April 21st 2011

Committee Secretary
Senate Standing Committees on Environment and Communications
Parliament House
Canberra

via email: ec.sen@aph.gov.au

Dear Committee Secretary,

Internode would like to thank the Committee for the opportunity to comment on the "The capacity of communication networks and emergency warning systems to deal with emergencies and natural disasters".

Internode is Australia's largest privately owned ISP, providing quality broadband services to over 200,000 residential and business customers throughout Australia.

Internode's sister company Agile holds a carrier license and operates various networks requiring a license. Internode uses those and other wholesale services to retail Internet, voice and data services.

Yours sincerely,

John Lindsay
GM Regulatory and Corporate Affairs

Introduction

Internode owns Australia's fifth largest broadband network operating in all states and territories. The core IP network is global with points of presence (PoPs) in London, Amsterdam, Ashburn (Pensilvania), Los Angeles, San Francisco, Tokyo, Hong Kong and Singapore connected to a national network of redundant PoPs in capital cities and regional centres.

End user access services are provided via ADSL, WiMax, WiFi, 3G and Optical Fibre.

The services are operated from dual PoPs at separate locations in each state capital city. Smaller single PoPs service the ACT and some regional areas like the Yorke and Eire Peninsulas.

Almost all PoPs are connected via two or more connections with sufficient capacity to ensure most services operate without noticeable degradation in the event of a lost connection.

The dual PoPs in capitals are designed to ensure the network operates without interruption when an entire PoP is unavailable due to power failure or disaster.

Internode's infrastructure is rated as "critical" by the South Australian and Federal Governments.

Internode has extensive experience in designing, building and operating high availability infrastructure and has an enviable track record of network availability.

Against this background Internode has several significant concerns with the design compromises being made in the National Broadband Network and in the shift of traditional voice services to IP based platforms.

Terms of Reference

This submission directly addresses the Terms of Reference of the Committee.

Effectiveness of communication networks

a. the effectiveness of communication networks, including radio, telephone, Internet and other alert systems (in particular drawing on the spate of emergencies and natural disasters of the 2010/2011 Australian summer):

(i) in warning of the imminent threat of an impending emergency,
(ii) to function in a coordinated manner during an emergency, and
(iii) to assist in recovery after an emergency;

The Internet both fixed and wireless has become the primary source of breaking news for many Australians and SMS and mobile voice are the key means of rapid communication during critical events.

Ensuring communications networks have resilience is difficult and expensive. It is often said of various industries that safety is compromised when costs are cut and telecommunications is no different. It is expensive to build a communications network that

is reliable and resilient. Achieving this requires redundant equipment and links. Building a reliable network is always more expensive than building one that works most of the time.

When defining the Service Level Agreement (SLA) of telecommunications services the number of "9"s of availability is usually mentioned. This is a description of the of percentage availability. A service that is 98% available is NOT available 2% of the time. This is generally considered to be one "9". The measure can be applied to any period of time and it is critically important to know the period. A service that is measured across a year could be unavailable for seven days in a row and meet a 98% availability commitment. Services which meet five "9"s availability are 99.999% available. This is often called "carrier grade". Across a year that is just over five minutes of failure in a single event but measured monthly it's less than thirty seconds.

You can hold your breath for thirty seconds but five minutes is long enough to drown.

SMS is a great way to deliver a message to thousands of people quickly. There are already such systems in place in a number of states and it is hard to conceive of a mechanism able to deliver a warning more rapidly.

Internet services are a key communication mechanism for distributing large quantities of data rich information like maps showing danger areas to the general public. It can be accessed via landlines and mobile phones.

There are numerous stories of emergency services personnel using the public mobile networks to bypass overloaded towers or to communication from unserviced areas.

The Internet and mobile networks are a key resource in coordinating disaster and emergency response.

Finally the Internet is providing innovative ways to help people in Japan recover from the recent tsunami with tools like Google's Person-Finder that helps people looking for loved ones to get the message out that they are safe and how to contact them if they have no other means of communication[1].

It is worth noting that Internet services are useful whether provided in peoples homes, places of work or public venues like libraries and shopping centres. Once connected to the Internet many people can make contact with family and loved ones very quickly even though their computer and other equipment may have been destroyed in a disaster. Once connected to the Internet people can organise replacement mobile phones, contact insurers and employers, pay their bills and transfer money to meet their urgent needs[2].

Blackouts

b. the impact of extended power blackouts on warning systems for state emergency services, including country fire brigades and landholders or home owners;

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[1] http://japan.person-finder.appspot.com/?lang=en

[2] http://www.salvationarmy.org.au/about-us_65047/media-centre/victorian-bushfire/reports-on-our-response-to-the-victorian-bushfires.html

Five minutes is about how long an Internet server takes to reboot after an uncontrolled shutdown. This might occur because of a power failure. Servers deliver Internet services like web pages and email. They also perform the resolution of domain names to IP addresses. When a web user browses to www.internode.com.au a lookup is requested by their device and the result, 150.101.140.197 is returned. This service is provided by DNS servers. Internet service providers usually operated several DNS servers to ensure this vital service is always available. There are numerous other services being provided that end-users are not aware of. When a user turns on their ADSL router or mobile telephone a series of authentication requests are served. If these services are not available the user cannot connect or make a phone call. Again service providers operate multiple servers to ensure these services are available. Larger providers operate them in multiple sites across multiple towns and cities.

