Two Issues Arising from the McKinsey-KPMG Implementation Study of the National Broadband Network

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Introduction

The Senate Select Committee on the National Broadband Network has sought submissions regarding the recently released National Broadband Network Implementation Study undertaken by consultants McKinsey-KPMG, currently available online at:

http://www.dbcde.gov.au/broadband/national_broadband_network/national_broadband_network_implementation_study

This submission considers two issues discussed in the Implementation Study that deserve greater attention, viz.

- A more realistic consequence of NBN Co being allowed to provide other than wholesale-only services; and
- The desirability of mandating 'Home-Run' as a future-proof topology for the NBN fibre access network.

ICON: The prime beneficiary of NBN Co offering other than wholesale-only service

In Chapter Five of its Fourth Interim Report issued May 2010, the Senate Select Committee examined various implications of the proposed NBN Co Bill still being considered by the Senate. In particular, in sections 5.7 to 5.27 the Fourth Interim Report delved into the matter of whether NBN Co would be restricted to supplying only wholesale services, what would constitute the appropriate service, to whom that service could be supplied, and the circumstances in which any exemptions should apply. The focus of this submission is on a more realistic assessment of the impact of subclause (9)2 of the Bill, introduced in the Fourth Interim Report as follows: (footnotes omitted)

> 5.10   After providing that NBN Co can only supply services to carriers or service providers, clause 9 immediately provides for an exemption. Subclause (9)2 enables the Communications Minister to, by legislative instrument, exempt a specified service from the scope of subclause 9(1) 'subject to such conditions (if any) as are specified in the exemption'. In effect this would enable NBN Co to supply a specified service to persons other than carriers, carrier service providers or content service providers, subject to conditions specified by the Minister. One example given in the Explanatory Notes is an exemption allowing NBN Co to offer services directly to certain end-users, for

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example, government agencies. The Minister is obliged to consult with the ACCC before exempting a service.

The Fourth Interim Report noted 'considerable confusion amongst submitters' as to three principal aspects of the operation of clauses 9 and 10 of the NBN Co Bill, including, concerning the operation of subclause 9(2), the matter of: {section 5.11 refers}

…… what would the exemption in subclause 9(2) enable the Communications Minister, and consequently NBN Co, to do?

Submitters differed in the extent to which they supported the Ministerial power and the circumstances in which it might be exercised. As a result, the Fourth Interim Report failed to reach a definitive recommendation regarding the legislative power proposed to be granted to the Communications Minister and only recommended that the NBN Co Bill be amended so that NBN Co can only provide services at Layer 2 and below. {section 5.26 refers}

In answer to a request for an explanation, the Department responded to the Senate Select Committee as follows: {section 5.23 refers in part}

This provision was included because some sophisticated end-users, such as some government agencies and corporate users, may want to buy wholesale services directly for their own internal use. It was considered appropriate that the option should exist for such end-users to be able to seek services directly from NBN Co for their use, rather than having to force them to use intermediary providers that could simply add unnecessarily to their cost structures. The Australian Telecommunications Users Group (ATUG) has supported this provision. Clearly if NBN Co were to supply such end-users it would need to be on the basis that they were not favoured over other customers of wholesale services.

For any end-user to be able to benefit from such an exemption, it would need to be able to invest in equipment to transform the bitstream service into useable services such as telephony or broadband. This is not a simple undertaking and would require the end-user to invest in necessary equipment and staff as opposed to simply purchasing higher level service from other providers. NBN Co would not be competing directly with retail providers to provide services to customers simply seeking a broadband or telephony service in the everyday retail marketplace.

Those submitters supporting the proposed clause 9 on this occasion were either incapable of understanding who would be the prime beneficiary of NBN Co being exempted by the Minister to offer other than a wholesale-only service, or were definitely conflicted.

However, at least one commentator has gained an insight into the matter and joined the dots. Writing in Communications Day, Grahame Lynch observed:[2] {partial extract}

> Several major operators including Telstra and Optus appear to have taken the clause at face value and believe that NBN Co will seek entry into retail markets. Telstra is worried, Optus is OK with it as long as it targets Telstra. And some of the leading pro-NBN rhetoricians are giving them little reason to think otherwise. Writing on his blog, the increasingly influential Paul Budde—whose smart grid and trans-sectoral ideas are gaining currency not just here but at the UN, opined: "The NBN infrastructure should be used for the delivery of a range of services such as healthcare, education, public safety applications and energy and environmental apps such as smart grids. If the NBN were to be built for commercial services, like high-speed Internet, delivery would cost an exorbitant $200 plus per month per user. So, from an economic point of view also, it is essential that we ensure the infrastructure is used trans-sectorally."

> ………

> The interesting thing is that the Federal Government already runs a National Broadband Network of sorts that enables retail services to its own agencies.

