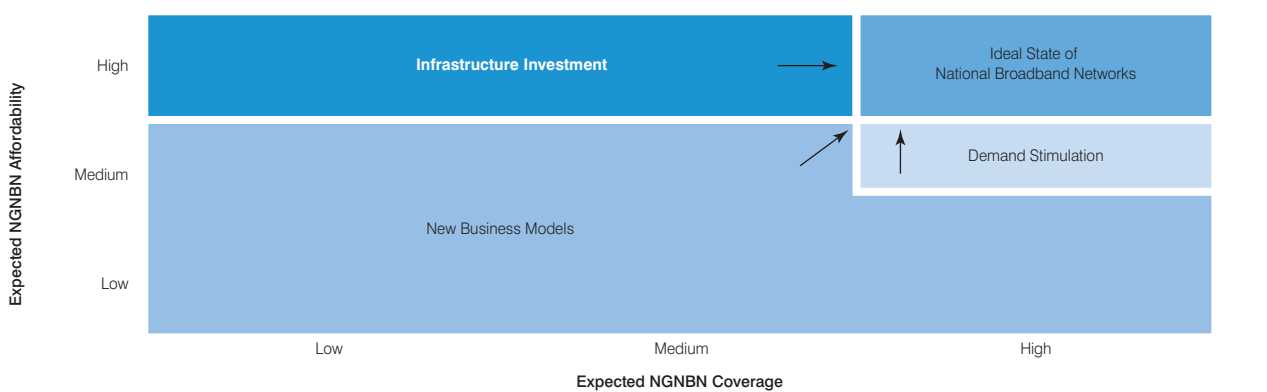
1. Introduce New Business Models

Traditionally, telecom has been a vertically integrated sector, with operators owning and operating all elements of the network while also serving end-users. This vertical integration is inhibiting investments in NGNBNs, because operators are wary of incurring significant deployment costs and then sharing the infrastructure with their competitors. Governments can propose a solution to this problem by introducing multilayer models, typically consisting of up to three different entities:

a PassiveCo, an ActiveCo, and a ServiceCo (see Exhibit 9).

PassiveCo operations are the most capital-intensive, but also face the least competition, allowing for low-risk, utility-like returns. By contrast, ActiveCo and ServiceCo entities operate in highly competitive industries, with higher returns but also higher risks. These new multilayer business models are increasingly being implemented globally (see Exhibit 10).

Exhibit 8
The NGNBN's Expected State of Affordability and Coverage Determine Which Government Levers Are Appropriate



Source: Booz & Company

Exhibit 9
New Business Models Can Reassign Risk and Return

	TYPICAL ELEMENTS	PROPORTION OF NGNBN INVESTMENT	INTENSITY OF COMPETITION	TYPICAL PAYBACK PERIOD
ServiceCo	Applications and Content	5%	High	1–2 years
ActiveCo	Switches and Routers	25%	Medium	5–7 years
PassiveCo	Ducts and Fiber	70%	Low	12–15 years

Source: Ofcom Next Generation Access (NGA) consultations; Booz & Company analysis

Exhibit 10
Global Telecom Players Are Already Experimenting with Multilayer Business Models

	AUSTRALIA	SWEDEN	SINGAPORE	NEW ZEALAND	UNITED KINGDOM	ITALY
ServiceCo	- Telstra - Primus Telecom - Optus	- TeliaSonera - Telenor Group - Tele2	- SingTel - StarHub	- Telecom New Zealand - Vodafone	- BT - Orange - Carphone Warehouse	- Telecom Italia - Fastweb - Tele2
ActiveCo	- New Network Entity		- Nucleus Connect	- Chorus	- Openreach	
PassiveCo		- AB Stokab	- OpenNet			- Telecom Italia

Source: OfCom NGA consultations, Booz & Company analysis

A restructuring in the industry, with new entities represented by PassiveCo, ActiveCo, and ServiceCo, would distribute NGNBN investment risks across several players, assign payback expectations tied more closely to risk, and enable wider and more affordable coverage. Additionally, a multilayer business model would likely attract a new set of investors to the sector, such as pension funds, that are looking to make long-term and steady returns on their investment.

