National Broadband Network

Submission to The Senate Select Committee

Dermot Cox
C-COR Broadband
3 July 2009

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About C-COR Broadband
An independent provider of integrated broadband carrier-grade products, complex VAS platforms and accessories from best-of-breed vendors.

C-COR Broadband Australia Pty Ltd | ABN 22 101 599 848
2 Anzed Court, Mulgrave VIC 3170 | **T:** +61 3 8542 0600

This submission is C-COR Broadband's response to the invitation of The Senate Select Committee on the National Broadband Network to its revised Terms of Reference.

In addressing the key issues, this submission will highlight:

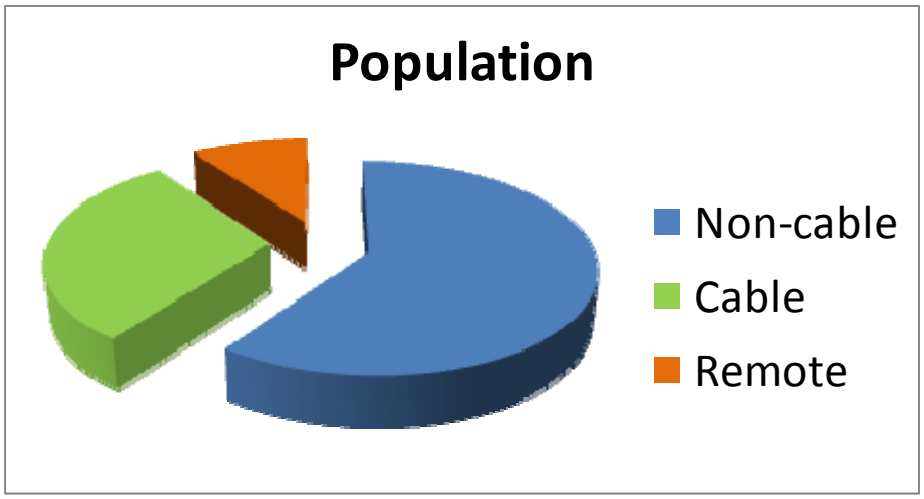
1. *the inherent economic advantages of the existing and severely under-utilised cable broadband (aka HFC) networks to deliver cost effective and highly reliable, resilient, high performance broadband service outcomes for up to 30% of Australians today; and,*
2. *The natural evolution to FTTP Cable network architecture as and when it makes economic sense to deliver ultra fast broadband to business and residential customers.*

1 OUR FOCUS

A key question in this Submission, asks "Should the proposed NBN Corporation leverage existing, in situ, broadband access networks specifically the hybrid fibre coaxial network(s) to ensure the cost effective and affordable delivery of superfast broadband services?"

This Submission highlights and emphasis that the existing cable broadband networks are recognised next generation access networks that can sensibly rolled into any NBN architecture to deliver immediate and cost effective superfast broadband outcomes for residential and business customers. We support the divestment of hybrid fibre coaxial networks into a wholesale network and in doing so identifies the following, six simple undeniable facts:

1. **Cable broadband reaches 7-million Australians.**
   Australia has 3 cable broadband operators that already deliver robust high-performance broadband outcomes to about 30% of Australia's population.



Telstra has already announced its intention to invest and modernise its Melbourne cable network infrastructure; the other networks could also invest and modernise; if started today this could be achieved by Christmas 2010 delivering a Net Present Value that is superior to a brand new FTTP build.

2. **Cost effective service delivery.**
   Experienced overseas cable broadband operators like Virgin Media, Comcast and Times Warner, just to name a few, enjoy a significant cost advantage compared to other fixed technology platforms according to credible, independent analysts.

3. **FTTP Cable Technology developments.**
   Cable operators are trialling FTTP Cable leading edge access technology for new network builds to cement their position as serious competitors against traditional telecommunications operators. To underscore its long-term aspirations to maintain its cost advantage CableLabs has already adopted the IEEE 802.3ah GePON technology for the FTTP Cable.

