

# Introduction to the Implementation Study

## SETTING THE CONTEXT FOR THE IMPLEMENTATION STUDY

The 7 April 2009 Government announcement of the National Broadband Network (NBN) project stated that it would deliver:

- Superfast broadband for all Australians, at affordable prices with an objective of providing broadband via fibre to 90 percent of premises, and via next-generation wireless and satellite technology for the remaining areas; and
- Structural reform of the telecommunications industry by requiring NBN Co to operate as a wholesale-only, open-access network provider; and a commitment to improve the telecommunications regulatory framework in the transition to the NBN.

At the heart of the NBN policy is an objective to deliver a step-change improvement in broadband service quality to all Australians. The ambition of this objective is matched by the scale and complexity of the implementation task. At stake are billions of dollars of Government investment, the continuity and availability of services for millions of end users and the opportunity to establish new competition settings around a network infrastructure that will last for at least 40 years.

This report advises the Department of Broadband, Communications and the Digital Economy (DBCDE) on how the Government's policy objectives can be implemented over time, as set out in the Terms of Reference.

The report is written for those in Government who will make and implement decisions regarding the NBN, including drafting and enacting legislation, supporting negotiation of potential agreements with existing operators, modifying NBN Co's constitution and playing a role in the ongoing oversight of NBN Co. It is not to be used or relied on by any other persons.

## SCOPE OF THE IMPLEMENTATION STUDY

The purpose of the Implementation Study is to advise Government on how best to implement its stated policy objectives, not to evaluate those objectives, given that the policies have already been agreed by Government. This report therefore focuses on translating high-level policy objectives into tangible actions for both Government and NBN Co to implement. Explicitly, it does not:

- Evaluate Government's policy objectives;
- Evaluate the decision to implement the NBN via the establishment of NBN Co;

- Undertake a cost-benefit analysis of the macro-economic and social benefits that would result from the implementation of a superfast broadband network.

The Implementation Study complements rather than duplicates NBN Co's activities in a number of areas. Our report focuses on how to translate the policy objectives into a mandate for NBN Co, including supporting legislation and regulation. Where the Implementation Study examines issues such as network design and pricing, it is with a focus on how these impact the commerciality, coverage and competition objectives of the NBN. Details of implementation planning, engineering analysis, technology evaluation and roll-out planning remain the responsibility of NBN Co.

The priority roll-out in Tasmania and the Regional Backbone Blackspots Program did not form part of the Implementation Study's scope, except to incorporate the cost of these initiatives in our modelling, given they were included in Government's initial \$43 billion estimate of the capital costs for implementing the overall NBN policy.

## **IMPLEMENTATION STUDY METHODOLOGY**

The methodology employed in the Implementation Study is summarised as follows:

We have taken a conservative and detailed, fact-based approach. The Implementation Study's geospatial modelling maps every address in Australia and constructs a bottom-up reference fibre network including access network equipment (e.g., feeder, distribution, drop), exchange locations and equipment and backhaul links, using conservative assumptions about the cost to build. For wireless, the model identifies indicative tower locations (either existing or new) sufficient to meet Government's objective of providing end users at least 12 Mbps and calculates the cost of tower construction or strengthening, additional radios, backhaul and customer premises equipment (CPE). For satellite, we calculate the full systems costs required to serve premises outside the fibre and wireless footprints, including premises that could be in a wireless blackspot. We also approach revenue modelling in a conservative manner, relying on existing revenue pools and current levels of industry pricing; we have not assumed NBN Co will capture additional revenue from the innovation that the NBN will enable.

We sought extensive input from relevant experts and stakeholders:

- We consulted with a range of experts, in addition to completing our own primary analysis and research. These experts include technical experts, vendors, regulatory experts and industry insiders from Australia and overseas. This input has helped inform our analysis; however the views expressed in this report are those of the Implementation Study, not those of others we have consulted.
- We benefitted from extensive industry and stakeholder consultation. Given the magnitude of the industry transition that the NBN will initiate, our findings are

grounded in an understanding of the potential impact this will have on the industry and on stakeholders, and the roles they could play in this transition.

