Submission to the Productivity Commission Draft Report (November 2016) on the Telecommunications Universal Service Obligation (TUSO)

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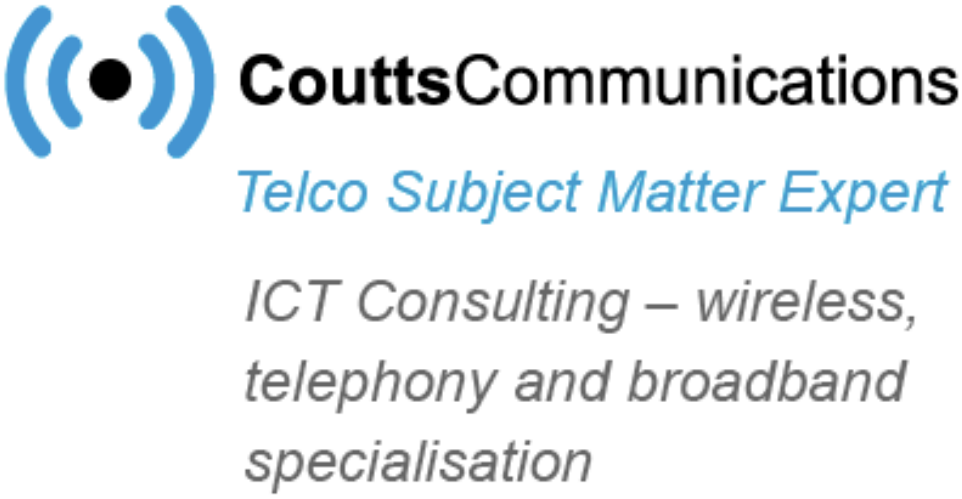

1. Introduction

Reforming the Telecommunications Universal Service Obligation (TUSO) in Australia is a complex process but should be considered as a journey recognising that change is long overdue. Change is urgent because it is expensive[1], is over regulated, distorts the industry and fundamentally fails to meet the needs of regional and remote citizens it is intended to protect. That said, any changes need to be incremental ensuring all stakeholders can input to any proposed change.

The Productivity Commission Draft Report (PC) [Productivity Commission 2016] on Page 99, states: "Arguably, the TUSO may no longer be needed once Australia fully transitions to NBN[2] infrastructure. ect…'. I have reservations with this argument from many perspectives. The NBN can only be considered part of the Australian telecommunications infrastructure (the mobile networks) and the term 'fully transitions to NBN' used by the PC report contradicts the very evolutionary nature of the infrastructure and services demanded. My concern in regard to NBN Sky Muster in particular is that Government can be tempted to 'crowd out' private sector satellite infrastructure covering Australia to reduce costs.

This submission builds on my original submission in early 2016 to the Productivity Commission (PC) and expands, in particular, on my view stated in Box 6.2 on the use of the satellite service for voice calling. I am heartened that the PC Report recognises the straightforward proposition that NBN Co should be empowered to provide a 'quality equivalent[3] voice service' on NBN Fixed Wireless. Correctly, in my view, the PC does not

[1] It is estimated in the PC Report Government allocate $1 billion annually to 'universal telecommunication services' in *addition* to the investment in the NBN!
[2] NBN is the acronym for the National Broadband Network
[3] The current STS definition in legislation is a prime example of outdated 'over regulation' in that it requires carrier selection

make a proposition with regard to satellite delivered voice services and the PC calls in Information request 6.1 for evidence on the adequacy of NBN in this regard.

Overall my submission examines of the potential and barriers for NBN Co to take over the role of NBN as the Universal Infrastructure Provider from Telstra over time. A current Baseline Telecommunication Service would include a broadband service, an expanded mobile service and needs to include a highly available and reliable telephone service. For remote areas in particular, to replace the copper based telephone with a cost effective alternative[4] is in the interests of everyone except the remote citizens!

2. Original Submission Summary

My recommendations to the Productivity Commission of July 2016 were in summary:

Recommendation 1: Universal Service Fund
Establish a Universal Service Fund (USF), to help fund non-commercial but socially important telecommunications infrastructure. The USF would be funded from contributions via an improved levy scheme that would look to reduce the distortionary impositions of the current arrangements.

