

Regional Telecommunications Review 2015: AARNet Submission

Executive Summary

AARNet's submission is based on the following three principles:

1. The critical issue for regional telecommunications is long-distance backbone and **backhaul services rather than "last mile" access.**
2. Much of the national agenda, dominated as it is by the nbn (national broadband network), has been centred on the provision of telecommunications services to **individual homes (the "demand side"), rather than government services, education, health, emergency services and businesses ("the supply side").** This disproportionately impacts organisations and institutions in regional communities (in large part because of principle 1).
3. Consistent with principle 2, **investments in regional telecommunications have generally had limited long term impact** because they have a narrow technology focus (eg. mobile phone towers), are focused on specific vertical opportunity (eg. telehealth) or provide a relatively short-term return on investment (usually because the infrastructure ends up being owned by a single monopoly provider).

AARNet recommends that future policy and investments:

- Increase the availability, quality and competitiveness of fixed long-haul telecommunications (fibre) infrastructure to and between regional communities;
- Support the improvement in digital service delivery for services relevant to, and located within, regional communities; and
- Provide long-term (decadal), cross-sectoral benefits to regional communities.

Specifically:

- **That the nbn offer services better aligned to the requirements of government services, education, health, emergency services and businesses, within regional communities, and**
- **Long-distance and backhaul fibre or equivalent open access services be made available to, and along highways between, regional communities either via the nbn, or through investments in related infrastructure (eg. mobile phone towers).**

Context

Many of Australia's universities are headquartered in regional Australia, including the members of the Regional Universities Network (RUN²), non-metropolitan members of the Innovative Research Universities (IRU³), and a range of non-aligned institutions. In fact, **a majority of Australian universities operate within and throughout regional Australia** (see Appendix A) through a range of mechanisms including regional campuses, study centres and partnerships with other institutions including TAFE⁴s.

The **universities that serve and support regional Australia play prominent roles in their communities**, not just as educational institutions, but as major employers, centres for support services and as a community hubs.

Digital technologies and networking services provided by AARNet into regional Australia enables institutions to overcome some of the traditional issues of isolation and disadvantage common to many regional organisations. Connectivity and the rapid adoption of new digital modes of learning unpins **access to content, resources, and people that enable the creation and delivery of new digitally-enabled educational experiences** (online teaching, flipped classrooms, blended learning, MOOCs). For educators and researchers, in an increasingly globalised and digitally-enabled world, AARNet removes barriers to innovation.

Digitally well-connected regional universities play a role as an **anchor tenant for network infrastructure** (from AARNet), which enables schools, TAFE's, hospitals, galleries, libraries, archives and museums (GLAMs) and other education and research institutions to reap the benefits of this transformative technology⁵. In the 21st century, digital connectivity is just as important for regional development as bricks and mortar infrastructure.

The quality of education, as well as health and other government services such as libraries and social services, are critical factors in determining where individuals and families choose to live. To ensure Australia's regional communities remain vibrant, they must be attractive compared to urban communities, not only regarding the quality of home or residential and mobile telecommunications services, but also regarding the quality of services that are available regionally. For education, this means attracting and retaining the best teaching staff, providing those teaching staff with access to the most modern teaching methods and resources available, and **ensuring the digital experiences students can enjoy in regional institutions are at least as good as those in metropolitan institutions**.

² Regional Universities Network (RUN), <http://www.run.edu.au/>

³ Innovative Research Universities (IRU) , <http://www.iru.edu.au/>

⁴ Colleges of Technical and Further Education (TAFE)

⁵ For more information see <http://www.aarnet.edu.au/communities/>

EXAMPLE – Regional Universities

Regional universities with a focus on-line and blended learning (formerly “distance education”), such as the University of New England in Armidale, Central Queensland University in Rockhampton, and Deakin University in Geelong are all able to compete in a global market for education services which contributes over \$15B pa to Australia⁶.