4. **Customer experience**
   Anecdotal evidence in Australia suggests that cable users are happy with their current experience: voice quality is good, latency on broadband is low and uptime is high.

5. **Innovations**
   Through transformation of their business, a focussed cable operator will be able to further enhance residential customer experience, including PCs via IP-based "video broadcast" applications like WebTV. This business transformation will support the development and expansion of a new video market segment, enabling operators to combine their broadband capacity with a clear leverage in content to bring in a new source of video revenue.

6. **Cable supports competitive wholesale open access**
   The current cable broadband networks can deliver competitive wholesale open access services - using industry standards-based internet protocol technology - today. And by extension, the infrastructures could be modernised to support virtual operator, or white-label, services for independent retail service providers.

2 SUMMARY

The facts:

- *Worldwide, cable broadband networks deliver cost effective superfast broadband.*

- *Australian cable networks are with easy access of about 7- million Australians.*

This Submission will make the following key points:

- Highlight the as yet untapped potential for Australia's existing cable networks to deliver the lowest cost broadband infrastructure to major cities and towns around Australia;

- Establish that cable broadband networks can deliver competitive wholesale, Quality of Service (QoS)enabled end-to-end engineered Internet Protocol (IP) services;

- Communicate the latent competitive advantages of cable protocols when implemented over existing HFC (Hybrid Fibre Coaxial) and / or the fast emerging FTTP Cable (RFoG and PON) solution architecture;

> "...we estimate cable operators in general will have to spend approximately EUR 190 - 240 per home passed to upgrade the network, which is 30% (or even less) of the cost of deploying fiber".
>
> **Arthur D Little, March 2009**

- A vibrant industry underpins cable networks - including global vendors like ARRIS, Cisco, Motorola, Netgear - marketing intelligent CPE ranging from simple data modems, to wireless gateways to support advanced point-to-multipoint SIP services.

The future:

Cable broadband technology and network architecture continues to evolve to FTTP and prosper against a competitive back drop where fibre and VDSL2 vendors are urging traditional carriers to invest in their flavour of broadband technology.

Cable broadband networks are able to deliver wholesale open access when cable operators open their networks. Refer to Figure 1. Because cable networks use standards-based internet networking products in the customers' home or office, like modems, operators could quickly launch new wholesale products and virtual (cable) operators / ISP services for on-sale via independent retailers, creating diversity and energy in the retailing of broadband services.

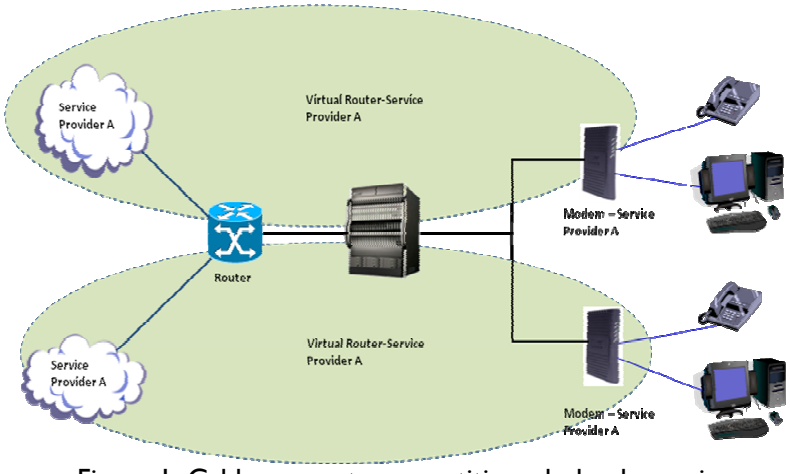


Figure 1: Cable supports competitive wholesale services

Beyond Australia, cable broadband is an established, highly competitive alternative for superfast internet and video rich media; preferred by many experienced carriers as their broadband technology of choice.

The owners of cable broadband networks have a natural, proven evolutionary path to leverage their sunken investments in operational processes and IT systems for their infrastructure.

