

Building Singapore's Next Generation Nationwide Broadband Network

Infocomm Development Authority of Singapore

Towards a Next Generation Connected Nation

Singapore's Next Generation Nationwide Broadband Network (Next Gen NBN) is a Fibre-to-Anywhere network project under the country's Intelligent Nation 2015 (iN2015) ICT master plan. The Next Gen NBN will help to transform Singapore into an intelligent nation and a global city, powered by info-communications. This case study outlines the co-creation effort of the Singapore Government and the industry to design, build and operate the all-fibre network to every home, office and institution in the country.

The combined information technology and communication (infocomm) sector has become a key enabler of Singapore's economic and social growth. Infocomm has also become integral to Singaporeans' lives. Today, mobile phone penetration in this city-state has hit 141.4 per cent (according to the Infocomm Development Authority of Singapore - IDA Statistics on Telecom Services, September 2010), eight in 10 households have access to computers, while households with at least one mode of broadband access has reached 80 per cent in 2008 (according to IDA's Annual Survey on Infocomm Usage Among Individuals and Households).

Over the years, Singapore has put in place an advanced and reliable infocomm infrastructure that has met the needs and demands of our economy and society. As Singapore progresses, the presence of a good infocomm infrastructure will be crucial to support the economic and social activities. It will not only support the needs of the users and allow them to thrive in this new global environment: it will also enhance Singapore's global competitiveness. With the explosion in demand for both fixed and mobile bandwidth in recent years, driven by a massive increase in content available online by content providers as well as the emergence of new services delivered over the Internet, the Singapore Government is putting in place a new nationwide Next Generation Broadband Network to increase its economic competitiveness in an increasingly digital world and to meet its future economic and social needs. This plan will be carried out by the IDA, which is the agency championing the Infocomm and Technology (ICT) sector in Singapore.

Next Generation Nationwide Broadband Network

More than four years ago, IDA initiated extensive formal dialogues with industry to jointly develop a strategic plan to develop an ultra-high speed next generation broadband network. The Next Generation Nationwide Broadband Network, or Next Gen NBN, was conceived under the broader context of the iN2015 masterplan, Singapore's sixth infocomm masterplan. An evolution of Singapore's ICT Masterplans can be found in the **Infobox A** below.

There were various strategic options IDA considered for putting in place a Next Gen NBN infrastructure. These ranged from having the Government build and own the infrastructure, to taking an investment incentive approach, to granting regulatory relief to incentivise existing operators to invest in the Next Gen NBN. With a fully liberalised telecommunications market since April 2000, IDA's fundamental belief is that reliance on market forces ensures the best outcome for consumers and that private sector companies are in a better position to ensure that the infrastructure is well-run and efficient, and better able to deliver services at the lowest cost to consumers and business. However, it was also important to ensure that the infrastructure would be operated in an Effective Open Access manner, to ensure that the operators had sufficient business incentive to provide competitive access and prices to downstream operators, and to develop and deploy services needed by Singapore's private, public and people sectors.



High Definition Interactive Digital Entertainment

Therefore, IDA decided that the appropriate approach would be for the Next Gen NBN operators to be selected through an open Request for Proposal or RFP process. This would ensure that Government could achieve the best "value for money" proposal. Accordingly, in March 2006, the Singapore Government announced its intention to support the development of a Next Gen NBN. IDA assessed that granting regulatory relief for investments was not ideal because although Singapore might have a Next Gen broadband infrastructure, the broadband prices would not have been competitive in the

long term and this would have eroded the competitiveness of the larger economy.

Infobox A - Singapore's previous ICT masterplans

For a country with little or no natural resources, Singapore recognised early on that it needed to develop its competitive advantage through investments in areas like infocomm infrastructure and manpower capabilities. The following chronicles its infocomm journey right up to the current sixth masterplan, iN2015:

Computerisation

The first was a five-year National Computerisation Plan in the early-80s focused on Computerisation. The plan looked into 3 areas - the computerisation of the Civil Service, the development of Singapore's computer industry, and growing a pool of computer professionals. One key project was the Civil Service Computerisation programme. By 1988, computer systems and software had been installed, enhancing the Government's overall efficiency and productivity.