Recommendation 2: NBN as the Universal Infrastructure Provider
Consistent with NBN's current remit, formally designate NBN as the Universal Infrastructure Provider to connect all premises in Australia. This would mean that all Retail Service Providers on the NBN would be able to provide voice and broadband services to all premises in Australia.

Recommendation 3: NBN as the Standard Communications Service Provider
Plan the phase-out of Telstra's current USO obligation, to maintain its copper network to provide a Standard Telephone Service, and provide funds to NBN to deliver a modern Standard Communications Service delivering voice and broadband capability to all premises.

Recommendation 4: Mobile coverage and choice
The Universal Service Fund should also consider the provision of funding for other essential services such as improving mobile coverage and choice in regional Australia via an expanded Mobile Black Spot Programme. The NBN should also develop a project plan to assist the industry to expand competitive mobile services to regional Australia by providing access to NBN backhaul and by upgrading its fixed wireless towers to deliver a wholesale 4G regional mobile network

Recommendation 5: Broader range of telecommunications solutions
As an alternate to traditional payphone subsidies, consider broadening the remit of the Universal Service Fund to deliver a broader range of telecommunications solutions for regional communities and other consumers, such as public open access WiFi. Consideration should also be given to providing funds for small-scale community-led innovative communication projects to enable broadband services to all Australians.

Thus my current submission goes to Recommendations 2 and 3 off my original submission.

3. Perspectives of Rural & Remote Citizens

In order to get an insight into the perspectives and concerns of rural and remote citizens, I posted a 'controversial' hypothesis on the Facebook Blog BIRRR

[4] Voice over IP (VoIP) over satellite in particular is considered.

https://www.facebook.com/groups/BIRRR/ 

Posting the statement:

'Sky Muster COULD be used to provide a quality telephone service in remote Australia. Let Telstra's copper retire!"

I will summarise the concerns and issues brought to my attention:

- Against a long history of poor satellite (for telecommunications) experience[5], the NBN Sky Muster satellite system has been consistent with this history and been extremely unreliable. I understand this has recently improved.
- There is a considerable lack of understanding and lack of experience of Voice Over Internet Protocol (VoIP). For some, there 'experience' of VoIP has only been the use of Skype.
- There is little understanding of what the PC calls 'Managed VoIP' and terms like CBR and TC1 used by engineers. This negative experience of VoIP is often compounded with the unreliability of NBN's Sky Muster and their ill advised down load constraints.
- Reference to the 'waiver' with regard to VoIP by some is misunderstood. The Customer Service Guarantee (CSG) waiver is commonly required by Carrier Service Providers for their VoIP service on naked DSL is that it is low cost using 'best efforts' Internet carriage and not of equivalent reliability to a 'normal' telephone service.
- Compounded with the contrast of Sky Muster reliability with the copper based 'PSTN' particularly where mobile service is not available, the mere thought of only a VoIP voice service on satellite (ie no copper PSTN) in emergencies makes their fears are well founded. A Satellite Phone[6] was mentioned as a back up for emergencies
- Calls between two remote users 'usually' entails a double satellite delay[7]. The 'unacceptability'[8] of double satellite delay to most[9] citizens is a significant barrier that needs to be factored into any satellite voice solution.
- Some comments mentioned LEO[10] satellite system that do not have such a large delay but are not a solution for USO voice as a replacement to copper, as the terminal equipment is unsuitable and expensive for individual premises. They have certainly not been used for the Indigenous Pay Phone system https://www.activ8me.net.au/about/remote-community-telecommunications that uses VoIP over GEO satellite(s).
- Current power backup from the local exchange with the copper PSTN is an important issue raised for all NBN transitions across Australia from the copper PSTN but particularly so in rural and remote users where local power is more uncertain. This need for power backup is, however, not an issue related to the use of VoIP.

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[5] My public comments have been 'the satellite brand' (for telecommunications) in Australia has been damaged!

[6] Sat Phones as they are termed are commonly available by Iridium and Global Star

[7] Ways to avoid double satellite delay will be discussed. Telstra's USO SAT uses one approach to limit the problem of double satellite delay.

[8] Double hop satellite delay is 'accepted by Corporate users but requires 'user acceptance'.