AARNet Background

AARNet was established in 1989 by the (then) Australian Vice-Chancellors Committee and CSIRO to create Australia’s National Research and Education Network (NREN). Like other NREN’s around the world, AARNet⁸ interconnects its members’ institutions nationally, and provides international connectivity via other NRENs to the global research and education community. AARNet brought the Internet to Australia and pioneered the use of Internet technologies and applications.

Today, AARNet is a licensed telecommunications carrier operating as a not-for-profit company limited by shares and owned by the universities and CSIRO. AARNet provides ultra-high speed, very high-quality broadband telecommunications services that are not commercially available (technically unique), or not available at reasonable cost (commercially unique) to **Australian research and education organisations**. AARNet has over 200 directly connected member and customer institutions. Members are the **Australian universities and CSIRO**, and customers include scientific research organisations, numerous **TAFE’s** and training organisations including health training, more than 700 **primary and high schools**, and a variety of galleries, libraries, archives and museums (GLAMs). AARNet’s operational costs are covered through a membership subscription model.

Australia’s NREN, AARNet, is a national asset and is a critical enabling factor in facilitating Australia’s research and education excellence.

⁶ Draft National Strategy for International Education, April 2015

⁸ Australian Academic and Research Network

Responses to Questions

In the following responses (specifically Q1, Q2, Q3), “people in regional Australia” (or “users”) is taken to be “government services, education, health, emergency services and businesses in regional Australia”. Although this is an obvious reversal in the demand-supply equation, the quality of these services is often a major difference between regional and metropolitan communities, and hence a critical factor in determining whether residents stay in or return to regional Australia. Telecommunications has a significant impact on the ability to deliver quality services.

Q1. Do people in regional Australia believe their reliance on telecommunications differs from those in urban areas? How does it differ and can you provide examples?

Regional Australians have always been more reliant on telecommunications⁹ and unique remote service delivery mechanisms¹⁰ than their countrymen and countrywomen in urban cities. These approaches have been necessary to address both the **remoteness of regional Australians** from both services and expertise, and **the very low density of people** within regional Australia.

With the rapid, and increasing, rate of innovation driven by information and communication technology (ICT) in all aspects of every supply chain and every work force, the **mechanisms and approaches used to deliver services into regional Australia will become indistinguishable from those used in metropolitan and urban regions**, if and only if telecommunications infrastructure enables regional access to those services.

EXAMPLE - The Highlands Health Education Research Network

The Highlands Health Education Research Network (HHERN¹¹) provides communication services to connect schools in the Southern Highlands region of NSW to the Australian Academic and Research Network (AARNet). HHERN aggregates the institutions under HHERN’s membership with AARNet leveraging the “anchor tenancy” of the Garvan Institute’s facility in Moss Vale. This sharing allows schools and institutions to connect at a low cost and at capacities far in excess of what is available from the NBN, and at speeds on par with any school in Australia.

Q2. For those users already connected to an nbn network service, has the service met your expectations?

Australia’s nbn is an access service designed to meet the needs of individual households/small businesses and does not provide a technically suitable or commercially attractive means of connecting most AARNet customers, who range in size from schools to universities. However, AARNet is an NBN retail service provider (RSP), and has been able to leverage the NBN when there are no other commercially viable alternatives, eg.

⁹ Regional Telecommunications Review 2015 Issues Paper, “School of the Air”, p. 9

¹⁰ Royal Flying Doctor Service, <http://www.flyingdoctor.org.au/>

¹¹ <https://hhern.net.au/>

Satellite services to remote schools and research facilities in rural and remote locations. As detailed in Q3, these access services are not ideal for AARNet's service offering, and hence fall short of AARNet's expectation that the nbn would be transformative for anything other than residential services.

Q3. Having regard to the technical solution likely to be used in your area, do you have views on the adequacy of that solution in terms of meeting needs now and into the future?