These sites are frequently large facilities known as Data Centres. They usually have generators to survive blackouts. Between the generators and the servers there is some sort of uninterruptible power supply using batteries or kinetic energy to ensure that the servers continue to operate during the period between the mains power failing and the generators starting.

Generators require fuel. One of the risks that data centre operators must manage is ensuring a supply of fuel for an extended period. This can be challenging during a natural disaster because there are competing demands for resources. Often there is only a single source of diesel fuel and everyone from hospitals, fire brigades, transportation operators and SUV drivers are demanding it. Ensuring fuel supplies for data centres and mobile generators for communications facilities like radio towers and optical fibre repeater sites is vitally important and may become a lost priority. It needs to be at the top of the list for ensuring telecommunications services after a disaster.

Future Communication Technologies

c. the impact of emergencies and natural disasters on, and implications for, future communication technologies

Disaster survivability and recoverability has started to fade from designer's minds in the decade since the September 11 event. For a decade designing systems to withstand large point strikes was a key requirement imposed by government but now significantly more attention is being paid to content filtering, access blocking and data retention. Making the Internet not work has become such a large focus that make sure it always works is not a priority.

The NBN Specifically

c. the impact of emergencies and natural disasters on, and implications for, future communication technologies such as the National Broadband Network;

The NBN is designed around 121 separate service areas each serviced by a single Point of Interconnection (POI). Each service area will contain roughly 80,000 premises. The highest is double this and the smallest is half.

Each POI will be a single point of failure for the NBN fixed line services for every residential consumer downstream of each POI. Other than a second access port at the

POI there is no current mechanism for having a redundant connection to residential consumers.

The NBN will entirely replace the copper PSTN network for 93% of premises in Australia.

Not only will the NBN deliver Internet services but also voice services.

The fixed line voice services of around 80,000 premises containing roughly 200,000 Australians will all be dependent on one single building. This building was once responsible for serving around 8,000 but will now have ten times the responsibility.

In September 2009 Internode suffered a total power loss event at one of its facilities in Adelaide[3]. This caused all equipment at the site to power down after the UPSes exhausted their batteries and before the generators were able to supply power. Around Australia and the world large data centres have suffered complete power failures, some on multiple occasions[4][5][6]. These are much larger facilities than the suburban Telstra telephone exchanges being pressed in to service as NBN POIs. These data centres have multiple generators, multiple uninterruptible power supplies, multiple air-conditioners and redundant connections to other facilities.

When, rather than if, one of these Telstra exchange NBN POI sites suffers a total power outage every single residential end-user serviced by that POI will lose their telephone and Internet service. The battery that NBNCo will be supplying for each end-user interface will be of no use when the exchange building is powered down because of a fire.

Similarly when a natural disaster damages a POI site so badly that the power is turned off as happened at cell phone tower sites in Brisbane during the recent floods. There were at one point 262 Telstra exchanges that were inaccessible due to flood waters[7]. This problem becomes ten times larger when ten times as many end-users are serviced from one location.

PSTN service availability is clearly a major concern because the battery issue received enormous attention. It is conceivable that this will not be addressed until the inquest after a large bush fire or flood where 80,000 people find themselves without a fixed line phone or Internet service and where the mobile services were offline because the power was cut and the batteries ran out before the generators (if they were even there) are refuelled.

End user education

d. the scope for better educating people in high-risk regions about the use of communications equipment to prepare for and respond to a potential emergency or natural disaster;

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[3] http://www.itnews.com.au/News/156363,internode-data-centre-struck-by-short-power-outage.aspx

[4] http://www.techworld.com.au/article/275063/major_melbourne_datacentre_suffers_complete_power_failure/

[5] http://www.zdnet.co.uk/blogs/mapping-babel-10017967/paypal-falls-offline-in-datacentre-failure-10020934/

[6] http://www.datacenterknowledge.com/archives/2010/11/04/transfer-switch-glitch-kos-iweb-customers/

[7] http://www.itnews.com.au/News/244596,telstra-red-zones-262-exchanges.aspx

Many end users do not appreciate that their current PSTN service depends on mains power being available to supply the base-station for their cordless phone. Labelling laws have been changed to ensure they are warned of this when they purchase the device but memories fade and often it isn't until the lights go out during a call that they remember this limitation.

Of course their simple solution is to grab their mobile phone and continue talking. Indeed landline voice is no longer the most important home safety lifeline. Why would you leave your critically injured child or dying spouse to make a call on your PSTN line when you have a phone in your pocket that works right there? Indeed if my house burns down while I'm in it I will be calling the fire brigade from outside on a mobile phone.

New and emerging technologies

e. new and emerging technologies including digital spectrum that could improve preparation for, responses to and recovery from, an emergency or natural disaster; and

Rather than dedicating large amounts of useful spectrum so that emergency service workers can occasionally communicate why not ensure that emergency service users can gain priority access to commercial mobile telephone and emerging data networks?

Surely this would be achievable legally and commercially. Hundreds of millions of dollars of public funds could be saved and some tens of million spent with existing operators.

The spectrum should be used to improving everyone's lives all the time.

Summary

Australia is fortunate that the Committee is examining these issues at this time. Telecommunications is developing at breakneck speed and the real concerns and needs of all Australians need to be examined. Changes to the telecommunications environment in Australia are having unintended and unimagined consequences that need sober thought and proper consideration because the NBN's network architecture shouldn't be designed by lawyers alone.