[9] Indigenous users of the Government's Indigenous pay phone system provided by Active8Me have accepted double satellite delay.

[10] LEO or Low Earth Orbit systems are now being deployed in a number of Island Countries.

A key strategy for achieving acceptance of the change by rural and remote citizens, particularly those outside reliable mobile coverage is to develop a 'value proposition' of why they should adopt, over time, the switch from the current copper solution[11] to VoIP over satellite! The value proposition over time Telstra and Government are if the USO payments were reduced would be to force migration to satellite or cost effective alternative. Unlike other incumbent Telcos in the development world[12] such as in the UK and the US who are under cost pressures and competitors to 'retire their copper network, they are not subsidised by whole subsidy not only by Government by their competitors. (ie USO industry levy).

4. Expansion of Mobile Coverage and Satellite

The PC Report states in Table 3.2 on P. 36 that all except some 90,000 of Australian premises rely on the TUSO as they have no mobile coverage. While most would agree this figure will diminish, this figure ignores to a degree those with marginal mobile coverage to truly enable diversity of service and provide adequate back-up of mobile service for emergencies for remote citizens. Quality mobile coverage needs expansion with advances in technology and innovation Government intervention.

My Recommendation 4 calls for expansion of mobile coverage endorsing the Government's Mobile Black Spot Programme and exploring ways NBN infrastructure can be further leveraged to expand both extent and depth of coverage. The recent expansion by Optus of its mobile network using microcells and satellite backhaul[13] to expand rural and remote coverage points to the need for innovative solutions to reduce the cost barriers to expanded coverage. I understand that there have not been any concerns with single hop delay as a result of the use of satellite backhaul.

My only comment on the current ACCC review of the potential for regulated roaming is that 'the threat of targeted regulatory intervention' may be useful. I note that in addition to Telstra, Optus is against any intervention to regulate roaming. I would stress the need for Government and the ACCC to give due consideration of the 'bottle-neck' impacts of backhaul on the costs of expanding mobile coverage. Further, a number of citizens commented on the BIRRR Facebook Blog that they have marginal mobile coverage and continue to question the assumed figures used on occasion by many of us in the industry. There is an ongoing demand by citizens for both passive and active[14] repeaters.

A more ambitious but very plausible initiative I support is that by Aero Stats All Australia (AAA) who propose a system of tethered balloons called Aerostats https://en.wikipedia.org/wiki/Aerostat which supports mobile base stations requiring low cost back- haul. AAA http://www.slideshare.net/BenLivson/aerostats-all-australia-aaa-mobile-coverage-final are also making an input to the Productivity Commission. Certainly over time mobile coverage will reduce the number of people and premises that are remote and will become solely reliant on satellite when the copper is retired!

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[11] A high reliability (ie noise, latency), high availability (ie 99.9%) copper PSTN with power back up from the local exchange all subsidised at increasing cost by the tax payer.

[12] Developing countries generally do not have an extensive copper infrastructure.

[13] Note I and colleagues [Crouch & Davies 2013] have been calling for the greater use of satellite backhaul and regulatory intervention where appropriate for several years.

[14] Please note active repeaters need to be authorized by a Mobile Network Operator (MNO) to avoid prosecution for interference!

This discussion lends further support for my Recommendation 1 to set up a Universal Service Fund for targeted intervention by Government to improve telecommunications for all Australians.

5. VoIP Telephony – Satellite the last frontier

VoIP telephony using 'packet switching' has been has been evolving with the Internet evolution since the mid 1990s. VoIP will progressively replace 'circuit switching' worldwide starting in core networks but also in mobile networks. This trend is well underway. In Australia, with the roll out of the NBN, VoIP will be used even where copper to the premise (ie FTTN) is retained. Backup power will be no longer being automatically supplied from the Exchange and the Government has strongly recommended local battery back up.

In the NBN citizens have the choice of Traffic Class 1 (ie Managed VoIP) which connects to their current 'analogue' telephone and has offers 'assured call quality' equivalent15 and sometimes superior to the original copper based telephone service. VoIP over satellite however has been a challenge over the last few years as seen references [….] giving an excellent overview on the various solutions that are now standardised:

- G-VoIP which provides guaranteed quality and reduced bandwidth of raw VoIP to prevent interaction with other forms of simultaneous data transmission
- The difference between the Star (usual) and Mesh Topologies. A Mesh Topologies can be used in some[16] instances to overcome the double-hop problem.