Introducing new business models is the most appropriate approach when the government expects a market-driven solution to be affordable for only a limited percentage of the population. These new business models would alter market dynamics, thereby increasing coverage and affordability of a NGNBN. Of course, actually restructuring the industry and breaking away from its vertically integrated model is easier said than done. It is evident based on the experience of countries including Australia that there will be strong industry reaction and opposition to such a move. Governments need to engage in a constructive,

open dialogue with stakeholders to highlight the benefits of the new model—especially in giving investors greater certainty regarding payback mechanisms and time lines—while holding firm to their objectives. If implemented effectively and with a broad array of stakeholders, such a multilayer model would enable the market to meet the investment demands of the next-generation broadband network opportunity on its own.

2. Invest in Network Infrastructure

As the example of Australia has shown, some governments invest directly in NGNBN infrastructure. That has an immediate benefit in reducing the magnitude of investment required from the private sector and accelerating NGNBN deployments. But government investment is not a simple matter; although such investments are becoming increasingly common, there continue to be inherent risks associated with them, including the potential to dissuade private-sector investments. A robust risk/benefit analysis, backed by a comprehensive stakeholder dialogue, is an imperative for any government

considering investment. In making their investment, policymakers have to consider three distinct options: direct ownership, public–private partnerships (PPPs), or concessions.

As seen in the municipal networks established by Japan, Sweden, and South Korea, direct government ownership and operation of certain portions of NGNBNs can bypass the biggest costs of network build out. But this creates a disincentive for private-sector investment, and public policymakers may not make the best decisions about where to allocate capital.

Governments may decide instead to allocate a grant or own equity in a NGNBN entity, as in the U.S., Australia, Singapore, Greece, New Zealand, Malaysia, Ireland, and Portugal. Policymakers have effectively used PPPs in other network industry segments, such as airports, and this model potentially represents the best way for the government to invest in a NGNBN. However, even in this model, there is a risk of delay caused by the complexities of a PPP engagement. Any PPP contract needs

to be carefully drawn up to ensure distribution of risk and returns between the government and the private player.

Finally, governments may decide to provide incentives for the private sector to accelerate NGNBN deployment. This has been successful in countries such as Japan, Canada, and South Korea. In Japan, for instance, the government allowed the private sector to depreciate investments in three years, as opposed to the typical 20, effectively providing a tax subsidy. In other cases, governments have made low-cost loans to operators to accelerate deployment. Even though this option is the easiest to implement, it does not assure the government widespread NGNBN availability, and raises the risk of misuse of concessions by the private sector.

Government investment in network infrastructure is best suited to situations in which the market will deliver an NGNBN that is affordable but has limited coverage. For instance, in some countries, operators may be willing to build in the urban areas where population density assures they can achieve scale, but will hold

back on putting NGNBNs in sparsely populated areas. In these areas, governments may need to invest in infrastructure to ensure nationwide availability.

After deciding that such an investment is warranted, governments must next decide whether to pursue direct ownership, PPPs, or concessions. If existing or potential coverage is so limited that the government must make a substantial investment, it is probably best if it owns the infrastructure directly. However, if there is a reasonable deployment of NGNBN infrastructure already and the government just needs to fill in some “hot spots,” a PPP or concessions model may be more suitable.

3. Stimulate Demand

Although the promise of next-generation broadband is tantalizing, many consumers remain very much in the dark as to the life-changing applications it can bring them. Governments can address that simply by offering public services through next-generation networks. That would whet demand for other services, providing some assurance to network operators that revenue will

follow. This lever is supplemental to introducing new business models and investing in infrastructure; on its own, its effectiveness is limited. But it offers a number of incremental benefits.

The Japanese and the South Korean governments have used this lever effectively to drive NGNBN demand. South Korea has established education centers to train housewives in how to use the Internet, has established free access centers, and provides free computers to top students in the country. Likewise, Japan has mandated that all administrative agencies must buy services from the NGNBN, thus boosting demand for such services. Additionally, it has provided subsidies on broadband access to certain end users, such as schools. In Europe, Sweden subsidizes companies that purchase PCs for their employees, and gives tax deductions on broadband deployment in certain areas and on personal broadband expenses.

Demand stimulation is appropriate in a scenario in which there is widespread coverage but services are not widely affordable or uptake has been limited.

CONCLUSION

The promises of a next-generation national broadband network—the closing of information gaps, the expansion of economic growth, the acceleration of labor productivity—all depend ultimately on a broad and affordable deployment of the infrastructure itself. And yet that deployment, although a national imperative, is policymakers' greatest challenge. Those who approach the challenge with a single solution or with a limited understanding of the needs of stakeholders will invariably fail to unlock the full potential of next-generation broadband—or fail to see it arrive at all.

