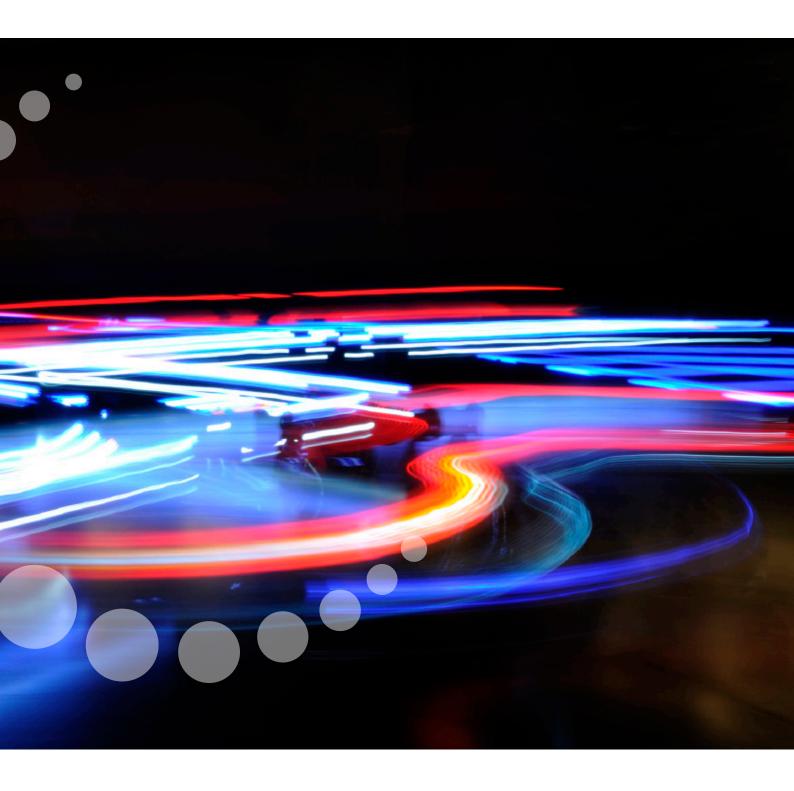# BAI Response to Public Safety Mobile Broadband Issues Paper

May 2015

22nd May 2015

Public Safety Mobile Broadband
Productivity Commission
Locked Bag 2,
Collins Street
Melbourne VIC 8003

Level 10, Tower A,
799 Pacific Highway
Chatswood NSW 2067
AUSTRALIA
T: +61 (2) 8113 4666
F: +61 (2) 8113 4646
www.baigroup.com

RE: Response to Public Safety Mobile Broadband Issues Paper

Dear Commissioner,

It is understood that the Commission has been asked to undertake a 'first principles' analysis of the most efficient, effective and economical way of delivering mobile broadband capability to Public Safety Agencies by 2020.   BAI is pleased for the opportunity to share its views with the Commission, and strongly endorses the focus of Australian governments through the Council of Australian Governments (COAG) to deliver this capability by 2020.

By way of background, BAI is Australia's leading specialist wireless communications infrastructure company. It is the owner of a national network of transmission towers, which are used to deliver ABC and SBS television and radio to Australian households, along with commercial radio and regional television services. The company provides infrastructure for all Australia's largest telecommunications companies, and is also a provider of private and government radio network services (including public safety). BAI provides satellite ground station infrastructure for the Commonwealth Department of Defence, and owns and operates confined wireless networks globally (in New York, Toronto and Hong Kong).

BAI is pleased to share its views in a domestic and international context, on the most cost-effective combination of private and public inputs, services and expertise to deliver PSA mobile broadband capability and aspects of this capability such as:

- National interoperability across jurisdictions and agencies
- Coverage, integration of voice services, security, capacity, resilience
- Sustainability of arrangements into the future and compatibility with end user devices

In summary, it is our firm view that police and ambulance officers, firefighters, paramedics, and other public safety agency frontline personnel have demonstrated a clear need for a dedicated nationwide wireless broadband network to support their operational needs.

Should you have any questions or require further information please contact myself or Ashley Marshall

Yours Sincerely,

Brad Freeman
Director, Account Management and Business Development
BAI

Public Safety Agencies need a pre-eminent public safety grade network

Public Safety Agencies (PSAs) must have a reliable, resilient broadband network to perform their life saving missions. Most Australians today own smartphones that are more powerful communications devices than those typically used by PSA frontline personnel. In many cases, frontline personnel and first responders have to bring their own smartphones to work to access applications, search databases and share videos.

PSA's require the use of rugged, easy-to-use devices designed to meet public safety requirements and provide a rich set of applications and services that enhance their ability to perform their duties in line with community expectations[1].

