INFOCOMM DEVELOPMENT AUTHORITY OF SINGAPORE
8 Temasek Boulevard #14-00 Suntec Tower 3 Singapore 038988
Tel : 65-62110888 Fax : 65-62112222 www.ida.gov.sg

FACT SHEET
(June 2010)

(A) Next Generation Nationwide Broadband Network
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(A) Next Generation Nationwide Broadband Network

ALL NEW, ALL FIBRE, NATIONWIDE INFRASTRUCTURE BY 2012

Singapore's **Next Generation Nationwide Broadband Network (Next Gen NBN)** is the wired network of the Next Generation National Infocomm Infrastructure (Next Gen NII), a project under the Intelligent Nation 2015 (iN2015) masterplan (www.iN2015.sg). iN2015 seeks to transform Singapore into an intelligent nation and global city, powered by infocomm.

The Next Gen NBN is Singapore's nation-wide ultra-high speed fibre network. It is a strategic enabler of economic and social growth, transforming the way we work, live, learn and interact. It will offer competitively priced broadband speeds of 1Gbps and beyond to users at the workplace, homes, schools and learning institutions, as well as other outdoor locations.

The Next Gen NBN will be fully deployed by 2012 and will prepare Singapore for an infocomm-enabled future and place it at the forefront of broadband development internationally. It will offer pervasive, competitively priced, ultra-high broadband speed to all physical addresses in Singapore. Singaporeans will be able to enjoy a richer broadband experience with more choices and at affordable prices. Businesses, large and small, will find it cheaper and easier to access ultra high-speed broadband, and be able to use infocomm more extensively to boost productivity and competitiveness. The Next Gen NBN will be a strategic enabler that will transform the way we work, live, learn and interact.

Next Gen NBN will achieve 60 per cent network coverage by end-2010 and 95 per cent by mid-2012. Services are expected to be available on Next Gen NBN as early as second half of 2010.

EFFECTIVE OPEN ACCESS

The Next Gen NBN comprises three distinct industry layers:

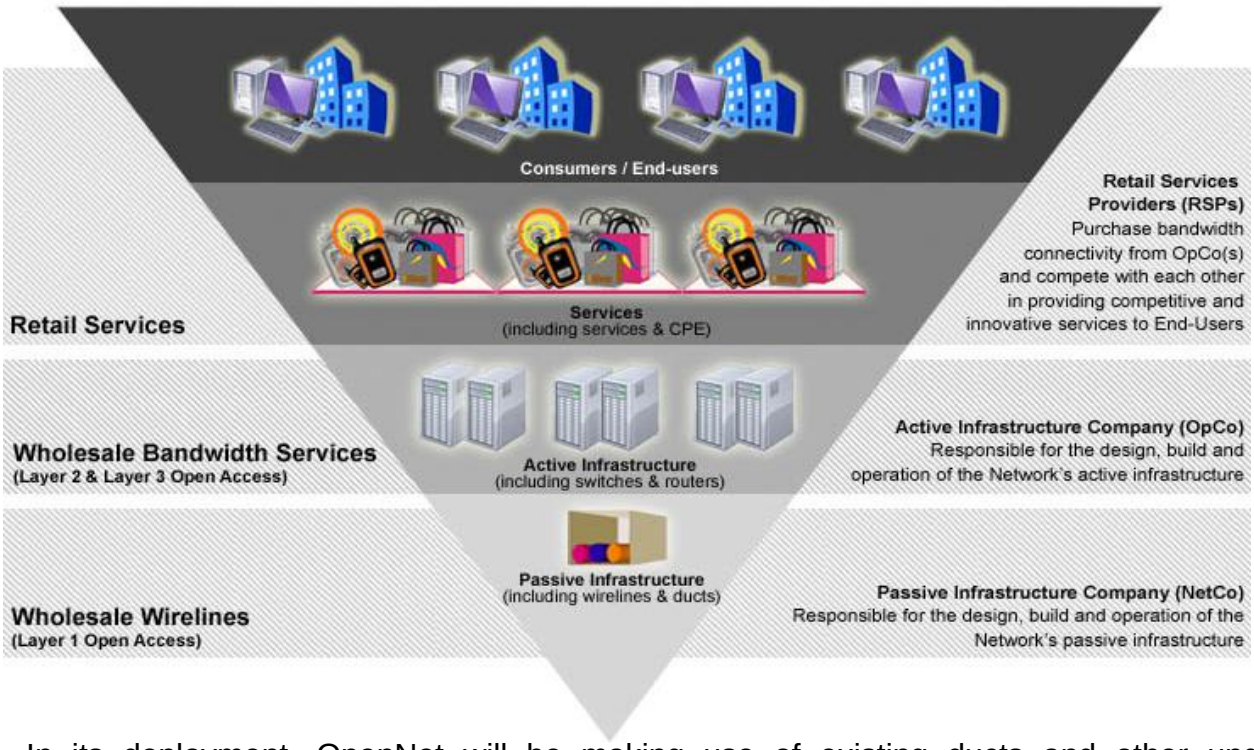
(a) The Network Company (NetCo) will be responsible for the design, build and operation