Communications

The 2nd theme was Communications, as the focus of the National IT Plan shifted to the provision of one-stop services through cross-agency linkages. Integrating manual processes through the use of IT established sector-wide networks. E.g. TradeNet, LawNet, MediNet.

Connectivity and Content

In the 90s, the focus moved on to Connectivity and Content through the IT2000 Masterplan. The aim was to position Singapore as a global IT hub and Intelligent Island. IT2000 sought ways to enable everyone to access IT, and envisaged the development of a national information infrastructure (NII). The rise of the Internet would serve to be its platform and led to the recognition of the importance of broadband, along with the installation of Singapore ONE, the world's first national broadband network.

Convergence

At the turn of the millennium, spurred by the Convergence of telecoms and IT, the Infocomm21 Masterplan was launched. Its broad strategic thrust was to dotcom the public, people and private sectors, putting the 'e' into as many spheres of life as possible. Many services went on-line and companies ventured into e-commerce.

Connected Singapore

This was followed by the Connected Singapore Masterplan in 2000. The vision of 'Unleashing potential, releasing possibilities, through Infocomm' was pursued through strengthening the foundational blocks of capability development, technology planning and building a conducive business environment.

Intelligent Nation 2015

With inputs from the People, Private and Public sectors, the iN2015 masterplan was launched in 2006, with a vision to transform Singapore into an Intelligent Nation, a global city, powered by Infocomm.

Industry Consultations

The Government chose to implement the project in distinct phases: first, a Competitive Dialogue phase; and second, the RFP phase. In addition to carrying out studies of overseas deployments, the Government worked closely with the industry, as an early engagement was vital for the private sector to better appreciate the project's impact and implications – an appreciation necessary to enable them to eventually design, build and operate the Next Gen NBN. Through the phases, IDA gathered inputs from the industry, on high-level concepts like the importance of open access, the three layer industry structure, the speed of the network rollout, and other considerations. Industry interest stayed strong over the phases.

Through the close engagements with the private sector, IDA concluded that it was important to put in place the right fundamental industry structure to support a vibrant and competitive broadband services market for long term

competition. This was all the more critical because the Next Gen NBN was expected to be the essential digital communications infrastructure for Singapore for the future.

In the year-long Competitive Dialogue with twelve pre-qualified consortia, IDA posed detailed and challenging questions to the participants on the structure and requirements for the RFP. This allowed the Government to better understand the industry's view on key RFP parameters and helped to resolve many issues, such as the Effective Open Access industry structure and the concept of the Interconnection Offer or ICO offered by the operators. The Dialogue was instrumental in helping IDA gain clarity on the business model and considerations of the operators. During this phase, the industry players could clarify on IDA's priorities and requirements, in order to better prepare their submissions to the subsequent RFPs. This period was also aimed at allowing the players to form partnerships and consortia for the next phase of the project.

Three-Layer Effective Open Access Industry Structure

In the three-layer Effective Open Access industry structure envisaged in the RFP, the Next Gen NBN would have a structurally separated Network Company or NetCo, and an operationally separated Operating Company or OpCo. **(Refer to Diagram 1 - Next Gen NBN Industry Structure)** The NetCo would be responsible for the design, build and operation of the passive infrastructure of the Next Gen NBN which would include optical fibre. The OpCo would be responsible for the design, build and operation of the active infrastructure of the Next Gen NBN, which would include the routers, switches and access network equipment. The diagram below illustrates the new industry layers.