They can invest and modernise with confidence, knowing that they can meet the market's latent demand for rich multi-media experience, choice of connectivity and innovation in services for both retail and 'virtual' wholesale customers.

As noted by Ofcom (Office of Communications, UK), "... there are a range of infrastructure options for super-fast broadband (e.g. FTTH, FTTC), and the choice is likely to depend on local conditions. There is therefore likely to be a patchwork of NGA networks based on different technologies ..."

3 COST-BENEFIT: MODERNISE OR NEW BUILD

Respected industry analyst Arthur D Little reported in March 2009:

> "Due to consistent investment in network and new technologies, cable operators are not only increasing their market share, but have also developed a cost-effective evolution path to meet future demand. In the foreseeable future, customer experience over cable will be comparable to that of fiber access networks, despite the attractive technological features of fiber ... we estimate cable operators in general will have to spend approximately €190 - 240 per home passed to upgrade the network, which is 30% (or even less) of the cost of deploying fiber".

The capital cost to modernise existing Australian cable networks is by far the lowest cost option available to the NBN Corporation or to any focused pure-play cable operator(s). Financial modelling using a Net Present Value analysis would highlight the long-term financial viability of cable broadband networks as part of any Next Generation Access (NGC) infrastructure. Rigorous financial modelling of a modern cable broadband network will confirm its financial sustainability, cost competiveness and cost effectiveness as the basis to transform any or all of the Australian cable networks.

- *As advocates for positive change, our proposition is that the major Australian cable broadband networks deliver the lowest cost of bandwidth today.*
- *Unfortunately, modernisation is a notion that appears to be vigorously at odds with the interests of the key telecommunications' vendors behind the NBN investment spree.*

The modernisation of, one or all, the cable networks is a much more compelling proposition. It is low risk.

- *It means more NBN funds can be channelled into other technologies for those more disadvantaged than our fellow Australians within access to the existing cable broadband networks.*

Duplication of Aerial Cables

The current cable (HFC) networks are either installed underground (Telstra) or aerial on power poles (Optus, Neighbourhood). These cables are designed for hostile environments: they are rugged and proven to deliver many years of reliable service. HFC cables are

comparable to other aerial cables like low voltage power cables and fibre optic cables in their respective physical dimensions, specifically in diameter.

Type of cable	Thickness	Colour
Low voltage power cable	25mm	Grey
Fibre optic cable	10 or 13mm*	Grey
HFC Distribution cable	13mm or 19mm*	Black (or Grey)
HFC Drop cable (To house)	8mm	Black (or Grey)
Strand / guide cable	10mm	Grey
Street furniture - cabinets, pole mounted equipment		Grey

*Depending on configuration and required strength plus Strand cable.

Figure 2: Comparison of aerial cable

It is important to note that both aerial fibre optic cable and HFC Distribution cable require an additional Strand cable to support them over spans, between power poles, to provide strength. So whilst policy makers may be aware of the visual impact of HFC cables, they may mistakenly assume that aerial fibre optic cable will be slimmer – this will not be the case. So suggestions of replacing HFC cable with fibre optic cable will not change visual impact at all.

All Australian cable networks could be rapidly modernised and ready to deliver the very best superfast broadband experiences for residential and small-medium business substantively by **Christmas 2010.** For 30% of Australians we don't need duplication of superfast broadband assets like aerial cables.

4 FTTP CABLE - THE CABLE ONU

The Evolution to FTTP Cable

The FTTP Cable ONU is the new embodiment of the broadband technology: it is a cost effective higher bandwidth device for the premises. This new evolutionary technology is undergoing commercial field trials in North America, today.

The FTTP Cable ONU is suitable for both residential and business applications. On the network side it provides an optical interface to the RFoG (RF over Glass) PON fibre and on the customer side provides a bi-directional RF input/output to which the customer can connect CPE devices (cable modem, Set-Top Box, eMTA and television). Shown in Figure 3 is a model with wavelength pass-through to connect a separate FTTP Cable PON ONU compatible with standards compliant EPON or GPON systems when the customer demands Gigabit data speeds.