of the passive infrastructure (such as dark fibre and ducts). The OpenNet consortium was selected as the NetCo on 26 September 2008;

(b) The Operating Company (OpCo) will commit to offering wholesale network services over the active infrastructure comprising switches and transmission equipment. Nucleus Connect was selected as the OpCo on 3 April 2009; and

(c) The Retail Service Provider (RSP) layer will sell services to end users and industry and will be a fully competitive layer, covering markets like Internet access and Voice-over-IP telephony.

For Singapore to fully benefit from the economic opportunities of Next Gen NBN, it is critical that Next Gen NBN provide effective open access to downstream operators. To achieve this, structural and operational separation will be implemented at the NetCo and OpCo layers respectively. This will spur greater vibrancy and competition at the services layer to benefit end-users.



In its deployment, OpenNet will be making use of existing ducts and other underlying infrastructure to minimise disruption to the public. Under a Universal Service Obligation, which will take effect from 2013, OpenNet is required to fulfil all reasonable requests to install fibre termination points in homes, offices and buildings.

Nucleus Connect will work together with OpenNet, on a coordinated nationwide rollout of the network. It is expected to start offering commercial services by the second half of 2010, and be ready to fulfill its Universal Service Obligation of meeting all reasonable requests for service from 2013.

A Rollout Committee, which includes both the NetCo and OpCo, will serve as a forum for both parties to coordinate their respective rollouts.

Homeowners encouraged to take up First Offer of Free Installation

Since August 2009, residents in Singapore have been receiving notification letters from OpenNet informing them about the fibre installation. OpenNet is contacting residents progressively in line with its rollout plan of Next Gen NBN. All homeowners are encouraged to take up OpenNet's one-time free installation offer by responding to OpenNet's notification letters.

The free installation of the first 15 metres of fibre is only available the first time OpenNet offers it to the homeowner. Beyond the first 15 metres, it costs $33 for every subsequent 5 metres (all prices before GST). If homeowners do not take up the one-time free installation offer, they would have to pay for subsequent installation:

- For apartment blocks: $220/connection
- For landed property: $450/connection

As at end Apr 2010, OpenNet has covered close to 30 per cent of homes and buildings in Singapore. Residents may check their rollout dates at http://www.opennet.com.sg . Residents and enterprises in Singapore can also log onto the Next Gen NBN website (http://www.nextgennbn.gov.sg) to learn more about Singapore's Next Gen NBN.

(B) Next Generation Services

Beyond infrastructure deployment, IDA has developed an overall strategy that focuses on catalysing the delivery and adoption, and spurring the demand for services on the Next Gen NBN. The strategy aims to achieve impactful services deployment that maximise the economic and social benefits from the new all-fibre network. An important guiding principle of the strategy will be to ensure the direct engagement and involvement of the public, private and people sectors for a comprehensive and inclusive approach.

To boost the ease of delivery and adoption of new services, IDA will:

- Facilitate the setting up of Next Gen Innovation Centres (NGICs) to allow major corporations to use Singapore as a test bed for new products, services and business models to meet the emerging needs of enterprises and consumers
- Set up a Next Generation Services Innovation Programme (NGSIP) to quicken the deployment of impactful and meaningful next gen services through pilot runs

Next Gen Innovation Centres (NGICs)

These are physical centres that will bring end-users from private, people and public sectors to work together with technology and service providers to create next generation services that meet end users' needs. By going to a NGIC, local companies can avoid the costs of acquiring or building their own infrastructure, to better focus on the development and delivery of next gen services that meet market needs. At these centres, RSPs can also get technical and business guidance to conceptualise, develop and prototype next generation services.