IDA decided that separate RFP exercises would allow it to determine the most cost-effective dark fibre wholesale price offered by the NetCo to the OpCo as well as the effective prices for wholesale broadband connectivity which the OpCo would provide to Retail Service Providers (RSPs) downstream. Having separate RFP exercises also facilitated more bids for the OpCo RFP as bidders need not secure a NetCo partner in order to participate in the exercise. When the RFPs were issued, the evaluation criteria for both the NetCo and OpCo RFPs were released to the bidders. Besides enhancing the transparency of the Government's evaluation considerations, this also enabled the bidders to put together a proposal that best met the Government's priorities.

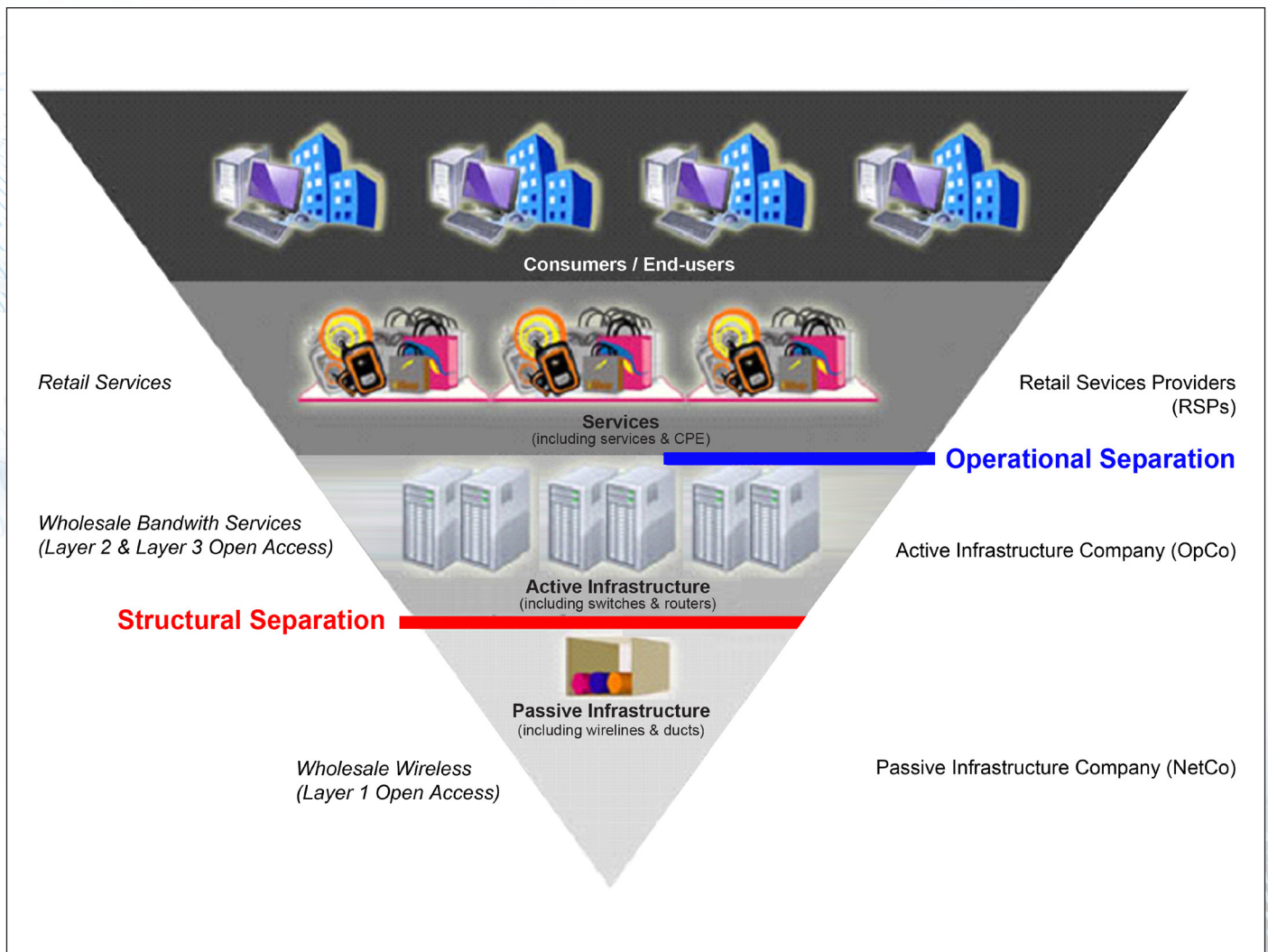


Diagram 1 - Next Gen NBN Industry Structure

IDA imposed structural separation on the NetCo to ensure that the downstream operators would have unencumbered access to the passive infrastructure. Structural separation of the NetCo meant that there were limits placed on the extent of ownership and shareholding of this entity by downstream operators. On the other hand, the Government decided to allow downstream RSP operators to retain full shareholding in the OpCo, on the condition that the OpCo be operationally separated from these downstream RSP operators. This meant that the OpCo would have to treat all downstream RSPs equally, and operate on a standalone basis, including being established as a separate legal entity and maintaining a separate board, management and staff.

In September 2008, the Government selected the OpenNet Consortium as the NetCo, and in April 2009, selected Nucleus Connect as the OpCo. OpenNet and Nucleus Connect are now working together on a co-ordinated nationwide rollout of the network. With deployment starting in August 2009, the Next Gen NBN is on track to cover 60 per cent of homes and businesses in Singapore by 2010, and 95 per cent of all homes and businesses by the middle of 2012. This rollout is ahead of the Government's initial target of nation-wide rollout by

2015. It is made possible through the use of existing ducts and manholes for the deployment of the new optical fibre network to minimise the extent of the civil construction works needed. IDA recognises that with the multi-layered structure of the Next Gen NBN market, there is a need to ensure seamless delivery of services to the end-user.

Propositions of the Next Gen NBN

