

NSW Government Response

Australian Senate - Environment and Communications References Committee

**The capacity of communication networks and emergency warning systems to
deal with emergencies and natural disasters**

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Recommendations

1. In dealing with emergency and disaster situations, communications networks are an essential service, primarily used by state and territory governments for communications within public safety agencies and between the public safety agencies and the community. However, regulation of communications is a Commonwealth responsibility.

Accordingly, while both the federal regulation and commercial nature of the industry are recognised, as is the cooperative nature of the industry to date, if communications networks are to be used more effectively under emergency conditions, revised governance arrangements should be considered.

In particular, the early notification of serious network outages, the impact of those outages and anticipated recovery times by commercial providers to public safety agencies would assist those agencies in providing appropriate and timely advice to the community.

2. Communications networks open to public access may be at risk of congestion under emergency conditions.

Given the important nature of such networks as an adjunct to public safety radio networks and notwithstanding their commercial nature, further investigation of the potential to reserve capacity for public safety agencies should be considered.

3. When market based competition is used as the basis for the allocation of scarce resources (such as spectrum), the provision of public safety services, should be recognised.

Accordingly, alternate means of allocating spectrum for essential public safety purposes should be pursued if public safety agencies are to be able to deliver state of the art applications reliably in emergency conditions. When spectrum allocation decisions are made they should reflect industry standard equipment such that public safety agencies are not at a financial disadvantage in accessing technology.

4. The capability of communications networks to provide an increasingly diverse, comprehensive and innovative range of communications services is recognised, but so too is their increasing vulnerability to power outages.

Accordingly, a continued reliance on 'traditional' forms of communication in emergencies must continue. Consideration might also be given to improving power redundancy and radio coverage in places of mass gatherings by evaluating the potential to include additional provisions in regulations and standards such as the Building Code of Australia.

5. The increasing tendency for emergency and disaster response and recovery assistance to be provided across jurisdictional boundaries requires national consistency in how communications networks are deployed and used.

6. NSW supports the use and ongoing development of the National Emergency Alert system, in particular, the pursuit of services that provide more timely accurate information messages to the community.

7. National interoperability of land mobile radio networks has been identified at COAG as a target for 2020 and should be supported as an important item of national infrastructure for earlier completion if possible.
8. Consideration be given to improving the education program for the Standard Emergency Warning System (SEWS) to better inform the community of its purpose and operation.
9. Whilst modern communications systems do provide additional means to disseminate messages to the community in emergency situations, it should be acknowledged the communication systems are still subject to limitations including the level of access that individual members of the community have to various mediums and the requirement for messages to be received and understood by individuals. Communications systems should not be portrayed as an all encompassing means for ensuring that all members of the community are informed.

Executive Summary

Over the past 20 years, the complexity of the Australian telecommunications environment has increased significantly. The industry has evolved both in terms of competition and privatisation. There are now many more providers of services and those providers are required to manage a number of considerations in their decision making, including commercial imperatives.

There have also been rapid advances in technology. There are now more ways in which to use the networks and the services they offer. The result is more choice and an increased opportunity cost for committing to one technology over another.

These changes in technology have combined to allow individuals to establish their own communications channels. There are now more sources of information about emergencies. In emergency situations the reliability, authority, and currency of the message is a critical factor, however identifying which messages should be relied on has become more difficult.

As a consequence of these changes, the environment has become more fragmented and more vulnerable, yet community expectations of it are greater. This fragmentation has arisen in parallel with the increase in the number of available commercial communications channels.

Vulnerability has increased due to the added complexity introduced by the interaction required between different networks, and because modern communications technologies have a greater reliance on power. A problem with one telecommunications provider may in fact be as a result of an issue in another provider's network. Networks that could once be centrally maintained and backed up in terms of power now require power at both the provider and user ends and at many points in between.

The expectations are also greater because the community has come to depend and rely on these technologies. No longer just a means of voice communication, one can bank, shop and socialise 24 x 7 without leaving home and without even speaking directly to anyone.