AARNet's core service is characterised by offering very high bandwidth (1Gbps and above), very low latency and very low congestion. In addition, most of AARNet's customers are content producers as well as consumers and typically require symmetric data services. AARNet customers are typically connected to AARNet's nearest Point of Presence (POP) using a dedicated fibre. This approach ensures a very long term future growth path for connected customers at the lowest possible operational cost.

The technical and commercial structure of nbn's existing services, do not align well with these requirements. In particular the Connectivity Virtual Circuit (CVC) component, make nbn services extremely commercially unattractive for dedicated bandwidth requirements such as these.

AARNet would strongly support the development of technical and commercial models for NBN services that better meet the needs of government services, education, health, emergency services and businesses, most specifically in regional Australia. To maximise the return and future-proof any investment, AARNet believes the (small number of) service delivery points of each of the services noted above (eg. schools, health facilities) should be fibre-connected in every regional centre.

Q4. Irrespective of the adequacy of your local access, are there issues with backhaul or long distance carriage that impacts on your use of telecommunications services?

AARNet's ability to secure backhaul and long distance carriage (specifically fibre) to connect a new customer seeking a connection to Australia's National Research and Education Network (NREN) is almost largely contingent on the existence of competitive fibre close to that customer location, and/or the ability to construct fibre to that customer location. In most regional locations, there is typically only a single provider of telecommunications infrastructure, and in these (and indeed, most other circumstances) this incumbent provider does not provide access to (dark) fibre. Notably, in regional areas where a competitive carrier is present it has been possible to secure access to fibre.

Independent of telecommunications providers, AARNet has worked with a range of other infrastructure providers including councils, utilities and railways to secure access to fibre to address these challenges.

AARNet strongly recommends future investments in regional telecommunications have a strong emphasis on establishing fibre infrastructure that is open to competitive access.

Q5. For users living in areas without mobile coverage, what priorities, other than specific locations, do you consider should be recognised in future efforts to improve coverage?

Any long-term, sustainable effort to improve mobile coverage must include a long-term strategy for upgrading and augmenting the fixed telecommunications infrastructure that supports mobile phones services. Inevitably this will require extending and improving the access to and affordability of fibre infrastructure into regional communities, and along the major highways interconnecting regional communities.

Q6. What opportunities do the mobile network industry see for extending coverage in regional Australia and increasing investment in mobile networks?

All mobile coverage has some form of backbone or backhaul component which underpins the raw data capacity and connectivity of the mobile service(s) by providing the trunk communications links between the mobile base stations and existing fixed telecommunications infrastructure. It can be implemented using fibre, or a range of fixed wireless technologies. Although investment in fibre has a higher capital expense, it provides a much longer and much higher return on investment and can be more readily leveraged to support other telecommunications services and multiple telecommunications providers. To address both mobile coverage, and improved services for regional service delivery agencies, AARNet recommends the deployment of fixed long-haul telecommunications (fibre) infrastructure to and between regional communities.

There are a range of sensor and machine-to-machine (M2M) technologies emerging that have the potential to provide much greater coverage for low-bandwidth low-power-consumption applications particularly for environmental management and precision agriculture. Planning for national scale deployment of such services should be commenced as soon as practical.

Q7. Do you have any views on co-investment approaches that might help to improve the broadband technology outcome in your area?

A range of co-investment models that engage multiple stakeholders can mitigate the initial investments in both the examples noted in Q6.

Demand aggregation techniques based on a larger anchor customer (eg. a university) has proven to be a very successful model for AARNet, involving universities, the Commonwealth, State governments, and other telecommunications carriers at different times on different projects. Notably, some of the largest carriers, and nbn, have in AARNet's experience proven to be the most difficult to engage on joint initiatives.

EXAMPLE – UniSA: Anchor Tenant in Mt Gambier and Whyalla

UniSA secured \$18 million in total funding from the Federal Government under the Regional Priorities round of the Education Investment Fund, to provide High Speed Fibre to their Mt Gambier campus (where a new learning centre was established) and their Whyalla campus. This project was delivered by AARNet in 2015.