The Next Gen NBN infrastructure has three propositions to end-users. The first is that OpenNet will waive all installation charges for home and building owners when the network first reaches their area. This will facilitate a high take-up of Next Gen NBN by home and building owners. The second proposition is the concept of "Universal Service Obligation" or USO for fibre connectivity. This means that the NetCo and the OpCo are required to meet any reasonable request for Next Generation services within stipulated service activation periods when the USO comes into effect from 2013. The third is that besides connectivity to homes and businesses, IDA requires OpenNet and Nucleus Connect to provide network connectivity to outdoor locations or what IDA terms "Non-Building Address Points" or NBAPs for short.

This Fibre-to-Anywhere concept will enable new market opportunities and allow innovative applications, such as real-time interactive content delivered to outdoor digital signage. End-users can benefit from richer mobile and wireless services with the Next Gen NBN providing backhaul coverage to base stations. Business users will benefit from ready access to a robust and pervasive network that can support data-intensive transactions. For the infocomm companies, the Next Gen NBN will enlarge the overall infocomm market and enable new revenue streams and business opportunities. Infocomm professionals can look forward to higher-value job opportunities with the emergence of new industry segments such as interactive digital media, cloud computing and Next Generation data centres. Indeed, the Next Gen NBN is a strategic enabler that will position Singapore well for the future, and will help to grow the already robust infocomm industry which is present here. In 2009, the number of infocomm professionals here grew 1.3 per cent to reach 140,800, up from 139,000 in 2008. In 2009, the infocomm industry grew by 8 per cent to reach S\$62.7 billion.

Conclusion

The Next Gen NBN NetCo started rolling out its network in August 2009 and is on track to cover 60 per cent of Singapore by the end of 2010 and offer nationwide coverage by the middle of 2012. The Next Gen NBN OpCo started its commercial operations from the end of August 2010. Since then, competitively-priced fibre broadband plans, with speeds starting from 100 Megabits per second, have been available to businesses and consumers. As the Next Gen NBN market and the overall infocomm industry evolve, the Government expects that this massive project, aided by the private sector, will lead the way forward for Singapore, into a future where infocomm will transform and become intrinsic in the way people live, learn, work and interact.

