Thank you for the opportunity to make a personal submission for the inquiry on the Telecommunications Universal Services Obligation.

I have over 30 years of experience in telecommunications in Australia and overseas, working in engineering, regulatory, marketing and senior management roles in companies such as Telstra, Siemens, Request DSL, AAPT and NBN Co. I have also been an active contributor to technical and regulatory working groups managed by Comms Alliance and headed the initial Comms Alliance project on the NBN in 2009.

From 2009 to 2014 I was Chief Technology Officer at NBN Co and oversaw the design, development and procurement of the technologies used by NBN Co for the FTTP, Fixed Wireless and Satellite networks.

I am currently the Chief Technology Officer at Hong Kong Broadband Network, a stock market listed carrier in Hong Kong that has built a fibre broadband network with approximately 40% market share of the Hong Kong residential broadband market and a growing presence in the enterprise market.

During my time working in Australia I have had many occasions to work on issues related to the USO from many different perspectives. As an engineer in Telstra for 8 years during the 1990s I worked on many projects involving delivering of the standard telephone service. With Request DSL and AAPT I was involved in designing and developing broadband services that used VoIP technology to deliver telephony services.

At NBN Co I was keenly aware of the need for the new broadband network technologies to support telephony services from a wholesale perspective. This was vital for both residential and business customers who would move from the predominantly copper access network to the NBN access networks.

I believe this experience puts me in a good position to provide a submission that will assist the Productivity Commission in its inquiry.

The main issues I want to address in detail are as follows :

- the 'standard telephone service' as a 'safety net' service
- the impact of the National Broadband Network
- the relevance of mobile phone services and the USO
- the removal of payphones from the USO and possible replacement with public WiFi
- the alternatives to the NBN satellite for the 'standard telephone service'
- the question of subsidies and competition for the role of providers of last resort

Standard Telephone Service

The USO predominantly covers the universal availability of the 'standard telephone service' (or STS) to all Australian premises. This service is essentially the traditional fixed telephone service involving a non-mobile handset with a numerical keypad, dial tone and the dialling of local, national or international numbers to establish two-way voice communications.

Technology has moved on considerably in the last 20 years. The volume of STS call minutes has steeply declined (as shown Figure 2 of the issues paper) and been replaced by mobile, SMS and other messaging services, and various internet and video calling applications.

However the ability to make a phone call that is "guaranteed" to be successful and intelligible is still very important. In today's age with varying qualities of internet and video calling applications the "safety net" of dialling a number with confidence is still very important to many people, especially in stressful or emergency situations.