The changes in the provision of communications services require governments to reconsider the nature of governance arrangements around these communications services, in particular to support emergency communications.

A primary focus of governments is to ensure that the needs of the community and emergency responders are met during emergencies. While the commercial nature of the industry is recognised, the dependence on it is such that its obligations in emergencies should not be underestimated. Public safety agencies require accurate, reliable and timely assessments about the state of the telecommunication networks in order to properly prepare their response and advice to the community.

With accurate information, the public safety agencies can perform effectively but, importantly for the carriers and services providers, accurate information also allows these agencies to support carriers and providers to keep their communications systems and hence their businesses operating, an outcome in which all parties benefit.

It should be acknowledged that traditional means of communication continue to be relevant. While many new technologies function well during emergency situations, they often supplement rather than replace traditional approaches which, if used appropriately, retain their reliability and usefulness. Despite the advances in capability, a battery operated radio receiver may still be the most reliable means of obtaining information about an emergency. Mobile two-way radio networks are still more reliable than mobile telephones in allowing public safety agencies to communicate during an emergency.

Despite the attraction of new and emerging means of communication, we still need to invest in the established means of communications. And despite the commercial nature of the communications environment that has been established, we need to ensure that public safety is prioritised.

All of this will require a greater degree of partnership between state and federal levels of government and with the telecommunications providers.

The states and territories respond to emergency events but the communications industry is regulated by the Australian Government. Telecommunications is an essential service that is not controlled by state and territory essential services legislation.

New developments in spectrum and technology will be used by state and territory public safety agencies, but access to them is largely controlled by the Australian Government.

Public safety agencies need access to modern tools, including radio spectrum and services and they must work when they are needed.

In promoting the use of their services for public safety applications, commercial carriers and providers should recognise and understand the community service obligations involved, particularly to ensure public safety agencies have sufficient capacity to assist the community to respond to and recover from emergency events.

Our emergency responders are asked to operate in often difficult and dangerous environments for our benefit. We should ensure they are provided with appropriate resources, for their own safety as much as for that of the community.

Introduction

Telecommunications networks are critical elements of national infrastructure that benefit the community, including providing the infrastructure for emergency warning systems used on critical events such as natural disasters.

This submission seeks to note the importance of telecommunications to the community, particularly during emergency events, and examines the current environment and regulatory framework within which these services are provided.

Emergencies may range from affecting an individual (a heart attack) to being community wide (major cyclones, bushfires, storms flood and tsunamis). In this submission, the term 'emergency' is used to describe a significant event that requires a coordinated response, as they are the type of emergencies that are most likely to test the capacity and capabilities of communications and warning systems.

In such situations, information technology is used by the community to seek assistance and obtain advice. That assistance and advice is largely provided by the public safety agencies of government (Police, Ambulance, Fire, both urban and rural, rescue and emergency services) as well as essential services (including public health, welfare, transport and environmental protection agencies and organisations).

Information technology is also used by public safety agencies to coordinate the provision of their assistance and provide advice to the community.

The communications environment prior to the 1990s.

Early communications networks were primarily manual and of limited value over wide areas. The introduction and widespread adoption of the telephone and broadcast radio networks provided a capability which enabled long distance communications.

The communications environment prior to the 1990s was relatively simple and straight forward and Australia mirrored most of the rest of the world in this regard.

Australia had a single telephone service provider and there was only one telephone network, the PSTN or Public Switched Telephone Network. Both the network and the provider were provided by the government. The network was a fixed line service providing almost national coverage.

Apart from the capacity to make telephone calls, there was only one emergency service offering to the public, which arrived in the 1960s – Triple Zero or 000. It provided a “one stop shop” for the community to ask for assistance from Police, Ambulance or Metropolitan Fire Services and the community was encouraged to use it in an emergency instead of ringing their local police, ambulance or fire station.

The provision of public safety advice was also relatively simple and straightforward. The required messages were disseminated via the available broadcast radio and television services.