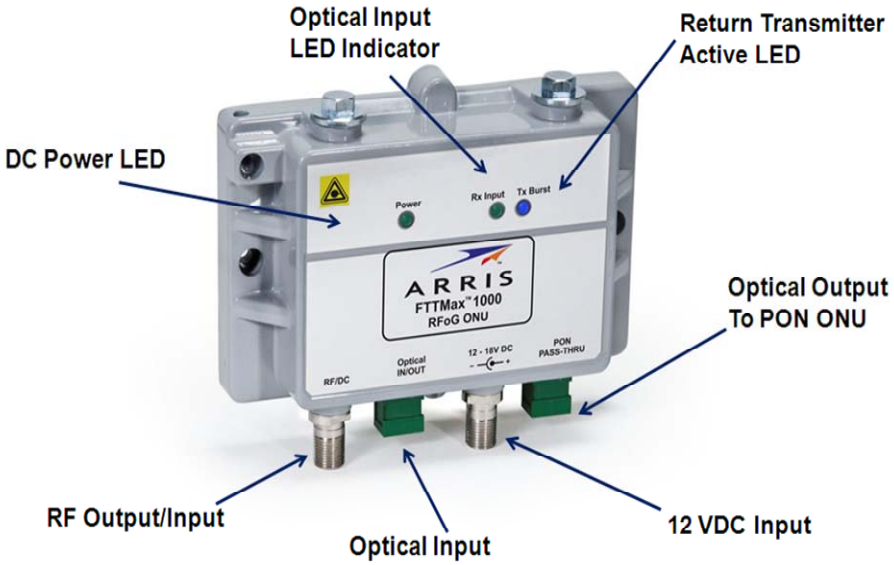


Figure 3: FTTP Cable ONU

The FTTP Cable (RFoG) ONU supports a forward RF bandwidth up to 1GHz.

The upstream laser power is 3dBm, and the wavelength is 1610nm. A wavelength of 1310nm is also available as an option. The RFoG ONU supports upstream/downstream 65/85 MHz band splits. The upstream in ONU supports "burst mode detection." If RF signals are present above

a certain threshold in the upstream, the laser is turned on for transmission. If no RF signals are present (or they are below their defined threshold), the laser is turned off. Burst mode minimizes Optical Beat Interference (OBI), which can occur if several ONUs connected to the same head end receiver transmits at the same time. In this manner up to 32 ONUs can be connected through an optical splitter to a single fibre and single receiver, providing a PON-based architecture.

The Future is EPON

Cable broadband is typically used by market challengers to enter markets. Overseas these cable operators are investing in superfast technologies and differentiating their services based on service innovation, performance, and reseller diversity.

Again, the leading cable operators are driving the vendor industry to develop the next generation of products, based on open industry standards, so they can cost effectively expand their geographic footprint to penetrate the markets of the incumbent traditional telecommunications operators.

FTTP Cable RFoG and FTTP Cable PON are natural evolutionary architecture approaches for cable network infrastructures. Operators will evolve their assets as and when the market and competitors drive their business to make these investments.

When new plant extensions are built with PON fibre architecture, it is a straight forward process to upgrade an RFoG customer to Gigabit data speeds using a Gigabit EPON overlay. It is commonsense to build PON to business and residences for all new developments.

An optional optical port for connection of a GPON / EPON ONU is available. In this case, when 1551 ± 6.5nm is used for the RFoG downstream (and 1610nm is used for the RFoG upstream), the RFoG PON ONU port will pass the 1310nm and 1490nm optical signals of the GPON/EPON upstream and downstream. Refer to Figure 3.

Simply, FTTP Cable RFoG and EPON use different wavelengths allowing both to operate on the same fibre, providing a wide range of alternate service levels to customers within the same neighbourhood.

5 CONCLUSIONS

Australia's cable networks deliver excellent, superfast broadband outcomes to residential customers in major metropolitan markets; seven million Australian are within easy reach of these networks today.