A pre-eminent Public Safety Mobile Broadband (PSMB) network should provide the backbone to allow the public safety community to improve its communications and perform its missions more safely and efficiently. We believe it has many dimensions. Some of them include:

- Coverage based on geography for public safety and our population.
- Cost effective hybrid digital and cellular solutions for serving remote, rural and blackspot areas.
- Reliability that the public and the PSAs can always depend on.
- Group communications to enable effective collaboration and teamwork.
- Redundancy and resiliency to sustain service during times of crisis or emergency.
- A diverse portfolio of public safety grade applications, services, devices and operating systems for different user types which deliver the right application on time to the point of demand.

Reliability

Extreme weather events, severe storms, flooding, droughts, heat waves or extremely violent cyclones are becoming more common[2] and they affect infrastructure when public safety needs it most. As wind speeds rise and electrical power begins to fail, cellular sites require ample power backup to address outages and adequate hardening to withstand the destructive forces of nature.

Simultaneously, the network must be designed so that it can stand up to criminal or terrorist events by rerouting rapidly if portions of the network are destroyed or compromised. A pre-eminent PSMB network should deliver a highly resilient and reliable network for Australian PSAs. It will need to be a hardened network to assist with resiliency during natural disasters, incidents and man-made threats.

Hardening entails strengthening cell tower sites and the overall network to ensure maximum reliability. It will need to be designed and engineered with as much resiliency and redundancy that it can afford to support, with back-up equipment and services to sustain operations during adverse conditions. Hardening cannot be a one size fits all approach. Hardening for bush-fires may be needed in south eastern Australia. Hardening for wind speeds from cyclones or super storms may be needed in the Northern Coastal Regions.

Further hardening guidelines for all components of the radio access network (RAN) will be required to be developed. Hardening must look at towers and antennas, power supplies, temperature control and the physical and electrical connections from the network to the user devices. We will also require a plan to determine how best to address hardening for security, data centres, aggregation points, servers and points of interconnect into other third-party networks.

---

[1] Future-Proofing the State: Managing Risks, Responding to Crises and Building Resilience, edited by Jonathan Boston, John Wanna, Vic Lipski and Justin Pritchard, published May 2014 by ANU Press, The Australian National University, Canberra, Australia.
[2]

http://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/Browse_by_Topic/ClimateChange/theClimate/moreExtreme

Priority

During emergencies like the Lindt Café hostage siege in Sydney and the Bali bombings[3], wireless traffic is concentrated in specific geographic areas and capacity can become inadequate for public safety's needs. For this reason alone PSA's require an exclusive network capability, so that they can communicate without interruption during emergencies.

The London Regional Resilience Report on events of 7 July 2005 highlighted the benefits of a dedicated PSMB network as well as separate commercial mobile network services for members of the public[4]. The report also makes explicit recommendations that PSAs do not rely on commercial public mobile networks during a major event.

This is essential during large-scale emergencies when public citizens may possibly overload commercial wireless networks to reach their family, friends and loved-ones. First and foremost, a pre-eminent PSMB network should provide PSAs with a priority communications network capability when they need it most.

Capacity

Capacity is not only an issue during emergencies. It is also an issue when thousands of people converge at special events such as concerts, art festivals, sporting venues or political rallies: PSAs have to be there. Many cities and towns host special events annually.

By way of example, for one week each year, even one of the most isolated outback towns Birdsville, home to the Birdsville Races sees its tiny town of 100 residents swell-up to 6,000[5] people. On the other hand, more than 2 million visitors[6] flock to Sydney harbour to experience New Year's Eve. A pre-eminent PSMB network should deliver mobile and robust capacity, as well as enhanced public safety coverage to keep the public safe in such circumstances.

Rural Coverage Challenges

Rural emergencies pose the greatest coverage challenges. The ability to maintain contact with an emergency trauma specialist is a lifeline for emergency medical services personnel, for instance, when treating an injured backpacker. When life-threatening emergencies happen in rural or remote areas, public safety agencies are often confronted without a network connection that could enable expert medical support during transport to a hospital.

A pre-eminent PSMB network should provide reliable, mobile coverage solutions because emergencies don't just happen where Australians live. It must also enhance public safety communications by delivering mission-critical data and applications that augment the voice capabilities of today's land mobile radio (LMR) networks.

It is anticipated that when a PSMB network is initially deployed, it will provide mission-critical, high-speed data services to supplement the voice capabilities of today's LMR networks. Users will be able to send and receive data, video, images, text, as well as use voice applications. They will communicate over the network and benefit from the ability to share applications.