Satellites present a significant challenge for voice communications in general but VoIP voice, in particular, due to transmission variation (eg jitter), bandwidth contention and propagation delay. It must be remembered that back in the 1980s, propagation delay on international satellite links used to be a problem for analogue telephony before highly effective low cost echo cancellation was developed VoIP over satellite is still developing and future 'on-board processing' offers a general solution to the double-hop problem.

A further frustration identified by some Sky Muster customers is the restrictive down load caps 'imposed' by Sky Muster via their retailers. I don't think this observation is a fair complaint. By global comparisons [Ovum 2016] the Sky Muster broadband service is rated by Ovum in terms of affordability and speed as a world leader. Secondly exceeding these caps will not lead to poor VoIP based voice service where Managed VoIP (ie TC-1) is used but may increase call-blocking probability.

For the current Telstra Satellite USO solution, I understand Telstra leases Intelsat-6 capacity at Ku band for an analogue SCPC[17] system (ie not VoIP) that uses Mesh Topology to obviate the occurrence of the double hop problem. It is old technology that works.

My conclusion is that there are two short-term solutions (ie before 2020).

- NBN Co can provide Managed VoIP (ie using Traffic Class 1) NBN Co can offer a reliable voice service via Sky Muster and utilise the current user handset, but:

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[15] There is an issue with older security and alarm systems over VoIP that have received much attention over the last few years to assure their reliability.

[16] The mesh technology currently only works over a single beam. NBN's Sky Muster system has been optimized to maximize broadband data and uses multiple spot/beams to cover Australia.

[17] SCPC stands for Single Channel Per Carrier http://www.satellitetoday.com/publications/2014/11/24/tdma-vs-scpc-for-satellite-backhaul-the-decision-is-simple/ a relatively old and expensive technology compared to TDMA

- the availability of the Sky Muster service which uses Ka band is subject to rain attenuation events particularly in Northern Australia
- calls between premises where both citizens are on Sky Muster will experience a double hop delay that may be unacceptable to some[18].

Alternatively, NBN Co could lease Ku band[19] satellite capacity separate from its own Sky Muster satellite system with a single national beam that could provide reliable telephone service with no double hop problem. Such a system would require a separate satellite dish for telephone service but would provide a level of redundancy to compensate for the loss of the copper service. A system like the ViaSat Skylinx Quad https://www.viasat.com/sites/default/files/legacy/SkylinxQuad_Brochure_011_web.pdf that is:

- more bandwidth efficient
- less expensive and
- far less power hungry

than the current Telstra USO Satellite product that can also be used for mobile backhaul could be evaluated even jointly by Telstra and NBN Co.

6. The Indigenous Community Access and VoIP Over Satellite

Since May 2009, the Australian Government https://www.activ8me.net.au/about/remote-community-telecommunications has contracted Active8Me to provide remote Indigenous communities access to telecommunications services.

The telephone service is via leased satellite capacity[20] using VoIP on the data link. In recent years, the service has been expanded to include free WiFi access within the community. The telephone service is free for calls within Australia and phone cards are used for overseas calls and calls to mobiles. The addition WiFi access has enabled access to the Internet and OTT services

It should be noted that this system does not use Managed VoIP and calls between distant remote Indigenous communities would involve two satellite hops but not been of concern to in Indigenous citizens.

This example further demonstrates that there are opportunities for innovative solutions that can be encouraged by targeted Government interventions as opposed to costly, out-dated 'one size fits all' solutions like the TUSO. Along with the mobile revolution where service is to the person, it further demonstrates the weakness of the over regulated construct of the 'STS to the premise' of the current TUSO scheme.

It is my understanding that the Government proposes to propose that the remote Indigenous communities access system use the Sky Muster satellite presumably for cost reasons but I would precaution against 'crowding out' private sector satellite.

7. Retirement of the Copper

[18] As noted earlier, corporate users and Indigenous users of the Government's Indigenous pay phone system provided by Active8Me have accepted double satellite delay.

[19] A Ku band system just for telephony would have better availability not impacted by rain fades and the single spot would enable Mesh VoIP.