- We undertook regular and extensive consultation with Government to understand policy issues, implementation considerations and to build alignment. Input was received from the Department of Broadband, Communications and the Digital Economy, the Department of Prime Minister & Cabinet, the Department of Finance and Deregulation, Treasury, the Attorney General's Department, the Australian Competition & Consumer Commission, the Australian Communications and Media Authority, the Australian Bureau of Statistics, the Australian Local Government Association and a range of other state and federal government departments concerned with aspects of the implementation of the NBN.
- We worked closely with NBN Co to share perspectives on various aspects of implementing the NBN and to understand NBN Co's work on the technical and commercial aspects of the network design. This engagement helped inform the Implementation Study's views on how Government can best achieve its policy objectives; however this report contains our independent perspectives and recommendations on how to implement the NBN policy through NBN Co and supporting mechanisms.

We present an integrated set of recommendations that can be implemented in a practical way. Our recommendations and the analysis that supports them aim to be internally consistent—the recommendations form a coherent package, rather than a menu of options. We recognise uncertainty where it exists, the ability (and need) to adapt implementation approaches over time, and the need to navigate a practical path rather than trying to solve all details upfront.

Finally, we recognise that negotiations have been proceeding with Telstra under the Terms of Engagement announced in December 2009. While we have considered the potential impact of a range of possible agreements in our analysis and recommendations, Government policy is to build the NBN—unilaterally if required—and that has been taken as our reference case.

## **STRUCTURE OF THE IMPLEMENTATION STUDY REPORT**

This report is structured into an executive summary, and four parts.

### **Executive Summary**

Chapter 1 contains a stand-alone overview of our findings and recommendations.

### **Part A: Achieving the national broadband objectives**

Sets out a recommended approach to implementing Government's objectives. It is organised in five chapters. Chapter 2 proposes a mandate for NBN Co. Chapter 3 describes how this mandate will enable a new generation of services for end users. Chapters 4, 5 and 6 provide detailed recommendations for constructing each part of the network. Chapter 4 describes the fibre access network to meet Government's 100 Mbps objective to 90 percent. Chapter 5 describes the solution for the final 10 percent. Chapter 6 describes how to ensure nationwide backhaul availability.

### **Part B: Creating sustainable commercial arrangements**

Describes the overall business case elements under different scenarios, and how these translate into funding considerations. It is organised in two chapters. Chapter 7 examines the overall returns for the NBN project under various scenarios. Chapter 8 presents recommendations on funding given the nature of the NBN project and how that funding model should be adapted over time.

### **Part C: Ensuring a competitive telecommunications industry**

Explores how to achieve Government's competition objectives through the NBN, both in the transition to the new network, and once NBN Co becomes the monopoly privately-owned fibre access infrastructure provider. It is organised in two chapters. Chapter 9 identifies the risks to competition that need to be addressed during and subsequent to the industry transitioning to the NBN. Chapter 10 describes the suite of actions required to deliver on Government's near-term competition objectives while also safeguarding competition once the network is built and privatisation is being considered.

### **Part D: Maintaining momentum**

Chapter 11 sets out the implications of implementing the NBN for Government's roles in oversight and support of NBN Co, and identifies practical considerations around implementing each of the recommendations. It includes a full listing of the recommendations contained in the report.

## NAVIGATING THE IMPLEMENTATION STUDY REPORT

Three similarly formatted inserts draw attention to the principal recommendations, advice and highlighted points throughout the report:

**Recommendation.** Significant counsel to Government on what should be done to implement the NBN.

**Advice.** Significant counsel to the NBN Co Board on matters expected to be at the discretion of the Board and by extension, NBN Co management. This is also intended to serve as a guide for Government in its role as shareholder providing oversight to NBN Co.