In the less densely populated areas of Australia it is not, and never will be, viable to establish a high speed communications coverage network using PSMB, VHF, UHF or cellular terrestrial options.

In this regard, BAI recommends that the Commission consider recommending a hybrid network solution which encompasses a Long-Range Digital Communication System (LRDCS) for PSA's in these less densely populated areas. LRDCS can provide coverage over vast distances and in effect, provide "virtual

---

[3] https://www.emknowledge.gov.au/category/?id=8
[4] London Regional Resilience Report on events of 7 July 2005, https://www.london.gov.uk/sites/default/files/LRRF-7July-debrief-report.pdf
[5] http://www.birdsvilleraces.com/FAQ#mobile-phone
[6] http://sydney-nye.com

blanket coverage" outside the PSMB and P25 coverage areas within Australia, while at the same time, it can be tightly integrated into these PSMB and LMR P25 voice networks.

Compared with satellite telephony, the most common alternative technology for communications of last resort, LRDCS is a form of encrypted digital high frequency (HF) radio. This is the economical choice. Once the initial investment in equipment is made, there are zero call costs and no ongoing monthly line or equipment rentals.

LRDCS equipment is built tough to withstand extreme conditions, which proves to be very cost-effective for remote and rural areas. Such an approach also fits with our earlier stated principle of a diverse portfolio of public safety grade applications, services, devices and operating systems for different user types which deliver the right application on time to the point of demand.

VoLTE

In time, a PSMB network may also be able to offer Voice over LTE (VoLTE). In the future, VoLTE may be used for daily public safety telephone communication in high density areas. At this stage, we cannot predict the arrival of mission critical voice, in part, because the standards are still under development. Standards will determine the functionality and performance requirements for mission critical voice. The industry at large is working to accelerate the development of this new worldwide standard. To deal with the complexity associated with the implementation of VoLTE, the main standard setting body for LTE, 3GPP[7], has created Working Group 6 or WG6 (sometimes referred to as SA6).

WG6 resides within 3GPP and it exists to create the definition, evolution and maintenance of technical specifications for applications elements and interfaces supporting specialised communications. 2015 is a significant year for Mission Critical Communications over LTE. 3GPP Release 12 is the largest release. R12 focusses on mission critical features and functions. It was finalised on 13 March 2015 at the 3GPP SA6 working group in Beijing. Some LTE vendors have announced trials later this year.

It is likely that vendors will not be able to deliver fully-compliant LTE Release 12 versions of equipment for possibly 2-3 years, due to the very large volume and complexity of included features and functions. Additionally, key mission-critical features, especially Mission Critical Push-To-Talk (MC-PTT) will not be included in the Release 12 version.

These may come in Release 13, or more likely Release 14. It is anticipated that commercial deployment is most likely about 3-4 or more years away. It will take some time before PSAs in Australia can rely on VoLTE technology to replace P25 LMR in metro areas today and the regional/rural PSA's requirements are still yet to be addressed by VoLTE.

Situational Awareness

Situational awareness during an incident will help protect people, property and frontline personnel. When public safety personnel have a common picture of an incident that's unfolding, they are far better equipped to respond and meet the expectations of their community.

The old adage "a picture paints a thousand words" certainly holds true during structural fires, crimes in process or medical emergencies, where the ability to share real-time images and video of the incident scene, as well as the locations of frontline resources and locally relevant information, significantly improves communication and outcomes.

As we see our PSAs' concepts of operations (CONOPS) transform from "tell-me" to "show me" style operations, a pre-eminent PSMB network will be required to carry high-speed data, location information, images, and streaming video that can mean the difference between life and death.

---

[7] The 3rd Generation Partnership Project (3GPP) unites [Seven] telecommunications standard development organizations (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC), known as "Organizational Partners" and provides their members with a stable environment to produce the Reports and Specifications that define 3GPP technologies.

One National Network

Sharing one national network will improve interoperable PSA communications and operational outcomes. Public safety agencies in Australia learned long ago that one simple number, like 000, made it easier for the public requiring assistance in an emergency, anywhere in the country, to call one number.

In building a new pre-eminent PSMB network for PSAs, we have the opportunity to provide one interoperable network for those first responders that are answering that call, to be able to respond with one, nationwide network of communications. Such an integrated network will improve communication during mutual aid calls and provides the latest communication technologies in a single nationwide network that is dedicated to public safety.

Today, PSAs rely on many separate, incompatible, and often proprietary land mobile radio networks. This makes it difficult, and at times impossible, for frontline personnel from different jurisdictions to communicate, especially during major emergencies.

PSAs devices will need to work anywhere on the network and save time when seconds matter. In addition, the network design and services offered will need to ensure interoperability among first responders and frontline personnel.