There are three key items to consider for governments that want to deploy a NGNBN. First, it is vital that they get a strong grounding in the needs of their markets, the likelihood of private-market success on its own, and what the market requires from the public sector—whether regulatory definition, funding, or some other critical action. Second, they have to be willing to engage in dialogue with stakeholders in order to address their concerns and ensure their cooperation. Operators, particularly, must be able to bring their ideas to the table, so that they can have a role in shaping the solution. Operators should get involved as early as possible in the discussion to offer their perspective on how various options may affect market structure

and attractiveness. Finally, they must also set clear goals for themselves on the kind of reach they are hoping to achieve within the first few years of deployment, and at what levels of affordability—and then design a policy with those goals in mind. Addressing these issues may well determine a course far different than initially expected—and it may not always require a more ambitious and expensive agenda.

The key is to see next-generation broadband as part of an economic strategy, rather than a concern only for sector regulators. In the digitally linked global economy, the ability of citizens and businesses to compete will depend greatly on their access to information. For mature economies, especially those experiencing a rapid shrinking in formerly dominant industrial sectors, the twin imperatives of the digital economy are speed and access, and next-generation broadband has the potential to offer both at levels never before imagined. Those nations taking the first step in seizing the opportunities of next-generation broadband may not always be the most efficient nor always the most successful in deployment, but they will surely be better off than those nations that remain on the sidelines, paralyzed either by fear, cost, or the unknown.

Endnotes

¹ "Australia to get faster broadband," BBC News, April 7, 2009: <http://news.bbc.co.uk/2/hi/asia-pacific/7986918.stm>.

² The Information Technology & Innovation Foundation.

³ The Information Technology & Innovation Foundation.

About the Authors

Roman Friedrich is a partner with Booz & Company based in Düsseldorf and is the head of the European communications, media, and technology practice. He focuses on the strategic transformation of leading telecom organizations in the European mobile, fixed-line, and Internet markets.

Karim Sabbagh is a partner with Booz & Company in Dubai and Riyadh. He leads the firm's communications, media, and technology practice in the Middle East. He specializes in sector-level development strategies, institutional and regulatory reforms, large-scale privatization programs, and strategy-based transformations focused on strategic planning, partnerships and alliances, marketing, and business process redesign.

Bahjat El-Darwiche is a principal with Booz & Company based in Beirut. He specializes in communications and technology and has led engagements in the areas of telecom sector liberalization and growth strategy development, policymaking and regulatory management, business development and strategic investments, corporate and business planning, and privatization and restructuring.

Milind Singh is a senior associate with Booz & Company in Dubai. He specializes in sector policy and development strategy for the telecommunications industry.

The most recent list of our office addresses and telephone numbers can be found on our website, www.booz.com

**Worldwide
Offices**

Asia

Beijing
Delhi
Hong Kong
Mumbai
Seoul
Shanghai
Taipei
Tokyo

**Australia,
New Zealand &
Southeast Asia**

Adelaide
Auckland
Bangkok
Brisbane
Canberra
Jakarta
Kuala Lumpur
Melbourne
Sydney

Europe

Amsterdam
Berlin
Copenhagen

Dublin
Düsseldorf
Frankfurt
Helsinki
London
Madrid
Milan
Moscow
Munich
Oslo
Paris
Rome
Stockholm
Stuttgart
Vienna
Warsaw
Zurich

Middle East

Abu Dhabi
Beirut
Cairo
Dubai
Riyadh

North America

Atlanta
Chicago
Cleveland
Dallas
Detroit
Florham Park
Houston
Los Angeles
McLean

Mexico City
New York City
Parsippany
San Francisco

South America

Buenos Aires
Rio de Janeiro
Santiago
São Paulo

Booz & Company is a leading global management consulting firm, helping the world's top businesses, governments, and organizations.

Our founder, Edwin Booz, defined the profession when he established the first management consulting firm in 1914.

Today, with more than 3,300 people in 59 offices around the world, we bring foresight and knowledge, deep functional expertise, and a practical approach to building capabilities and delivering real impact. We work closely with our clients to create and deliver essential advantage.

For our management magazine *strategy+business*, visit www.strategy-business.com.

Visit www.booz.com to learn more about Booz & Company.
