29 May 2002

Committee Secretary
Wireless Broadband Technologies
Standing Committee on Communications, Information Technology
 and the Arts
House of Representatives
Parliament House
CANBERRA   ACT   2000

e-mail: cita.reps@aph.gov.au

Dear Sir/Madam

Please find attached the submission by ntl Australia Pty Ltd (ntl) to the Wireless Broadband Technologies House of Representatives Standing Committee on Communications, Information Technology and the Arts.

ntl would be very happy to appear before the Committee to explain the concepts included in its submission.

Should you have any queries in relation to this submission please don't hesitate to contact myself on 02 8425 4600 or e-mail Clive.Morton@ntla.com.au or Linda Andersen on 02 8425 4666 or e-mail Linda.Andersen@ntla.com.au on this matter.

Yours sincerely

Clive Morton
Broadcast Services Director
ntl Australia Pty Limited

ntl Australia Submission to the Wireless Broadband Technologies Inquiry, House of Representatives Standing Committee on Communications, Information Technology and the Arts

Background

ntl Australia (ntl) is the major provider of broadcast transmission services in Australia, and owns and operates the National Transmission Network (NTN) acquired from the Commonwealth in 1999. ntl Australia (until recently owned by ntl Inc, a major interational telecommunications and broadcasting company operating in the UK, Europe and Australia) was purchased by Macquarie Bank in March 2002 and is now 100% Australian owned. ntl has entered into a technical service agreement with its former owner to ensure that it retains access to leading edge technical information and developments in the fast-moving communications marketplace.

ntl's major customers are the national broadcasters, ABC and SBS, transmitting radio and television services from approximately 600 terrestrial transmission sites around Australia, reaching 98.5% of the Australian population. ntl's infrastructure is also used to provide services to other broadcasters and radio and telecommunications service providers

In addition, ntl Telecommunications is a provider of wholesale telecommunications services along the eastern seaboard of Australia, and is jointly owned by ntl, WIN Corporation and Southern Cross Broadcasting. ntl Telecommunications has now completed the first phase of a microwave-based, regional telecommunications backbone network providing services from Cairns in North Queensland to Melbourne in Victoria .

It is ntl's view that Wireless Technology can contribute significantly to the provision of broadband services to rural/regional Australia. In so doing, we advocate a "horses for courses" approach as it is our view that no particular application (wireless or wireline) can meet all the needs of users or is suited across all situations. This submission aims to provide information to the Inquiry on:

A.   BushNet: a potential Wireless Broadband product (which utilises the Broadcasting Services Band);

B.   A comparison of broadband access technologies detailing the strengths and weaknesses of each product against a series of benchmarks;

C.   Comments on the regulatory environment relating to the allocation of spectrum.

A   "BushNet"

ntl has developed the concept for an innovative product which delivers high-speed Internet services using wireless terrestrial broadcasting transmissions (BushNet). This product provides an asymmetric broadband "last mile" solution which is particularly suited to more commercially marginal regional/rural locations around Australia where

the only alternative delivery mechanisms consist of unacceptably slow telephone (PSTN) based services or expensive satellite services. ntl believes that satellite delivered Internet services will, however, remain the only viable solution for truly remote areas at least for the short to medium term.

ntl believes that BushNet has the potential to make a substantial contribution to solving the "last mile" problem of delivering high-speed services in regional and rural communities. BushNet takes advantage of the wide coverage area of existing broadcast transmission infrastructure operated by ntl (ie. an effective means of servicing widely dispersed communities) throughout Australia. Around 80% of ntl's network is located in regional/rural Australia and serves communities down to 200 households.

ntl has undertaken live technical trials of BushNet and demonstrated its workings to the Minister for Communications, Information Technology and the Arts, other parliamentarians, senior officers of the Department of Communications, Information Technology and the Arts and other government agencies. However, while the technical feasibility of BushNet has been established, it will be necessary for the BushNet concept to be piloted in order to fully understand its commercial viability and operational performance before a broader national rollout of BushNet services can occur.

ntl is currently working with a number of regional internet service providers with a view to launching pilot services to test the new service delivery model, and further define the financial viability of the product in different types of markets.