> The Intra Government Communications Network or ICON is a bona fide dark fibre network set up under the Department of Finance to provide connectivity to government agencies in the Australian Capital Territory. In the words of Finance, "ICON assists agencies with their intra- and inter-communications needs by supplying "dark fibre" connections between their various locations throughout the ACT. Agencies supply and maintain the equipment that activates ("lights") the fibre. Similar to a transportation system,
> ICON supplies the roads (fibre pathways), the agencies own the vehicles (data services) that travel on it. As ICON is a passive network, it has no monitoring capability and is dependent on the Agencies informing ICON if the fibre connections are disrupted."

> AARNet provides more explanation on its website: "AARNet uses ICON extensively to connect all of its Canberra members and customers, to provide diverse connectivity between its two PoPs, as well as to connect to its service providers, particularly NextGen and Optus." AARNet also suggests that ICON not only connects government agencies but also the various cultural institutions in Canberra such as the National Gallery, Museum, Library, Archives and the War Memorial.

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[2] Lynch, Grahame "The low-profile NBN forerunner: ICON", Communications Day, 3 March 2010.

So in this context, the draft legislation perhaps makes more sense. The major Canberra government departments already operate their own fibre network and the advent of the NBN could potentially upset that status quo. And although there has been no statement on this, it would seem likely that at some point the NBN will absorb the ICON network.

So perhaps allowing NBN to go direct to government is more evolutionary than revolutionary.

But that said, the fears of NBN mission creep still seem well founded.

Government is an exceedingly important market for a number of carriers. Enterprise and government is a $4.4 billion annual business for Telstra, even for a niche competitive carrier such as Macquarie Telecom, it seems government is a core revenue driver. The rhetoric of Budde and co seems to suggest that typical carrier mark-ups and margins are seen as an undesirable cost in the new era of government service delivery over broadband. As Budde writes "We certainly need to ask the question: what gets priority here – competition policy subtleties or the national interest?"

"...if the NBN is not made available to these sectors on a utilities basis the costs of using the NBN for such purposes will be too high. This would result in a continuation of the private networks that are currently used within these sectors and the opportunity for an important revenue stream for NBN would be lost."

Budde does not speak for the government but he does seem to inform a substantial degree of the government's vision on matters NBN. Conroy and Quigley have indicated over recent weeks that the NBN will not create price shocks for consumers and that the enterprise will be run on commercial terms.

This indicates that additional revenues will have to come from somewhere.

Bringing as much government traffic on-net as possible is one option, so are the options of selectively relaxing its self-imposed ban on backhaul market participation (the regional blackspots build already belies this intention) and charging additional imposts for business users as is the case with Singapore's NBN.

Conroy himself says he will do whatever it takes to make the NBN happen. Believe him.

The Intra Government Communications Network or ICON, public details of which are available at http://www.finance.gov.au/e-government/infrastructure/icon/index.html is Canberra's best-kept secret that no telecommunications carrier dares to criticise. In effect, the federal government already runs its own defacto carrier operation at least within Canberra. The Department of Finance is very well aware that ICON demonstrates an enormous Return on Investment!

Once the NBN carries ICON beyond Canberra, it then becomes a doddle to extend ICON to every government department and agency office everywhere in Australia - that means effectively to every suburb of Australia. Upon examining the full governmental scope of departments and agencies involving contracts with third-party bodies nationwide, it could be further justified – in the national interest of course – that ICON should also provide telecommunications services to a large number of non-governmental bodies that are delivering government services to the public.

Such an outcome would hollow out the business model for all carriers, particularly Telstra and Optus, and as a consequence the bulk of Australia's consumers, other end-users and SMEs will then have to pick up the tab by way of higher prices for retail telecommunication services. In effect, a Ministerial direction allowing NBN Co to provide other than wholesale services to the government's own ICON will amount to an indirect tax on all retail customers of the telecommunications industry.

Unfortunately, the Implementation Study (in pages 455 to 458) failed to draw this distinction. Handsomely paid by the Department, McKinsey-KPMG were conflicted.

Conclusion: The Senate Select Committee should investigate the full implications of the NBN Co Bill granting the Communications Minister, effectively the owner of the NBN, the power to allow NBN Co to offer services directly to the government's own Intra Government Communications Network, ICON, thereby enabling the government to favourably treat itself at the expense of all retail customers of the telecommunications industry.

'Home Run': A Future-Proof Topology for the Fibre Access Network

My submission number 24 to this Senate Select Committee (dated 12 September 2008), written when competitive bids were being sought for the original version of a National Broadband Network based on fibre-to-the-node or FTTN technology, stated on page 7:

> **The Network Design does Matter**
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> The architecture and design of any optical fibre access network is the crucial determinant of its ability to accommodate competitive service providers in a non-discriminatory manner. It is critical to factor this into regulatory considerations.
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> Wireline telecommunication access networks are modern-day behemoths, extensive in coverage, expensive to build and slow to change. When each opportunity for change does arise, the occasion should be of national significance as the next opportunity may be decades away. The purpose of generational change is to significantly upgrade service capability and this is often effected through a wholesale change in network architecture and system design. The proposed National Broadband Network represents Australia's next such opportunity.
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> Since the inevitable natural monopoly of widespread rollout of optical fibre in the access network will make facilities-based competition infeasible, the key factor

will be whether the next generation wireline network is capable of permitting service-based competition via unbundling to the lowest possible network element. This is the only way end-users can experience true innovation arising from competition.