Three NGICs have been launched to date. They are Cisco's Enabling Platform Innovation Centre (EPIC),Oracle's Enterprise Fusion Innovation Centre (E-FIT) and IBM's Service Innovation Centre "The Innovation Place" Companies and RSPs with new ideas for innovative services can tap on these NGICs for the development, and delivery of next generation infocomm solutions and services that meet market needs.

Next Generation Services Innovation Programme (Next Gen SIP)

IDA launched the Next Generation Services Innovation Programme in the second half of 2009 as part of larger efforts to develop a thriving retail services layer that leverages the Next Gen NBN, and to support the deployment of innovative and impactful next generation broadband services for the nation. IDA will engage both local and foreign providers, enterprises and consumers to use Singapore as their centre of excellence for next generation services.

The first Call-for-Proposal was launched in September 2009 and IDA received a total of 18 proposal from 12 Retail Service Providers and Application Service Providers. IDA has selected 7 proposals for services such as software-as-a service, 3D signages, high definition videoconferencing and remote storage-as-a-service . Pilot trials are underway for several of these services and these services are expected to be commercially available in the second half of this year.

IDA will continue to engage with Retail Service Providers and Application Service Providers on new market opportunities and will be planning to launch a second Call-for-Proposal later this year.

INFOCOMM EXPERIENCE CENTRE

The Infocomm Experience Centre (iExperience) aims to bring about the possibilities and benefits of Next Generation (Next Gen) services and the Next Generation Nationwide Broadband Network (Next Gen NBN) to the public and businesses. The interactive and engaging exhibits are designed to educate visitors via hands-on experience the possibilities presented by Next Gen NBN, including possible next gen services leveraging next gen technologies that encompass our daily lives. Located at the heart of the city in Esplanade Xchange, the centre presents a range of functional yet fun services and applications for businesses, consumers, Government and overseas visitors.

(C) Wireless@SG

Wireless@SG launched its services in December 2006 with the aim of extending broadband access beyond homes, schools and offices to public places. It offers everyone free wireless access in high human-traffic areas, including Central Business District, downtown shopping belts like Orchard Road and residential town centres. As of April 2010, there are close to 1.6 million subscribers, far exceeding the original target of reaching 250,000 subscribers by Dec 2008. Usage has also been high – Wireless@SG users have been clocking in longer hours from a monthly average of 2.1 hours per user per month in Dec 2006, to approximately 10.1 hours per user per month today.

The next phase of Wireless@SG will focus on enhancing user experience and driving the adoption of innovative consumer and enterprise services. Enhancements to the network include:

i) Higher access speed;
ii) Easier to login to the network;
iii) Easier access to applications and services;
iv) A wide range of services in the areas of payment, security, advertising and location-based applications

Free Wi-Fi till 2013

In anticipation of future demands for higher speed Internet as media-rich online content becomes the norm, the access speed has been doubled to 1 Mbps since 1 Sep 2009 and the free service will continue until 31 March 2013. With this enhancement, Wireless@SG users will be able to easily access media-rich and interactive websites as well as use bandwidth-intensive applications like video streaming.

Seamless and Secure Access (SSA)

Launched on 10 Feb 2010, Secure and Seamless Access allows users to access Wireless@SG without the need to re-enter their passwords on each log-in (similar to how mobile phones automatically log-on to the mobile networks when the device is switched on). SSA significantly enhances the user's experience, particularly for users who are using their mobile devices like Wi-Fi capable mobile handsets. SSA also allows quicker and easier access of applications such as email, VoIP, instant messaging and social networking.

Wireless@SG Connect

The operators have launched the Wireless@SG Connect application on 10 Feb 2010. It allows users to access a variety of applications and services provided by their operators over Wireless@SG, such as mobile messaging, social networking, directory search and location-based services. A hotspot finder is also available to allow users to easily search and locate nearest Wireless@SG hotspots.

