



SUBMISSION TO THE REGIONAL TELECOMMUNICATIONS REVIEW

The Desert Knowledge Cooperative Research Centre

DKCRC is a partnership of 28 agencies, government departments, non-government organisations and universities whose research focuses on the people and communities of the remote arid regions (see more at www.desertknowledge.com/crc). We are an interdisciplinary organisation whose work covers four States and the Northern Territory and we deal with a sizeable proportion of the three per cent of Australians who live on 70 per cent of the land mass – the areas that the rest of the nation knows as “remote”.

Aboriginal people are significant contributors to our research program and we work extensively with people in remote Aboriginal settlements on projects researching sustainable housing, water use, infrastructure and business development as well as natural resource management. Their knowledge is integral to our research and valuing Aboriginal intellectual property is embedded in our practice and philosophy.

Our research is about making life sustainable for desert people and promoting sustainable livelihoods in thriving desert region economies. We also look at how we can promote effective governance and equitable access to services for remote settlements, particularly remote Aboriginal settlements. Our program involves a great deal of scientific and technical research, but we also apply social science insights into what makes communities work and how we can develop appropriate and sustainable local-level economic activity to support these communities.

We will achieve our goals by delivering to three broad outcomes under which six core projects are structured:

Outcome 1: Sustainable livelihoods for desert people

Core Project 1: Benefiting Australia through livelihoods from desert resources.

Core Project 2: Key industry opportunities in remote areas.

Core Project 3: Supporting the emergence of small business in desert Australia.

Outcome 2: Sustainable remote desert settlements – particularly remote Aboriginal settlements

Core Project 4: Sustainable desert settlements

Core Project 5: Demand-responsive access to services for settlements.

Outcome 3: Thriving desert regional economies

Various Projects: Desert regions as integrated systems.

Telecommunications is a significant element for all of these objectives and it is on this basis that we make our submission. The bulk of the questions raised in the Discussion Paper have less relevance to our constituent groups and will, in any case, be extensively canvassed by other interest groups. We will therefore concentrate on section 5 and offer our perspectives to the questions it raises.

5.1 Access

Telecommunications and desert people:

It is no exaggeration to say that effective and accessible telecommunications are a missing element in the lives of the Aboriginal people of remote desert settlements and, it has to be said, for all people living in remote areas. The impact on Aboriginal people is, however, disproportionate.

The minimum service of a phone in a household is far from available in Aboriginal settlements, whether they are remote, rural or urban (town camps, for instance). Similarly, they are poorly provided with

access to mobile services. All areas in remote areas need priority attention: there is no one place worse off than any other.

The closing of CDMA and the advent of NextG™ has done little to relieve the almost non-existent mobile coverage. NextG™ services are characterised by 'black holes', or communications gaps of some hundreds of kilometres, between settlements. Indeed many of the smaller settlements have no mobile access whatsoever. As desert people are highly mobile between settlements and there is a recognised and established pattern of mobile phone use, major centres become locations where voicemail is collected before again travelling through large areas of blackout.

It may be that service providers have worked on the assumption that it is too expensive to install and maintain phones in each household, and in any case people may not be able to afford to run a phone service. DKCRC does not believe this is a reasonable starting point. Nor do we believe it has ever adequately discharged the Universal Service Obligation. There has been a great deal of investment in developing ever-more sophisticated technologies to suit heavily-populated regions. There should be a comparable level of investment into sparsely-settled regions, where the need is just as great if not greater.

It is important not to lose sight of the social role telecommunications plays in all of our lives and consider a new starting point which first and foremost sees investing in telecommunications as a significant investment in desert futures. It is accepted internationally that information and communications technologies can deliver economic growth, livelihood opportunities, improved health services, better health outcomes, improved law enforcement and community empowerment. Clearly we will be unable to test this in remote Australia unless there is significant improvement in the state of telecommunications

The concept of the social determinants of health argues that lack of access to the kind of services and facilities most Australians take for granted has a significantly detrimental impact on Aboriginal people's health. Investment in any of the social determinants – which certainly applies to access to telecommunications – is likely to contribute to better health and a sense of well being that arises out of participation in normal social activity. As this is likely to mean reduced spending on Aboriginal health, its impact goes wider than simply providing telecommunications services.

High quality telecommunications has a significant role to play in developing successful and sustainable small business – which is vital in a region which needs to develop elements of a free-standing economy if settlements and economies are to thrive. New technology in communications can also boost sustainability and profit for existing businesses, such as arid land pastoral enterprises, as some of our research is already showing.