BushNet Platform: Key Elements

BushNet provides a 'last mile' connection and provides an alternative ACCESS network (see diagram, at Attachment 1). It is an 'asymmetric' access solution with high-speed downstream data delivered over a digital broadcast channel (ie. up to 27 megabits per second total datarate depending on modulation scheme used) and return data delivered via a standard telephone line (either the copper wire/PSTN or mobile phone network). BushNet is capable of delivering a very robust and effective service even with a very low bit-rate return path (eg: 256 kbps downstream with a 9.6 kbps return path and 1Mbps downstream with 28kbps return path).

The technical model for BushNet is similar to asymmetrical satellite Internet (e.g. Telstra Bigpond Advance) – though it offers unique advantages over satellite due to the characteristics of a terrestrial broadcast network.

The key benefits of BushNet include:

- Cost. ntl's preliminary analysis shows that BushNet will be a cheaper solution for the regional consumer than, say, satellite Internet services. BushNet utilises existing infrastructure

(including the consumer's own home television aerial) and requires only a low-cost decoding box (like a small set-top box) supplied with installation software on CD-Rom to connect up the home PC.   In other words, BushNet will be a self-installed solution, rather than requiring professionally installed and expensive equipment. This represents a real saving in deployment costs that reduces the cost of entry of service to the consumer.

- Quality of Service. Given the technical characteristics of the service (ie. similar to a digital broadcast service), BushNet will not be affected by some of the service difficulties associated with other existing technologies. Satellite, for example, is affected by latency (delay) and drop-out (in bad weather).   Other licensed-spectrum wireless technologies, such as LMDS and MMDS, are very restricted by line-of-sight requirements. IEEE802.11 and similar 'unlicensed' (class licence) technologies are subject to increasing in-band interference in the unlicensed spectrum, and quality of service cannot be assured by the service operator at any present or future point in time.

- Wide area coverage. All regional (not remote) communities in Australia are served by a television transmission tower which, depending on the site, may have a range of up to 100 kilometres (ie. the areas within which people can receive an ABC television signal).   This wide coverage area extends way beyond those available to most alternative technologies (ref Map at Attachment 2, which provides a graphic representation of ntl's TV transmission tower coverage and television broadcasting site numbers on a State-by-State basis).

- Local footprint. Unlike satellite, the roll-out of BushNet services would see a large number of independent services being deployed, each based on the local transmission tower. This opens the way for the involvement of local operators (eg. local Internet Service providers) and local content (in contrast, satellite has a national footprint, and cannot differentiate between the locations to which services are delivered).

- Local content. BushNet can also deliver content services to users on a 'push' basis, without the necessity for users to dial-in and log on, as the receiver is 'always-on' the network. Local content could take the form of weather information, tourist information, local council information etc.

- Mobility. BushNet has the capacity to deliver high speed <u>MOBILE</u> internet services without waiting for 3G or other future network rollouts.   BushNet can take advantage of the increasing penetration of today's 2G/2.5G (GSM, CDMA and GPRS) cellular telephone networks, using these networks to provide a moderate speed return path and delivering data at 'satellite' speed to the mobile terminal over a wide operating distance.   No other presently deliverable broadband wireless network offers this unique ability.

- Technical viability. BushNet services are technically viable with current receiver and network technology. BushNet can provide (asymmetric) high-speed access for an estimated maximum population in the range of 10,000-20,000. The upper limit is determined by the available bandwidth in a service area to be shared between users. The upper and lower limits of viability are to be confirmed by information gained from the proposed pilot projects.