Q8. How might new applications and services that utilise mobile networks for voice and data transform the way you live and work?

Mobile networks, including those provided through WiFi in universities, cafes, and public transport (for example), already play a key role in enabling a variety of new and innovative digitally-enabled teaching and learning methods.

These include:

- **Blended or On-Line Learning** (previously called Distance Education), which makes many of the learning resources available online, including as Podcasts, video and other forms of media. Blended learning also supports collaborative tools and remote participation through video conferencing.
- **Flipped Classrooms**, whereby students consume one-way lecture style content whilst at home or on the move, and whilst at school work through problems and exercises and collaborate with peers. This in effect has students doing “homework at school”, and “schoolwork at home”.
- **Massive Open Online Courses** (MOOC’s), which allow hundreds or even tens of thousands of students to participate in a course of study completely remotely.

Q9. What communications barriers have you experienced in expanding or operating your business or providing services, such as health or education? Have you been able to overcome these barriers and if so, how?

AARNet was established over 25 years ago to provide telecommunications services for the Australian research and education sector that were not available from the commercial market, or at least not available at a price that the sector could afford. In effect, this is how the Australian universities and AARNet’s other customers (such as schools and TAFE’s), including those located and operating within regional Australia, have addressed the barriers they have faced in expanding and operating their education services.

That technical and commercial differentiation continues today and is enabled by AARNet having access to (and in many cases owning) the raw commodity of telecommunications – fibre optic cable. This, in conjunction with the necessary skills and expertise, the aggregated demand from all research and education organisations, a commercial (or consumption) model based on annual subscriptions, and not-for-profit status with a “for purpose” mission, enables AARNet to make long term investments (including the laying of additional fibre) to provide the connectivity its shareholders and customers require nationally, regionally and internationally. It would have been impossible for AARNet to meet the technical demands of its customers without “lighting our own capacity”.

For more than a decade the volume of traffic carried by AARNet for its members has continued to grow at over 45% per annum, proving that the cooperative demand aggregation model is remarkably resilient.

Q10. What communication functions (e.g. speed, mobility, reliability, data, etc) would best suit your needs, noting the limitations of each technology (e.g. mobile, wireless, satellite, fibre)?

AARNet provides services that meet the needs and expectations of the Australian education and research sector. As outlined in Q9, these services are based on very high quality, ultra-high speed broadband (1G, 10G, 100G, plus) with very low latency, low congestion and connectivity to peer organisations and relevant service providers, regionally, nationally and internationally. As noted above, the mechanism that enables AARNet to provide the long term (multi-decade) return on investment necessary to support the extreme requirements of the Australia research and education sector is owning or having direct access to fibre.

Q11. Do we need to continue to guarantee the standard telephone service for all (or only some) consumers, and if so, to what extent?

AARNet has no position on this question.

Q12. Are there new or other services, the availability of which should be underpinned by consumer safeguards?

AARNet has no position on this question.

Q13. What standards should apply to your services? How might they best be enforced?

AARNet has no position on this question.

Further Information

For further information, please contact:

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Appendix A – Regional Universities

Part 1: Universities based in regional areas

- Central Queensland University
- Charles Darwin University
- Charles Sturt University
- Federation University
- James Cook University
- Southern Cross University
- University of New England
- University of Southern Queensland

Part 2: Universities based in larger regional centres

- Australian National University
- Deakin University
- James Cook University
- University of Canberra
- University of Newcastle
- University of Notre Dame Australia
- University of Tasmania
- University of Wollongong

Part 3: Major capital city universities with regional campuses

- Australian Catholic University
- Curtin University
- Edith Cowan University
- La Trobe University
- Monash University
- Murdoch University
- RMIT University
- University of Adelaide
- University of Melbourne
- University of Queensland
- University of South Australia

- University of Western Australia