

**Joint Standing Committee on the National Broadband Network  
Inquiry into the rollout of the National Broadband Network in  
rural and regional areas.**



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**Submission – Professor Reg Coutts – 4<sup>th</sup> April 2018**

**1. Introduction**

The policy intent in late 2007 of the then Government was to partner with the private sector to provide a national broadband network to all premises in Australia and in 2008 they established an ‘expert panel’ of multiple disciplines and expertise to oversee a public call for tenders to provide the best proposal from the private sector to match with \$A4.7 billion contribution from government.

The prevailing view was that a national broadband network infrastructure was needed for Australia’s future in a competitive global digital economy. The prevailing view was at that time that there had been a ‘market failure’ preventing the private sector itself from investing in a national broadband network in a sustainable competitive industry framework without government investment.

The GFC or ‘global financial crisis’ in 2008 meant no proposal by the beginning of 2009 could be recommended to Government investment to support. The revised ambitious plan announced in April 2009 by the Government was in response to this new global economic reality to realise the national broadband network.

**2. My Previous and Related Submissions**

I was one of the Experts on the panel chosen by the then Federal Government in 2008 to advise the government on considerations to provide a broadband service to all premises in Australia. In April 2009, the Government announced its plan to roll out a National Broadband Network (NBN) based on the considerations of the panel. The Government released an extract from the Evaluation Report for the Request for Proposals to Rollout and Operate a National Broadband Network for Australia. [Ref 1]. Based on the submissions, it was observed some 7% of premises in rural and remote Australia could not be provided cost effectively by fibre technology based solutions. Advanced wireless and Ka band satellite were the recommended solutions for this 7% of premises.

Part of the announcements in April 2009, was to tender for an implementation study of the proposed broad NBN policy. In May 2010, the Government released the National Broadband Network implementation study [Ref 2] that endorsed the use of fixed wireless

and Ka band satellite as the cost effective technology solution for the 7% of rural and remote premises in Australia. However, I did not endorse several of the realisation options recommended by the implementation study report but this outside the scope of my submission.

The then Government then proceeded with the rollout of the NBN and the fixed wireless and satellite components:

- NBN Co contracted Ericsson to implement the Fixed Wireless at 2.3GHz based on a ‘fixed variant’ of the mobile LTE<sup>1</sup>
- NBN Co contracted the launch of 2 Ka band high capacity satellites that were dubbed Sky Muster<sup>2</sup> when launched in 2016.

The change of Government in 2013, changed a number of key aspects of the NBN plan and the fibre technology options to the bulk 93% of premises in Australia, but the use of Fixed Wireless and Ka band satellites were kept essentially unchanged.

My other area of related public policy concern on which I have made public submissions is the ongoing slow lack of reform of the Universal Service Obligation (USO) that is in part has been exacerbated by the NBN policy. In fact the NBN plan of 2009 in a sense derailed realistic reform of the USO to provide a telephone service in the government’s drive to get agreement from Telstra still deemed the monopoly USP provider. The USO reform process [Ref 3] is underway and NBN Co has been nominated in 2017 to play a key role.

While I disagreed and still do with many of the system design aspects of mainly the satellite system design [Ref 3], my major ongoing concern and focus for my submission is *the lack of transparency* of both historical and ongoing system design decisions of both the fixed wireless and Sky Muster systems. Both investments are public investments in monopoly infrastructure and such systems design assumptions and observation of actual performance should in my view be open to comment by industry observers.

### **3. Main Focus of Concern**

Quoting from the Request for Submissions:

*“The committee’s intention in this inquiry is to focus on the broader policy aspects of the rollout of the NBN in rural and regional areas”.*

As indicated earlier, the main focus for this submission is the lack of transparency both within Government and NBN Co as to the system design considerations and the realised performance of the network.

My confidential assessment report [Ref 3] on the NBN Implementation Report while happy with the endorsement of the broad satellite/fixed wireless solution, I was critical of a number of the implementation recommendations. The lack of any consultation or transparency from Government or NBN Co has been a source of frustration particularly in the light of foreseen problems emerging.

The particular design decision considerations that I am interested are the:

- basis for NBN Co ‘deciding’ a premise will receive broadband via Fixed Wireless or Sky Muster satellite
- traffic load assumptions for residents including NBN Co provided backhaul

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<sup>1</sup> LTE stands for Long Term Evolution technology often referred to as 4G

<sup>2</sup> See [https://en.wikipedia.org/wiki/Sky\\_Muster](https://en.wikipedia.org/wiki/Sky_Muster), which incorrectly in my view attributes the concept of the use of Ka band satellites to the later Gillard Government.