The public safety agencies may have communicated with the public via broadcast radio and television but they communicated amongst themselves via mobile two way radio. Radio was, and is, the preferred means of communications as it was mobile, interactive, optimised for one-to-many communications, and could be centrally monitored and recorded. Radio could also remain active during extended power outages.

The communications environment after the 1990s.

During the 1990s, the pace of change was starting to accelerate dramatically. Increased competition and privatisation resulted in multiple communications providers.

Mobile telephones and simple text messaging introduced new services to consumers, and widespread adoption has turned these into a perceived necessity for many in the community. Community expectations for quality and service coverage also increased.

Access to web pages, emails, and the ability to share documents over the Internet further increased convenience and reliance, and the more recent explosion of use of 'smart' mobile devices and social media has introduced further accessibility and service to consumers. Industry and governments have also taken advantage of the new network capabilities, including to provide early warning data essential to public safety.

The main impact of these changes was that there were now multiple means by which public safety agencies could send messages to the community about emergencies. The community could also generate messages themselves.

Triple Zero retained an important role in providing the central mechanism for contacting public safety agencies and it actually increased in importance. So much so that non-emergency contact numbers were set up to take the pressure off Triple Zero such as the Police Assistance Line (PAL).

Further those public safety agencies outside Police, Ambulance and Fire that were not serviced by Triple Zero went about setting up their own emergency call taking solutions such as the national 132 500 service for State Emergency Services.

Within 20 years, the communications environment of the early 1990s had become significantly more diverse and complex, and many technologies became ubiquitous.

The consequences of change.

Networks and Service providers

The first and most obvious consequence of this proliferation in services is the increase in available service providers and networks.

Many providers resell wholesale services, and many seemingly separate networks have dependencies on one another, which is often not obvious to the community.

Due to the complexity of the communications environment, it is increasingly difficult to understand the root causes of failures, particular in the event of an emergency situation. Having multiple networks does not necessarily mean that an alternative service automatically becomes available when required, and from time to time that a single failure in one network has implications for other networks.

Overall, communications networks are resilient and, even if just for commercial reasons, have high levels of redundancy.

However, there is a greater reliance on power to support the provisions of services, including for emergency alert systems. Copper networks and fixed line telephones are powered from the exchange but the widespread adoption of cordless phone and broadband modems means that local availability of power becomes an increasing issue.

Power is, however, not the only determinant of availability. Despite the drop in landline services, the overall demand for telephony has increased.

The result is that there is a significant increase in demand by the community and, during times of peak demand, including during in emergency situations, networks may run out of capacity and/or become congested, restricting availability at the time it is most required and at the same time that power supplies may come under the greatest threat. Because much of the user population uses mobile services, predicting where that demand is going to come from and to what degree can also be difficult.

To date, telecommunications providers have largely divulged information and cooperated during emergency events at the formal request of the government. There is no natural inclination on the part of the providers to behave in this manner as the provision of information relating to service disruptions and outages may be seen to be placing that particular provider at a commercial disadvantage. Formalising these arrangements between government and all providers would allow for a “level playing field” where all providers are required to disclose equally and consistently thus ensuring that the required information is provided to the public safety agencies in a timely fashion without disadvantage to any particular carrier.

Message media and applications

Once the community requested assistance and listened for advice using voice telephony communication and television. The responses and the advice were all controlled by government. That tended to lead to consistency. The message received from hearing a Minister or agency head on radio was the same across all radio networks and across all television networks.

Now there is also SMS and Facebook and Twitter. There is the web and there are alerting message services, much of which is not controlled by government.

Inconsistent messages with differing origins can cause confusion as to what is right and wrong, what is authentic and what is not. It is important to recognise that the provision of some unsubstantiated information can be detrimental.

Community Expectations

In parallel with the growth of communications technology and communications applications, user expectations have also changed. More people spend more time online or using their mobile phones and governments have needed to adapt to meet the communications and interaction expectations of users.