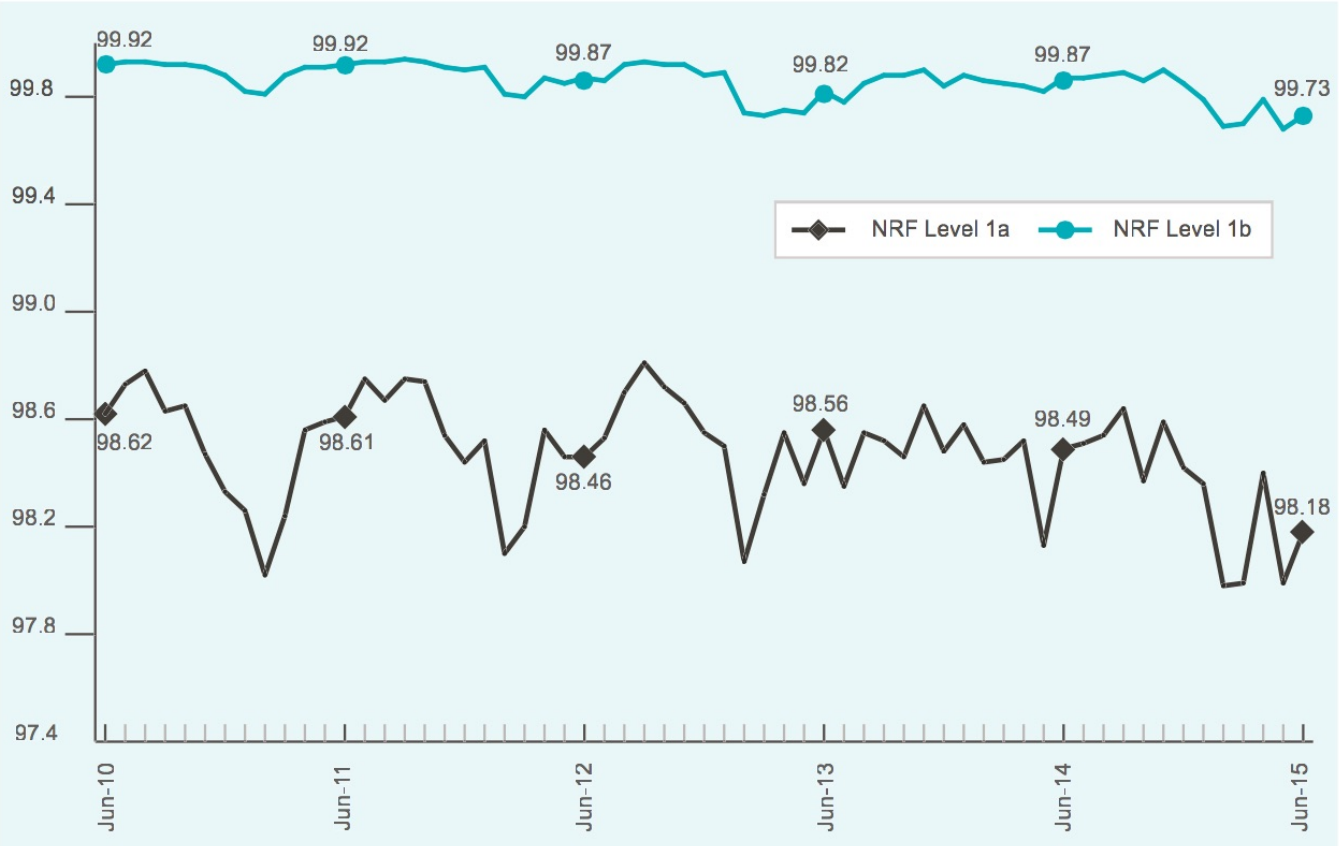
In my view, it this aspect of a "guarantee" or "safety net" that is the prime issue to be considered and why the USO and STS needs to be maintained. However, there does need to be significant changes to the USO to better protect this safety net and also take full advantage of the rollout of the NBN.

Somewhat perversely the current STS does not have a regulated guaranteed level of availability. The "standard" part of the STS name refers to the service being an "average" or "normal" telephone service not a service that meets a particular "standard" or quality level.

The ACMA does monitor a number of performance aspects of the STS under the Customer Service Guarantee (CSG) and Network Reliability Framework (NRF). The CSG covers timeframes for installing, repairing and meeting appointments and does involve customer rebates when service providers miss benchmark times. The NRF monitors the availability of the STS which is then reported by the ACMA in its annual reports.

In its latest report for 2014/15, the ACMA reported Telstra's overall network reliability as follows :

Figure 5.3 Telstra's Level 1a and 1b performance, based on monthly reports (percentage)



Base: Number in each category.
Source: ACMA, Telstra.

The NRF Level 1a line plots the percentage of Telstra lines that did not experience a fault during the month. The NRF Level 1b shows the percentage of time in a month that a line is available to provide the STS.

As can be seen the availability figures was 99.73% in 2014/15. This equates to just under 2 hours per month of unavailability or "downtime" on average. The figure for 2014/15 was significantly worse than previous years which were more like 99.9% (or approx 45 minutes per month) on average of 5 years.