These local cable operators have extensive cable broadband network infrastructure in place: the access networks are deployed underground and aerially on street power poles. Combined with the arrival of DOCSIS 3.0 this will support the majority of their residential and business service needs, minimizing costly new fibre builds or unwanted duplication of aerial broadband assets into the future.

Australian cable broadband operators also have a considerable investment in back office systems for voice and data services. As a result, DOCSIS 3.0, coupled with traditional HFC technologies and/or FTTP Cable technologies can provide an excellent end-to-end solution architecture for bandwidth intensive business services.

Investment in modernising a cable broadband network delivers a superior Net Present Value compared to an investment in a brand new replacement access network.

Currently policy makers are ignoring this financially superior option and appear determined to build fibre access for all existing residential estates or business customers in the mistaken belief (myth) that cable networks cannot be upgraded to deliver equivalent broadband services.

New FTTP Cable technologies like RFoG (RF over Glass) offer an equivalent, alternative infrastructure to shared media GPON optical solutions.

The resulting system will be capable of supporting data services with bandwidths of 100 Mbps downstream or more per customer while leveraging existing data and voice networks and systems.

This submission asserts that evolutionary cable broadband technology and network architectures are still relevant today and offer low risk, cost effective solutions to providing superfast broadband services.

The United Kingdom's regulator, Ofcom, recognises this and includes cable broadband technology and network architectures as a Next Generation Access network; in part recognising the impact Virgin Media's investment in superfast cable broadband has had in stimulating and challenging other industry participants to invest.

The negative investment environment has left Australia's cable broadband networks lagging below the global industry average – the evidence clearly showing that investment in fixed cable networks does not approach growth or challenger investment/sales ratios.

With the exception of Telstra's recent announcement of a $300m Melbourne upgrade to its cable broadband network, the investment in fixed cable broadband by industry participants is extremely weak. Australian Telecommunications policy has, unfortunately for its broadband service users, developed and rewarded an industry that survives on using the outdated Telstra copper network.

Significant regulatory change is urgently required if Australia is to build an affordable, globally competitive, broadband network.

A new landscape

In Australia, our 2 biggest operators use all forms of technology platforms: fibre to corporate customers, ADSL2plus to small & medium business and residential customers and 3GPP wireless for mobility customers.

We have a competition model but no practical, real fixed network intermodal competition.

The critical questions are:

- Will the Government see merit in restructuring the competition landscape to force intermodal competition, namely superfast broadband from wireless and wired networks? (The current policy mix has distorted platform investment profiles leading to an addiction to using Telstra's copper network for ULLS services: for example. Optus has overbuilt its DSLAM network on Telstra's copper in the same footprint as its perfectly good HFC network).

- Through the Regulatory Reform process, will the Government demand a trade sale of one or all cable broadband networks to a third force – an overseas operator or to NBN Corporation – to create a new industry participant of global scale. (The evidence of poor investment in fixed broadband is consistent with the lack of executive strategic thinking in Australia about market orientation that includes cable broadband as a platform to deliver innovation in the market place. Non-Australian pure-play cable operators have a market challenger bias to market orientation and investment scale that are sadly lacking in the Australian fixed broadband industry).

A simple pragmatic solution to delivering resale wholesale services to all service providers and so solve the competitive landscape conundrum would be to roll all of the Australian cable networks into NBN

Corporation. This solution would allow all cable network operators to focus on their retail business and reallocate their scarce investment budgets and at the same time reduce execution risk for the NBN Corporation.

It is unlikely Australian cable network operators would requires a subsidy from the public purse or for their investors to accept a below average risk-reward return. And, importantly the IT platforms, supply chain systems, technical support organisations and training programs are already in place.

Australian cable networks can be modernised and delivering very cost effective, superfast broadband by Christmas 2010. These networks can also be migrated to FTTP Cable as and when market demand requires ultra fast broadband speeds.

DOCUMENT ENDS