A government that does not react to that trend will be at odds with what large numbers of the community consider is routine. There is an expectation in the community that information will be provided via these channels and Governments now have little choice as to whether or not to utilise Facebook and Twitter. If the underlying infrastructure that provides these services fails, governments, unfairly or otherwise, may be held accountable.

Areas for action

a. *The effectiveness of communication networks (including radio, telephone, the Internet and other alert systems).*

Categorising communications networks can be difficult because of the progressive convergence of technology. One way of categorisation is by means of the relationships, which can be identified as:

- Public Safety Agency to Public Safety Agency

This is essentially concerned with undertaking response and recovery operations. It is primarily by mobile two way radio but telephony, both landline and mobile, is still important as is the movement of information via online databases and spreadsheets, emails and other computer based services. Calls for assistance are stored in Computer Aided Dispatch (CAD) systems and shared between agencies through ICEMS (Inter-CAD Electronic Messaging System).

In addition to the traditional communication systems, there are also the services that use those systems. These services can warn of impending emergencies in infrastructure.

Flood gauges provide real time monitoring and data transfer of rainfall, water levels and flow rates to the Bureau of Meteorology and the owners of bulk water storage infrastructure. However, these systems are only effective while the telemetry communications systems are in place.

The Australian Energy Market Operator (AEMO) has an SMS alert system for monitoring impending emergencies in the National Electricity Market (NEM). This enables the market to take preparatory action in the event of a sudden loss of supply.

- Public Safety Agency to the Community

This is essentially about advising of developments in changes in emergency conditions, locations of impact, warnings of impact and advice on what action to take in preparation of response.

It is achieved via a variety of mechanisms, including the traditional approaches: broadcast radio and television and physical attendance and interaction – public safety agencies on the ground delivering messages personally and directly to affected communities. This can be a time consuming and resource intensive process.

The effectiveness of radio and television messages can be improved by attracting the listeners' or viewers' attention to the message. In the Cyclone season in Queensland this is achieved by sounding a siren like sound immediately before a cyclone related message is put to air.

This concept has been extended by the adoption of the Standard Emergency Warning Signal (SEWS). It is used by the Public Safety Agency with responsibility for an event to draw attention to an upcoming announcement.

An alternative to the Police car and a bull horn delivering messages to an affected community is the system of issuing warning by means of fixed public address speakers in an area. This type of arrangement is delivered in Sydney via the Sydney CBD Emergency Warning System, a system of public address (PA) speakers in 49 strategically located sites in the Sydney CBD. It is complemented by variable message signs (VMS), both of which have 4 hour battery backup, in the event of a power disruption.

This system is under the control of the State Emergency Operations Controller (SEOCN) during an emergency, and is controlled from the main Police Operations Centre.

Telephone based emergency alerting systems are another means of communication.

NSW uses the national Emergency ALERT system but it also has its own Sydney Alert System, a free 'opt-in' service for emergency services to alert building managers, emergency wardens and security staff with information and instructions to help them manage and assist staff and others in their buildings during an incident.

This system in the Sydney CBD is bounded by Darling Harbour, City South, Hyde, Cook and Phillip Parks, the Domain, Royal Botanic Gardens and the Domain Safety site. North Sydney includes the North Sydney CBD, sections of Milsons Point and Crows Nest. The system relies on the sending of SMS and e-mail based message which is carrier/s infrastructure dependent.

Telephone based emergency alerting systems are seen by public safety agencies as an adjunct to, rather than a replacement of, the traditional means of delivering messages.

All agencies operate websites and call centres. Many have now adopted Facebook and Twitter accounts, even YouTube.

In the Queensland floods, Queensland Police used social media extensively and with great success, to disseminate emergency related information. Their postings were often used by conventional media as a reliable reporting source using the most up-to-date information.

This trend is likely to continue.

The NSW Police Force operates the Public Inquiry and Information Centre (PIIC) in support of the state's emergency management arrangements. The principle function of the PIIC, is to provide accurate, up-to-date general information to the public and also to answer their inquiries regarding any event which has, or is likely to impact on the community. The PIIC does not normally handle disaster victim inquiries, as this is a function of a Victim Inquiry Centre (VIC). However, for events which might not involve large numbers of victims, a VIC may be co-located with the PIIC.