This is an average over the entire Telstra network. The median figure is likely to be significantly better, with a low percentage of lines having significantly worse performance than the average reported by the ACMA.

However, as stated above, there is no minimum "guarantee" on the availability of any particular STS service. Telstra on its **website** does recognise as part of its obligation to provide a "reliable telephone service" under the USO STS, however there is no objective benchmark defining what reliable is.

So what does this mean in the context of a review of whether Australians should continue to have universal access to the STS in this digital age?

As stated above the STS is likely only to continue to be relevant as a "safety net" or "guarantee" for Australians when newer communication services (eg. mobile or internet based) do not provide the confidence or certainty especially in stressful or emergency situations.

Therefore it is, in my view, important that a "benchmark" or "minimum standard" be set for the availability of the STS. If this is not done then the USO may as well be abandoned altogether. Universal access to a service as a "safety net" service without a "minimum standard" is bordering on misleading and deceptive conduct. The growing use of mobile and internet calling applications is seeing a gradual lowering of the "norm" or "standard". At some point an objective standard is required otherwise the USO is irrelevant.

National Broadband Network impacts on the USO

The NBN is in the progress of being built with a range of technologies. Fibre, fixed wireless and satellite network technologies are now firmly in place with FTTN and HFC being introduced.

All of these technologies are primarily being implemented to carry wholesale broadband services to all Australian premises. According to NBN Co's latest **Service Level Schedule** (part of its agreement with RSPs) the network availability objective is 99.9% for all network types except the satellite network which has an objective of 99.7%. For the non-satellite networks this means downtimes of less than 45 minutes per month on average which is significantly better than the recent results report by the ACMA for Telstra's network (but in line with previous reported average downtime figures).

NBN Co, in developing its wholesale broadband services for RSPs, was conscious of the need to make special provisions for the delivery of voice services that would support an STS. High priority traffic classes for voice traffic ensure voice quality in a packet network environment which is equivalent to, if not better than, the traditional analogue telephone service using the copper loop.

RSPs can use the NBN Co supplied Network Termination Device in the end users premises for connection to normal telephones on the NBN FTTP service or RSPs can supply end users with additional devices for use on all network types (eg. FTTP, FTTN/B, HFC, Fixed Wireless and Satellite).

The rollout of the NBN in FTTP, FTTN/B and HFC areas will see the de-commissioning of Telstra's copper network used for the STS. The NBN networks in these footprints will replace the Telstra copper network as the platform for the STS. However, Telstra's copper network will still be the platform for the STS in the NBN Fixed Wireless and Satellite networks. Given the availability target and capability of the NBN Fixed Wireless network it should be clear that it is also be a viable platform for the STS.

However, the NBN Satellite network does have significant issues as a "safety net" platform for the STS. Firstly, the lower availability objective (equivalent to over two hours per month) means that

the service may not meet community expectations from a performance perspective. In addition the transmission delays inherent in geo-stationary satellite networks mean that calls will have longer delays that affect call quality. Delays of over 200 to 300 milli-seconds begin to degrade the perceived quality of traditional voice calls. The satellite delay objective (see Section 14.5 of the latest Services Level Schedule) is 370 milli seconds or less. As a result it is difficult for the NBN Satellite to provide a "safety net" service with reasonable call quality.

However, despite this it is likely that many users will still use the NBN Satellite for voice calls as well as new messaging and video applications. Many users can adapt to these different performance characteristics. In particular for video calls the video signal helps users compensate for the delay and adjust their conversations accordingly. I am unaware of any research in this area but have experienced first hand two-ended satellite video calls with delays of over 600 milliseconds and rate the experience as "good". However, this is unlikely to be satisfactory in times of end user stress or emergency.

So with the exception of satellite end users, the introduction of the NBN would appear to provide a platform for RSPs to deliver STS services to their users.

Mobile phone networks and the USO

More phone calls are now made from mobile phones than fixed phones. There is a good argument to make that the mobile phone call is now the "standard" or "norm" rather than a fixed phone call. But do mobile phone calls meet the "safety net" expectation of Australians?