A way forward

DKCRC has been looking at innovative ways to use telecommunications technologies for the remote and rural settlements of Australia. Working in collaboration with the University of Wollongong, we have been running the Sparse Ad hoc Network for Desert (SAND) project since July 2004. Its initial focus was to develop cost-effective voice and data services for remote Aboriginal settlements. This included a major field study based on the telecommunications requirements of the Ngaanyatjarra settlements in Western Australia, which identified services that may provide improvements over the existing forms of communications infrastructure and services, in and between the Aboriginal settlements of Ngaanyatjarra, including:

- digital voice services (Voice over IP) that would improve capacities of existing intersettlement infrastructure
- ad hoc style voice networks in settlements, which would reduce major capital infrastructure requirements in the settlements and allow houses or other buildings to be connected quickly to a phone network using emerging wireless networking and physical layer techniques
- improved services similar to the popular UHF repeater service in the Ngaanyatjarra.

The project team then studied the types of technologies that could be used to address them, including emerging technologies such as ad hoc networks and the 802.11 radio technology, and ran a number of simulation studies to predict their performance in sparse desert conditions.

The studies showed that ad hoc networking technologies based on the 802.11 radio could be combined to design new telecommunications hardware to address a number of the identified service requirements. The team then developed a prototype networking device called Sparsenet's Outback Phone and Internet (SOPHI). SOPHI provides residential voice and data service, which allows users to make direct voice calls without connecting to a base station. The voice service is based on the popular Voice over IP technology which is commonly used to make cheap long distance calls. SOPHI also provides a broadband data port, which can be used to connect end-user nodes (such as computers) to the Internet.

The team has developed a number of other prototypes to provide long-range network connectivity, such as the High-powered Multi-radio Ad hoc Node, which combines the idea of ad hoc networking with high-powered radio devices to create a backbone network.

Comparing the proposed ad hoc networking technology with a number of existing telecommunications strategies, the team focused on the cost benefits, and the availability and the capability of each technology. As an initial study of the performance of ad hoc networks, they simulated the behaviour of an ad hoc network under strict conditions. The simulation results indicated that ad hoc networks should provide sufficient level of performance to handle the bandwidth requirements of proposed services, such as Voice over IP (VoIP).

The prototype ad hoc networking device – the Sparsenet's Outback Phone and Internet (SOPHI) – has been trialled at the TITR labs and in the field. Performance has been explored using three different nodes, which can interconnect to analogue telephones to provide real-time voice calls. The data port provides access the Internet and SOPHIv1 is designed around off-the-shelf components that are readily repaired in the event of failure. SOPHI nodes run on 12-volt DV power, a maximum of 12 watts, powered by solar panels and rechargeable batteries. SOPHIs are built for remote use and remote maintenance circumstances.

Our trials have also involved:

- developing weatherproof and durable cases for the nodes
- the benefits of various wireless technologies and devices such as different programmable wireless routers and radios as a development platform for SOPHI
- various ad hoc multi-hop routing protocols
- WiFi-enabled mobile phones to link into SOPHI networks where the broadcast cloud extends across a settlement.

The system clearly works and it is cost-effective. It is a workable solution to the problems of delivering accessible, quality telecommunications to remote communities, including mobile service in and around settlements. The project team has published its results extensively. A more detailed report is to be found at: <http://www.desertknowledgecrc.com.au/publications/downloads/DKCRC-Report-23-Sparse-ad-hoc-networks.pdf>.

Internet access

The short answer is that there is inadequate access to the Internet for remote Aboriginal communities. As we are seeing elsewhere, the Internet is a powerful educational tool; it has applications in health; and it has become critical to the success of business everywhere. The question to be asked is why access should continue to be denied to people on the basis that they live in remote areas. It is simply not forward-looking enough to limit access to a single shared facility, as happens frequently in desert settlements.

The SAND technology we have outlined above can provide a solution. The wireless mesh networks allow for internet and high capacity data transfer. It is applicable to business transactions, emergency services response and data logging equipment for pastoral and other enterprises. DKCRC is already using computer-linked telemetry for managing water supplies in remote cattle stations and for a walk-on weighing system which allows for assessing cattle weight gain at water points without any human intervention. These innovations save money and reduce the use of fossil fuels for service visits, so there is a triple bottom line to the use of accessible improved technology.

Current actions

- SAND technology is currently being deployed on a pastoral property in central Australia where it is being used to improve business efficiency by reducing costs and improving the precision of management as noted above.
- We are also currently planning for a pilot implementation of SOPHI telephones in an Aboriginal settlement in central Australia where we will refine hardware (ruggedisation and testing components for failure rates), continue to improve and simplify software and installation requirements and examine social and behavioural responses to the new opportunities that residents have.

Conclusion

DKCRC believes SAND technology is a significant development for remote telecommunications and we submit the issues we have raised for your consideration.

Further information on DKCRC can be obtained by visiting <http://www.desertknowledgecrc.com.au>, or discussion about the issues raised in this paper by contacting:

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