- Community to Community.

The community generally communicates via the telephone systems although there is an increasing trend to use Facebook and Twitter as emergency communications systems. Accounts are set up as a message board for particular events, either in advance or at the time. These may be private accounts but many agencies are considering moving into this space or have done.

There is increasing evidence that such sites can be useful for collecting and collating photographs or video of an event using the cameras in mobile telephones.

- Community to Public Safety Agency – Triple Zero

Triple Zero remains the primary means for community contact with public safety agencies for the purposes of requesting assistance.

By way of example, NSW Police have experienced an annual increase in call volume up to 2010 that has been averaging 7%, with 63% of these calls originating from mobile phones. Police have also established a non emergency version of Triple Zero, the Police Assistance Line (PAL). During the 1990s Telecom/Telstra reduced the number of Triple Zero answering points from in excess of 100 across Australia to two for all of Australia. This may raise questions of capacity and overflow during major emergencies in the future. Lack of local knowledge has already been blamed for sending responders to the wrong place.

The effectiveness of these systems depends on availability and performance.

Availability depends on:

- Coverage – a service is not available if it is not delivered in that location.
- Capacity – a service that is inadequately dimensioned may not be able to handle the demand.
- Resilience – a service that is not resilient will be prone to damage and may not be available when it is needed. Telephone exchanges, by way of example, tend to be substantial structures that are not generally built in floodplains.
- Redundancy – a service may continue to operate by alternate means of delivery. Those telephone exchanges mostly have battery backup and emergency generator delivered power supplies.

Performance is related to the extent to which one can access the network when and where that access is required.

No matter how technically capable a service is, it cannot perform to requirements unless it has access to information that is:

- Available

- Accurate
 - Current.
- System Interdependency

Interdependency between critical infrastructure is a pivotal issue in determining whether communication networks will function during an emergency. For example, critical infrastructure such as electricity, water supplies and telecommunications are interdependent. A failure of one of these infrastructure services (e.g. water used for air conditioning and cooling plant and equipment) will cause a failure in the others (electricity and telecommunications), creating a more profound failure in the water system. From a systems perspective, all utility infrastructure is inextricably linked.

(i) In warning of the imminent threat of an impending emergency.

Each of the systems referred to above are electronic in nature and therefore all these systems depend on the availability of mains power. All have battery backup to some degree but not all have emergency generator power. If power holds, most are effective, to varying degrees, in warning of impending emergencies.

Emergency ALERT is limited by relying on the billing address of mobile phones and landlines. It is therefore of limited use for providing information to mobile phone users when they are not at the billing address. Additional limitations also exist for both landline and mobile users and further examination of the systems to reduce those limitations is supported including the development of location based capabilities.

Supervisory Control and Data Acquisition (SCADA) systems provide the public safety agencies and industry with early warning of natural events which may endanger the community. The Bureau of Meteorology (BoM) issues fire weather warnings to the Rural Fire Service who in turn uses that data to declare total fire bans. Similarly the Australian Energy Market Operator (AEMO) employs an SMS alert system to warn of impending emergencies in the national electricity supply.

(ii) To function in a coordinated manner during an emergency.

Operational coordination

The NSW Police Force in conjunction with the Commonwealth Government has coordination arrangements for the activation of the National Emergency Call Centre Surge Capacity Arrangements (NECCSCA). This allows NSWPF to coordinate the flow of excess call to the PIIC, if anticipated.

Many agencies will have similar overflow capability in their call centres.

The maintenance of government radio networks is a major effort in response operations. By way of example, Police employ more than 100 communications technicians at 9 strategic locations across the State. They are able to enter sites otherwise closed to the public or technical

staff from the carriers. They are able to install generators and undertake emergency repairs to either the Police network or the networks of other agencies.