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## Glossary of acronyms used

2G	Second Generation mobile communications technology
3DTV	Three-Dimensional Television
3G	Third Generation mobile communications technology
3GPP	Third Generation Partnership Project
4G	Fourth Generation mobile communications technology
AAS	Australian Academy of Science
ABC	Australian Broadcasting Corporation
ABG	Australian Broadband Guarantee
ABN	Australian Business Number
ABS	Australian Bureau of Statistics
ACCC	Australian Competition and Consumer Commission
ACMA	Australian Communications and Media Authority
ACTU	Australian Council of Trade Unions
ADSL	Asymmetric Digital Subscriber Line
AEC	Australian Electoral Commission
APON	ATM (Asynchronous Transfer Mode) Passive Optical Network
ARPU	Average Revenue Per Unit
ASP	Application Service Provider
ASX	Australian Stock Exchange
ATA	Analogue Telephone Adapter
ATUG	Australian Telecommunications Users Group
AUSFTA	Australia-United States Free Trade Agreement
BBSW	Bank Bill Swap Reference Rate
BOT	Build-Operate-Transfer
BPON	Broadband Passive Optical Network
BSS	Business Support System
BT	BT Group (formerly British Telecommunications)
CAGR	Compound Annual Growth Rate

CAN	Customer Access Network
CAPM	Capital Asset Pricing Model
CaSP	Carriage Service Provider
CAT 5	Category 5 (a type of cable used for in-home wiring)
CAT 6	Category 6 (a type of cable used for in-home wiring)
CATV	Cable Television
CDMA	Code Division Multiple Access
CIR	Committed Information Rate
COAG	Council of Australian Governments
CoSP	Content Service Provider
CPE	Customer Premises Equipment
CSG	Customer Service Guarantee
CTO	Chief Technical Officer
Dark fibre	Optical fibre with no active electronics attached
DBCDE	Department of Broadband, Communications and the Digital Economy
DCF	Discounted Cash Flow
DEEWR	Department of Education, Employment and Workplace Relations
DEIWG	Digital Economy Industry Working Group
Digital dividend	The radiofrequency spectrum from 694 MHz to 820 MHz
DOCSIS	Data Over Cable Service Interface Specification
DOFD	Department of Finance and Deregulation
DSL	Digital Subscriber Line
DSLAM	Digital Subscriber Line Access Multiplexer
DTV	Digital Television
DVR	Digital Video Recorder
EAS	Ethernet Aggregation Switch
EBIT	Earnings Before Interest and Taxes
EBITDA	Earnings Before Interest, Taxes, Depreciation and Amortisation
ECA	Export Credit Agency
EFTPOS	Electronic Funds Transfer at Point of Sale

EoI	Expression of Interest
EP2P	Ethernet Point-to-Point system
EPON	Ethernet Passive Optical Network
EV	Enterprise Value
FAN	Fibre Access Node (i.e. fibre exchange)
FATA	Foreign Acquisitions and Takeovers Act
FCC	Federal Communications Commission (U.S.)
FDD	Frequency Division Duplex
FDT	Fibre Distribution Terminal
FiOS	Fibre Optic Service
FIRB	Foreign Investment Review Board
FTTB	Fibre-to-the-Building
FTTC	Fibre-to-the-Curb
FTTH	Fibre-to-the-Home
FTTN	Fibre-to-the-Node
FTTP	Fibre-to-the-Premises
GB	Gigabyte
GBE	Government Business Enterprise
Gbps	Gigabits per second
GEO	Geostationary Earth Orbit satellite
GFS	Government Finance Statistics
GHz	Gigahertz
G-NAF	Geocoded National Address File
GPO	General Purpose Outlet
GPON	Gigabit-capable Passive Optical Network
GSM	Global System for Mobile Communications
HD	High Definition
HDTV	High Definition Television
HFC	Hybrid Fibre Coaxial
HSPA	High Speed Packet Access