Learning Points

Learning Point 1: Cross Disciplinary Approach

As infrastructure expected to last 25 to 50 years, the Next Gen NBN would set the tone for telecoms competition for the next few decades. IDA chose to adopt a holistic approach, including commercial, regulatory/competition, legal, and technical aspects to bring about the desired outcome

IDA considered policy issues that incorporated key commercial considerations: required features versus costs, acceptable business models, permitted rate of returns, limits on pricing and charges for key services, financing arrangements and potential commercial structures.

From the regulatory perspective, it was important to look at issues like industry structure, competition issues, price control mechanisms, interconnect offers which are acceptable to the telecoms industry and which will bring about greater vibrancy and innovation in the retail services market.

From a legal perspective, specific agreements on rights and obligations need to be set forth clearly, particularly when industry restructuring is involved.

From the technological perspective, IDA considered issues of whether the network would be future proof, how the network would be designed to meet such strategic requirements as "open access".



Immersive Next Generation e-Learning Applications

Learning Point 2: Engaging the Industry

Given the complex set of issues, industry consultation was a key plank through which IDA was able to understand the industry's concerns, as well as a chance for an exchange of views and ideas that would eventually lead to the final structure of the Next Gen NBN. The processes through which IDA consulted industry included the Request-for-Concept, Competitive Dialogue, Request for Proposal, etc.

In the process of engaging the industry, safeguards like confidentiality clauses, rules for one-on-one discussions etc. were put in place to assure industry players that confidential information would be safeguarded during the discussions. Also, when issuing information IDA made sure there was parity for all participants by sending out the same information to the various parties at the same time. The manner of handling of bid information, evaluation results, etc., was critical to a robust evaluation of the RFP bids.

Learning Point 3: Educating Stakeholders – Government, Industry and the Public

It is not sufficient to roll out a new network; educational efforts to engage the relevant stakeholders, namely government, industry and the public are equally necessary for the widespread adoption of services on the Next Gen NBN.

IDA worked with the Finance Ministry to facilitate the public sector's subsequent procurement of services from the Retail Service Providers (RSPs) operating on the Next Gen NBN.

This not only resulted in high speed broadband for key public sectors like health, educations etc., and also had the effect of improving the business case for the NetCo and OpCo.

IDA also engaged the industry before commercial offerings were available on the Next Gen NBN. The Lighthouse series of industry forums and workshops were intended to engage industry players to come onto the Next Gen NBN to deliver new and innovative services. In addition, IDA formed industry thematic workgroups to foster a conducive environment for the development of next generation services, to create new industry value chains and generate new business opportunities.

In order to increase awareness of Next Gen NBN amongst end-users, IDA conducted another series of BEACON (Bringing Enterprises and Consumers On Next Gen NBN) sessions aimed at the end-users from government, enterprises and consumers, to highlight the benefits and possibilities of next generation services.

Before the launch of retail services, IDA undertook efforts to improve public awareness of the Next Gen NBN and to expose the public to how the Next Gen NBN will transform the way we work, live, learn and play. IDA launched an advertising campaign on the mass media and set up an Infocomm Experience Centre to showcase to the public the possibilities and benefits of Next Gen NBN and Next Generation services. In addition, IDA is continually working closely with grassroots organisations, the Community Development Councils and town councils to help increase awareness and adoption of the Next Gen NBN amongst residents, in particular organising Next Gen NBN showcases at various community events.

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The Infocomm Development Authority of Singapore (IDA) is committed to growing Singapore into a dynamic global infocomm hub. IDA uses an integrated approach to developing info-communications in Singapore. This involves nurturing a competitive telecoms market as well as a conducive business environment with programmes and schemes for both local and international companies.