[20] Initially, Active8Me leased satellite capacity from Ipstar http://ipstaraustralia.com/about.html and Intelsat-6 for York Peninsula

The eventual retirement of the copper network belonging to incumbent Telcos in developed countries such as the UK, US and Australia has been the objective of:

- the incumbent Telco as their customer base
    - demands higher data rates that cannot be met with DSL technologies and require fibre
    - migrates their telephone service to mobile
    - increasing unsustainable operating expense (OpEx) to maintain the copper network for a diminishing number of customers
- the new telcos push the migration of the telephone service to broadband assisted by the regulator

The life of copper in the rural and remote areas is seen as a longer-term challenge.

The announcement in 2010 by he then Australian Government with Telstra regarding their 'contract' with NBN Co was seen as in a sense a 'retirement of the copper network' paid for by the Australian taxpayer some 5 years earlier the US and UK.

The revised NBN direction by the incoming Government in 2013 to adopt the mixed technology strategy and FTTN in particular has extended the life of the copper network in the fibre footprint. However, VoIP will become the transmission mode for all voice services except for remote[21] areas given VoIP over Fixed Wireless is adopted. The key question is how will 'analogue' voice services be migrated off the high cost but sturdy copper network in the satellite coverage area, some 3% of premises.

At some point, while remote users can retain their copper, they will not be connected to the network! In a sense Government policy with the current NBN contract to maintain the copper based USO is spending $1 billion per year retarding innovation in the bush.

8. Baseline Telecommunication Service?

As I have said previously, the current USO should be dismantled along a journey of at least 5 years but starting now with the reform of the legislated definition of an 'STS' and caveats with respect to the CSG and Priority Assistance and moving to a framework of a more targeted cost effective form of Government intervention.

A key recommendation of the PC Draft Report is getting community acceptance of a Baseline Telecommunications Service to which all citizens should have affordable access. The Baseline Telecommunications Service to include 'high cost' areas need to within an overall financial cap[22] the community to accept as part of a National community. In Australia unlike many countries this was accepted in the 1980s around the standard telephone service and is what we have today. In 2017 over 30 years on the world has changed and we need to move on but confirm a rebooted social compact.

Today a Baseline Telecommunications Service for all citizens might include a:

- Highly available and reliable telephone service (ie not Skype or any other OTT[23] App)
- A basic mobile service (where reasonable)
- Access to the Internet with a reasonable data cap

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[21] The definition of remote for NBN Sky Muster is controversial as those premises outside the 'footprint' of Fixed Wireless that are not generally regarded as remote are slated for Sky Muster!

[22] A related issue is the way this cap is finance which to date has been a mixture of the Government and industry.

[23] OTT stands for Over The Top services such as Viber or WhatsApp in the case of voice services)

with the ability to upgrade this service to cater for individual demand at an additional cost.[24] However, as we have seen and will further see these benchmarks will change with demand and technology so it is essential to establish a regular process of review of the Baseline Telecommunications Service. Certainly neither Europe nor the US provides us a lead on how to institute such a process! We could use this opportunity to become world leaders yet again to define a solution to a sustainable Baseline Telecommunications Service for all our citizens

9. Recommendations and Options

My conclusion is that NBN Co is able to provide a 'quality voice service' using VoIP over Fixed Wireless. However, I am not confident provide this service over Sky Muster satellite system.

NBN Co needs to explore and trial satellite options discussed including trialling a more modern satellite system to provide a lower cost but reliable 'quality voice service' with potential to substitute for the copper post 2020.

My recommendation is that the USO reform journey should be commenced but with the long term in view by:

- Establishing a sustainable Baseline Telecommunications Service for all our citizens
- Redrafting the current regulated definition of the STS to a broader Baseline Telecommunications Service
- Commence discussions with Telstra and NBN Co with respect to the contractual flexibility to realise a long term transition from Telstra to NBN Co as the future lead Universal Infrastructure Provider
- Assure remote citizens that any planned retirement of the copper be a major subject for the review in 2020 on completion of the NBN roll out.
- As recommended in the PC, the 2020 review should not contingent on NBN privatisation decisions.

10. References

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[24] Such additional costs to consumers would be minimised by assuring competitive supply industry.