The Rural Fire Service will actively water bomb radio sites in bush fire affected areas to protect them from the impact of fire.

Spectrum

The various land mobile two-way radio networks used by the various agencies and the various jurisdictions have only a limited level of coordination.

However, decisions made in relation to radio by jurisdictions since 1993 and the decisions made by the federal spectrum regulator, the Australian Communications and Media Authority (ACMA) in 2009 and 2010, have begun to address this issue. The goal of this reform is to provide incentive to use spectrum efficiently.

Historically frequency allocations were on a first-come, first-serve basis. Recently ACMA has allocated, within the 400MHz band, specific blocks for government use, primarily but not exclusively for public safety agencies. As a result the allocation of spectrum needs to be planned, to maximise the efficiency of allocations. Further, supply can be controlled by using more spectrum efficient technologies and by moving to technologies that increased the supply of spectrum.

The ACMA has put the onus on the jurisdictions to come up with a plan, to manage the demand and to introduce spectrum efficient technologies. The extent to which the ACMA transfers existing functions for spectrum allocation to the jurisdictions is yet to be determined as is the effectiveness of the reform in driving spectrum efficiency.

In practice, that means a greater use of trunked radio technologies, which allow agencies to share infrastructure including frequencies, in the high user demand areas. These are primarily around the capital cities and adjacent regional centres (Sydney-Newcastle-Wollongong, Melbourne and south east Queensland).

In addition to the use of trunked networks such as the NSW and SA GRN's, there has been a general move from 25 kHz bandwidths to 12.5 kHz bandwidths and soon 6.25 kHz equivalent bandwidths. Each change has the effect of doubling the carrying capacity of a network.

However, there is an important consideration that flows from this reform.

By allocating the same block of spectrum to governments Australia wide, the ACMA has facilitated the possibility of a standardised approach to radio interoperability across the nation. It makes possible a situation in which the users of a network in one jurisdiction can operate seamlessly across state borders.

To date, only NSW and the ACT have integrated their networks. This means that for example a NSW rural fire fighter can follow a bush fire into

the ACT and maintain communications with both his or her NSW colleagues and his or her ACT colleagues.

There is now the potential to solve a problem that has been around since before Cyclone Tracy in 1974. NSW, the ACT, Melbourne, South Australia and the Northern Territory have all adopted the same technology in the same spectrum band.

With interjurisdictional cooperation that situation can be extended across the nation.

(iii) To assist in recovery after an emergency.

Recovery operations begin almost at the same time as response operations commence but can last much longer. Once power is restored, and provided not too much infrastructure is damaged, communications systems recover rapidly.

One recovery related operation is quite relevant – the establishment of recovery centres. These require telecommunications support equipment scaled to the required capacity and can be difficult to secure without carrier support.

b. *The impact of extended power blackouts on warning systems for state emergency services, including country fire brigades and landholders or home owners.*

Whether a power failure affects a warning system depends on:

- whether there is a backup battery in place
- the length of time the battery can operate
- whether it can be replaced by a generator
- whether a generator is available
- whether there is fuel available for the generator.

These factors apply to both the sending system (telephone, radio, television network) and the receiving systems (telephone handsets, radio receivers and television receivers).

Emergency warning systems that rely on the public landline network are generally supported by generator backed exchanges that allow for ongoing availability, provided that fuel supplies are replenished at appropriate intervals.

Warning systems that make use of the mobile phone network are susceptible to extended power failures as mobile base station backup battery life is limited, often 4-8 hours. Because of the density of transmitter sites, generator backup is difficult except in key locations.

Mobile two way radio networks generally have 10-12 hours battery backup (Police have 24 hour backup in a number of locations) and the density of the transmitters being much less, generator support is easier to deliver. That is, radio networks could be kept working during extended power failures.

c. *The impact of emergencies and natural disasters on future technologies*

The impact of emergencies and natural disasters on any communications infrastructure is largely uniform and can be categorised in a number of ways, the most relevant of which are:

- they destroy infrastructure (and as a consequence reduce coverage and capacity, unless redundancy arrangements are in place);
- they create demand (and as a consequence stretch capacity); and
- they disrupt the smooth flow of information.