For the many Australians living in metropolitan or regional areas it is my view that the quality is equivalent, if not better, than fixed lines. A case where mobile phones are superior than fixed lines is during electrical power outages. Most Australian households use cordless telephones to connect to the fixed telephone network. During power outages these phones cease to function as the base station unit relies on mains supply power (unlike non-cordless phones connected directly to the copper exchange line). Mobile phones however will continue to function normally using the phone's battery and connecting cell-site will have considerable back up power available.

The main issue for mobile phones will be one of coverage. If the user is located or moves to a location with poor signal strength then the mobile phone service will cease to be work.

The Mobile Blackspots Program does provide subsidies to Australian mobile carriers to extend mobile network coverage to new areas where it is otherwise uneconomic to do so. This program will require significant subsidies to continue to increase mobile coverage in regional and rural areas. It will however never be able to cover all Australians. The geographical challenge is too great and the rollout of mobile networks impractical.

In my view mobile phone services are of a sufficient quality to be able to qualify as an STS provided signal strength is high. If a proper availability standard is set for the STS then mobile

services should be able to qualify as an STS based on signal strength at specified locations. With today's geospatial tools and smartphone technology users can be kept informed of signal quality and advised if the location is covered for STS purposes by a mobile service.

Elderly, disabled or other special needs

Not all users will be able to use increasingly sophisticated and new devices (eg. handsets, computers, tablets) for the purpose of making telephone calls.

Traditional or specialised devices and services for these users will need to continue to be provided. Some of these devices may not be mobile due to the specific special needs or requirements for electrical power.

Users in these categories should still be able to access these devices and services. This may be at a higher cost than these users are prepared or able to pay for. As a result subsidies will need to continue to be provided for these devices and services.

Furthermore, this may mean that fixed phone services will be more appropriate than mobile phone services to these users. However, mobile networks may still be able to provide the connectivity to these fixed devices.

It is important that mobile networks are leveraged as an option for the USO and STS even for the provision of services to what are essentially fixed devices. The NBN Fixed Wireless service is an example of mobile network technology being used to provide a fixed broadband service. More innovative solutions that combine mobile networks with fixed devices are an important part of the tool set that should be used to deliver on the USO objectives.

Payphone considerations

The payphone is an anachronism in today's world of mobile phones and low cost or free voice calls. There does not seem to me any reason why this USO service should continue.

An alternative service at these locations, of much better benefit to the travelling or stranded user, would be public WiFi hotspot services that enable data, voice services and battery charging. A government subsidy may be necessary in some areas given the prevalence of good quality mobile services. In non-mobile coverage areas such a service would be of considerable benefit to travellers and local residents.

Some cities, such as New York, are seeing co-operative arrangements between local government and private enterprise providing high performance WiFi services to the general public that includes free voice calling, broadband and charging services (see **Link NYC**).

Alternatives to NBN Satellite

As discussed above the NBN provides a solid platform for RSPs to deliver STS services meeting "safety net" quality standards to all Australians with the exception of the satellite network due to the inherent delay in satellite transmission and lower availability targets.

RSPs, using VoIP technology, do sell voice services for use on the NBN Satellite service. Most calls to fixed telephone lines will be adequate as the delay is around 300 milli-seconds. However calls to mobiles and other satellite based users will be problematic.

The most severe impact will be for communities that would need to rely totally on satellite communications for voice services within their community if there were no terrestrial alternative. This would be the case on many islands communities (such as Christmas Island, King Island or Magnetic Island) or remote townships and indigenous communities if the existing copper networks were closed down.

All calls within these communities would suffer long delays of over 600 milli-seconds and resultant poor quality as both parties would be relying on satellite links (ie. double hop calls). This would be a significant backward step for these communities.