Although the concept and practice of competitive access through unbundling is well established with the PSTN, such application to FTTN/FTTP networks and services is currently novel. Incumbent network providers can frustrate attempts to unbundle networks or services through either intentional design or merely the adoption of industry designs that just happen to assume the network provider to be the sole service provider.

The architecture and design of a given FTTP network is the crucial determinant of its ability to accommodate multiple service providers in a non-discriminatory manner. The differentiating factor is the extent to which a network architecture and design has been engineered to maintain a 'one-to-one' and symmetrical relationship between service providers and customers. The stronger this relationship, the more readily choice of service providers can be supported as well as services delivered that are unique to particular service providers. Conversely, the greater the sharing of resources in the access network, the lower the ability to support choice of service providers and the more likely their service packages will be replicas of one another – with there being only monopoly service provision in the limiting case.

Left unregulated, we should not be surprised if the operator of an optical fibre access network sees fit to minimise the outcomes for competitive access through what has been called 'defensive engineering'.

Being intentionally brief to aid readability, that submission made reference to my doctoral thesis that discussed in detail the strategic, competitive, service and cost implications of various fibre access network topologies.[3] In particular, mention was made that the two main competing topologies, home-run/point-to-point and passive optical network/PON could be juxtaposed as follows:

ADVANTAGES	DISADVANTAGES
Home-Run Network Topology	
• Can potentially deliver the greatest bandwidth per customer compared to (Active Star or) PON architectures. • Highest possible security of services between customers. • Involves no contention for network resources.	• Requires considerably more fibre in the access network. • Requires more OLT units (one per customer).
PON Network Topology	
• Requires less fibre in the access	• Security of services between

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[3] Kelso, D.R., "Open Access to Next Generation Broadband", QUT PhD Thesis, February 2008, Chapter Six discusses this in greater detail; refer to http://www.rosskelso.com or http://www.eprints.qut.edu.au/16612/

ADVANTAGES	DISADVANTAGES
network due to shared 'feeder' cable plus fewer OLTs than Home-Run. • Passive Remote Node requires no powering and less environmental protection. • Popular with incumbent carriers in terms of maintenance and operation.	customers needs to be guaranteed by encryption within ONU. • Shared 'feeder' cable and passivity restricts bandwidth potentially deliverable per customer to the lowest of all (four) architectures. • Customer bandwidth typically asymmetric.

Key: OLT = Optical Line Termination; ONU = Optical Network Unit

Although submission number 24 was written in the era when competitive bids were being sought for the original version of a National Broadband Network based on fibre-to-the-node technology and hence pre-dates the current plan for a fibre-to-the-home network operated by a government-owned company, NBN Co, the basic message retains full currency.

NBN Co has recently stated that there is a 'general consensus' on the choice of Ethernet/GPON topology for the mass market, with home-run (or point-to-point) fibre access to be provided only for large data users such as schools, hospitals, etc.[4] In other words, mass market users will be for ever blighted with a fibre access network topology that inherently delivers an asymmetric data bandwidth in the upload direction.

The correctness of this decision has now been cast in doubt by the Implementation Study which modelled both 'home-run'/point-to-point and shared network/PON topologies. Some relevant highlights of this Implementation Study are:

> Fibre offers almost unlimited future upgrade potential, so NBN Co should deploy the network in the most future-proof way possible, not limiting the upgrade paths that could emerge to those seen today. The most effective way to accomplish this is to deploy a single fibre per home, described as a 'home-run' topology. (p.47/48)

> Home-run topology fully supports physical unbundling, as individual fibres from a fibre exchange can be used by an access seeker to serve any given premises. Unbundling on home-run topologies is analogous to copper networks today. (p.186)

> Implementation Study modelling suggests a fully national home-run topology would require a $2.6 billion investment premium over a shared configuration. (p.188)

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[4] Refer to various presentations at http://www.nbnco.com.au/publications-and-announcements/latest-announcements and Fact Sheet 2 at http://www.nbnco.com.au/students/fact-sheets

AARNet's director of e-research, Guido Aben, was recently quoted as urging that "the vision ought to be symmetrical data pipes. The NBN ought to be 100Mbps up and 100Mbps down."[5] Correspondingly, it follows that when the fibre access network technology is upgraded in the future enabling, say 1Gbps data transfer, then this data capability should also be symmetrical.

Conclusion: In the interest of ensuring that this once-in-a-lifetime opportunity to create new telecommunications infrastructure 'gets it right' from the outset by enabling symmetrical data connectivity, the Senate Select Committee should urge the government and NBN Co to adopt the Implementation Study finding regarding the future-proof advantage of the NBN deploying 'home-run' fibre access network topology across the nation – given that there is only a rather modest cost premium involved in doing so.

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[5] Refer to article "Asymmetric speeds plague first NBN plans" dated 21 May 2010
http://www.computerworld.com.au/article/347431/asymmetric_speeds_plague_first_nbn_plans/?fp=4&fpid=5