To be effective in emergency situations, infrastructure and networks need to be designed to meet a standard set of requirements:

- broad coverage;
- high level of capacity;
- resilient infrastructure;
- redundant routes;
- no single points of failure;
- hot standby in key parts of the network; and
- a presence in remote locations, especially on mountain tops where radio sites are located.

d. *The scope for better educating people in high risk regions about the use of communications equipment to prepare for, and respond to, a potential emergency or natural disaster.*

One of the lessons from recent emergencies has been to question the community expectation that, in the event of a large scale natural disaster, public safety agencies will be able to respond, regardless of circumstance.

A better understanding in the community that some services that are available for day to day activities and for moderate emergencies do not necessarily continue to operate in large scale emergencies and extreme conditions.

If that lesson is understood, then, in the communications field, the key messages include:

- retention of a landline telephone service offers a greater level of reliability in mains power failure conditions but recognise that, in the event of mains power failure, landline telephone networks that have some reliance on power may be susceptible to failure;
- have a battery powered radio receiver available (a battery powered television may be a suitable alternative, if the local television stations carry emergency messages; a car radio may be a suitable alternative if one does not have to leave the car behind);
- have spare batteries available;
- conserve the use of battery powered mobile phones, laptop computers and other devices that need 240V power for recharging; and

- recognise the fact that, in the event of mains power failure, mobile telephone networks have limited survivability.
- e. ***New and emerging technologies (including digital spectrum that could improve preparation for, responses to and recovery from, an emergency or natural disaster).***

The extent and diversity of technological development in the last twenty years demonstrates that predicting the likely developments beyond a few years is difficult.

It has been identified that there will be a convergence of technologies such that mobile radio and telephone services may merge and, provided that commercial providers can guarantee appropriate service levels, governments may examine the delivery of these services from commercial providers. However, it is unlikely that this will eventuate in the short to medium term.

More likely is the development of cognitive radio which will be far less frequency dependent than current radio technologies. But that is still under development so regulators and users will be forced to continue to grapple with the intricacies of managing spectrum for the foreseeable future.

The immediate solution to the spectrum shortage is to adopt 6.25 kHz equivalent bandwidths instead of the standard 12.5 kHz or the legacy 25 kHz bandwidths. These will become available in the P25 systems projected to be used in Australia by about 2012 and will effectively double the spectrum availabilities in the high user density areas.

What is immediately clear is the growing demand for data services. This is occurring in both the commercial and government environment.

Whereas once the data transfers were a maximum 160 character SMS messaging on mobile telephones, the demand has risen from simple text through, images (maps, fingerprints, etc), colour photographs to video of several megabytes.

The growth in data is in both the volume of data that needs to be moved and the speed needed to move it. Volume is determined by the type of data (text documents are smaller than photographs, while low quality video is smaller than high quality video) and the use to which it is put (one can wait a few minutes until the entire map is downloaded but videos often have to be observed in real time to be effective).

NSW is using low speed data effectively in the 400MHz band to provide dispatch information in text form for the Ambulance Service. But agencies that require high speed, high bandwidth data services must currently resort to commercial services. This works when the demand for those services is "normal" but in emergency situations it becomes risky if the demand for services becomes too much and the service congests.

With the emergence of video as the service most in demand, carriers have strived to find more effective data technology over radio for mobile telephone purposes. The emerging standard is LTE and the emerging target frequencies are in the 700MHz band in the spectrum freed from the move from analogue to digital television; the digital dividend spectrum.

This is one of the areas over which the competition for spectrum is most intense. The mobile telephone providers want access to the spectrum to provide high speed video services and are set to make considerable profits. They are therefore prepared to offer a high price for the spectrum.