ICT	Information and Communications Technology
IDA	Infocomm Development Authority
IEEE	Institute of Electrical and Electronics Engineers
IGMP	Internet Group Management Protocol
IOG	Independent Oversight Group
IP	Internet Protocol
IPND	Integrated Public Number Database
IPO	Initial Public Offering
IPTV	Internet Protocol Television
IRR	Internal Rate of Return
ISDN	Integrated Services Digital Network
ISP	Internet Service Provider
IT	Information Technology
ITU	International Telecommunications Union
IX	Internet Exchange
Ka-band	The radiofrequency spectrum from 27 GHz - 40 GHz
kbps	Kilobits per second
KEIC	Korea Export Insurance Corporation
KT	Korea Telecom
Ku-band	The radiofrequency spectrum from 15 GHz - 17 GHz
L2	Layer 2
L3	Layer 3
LAN	Local Area Network
LEO	Low Earth Orbit satellite
LFC	Local Fibre Company
LRIC	Long Run Incremental Cost
LSS	Line Sharing Service
LTE	Long Term Evolution
MB	Megabytes
Mbps	Megabits per second

MDF	Main Distribution Frame
MDU	Multi-dwelling Unit
MEO	Medium Earth Orbit satellite
MHz	Megahertz
MIMO	Multiple Input, Multiple Output
MIRR	Modified Internal Rate of Return
MLPA	Multi-Lateral Peering Agreement
MUX	Multiplexer
MVNO	Mobile Virtual Network Operator
NBN	National Broadband Network
NBN Co	NBN Company
NGN	Next Generation Network
NID	Network Interface Device
NTD	Network Termination Device
NTT	Nippon Telegraph and Telephone Corporation
ODF	Optical Distribution Frame
OECD	Organisation for Economic Co-operation and Development
OLT	Optical Line Terminal
ONT	Optical Network Termination
OPEL	An Optus and Elders joint venture
OPTA	Independent Post and Telecommunications Authority of the Netherlands
OSI	Open System Interconnection
OSS	Operational Support Systems
OTT	Over-the-top
P2P	Point-to-point
PAPL	Permitted Attachment Private Lines
PC	Personal Computer
PNFC	Public Non-Financial Corporation
POI	Point of Interconnect
PON	Passive Optical Network

PoP	Point of Presence
POTS	Plain Old Telephone Service
PSMA	Public Sector Mapping Agencies
PSTN	Public Switched Telephone Network
PSU	Power Supply Unit
PT	Portugal Telecom
RF	Radio Frequency
RFoG	Radio Frequency over Glass
RG	Residential Gateway
RIM	Remote Integrated Multiplexer
RLC	Remote Line Concentrator
RSP	Retail Service Provider
SLA	Service Level Agreement
SME	Small and Medium Enterprise
STB	Set-top Box
STS	Standard Telephone Service
TDD	Time Division Duplex
TER	Telecommunication Equipment Room
TPA	<i>Trade Practices Act 1974</i>
TPON	Telephony over Passive Optical Network
UBA	Unbundled Bitstream Access
ULL	Unconditioned Local Loop
UN	United Nations
USO	Universal Service Obligation
VDSL	Very high speed Digital Subscriber Line
VHA	Vodafone Hutchison Australia
VHF	Very High Frequency
VoD	Video-on-demand
VoIP	Voice over Internet Protocol
VSAT	Very Small Aperture Terminal

WACC	Weighted Average Cost of Capital
WAIX	Western Australian Internet Exchange
WARPU	Wholesale Average Revenue Per User
WDM	Wavelength Division Multiplexing
WDM-PON	Wavelength-Division-Multiplexed Passive Optical Network
WiMAX	Worldwide Interoperability for Microwave Access
xDSL	Any form of Digital Subscriber Line technology (e.g. ADSL, VDSL)