Centralised Location-Based Engine

Wireless@SG operators have implemented a Centralised Location-based Engine (CLBE) on 10 Feb 2010 to allow mobile application developers to obtain location information from Wireless@SG. This location information will enable developers to easily deliver location-sensing services over the network.

Wireless@SG Services

Together with the industry, operators have rolled out a variety of enterprise services over the Wireless@SG network such as advertising, location-based services, cashless payments and

facility monitoring, etc. IDA welcomes the industry to collaborate with the operators in deploying both consumer and enterprise services. Wireless@SG Operators' are contact details are iCELL Network Pte Ltd, M1, Singapore Telecommunications Ltd.

(D) Grid Services

The National Grid is built upon commercial grid service providers, and seeks to equip industry and consumers with on-demand and pay-as-you-use access to high performance computing capabilities, software, and immense data storage capacity.

Singapore is one of the first countries in the world to embark on such a national effort that draws together commercial Grid Service Providers (GSPs) to offer industry and government consumers with on-demand and pay-as-you-use access to high performance computing capabilities, software, and immense data storage capacity.

On 17 June 2008, IDA awarded three consortia to be the first National GSPs. They are led by the Singapore Computer Systems Ltd (of which a 60% stake was acquired by SingTel in August 2008), PTC System (S) Pte Ltd, and New Media Express Pte Ltd.

With these commercial GSPs, grid services which are based on a pay-per-use model are now available to the masses. Businesses, from multi-national corporations to small-and-medium sized firms, can enjoy:

- Cost savings, since they no longer need to fork up hefty upfront investments in IT servers or software, and pay subsequent maintenance costs
- Better utilisation of IT resources, as they buy only what they need, and reduce idle computing resources.
- Increased competitiveness, as they can focus on core competencies instead of IT maintenance, by leveraging Grid's high performance computing capabilities to deliver new and innovative business models.

The National GSPs launched their commercial services on 1 November 2008. Businesses can now approach any of the three consortia to obtain grid services.

By 2011, more than 3,000 SMEs are expected to leverage the National Grid for on-demand, pay-per-use compute, storage and software resources.

By 2013, Singapore envisions a Grid Market Hub, an infocomm-enabled marketplace of GSPs offering the global community a platform to share, buy and sell infocomm resources such as software, computing and storage, on-demand and on a pay-per-use basis.

Benefits of Grid Services to Users

- Lower Cost - With the establishment of GSPs, businesses can buy high performance compute capabilities for as low as S$0.33 per core hour, and data storage capacity for as

low as S$0.48 per GB per month. This is opposed to having to spend thousands of dollars buying and maintaining in-house servers, or leasing them from overseas Grid providers that typically charge about US$1 per CPU hour.

- Compute-As-A-Service - Firms requiring high performance computing, such as financial organisations that do data-crunching, or animation producers in Singapore, can look forward to local access to the compute capabilities of more than 2,500 cores for a start, then more than 3,500 cores by 2011, all on a pay-per-use basis. Typically, an animation company would have invested in one computer dedicated for animation rendering, for instance. But that process can be time-consuming. If more compute power is available, the process can be sped up. The GSPs will offer such companies the option to scale up their computing power when needed.

- Storage-As-A-Service - GSPs will offer immense storage capacity of more than 30 TB, making it possible to back-up massive amount of data. Educational institutions, for instance, which are increasingly adopting online learning models, will no longer need to fear the loss of their material stored on their in-house servers. Others, such as pharmaceutical companies that need massive archival space to keep the data generated by their experiments, can also tap on the National Grid's huge storage capacity.

- Software-As-A-Service (SaaS) – By 2011, businesses can look forward to choosing their software and obtaining them through on-demand pricing, from more than 80 SaaS providers who will be part of the National Grid. They will offer services such as productivity and desktop publishing tools on a pay-per-use basis.

(E) Cloud Computing

The Infocomm Development Authority of Singapore (IDA) foresees a paradigm shift in computing, where businesses and end-users will be accessing applications such as word processing, storage, and even compute power, through the Web. In short, the interwoven nature of Internet applications will be akin to a "cloud" of services that everyone can eventually access easily through a broadband connection. These services are also typically offered via a "pay-as-you-use" model. Cloud computing enables consumers and business users to consume infocomm services without a need to own or operate an IT support team. This enables a lot more business users to adopt infocomm than possible today.