- Spectrum availability. The BushNet service is different from other wireless products as it will utilise spectrum in the Broadcasting Services Band (BSB) and is regulated by the Broadcasting Services Act (BSA) as well as the Telecommunications or Radiocommunications Act. BushNet content will be classified as "Datacasting" under the definitions of the BSA.

  Rollout of BushNet is dependent upon the Government making available digital broadcasting channels in rural/regional Australia. So far, no datacasting channels have been released for purchase or a mechanism identified for this process. Given the target locations (ie. regional, rather than metropolitan, areas), ntl believes that spectrum should not be a serious limiting parameter for BushNet as:
  - broadcasting spectrum is in far less demand in regional Australia than in the cities; and
  - the Government has requested that the ABA set aside two datacasting channels in each licence areas as part of their spectrum planning for the introduction of digital services.

  However, the viability of BushNet services will be critically dependent on spectrum being made available at minimum cost (ie. realistic expectations by the Commonwealth on its financial return from this spectrum).

  ntl believes it important that the Government quickly release a process by which datacasting spectrum may be made available in rural/regional Australia, once there is an indication of bona fide demand for the spectrum.

B. Comparison table of broadband access technologies

The following table details currently available broadband access technologies and provides a comparison of each technology with the BushNet proposal according to certain key benchmarks.

	Broadband Cable	ADSL	Satellite	Fixed Broadband / WLL (wireless local loop)	IEEE 802.11 standard configuration	IEEE 802.11 with outdoor antenna system	'BushNet' DVB-T
Data transmission path	Cable to the home	Copper Access Network 'CAN' (PSTN network)	Direct to home via satellite / return via PSTN (1-way satellite) Direct to satellite (2 way satellite)	Terrestrial RF transmission 2.4 - 28 GHz and above MMDS, LMDS, WLL	Terrestrial RF transmission 2.4 GHz 'unlicensed' spectrum IEEE 802.11(b) 5.7 GHz 'unlicensed' spectrum IEEE 802.11(a)		Downstream via Terrestrial RF transmission – VHF/UHF 0.2-0.8 GHz Return via fixed or mobile network (eg: PSTN, GPRS)
Range of service from closest network access point (maximum distance)	Limited to extent of physical cable rollout.	Maximum of 3-4 km of copper line between user and local exchange / DSL access multiplexer.	National for two-way satellite Approximately equal to PSTN coverage for one-way satellite	Up to 40km in ideal conditions for 2.4GHz[1] - diminishing at higher frequencies. Typically £20km[2] and significantly reduced by trees, rain, obstructions, etc.	Hundreds of metres from a single access point. Possible to extend range of service over several kilometres using mesh networks - relies on terminals placed at close intervals to relay signals.	~10km for Point-to-multipoint system (omni-directional coverage from access point). Subject to local congestion and interference in unlicensed band. Up to 25km for Dedicated point-to-point link with high gain, directional antenna at each end.	Maximum range in excess of 100km from a single access point. Requires basic PSTN network access for return path (mobile or fixed).
Wide area coverage properties	Limited by cable reach.	Deficiencies in many localities due to PSTN line quality, use of Pair Gain systems, RIMMs and general line distance limitations. Suitable for Multi-dwelling units.	Greatest range of any option but impacted by line of sight requirements eg structures and topography	Line of sight issues improved with newer technologies, but still very limited. Near line of sight ("NLOS") technology in this frequency band achieves significantly less than maximum (Line-of-Sight) range[3].	Poor. Service available only within limited proximity to service access point or other 802.11 terminals – a few hundred metres. Available bandwidth diminishes with distance.	Highly variable depending on topography - requires line of sight from users antenna to access point. Limited distance due to power restrictions; holes in coverage due to line of sight issues.	Lowest frequency spectrum delivers best coverage - non line of sight over long distances – providing both range and quality of coverage. Most homes in a service area already have reception equipment installed, ie: a TV antenna.
Readily installed in multi-dwelling units	No	Yes	No	May be possible depending on line of sight	n/a	May be possible depending on line of sight	Yes