- availability objectives for Sky Muster including the outage impact of rain fades
- mean time to repair (MTR) for remote premises

The particular realised performance for:

- traffic observed and growth
- availability for the wholesale Sky Muster service
- MTR in particular

**a. Satellite Versus Fixed Wireless ‘Decision’**

A basic big picture design decision taken which I have been critical is a potential NBN customer or even town<sup>3</sup> who is outside<sup>4</sup> the planned wired footprint, is allocated by NBN Co ‘administrative decision’ to Fixed Wireless or Sky Muster satellite.

The selection criteria, the appeal process and possible reconsideration over time were communicated. For example the economics of fixed wireless improve with multiple NBN premises in an area and satellite capacity is constrained. This decision process is particularly curious in that Sky Muster covers the whole 7% of the rural & remote land mass and the economics of satellite broadband capacity limits per spot would seem to favour moving customers from satellite to fixed wireless where possible. A key question relating to transparency is:

What are the selection criteria for fixed wireless over Sky Muster, the appeal process and possible basis for reconsideration going forward?

The unfortunate policy decision on the NBN was to regard the service characteristics (eg down load limits and bandwidths) could be considered distinctly from the underlying technology. This ‘doggy thought experiment’ is particularly not helpful when considering satellite and all of the terrestrial technologies noting in particular:

- The broadband Ka band satellite technology uses GSO<sup>5</sup> satellites introducing a large delay that can be a particular problem for some services without the use of ‘protocol conversion’.
- As I understand there was minimal consideration in the design of Sky Muster of resale at layer 3 rather than layer 2 more usual in commercial practice.
- The satellite system infrastructure in the sky is fixed and so its ‘data capacity’ or traffic needs to be managed for growth over the 15-year economic growth. This is quite different to terrestrial infrastructure than can be grown to meet growth.

Thus such satellite systems require what is termed a ‘fair use’ policy. The ‘design’ of the NBN Co fair use policy has been an ongoing problem to explain to the public, retail service providers and customers.

The method seemingly adopted by NBN Co without the benefit of ‘price signals’ usual in commercial systems, is to constrain current capacity based on projections of growth. This design assumption of projected growth would seem to have been revised to allow larger

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<sup>3</sup> For example the town of Kaniva near the South Australian and Victorian border were ‘allocated’ Sky Muster and never told as to the rational of future possibilities. They have made representations to this Committee. Another example is I understand the most ‘congested’ spot beam is that over Sydney where greater deployment of Fixed Wireless would be beneficial.

<sup>4</sup> I will not comment on this decision of which premises are deemed ‘rural and remote’.

<sup>5</sup> LEO or MEO satellites while not having a large ‘round trip delay’ are not an option for broadband data. Further while multi-spot (eg over 100 in the case of Sky Muster) do provide broadband but do result in a potential double ‘round trip delay’ and do not allow mesh networking to remove possible double hop delay for voice.

data caps announced in late June 2017 which were very welcomed by the industry. A key question relating to transparency is:

What is the assumed traffic growth of Sky Muster and what has been the reality to date?

**b. Performance and Traffic Growth – assumed and measured**

A key measure for the dimensioning of NBN as a whole is the data per premise assumed and measurements at regular intervals of the measured data traffic. This area has been very controversial and the ACCC, Choice and other bodies have started reporting measured data rates.

Unfortunately policy the service characteristics (bandwidth variability and changes over times of the day) need be considered distinctly for different underlying technology, backhaul used by the RSP. Further, not often is speed variability considered sufficiently by wise economists and lawyer colleagues along with other factors that are MORE important for particular services than certainly headline speed.

Both Fixed Wireless and Satellite are very different in service characteristics to terrestrial systems on which I make no comment in this submission. I note the ACCC for example is concentrating on terrestrial systems and not measuring satellite-based systems.

In broad terms, performance and traffic growth are related in that once traffic grows beyond the designed performance standard, performance reduces due to contention.

What is the assumed performance metric (eg data rate including variability) of the Sky Muster service and what has been the reality to date?

**c. Availability Objectives including Mean Time to Repair – assumed and measured**

Overall end-to-end availability of telecommunications services of standard services continues to be a crucial framework of systems design. A service is said to be ‘available’ if the minimum performance design metric is met and is often expressed as % of the year. Telephone systems were designed to be available for better than 99.9% of the year.

As stated at my appearance at the Joint Standing in Adelaide on the 27<sup>th</sup> June 2017, the overall availability design objectives for both the Fixed Wireless Service and the Sky Muster Service have never been stated. For both Fixed Wireless and Satellite, propagation factors (eg ‘heavy rain attenuation’ impact on Ka band satellite) need to be included in system design. The availability design budget for rain fading for a satellite system is usually translated into a ‘rain power margin’ that can be increased by the use of larger dishes at the premise. Typically one might expect an availability objective of 0.3% which is harder to meet in northern Australia that experience high rain rates. This amounts to a design objective of just over 24 hours per year.