Public safety agencies want access for the same purposes but will not make a profit from its use and therefore cannot offer a high price. But they will put it to operational use in the field, utilising high speed file download and upload, video download and upload and real time asset tracking. Specific applications include:

- advanced pattern recognition such as image, vapour, and radiation detection;
- advanced mobile broadband based surveillance and situational awareness through full motion video (eg Police pursuits);
- iris scanning for identification;
- mobile robotics for automated inspections, disarming bombs, tactical manoeuvre in terrorist incidents etc;
- telemedicine: remote patient monitoring to provide effective frontline medical assistance;
- online monitoring of fire-fighting operations; and
- ad hoc networking (ability of a terminal to automatically work as a small base node in the absence of fixed infrastructure).

There are essentially two ways to deliver such services – through the carriers or by constructing networks specifically for public safety use. But if those networks are constructed in the 700MHz band, the amount of spectrum available to the carriers is reduced by about 20MHz of the 100MHz available for use.

Clearly, the carriers favour the option of data services being provided to public safety agencies as part of their commercial offerings but the public safety agencies are concerned that they will not be able to secure the required service guarantees that allow them to operate effectively under emergency conditions when the public networks are likely to be under the most demand for access.

To date, the Federal response has been to look to provide public safety spectrum in the adjacent 800MHz space but the agencies hold concerns that there may be no off the shelf hardware to support data applications in this area of the spectrum.

This is a difficult policy area complicated by the provisions of the Radio Communications Act 1992 which requires the Australia Communications and Media Authority (ACMA) to ‘make adequate provision of the spectrum for use by agencies involved in the defence or national security of Australia, law enforcement and the provision of emergency services.’

Further, the Council of Australian Governments (COAG), through the Interoperability Framework, has agreed on the need for harmonisation and greater interoperability between law enforcement and other public safety agencies. National reservation of a data spectrum block is an important part of this process.

The need to conserve spectrum is accepted but there is a concern that an auction process is not the most appropriate approach where the parties have a disproportionate capacity to pay. The benefits of emergency applications for enhanced data services are realised in reduced overall economic loss to the community and are difficult to assess.

Similar issues will arise in relation to the allocation of spectrum for rail and other smart transport systems and for smart electricity grid systems. A solution needs to be found and found urgently because the opportunities delivered by the digital dividends reallocations are very rare. A clear inter Government position is required.

f. *Other relevant matters*

Information processes

Communications infrastructure is critical infrastructure and should be treated as such. NSW believes that, particularly in emergency situations, there is a strong argument for requiring carriers to provide details of network infrastructure and interconnections and for providing detailed reports on services breakdowns and required repair times.

Necessary legislative amendments to provide the telecommunications providers with the framework to legitimately participate in emergency management processes without compromising their commercial or consumer interests should be evaluated.

Retaining capacity

One of the key arguments of carriers is for public safety agencies to make greater use of their services. One of the key issues for public safety agencies is the limitations of access in emergencies due to congestion.

Resolution requires consideration being given to the allocation of a portion of the commercial service exclusively for public safety purposes, as has been previously considered by at least one service provider in relation to mobile telephones.

Consideration of emergency communications by property developers

Certain environments, such as large shopping centres, present particular challenges in relation to ensuring adequate emergency communications often requiring dedicated infrastructure within these environments. NSW believes that operators who benefit from such facilities should be required to make provisions for ensuring emergency communications are available within those facilities.

Extending national assistance

Consideration could be given to an Emergency Service TV Channel with full rights to re-broadcast any existing radio and broadcast television material pertaining to the current emergency(s).

Learning from experience

Due consideration should be given to relevant findings from recent coronial inquiries and Royal Commissions.

Conclusion

There is no doubt that Australian telecommunications providers run reliable and effective services.

Communications are a critical service heavily used by the community in general, and public safety agencies in particular, during emergencies. However, elements of these services are provided on a commercial basis and this does not necessarily align with the expectations of public safety agencies or the community.

There is a strong need to facilitate a more consultative environment so that the community, public safety agencies and telecommunications providers can maximise the benefit to each without compromising the requirements of the others.