---

[1] Source: Broadband Wireless Association presentation, IBC 2001 Conference
[2] eg: Cambridge Broadband 'VectraStar' product operating in 3.5 GHz licenced spectrum
[3] eg: Cisco 5.8 GHz VOFDM broadband wireless specifications: 15 miles Line-of-Sight (LOS); 3-5 miles "Near Line-of-Sight" (NLOS)

	Broadband Cable	ADSL	Satellite	Fixed Broadband / WLL (wireless local loop)	IEEE 802.11 standard configuration	IEEE 802.11 with outdoor antenna system	'BushNet' DVB-T
Mobile coverage	No	No	No	No	Very limited within local 'hot-spot' areas of a few hundred metres	No possibly portable	Mobile or Fixed installation depends on return network (see 'Infrastructure" below)
Installation	Installation by network provider, removal & re-location. ~$200	Professional install But Self installation may available for experienced users	Professional installation, removal & re-location. ~$300	Professional installation, removal & re-location. Antenna typically roof mounted for best performance.	Plug and play PC Card. Possibly user install, depending on configuration requirements.	Professional installation, removal & re-location. Antenna typically roof mounted for best performance.	USB plug-and-play receiver, or internal PC card. User can install remove and re-locate the device by themselves.
Infrastructure	Expensive infrastructure; limited to high-density areas due to economics.	Currently being rolled out.	Transmission infrastructure In place. Receive dish not feasible in all premises eg multi-dwelling units	New access points to be installed. For same coverage, would require additional sites to existing broadcast sites/towers.	Requires many access points each provide small "islands" of coverage. Would require hundreds of access points to equal a typical 'BushNet' coverage for mobile service. In urban areas may relay service from other terminals close by.	New access points to be installed. For same coverage, would require many additional sites to existing broadcast sites/ towers.	Uses existing broadcasting infrastructure/facilities; Uses existing consumers TV antenna. May utilise consumers existing ISP service. Uses existing return network infrastructure (PSTN, GSM, etc)
Return path	Yes	Yes	External fixed network (PSTN)	Yes	Yes		External network (eg: PSTN or mobile telephone)
Bandwidth capability per user	Mbps in both directions	Mbps in both directions	400kbps downstream / upstream limited by PSTN modem (eg: 33kbps) 2-way Sat: 512kbps downstream/ 128kpbs upstream	Mbps in both directions	Mbps in both directions		Mbps downstream/ upstream dependant on return network – eg: 40 kbps PSTN fixed 40 kbps GPRS mobile 9.6 kbps GSM mobile
Other					Uses 'unlicensed' (class licence) spectrum, therefore not possible to provide any guarantee of service using this technology. Increasing congestion in 'unlicensed' bands is becoming an issue internationally, particularly due to IEEE802.11 equipment.		Uses DVB-T standards hence, Compatible with digital Free to Air television. Receivers able to receive digital TV services on the PC, and dual purpose single-box receivers are under development.

2.5G and 3G/UMTS mobile networks

2.5G and 3G mobile networks have not been included in the above table for reasons as explained below.

2.5G Networks:

2.5G technologies do not deliver speeds that are more typically regarded as 'Broadband', hence were not included in the broadband comparison.

GPRS and EDGE are relatively limited in bandwidth / total user capacity. GPRS can achieve throughput of up to 115 kbps; EDGE up to 384 kbps (using 8 GSM timeslots). In practice, the speeds delivered on actual networks are less than these and are significantly below the maximum speeds achievable using other broadband technologies.

Future 3G/UMTS Networks

3G mobile networks, whilst suitable for high speed data users in a mobile environment, are not yet established for this application in Australia and ntl understands that commercial rollout plans have been impacted globally by uncertainty in the 3G business case.