As a result it is my opinion that on a case by case basis most communities relying on satellite for the NBN will also need to retain the use of a terrestrial network for voice services. However, this terrestrial network may be transitioned to wireless technology (fixed or mobile) to be able to bring more modern service types to these communities as the existing technologies approach their end of life.

Isolated homesteads and farms may be better and more cost effectively served by satellite phone services using Low Earth Orbit (LEO) satellites such as Iridium or Globalstar. Being LEO satellites closer to earth, the delays are much shorter than the geo-stationary satellites used for the NBN. Call quality should be sufficient for an STS but availability may be subject to location and weather conditions.

Subsidies and 'competition' to be STS RSP of last resort

The current cost of the USO, $300 million per annum, is provided to Telstra as the sole provider of the Universal Service Obligation services. As part of this role Telstra must continue to operate and maintain the traditional copper network and specialised radio and satellite networks to connect premises outside the NBN FTTP, FTTN and HFC footprints.

Based on the foregoing I believe the NBN Fixed Wireless is capable of providing an STS service. Telstra should be absolved of this from an infrastructure perspective (ie. continuing to operate and maintain the copper network in Fixed Wireless areas). This should create a substantial saving in the cost of the USO.

In my view the role of the STS RSP provider of last resort on the NBN (FTTP, FTTN, HFC and

Fixed Wireless) could be put to a reverse tender with the lowest subsidy provider winning. This subsidy should be provided on a 'per end-user' basis (with a minimum overall payment) to encourage efficiency. There may be some significant advantages as an RSP to be seen to providing this service nationally from a marketing perspective. Competitive tension may result in a better indication of the actual cost, if any. This cost will depend to a large extent on the "safety net" obligations tied to this role and also the cost recoverable from end users which it is assumed would need to be independently established after community consultation.

It would also seem logical to consider linking the role of the STS RSP provider with the Emergency Call Service provider for '000' (currently Telstra) and National Relay Service (current the Australian Communications Exchange). Synergies are likely between these services that may improve the service or reduce the cost considering the STS will move to be the 'safety net' service.

For services in the NBN satellite footprint where a combination of non-NBN terrestrial infrastructure and LEO satellite phone services (plus other innovative options) would be required it would also make sense to put this to a reverse tender. There would need to be fixed and variable cost structures involved to cater for the infrastructure obligations in these areas. A range of service providers may be encouraged to 'bid' for this service to obtain the marketing advantage of providing broadband services to remote Australians.

These initiatives would establish a more realistic cost structure for the USO and could a achieve considerable savings against the current cost of $300 million per annum.

Any savings made on the USO would be better directed at improving the coverage of the NBN Fixed Wireless and Satellite services as well as extending the Mobile Blackspots Program. Funding of this infrastructure will be of more benefit to regional and remove Australians than continuing the high costs of supporting legacy technologies to provide the STS. Extension of the Fixed Wireless network will also reduce the cost for the provision of special infrastructure in areas serviced by non-NBN infrastructure.

Summary

So in summary my recommendations for the USO are as follows :

1. Establish a 'safety net' availability benchmark for the STS in line with its future role as a back up to the growing range of innovative voice, video and messaging services being provided using mobile and internet networks.
2. Remove payhones from the USO and consider the conversion of these locations to public WiFi hotspots.
3. Use the NBN Fixed Wireless network as a platform for the STS on the NBN in similar manner to the current plans for FTTP, FTTN/B and HFC.
4. Use mobile networks to provide alternative options for delivery of the STS to locations with good signal strength and stimulate innovative solutions for users with special requirements such as the

elderly or disabled.

5. Encourage competition to be the STS RSP of last resort on the NBN through a reverse tender process costed on a 'per end-user' basis.

6. Consider linking the roles of the STS RSP of last resort and the Emergency Service providers to increase opportunity for innovation, service improvements and cost reductions.

7. Encourage competition to be the STS infrastructure provider and RSP of last resort in the NBN satellite footprint through a reverse tender process.