With this paradigm shift, it is important for Singapore to remain competitive through the adoption of cloud computing and enhance the vibrancy and growth of the Singapore infocomm sector through the development of a cloud computing ecosystem. With the Next Gen NBN coming into place, Singaporeans will have even faster access, with cloud computing offerings being part of the exciting range of next generation services to come.

CLOUD COMPUTING IN SINGAPORE

Singapore Centre of Excellence for Open Cirrus Cloud Computing Testbed

On 30 July 2008, the IDA joined hands with three technology giants (HP, Intel and Yahoo!) to set up a research initiative to study one of today's hottest technologies: cloud computing.

As a Centre of Excellence (COE) in this joint initiative, IDA creates opportunities for research and development in the area of cloud computing, enhances local capabilities and also lets users here have easy access to this next generation service.

Researchers from HP Labs, Intel, Yahoo Research and Singapore will jointly identify the research and development focus for the testbed. However, the main aim is to build up a core group of people who have the skill set to undertake and develop cloud computing innovations.

The objectives for the Singapore COE are:
(a) Promote research and development
(b) Competency building

SaaS Incubation Centres

To ensure that aspiring independent software vendors (ISVs) have access to help in adopting the Software-as-a-Service (SaaS) model, SaaS incubation centres (SICs) are needed to render business and technical consultancy services to these ISVs. In so doing, SICs equip industry and consumers with on-demand and pay-per-use access to grid/cloud services to deliver new and innovative business models.

At each SIC, a staging platform is available for aspiring SaaS ISVs for:

- Testing & initial commercialisation for new SaaS providers
- Integration with SaaS provisioning – portal & billing system
- Technology augmentation
- Implementing proof-of-concepts
- Demonstration to end users

The SICs also provide training and hand-holding in SaaS-enablement. Software that have been successfully ported are hosted by the grid and cloud service providers.

The AxSaaS incubation Centre was appointed by IDA as a SIC in September 2008. This SIC is operated by AkSaaS Pte Ltd, which successfully graduated as an incubatee of Exploit Pte Ltd. As of 1 April 2010, 20 ISVs have been SaaS-enabled at this SIC. These SaaS offerings include: Enterprise resource planning, Supply chain,Business Intelligence, Document management, Property management, Finance, Workflow, Performance management, Inventory, Marketing, Medical diagnosis, Maps and Helpdesk.

Cloud Innovation Centre

The Cloud Innovation Centre (CIC) established on 13 April 2009, operated by Platform Computing Inc and with the support of IDA, enables Singapore enterprises, ISVs and start-ups to accelerate the adoption of cloud computing technologies in transforming their business for greater competitiveness and productivity. In particular, the CIC, which is located at Fusionopolis, will focus on helping enterprises to build private clouds and address many of

the challenges associated with using a private cloud. The CIC provides enterprises with the infrastructure and software expertise for consultation, development and testing of cloud computing applications or proofs-of-concept.

IBM Cloud Lab

This collaboration between IDA and IBM seeks to promote and accelerate the adoption of cloud computing and associated business models through conducting applied R&D to solve challenges and issues identified by users from government and industry. IBM Cloud Lab provides an integrative capability that creates and prototypes innovative and useful real world repeatable 'first-of-its-kind' innovative solutions required by the industry, hastening the harnessing of research results and deployment, and shortening the timeframe to adoption.

The IBM Cloud Lab in Singapore was officially launched on 4 May 2010. The Cloud Lab is hosted at IBM Changi Business Park Building with required hardware, software and resources.

FOR MORE INFORMATION, PLEASE CONTACT:

Mr Marc Ling, Manager, +65 6211 1000, marc_ling@ida.gov.sg

Ms Felicia Yeo, Manager, +65 6211 1536, felicia_yeo@ida.gov.sg

Ms Chia Wan Fen, Assistant Manager, +65 6211 0555, chia_wan_fen@ida.gov.sg

Mr Sheo S. Rai, Assistant Director, +65 6211 1073, sheo_s_rai@ida.gov.sg