The evolution of 2G networks to 3G networks may be viable for incumbent service providers with existing 2G network infrastructure. However, the entry cost to 3G for service providers that do not already own 2G networks represents a significant barrier to entry, meaning that 3G is an unlikely vehicle for introduction of alternative products and services into these markets.

3G/UMTS and DVB-T (BushNet) as complementary technologies

However, rather than being competing broadband technologies, 3G/UMTS and DVB-T represent complementary technologies in the longer term. Both the UMTS Forum and the DVB Project are working towards integration of DVB/DAB and UMTS/3G networks for future service delivery. Reports on this work are available from these industry bodies.[4,5]

In regional/rural areas in particular, DVB-T networks may offer a low cost solution for service delivery. This view is supported by a report from the UMTS forum, which states: "In low density areas, it [DVB-T broadcasting] can help in delivering personal services at a limited deployment cost." [6]

The industry work on convergence indicates that an early 'BushNet' DVB-T rollout would be fully compatible with future rollout of 3G/UMTS networks from the point of view of convergent services delivery.

---

[4] DVB (Digital Video Broadcasting Project): "Ad hoc Group DVB-UMTS Report No 1 (Summary)" 13 March 2001
[5] UMTS Forum Report No. 14: " Support of Third Generation Services using UMTS in a Converging Network Environment" April 2001.
[6] Ibid.

C.   Spectrum Regulation

It is ntl's view that the allocation of spectrum is one of the most significant issues confronting the development of viable Australian telecommunications services in rural and regional areas throughout Australia. The current approach of using an auction process to allocate spectrum licences has two effects:

- It raises the entry price for new entrants such that in most cases only very large and significant entities can afford to enter the market; and
- It raises the hurdle of commercial viability effectively ruling out markets which are not of significant size. Consequently the smaller regional towns tend to have insufficient population to generate the required return on investment to justify rollout into those areas.

While there is a tendency to blame insufficient population within Australia as the reason for a lack of competition, ntl believes that the use of auctions to sell spectrum (and raise revenue) is in fact equally critical to the development of new services. ntl notes for example, that Hong Kong adopted a "beauty contest" plus fixed fee based approach for 3G spectrum presumably in response to recent problems being faced world-wide by the telecommunications industry.

It is ntl's view that the Commonwealth should allocate spectrum under a tender process but charge for spectrum using a revenue based model (ie. Commonwealth financial return spread over a period of years, based on revenue generated by the business, similar to commercial television broadcasting licences). This would have the effect reducing the up-front capital requirements and hence hurdle rate for new entrants making rollout to smaller population centres more likely to be viable.

ntl proposes that the Commonwealth consider a more conservative approach to pricing spectrum, for example, the use of a hybrid system which incorporates both financial and non-financial criteria. Such a system could involve a system similar to the Hong Kong approach or a traditional tender process incorporating the usual quantitative and qualitative criteria. Such a process would incorporate a form of "beauty contest" which takes account of the financial strength and credibility/experience of tendering parties as well providing for competition in the price paid.   It would also allow assessment of tenderers on the basis of the policy objectives of the government of the day.

While ntl recognises that financial return to the Commonwealth is a significant issue, in the longer term a limited financial return to the Commonwealth together with significant wider public interest benefits of a viable telecommunications sector and telecommunications services is clearly superior to inhibited rollout of telecommunications services.

BushNet -basic system diagram

ntl:

BushNet System

UHF / VHF broadcast

PSTN return path

Computer   Modem

Broadcast equipment

IP to DVB Router

Transmitter

Computer   Modem

DVB-T receiver

Computer   Modem

High speed forward path

(etc...)

internet

Web Proxy / Router

Dial-in Server

PSTN

ISP

NT
18 TV sites

WA
68 TV sites

QLD
125 TV sites

SA
33 TV sites

NSW
99 TV sites

VIC
51 TV sites

ACT
4 TV sites

TAS
49 TV sites