*From various quotations from NBN Co to the Productivity Commission Report on the USO, NBN Co are not clear themselves how ‘rain fades’ are included in the Sky Muster design. Comments on the BIRRR Blog cite <https://birrraus.com> 4reported ‘rain outages’ (suspected) in 2017 but seem to have reduced in the last 12 months. This is curious?*

Unavailability caused by equipment failure is usually assumed to be low compared to propagation factors. However, when there is a failure the ‘mean time to repair’ is crucial<sup>6</sup> in particularly remote locations.

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<sup>6</sup> I have heard NBN Co taking 10 hours to repair a Sky Muster fault!

What is the assumed availability objective for the Sky Muster service and what has been the reality to date? How much of the design availability is attributable to propagation factors?

#### 4. Unique Policy Context for the NBN

A unique policy objective for the initial NBN plan and the revised plan from 2013 to break with former was to provide a truly national infrastructure including rural and remote areas. Prior to the NBN policy and its variants since 2009, telecommunications to the rural and remote Australia referred to, as ‘the bush’ essentially was secondary to the core from the cities but within the political pressure from the National Party to protect its constituents from the impact of an urban/rural divide.

The USO that still provides for a subsidised telephone service was enshrined in legislation in 1990 as the guardian of the principle going back to 1960’s of access to a telephone independent of geographic location.

Increasingly from the mid 1990’s since the rise of the Internet and mobile, the Standard Telephone Service (STS) has become less sufficient or efficient regulatory intervention to militate against the now digital urban/rural divide. Unfortunately, the NBN policy of 2009 not completely ignored the much-needed reform of the USO policy but entrenched it in even further with prescriptive legislation without addressing the issue in my submission of the lack of transparency. The lack of transparency from Telstra the monopoly USO provider as well as the government was high lighted in the Productivity Commission Report into the USO in 2016.

A consequence of the ‘policy silo thinking’ was that while multi spot Ka band satellites were recognised as the technology solution for broadband in the bush, they could not meet the ongoing requirements for a telephone service particularly outside mobile coverage areas.

Satellite service to provide remote telephone service are currently available (eg Telstra’s USO satellite USO service) and are improving they cannot provide adequate broadband. The current NBN Co satellite service is less than ideal for telephony<sup>7</sup> and thus is an ongoing challenge to USO reform.

#### 5. Observations and Conclusions

The promise provision of broadband service in the bush using Fixed Wireless and Satellite was inspiring. However the implementation by NBN Co particularly of the Sky Muster service has been a disappointment exacerbated by a lack of transparency with the public and the industry.

My overall observations are:

- The Fixed Wireless NBN Co service has generally been world leading based on best practice LTE mobile technology albeit in a different frequency band.
  - The potential for repeaters and reception mods to improve marginal service were poorly communicated and the process by which residents could be empowered
  - Performance congestion has been experience but it is not clear *due to lack of transparency* whether this is due to ‘radio resource congestion’ or NBN Co backhaul

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<sup>7</sup> Telephone services could utilise VoIP over NBN satellite but would be inferior to any terrestrial service and could not substitute for copper VoIP especially with battery back up.

- The Sky Muster NBN Co service has significantly improved in reliability since 2016 but cannot be regarded as ‘global industry practice’ in implementation in particular. Particular criticisms that are particularly relevant *due to lack of transparency* are:
  - The Sky Muster NBN Co service seemed to be ‘rushed into service’ before significant software problems with the system and installation problems were solved.
  - The system design availability assumptions particularly with respect to potential heavy rain outage were not and still not provided.
    - The customer design options considered such larger antenna were not mad available
    - No measurements on reported rain outages were available leading to bad press
  - While system availability also includes hardware/installation outage, unlike rain outage the ‘mean time to repair’ can be a significant figure particularly for remote users. Again no information was provided on what was assumed and what has been the experience to date?

## 6. References

- [1] “Extract from the Evaluation Report for the Request for Proposals to Roll-out and Operate a National Broadband Network for Australia”, published on the Web by the Government in May 2009.
- [2] “National Broadband Network implementation study”, Department of Broadband, Communications and the Digital Economy, 7<sup>th</sup> May 2010
- [3] “NBN Implementation Report – Meeting the 10% - An Assessment” (Personal confidential) by Professor Reg Coutts, 7<sup>th</sup> June 2010
- [4] “Better telecommunications services for all Australians - Rethinking the Universal Service Obligation” by Professor Reg Coutts, May 2015  
<http://www.couttscommunications.com/Published-Articles/RethinkingTheUSORegCoutts.pdf>