The Right National Spectrum

Australia is fortunate to be part of the International Telecommunication Union (ITU) Region 3. The region contains most of non-former-Soviet Union Asia, east of and including Iran, and most of Oceania[8]. Approximately one- third of the world's population and presumably, one-third of the world's PSA users reside within the countries of the region.

With such a large market of millions of public safety users, it is anticipated that over time, the volumes of PSMB devices will give rise to economies of scale and that these will translate to equipment savings opportunities for national, state and local budgets within ITU Region 3.

It is understood that our federal regulator, the Australian Communications and Media Authority (ACMA) has been and remains heavily engaged in international forums that develop technical guidance for development and deployment of current and future public safety radiocommunications solutions.

The main forums that the ACMA has been engaged with are the International Telecommunication Union—Radiocommunications Sector (ITU-R) and the Asia-Pacific Telecommunity (APT). The latter works towards spectrum harmonisation in our region through the work of the APT Wireless Group (AWG), and represents our region's common interests at the ITU through the work of the APT Preparatory Group (APG).

In line with the findings from the ITU-R, the ACMA has chosen to allocate 10 MHz of spectrum from the 800 MHz band for the specific purpose of realising a nationally interoperable PSMB 4G cellular data capability, which fits ITU-R Resolution 646 on public protection and disaster relief (PPDR). This band supports 4G (LTE) systems and, as such, is considered to be 'beach front' spectrum[9] by carriers and PSAs alike. It will form the basis of a pre-eminent PSMB network for Australian PSAs harmonised with other nations from our region.

The allocation of PSMB spectrum for PPDR offers the opportunity of a single, nationwide, interoperable network. It is our firm view that such a network must be built to open (as opposed to proprietary) standards to ensure interoperability for public safety agencies across the country and stimulate contestability in the supply of equipment and network components.

The amount of available contiguous spectrum must provide capacity for public safety's needs. Whilst a number of studies have attempted to model a range of anticipated capacity demands, the quantum remains

---

[8] http://www4.plala.or.jp/nomrax/ITU_Reg.htm
[9] The Australian Communications and Media Authority Current Spectrum for public safety radiocommunications ACMA initiatives and decisions OCTOBER 2012

unknown and will remain so for the foreseeable future. It is not until such a network is established and use-case traffic profiles are mapped and analysed, will we fully understand and appreciate the requirements. Therefore BAI recommends a cautions flexible approach to addressing demand and capacity management.

BAI also anticipates there may be times when there is excess capacity. BAI strongly encourages the Commission to mandate as part of its 'first principles' approach, the exploration of ways to make this valuable resource available to other users/network operators, while preserving priority access to first responders.

Budgets are Tight

PSAs around the world are entering a period of rapid transformation, above and beyond what are normal evolutionary cycles. This transformation is being driven by several key factors:

- Expectations of citizens are growing, for timely and effective emergency responses in the face of large scale natural and man-induced events – prevailing attitudes are for a near-zero tolerance for loss of life and property, even under the most challenging of circumstances, and continuity of communications/information.
- In the case of natural events, their frequency and severity is increasing.
- Economic and fiscal conditions in the developed world are likely to remain challenging, forcing governments to revisit their longstanding business and funding models. Historically there have been cyclic recession patterns followed by rapid revenue recoveries driven by economic growth. In most of the developed world, we now see post-recession bubbles that are smaller and there are signs of long-term slowing of government revenues. Serving growing public debt will limit the capital that is required for investment in critical infrastructure.

Two key public policy issues will weigh substantially on the pace of transformation: funding and spectrum policy.

Funding models are likely to shift more towards on-going operational expenditures (OpEx) in lieu of large scale capital projects driven by substantial up-front CapEx commitments. Public/private partnerships, outsourcing and other business practices are likely to gain prominence over traditional build/own/operate models. Given the long-term economic characteristics of PMSB networks, there is clear scope for their development to benefit from these innovative funding and service provision approaches.

The explosion of wireless broadband services for consumer and government use, pose challenges for spectrum policies, particularly where spectrum auctions are viewed as a significant source of government revenue. Similar trends are occurring around the world and are now also occurring in Australia.

The United States has pursued a particularly aggressive spectrum policy, allocating significant swathes of valuable spectrum for the construction of a purpose-built PSMB network on dedicated spectrum. This network is known as FirstNet[10]. BAI strongly encourages the Commission to look at this model and consider a similar approach to making valuable spectrum resources available to other users/network operators while preserving priority access to first responders as a means to offset the costs associated with building, operating and maintaining a PSMB network.

To be clear, our concept of "a dedicated nationwide PSMB network" is that of a dedicated virtual (hybrid and physical) network. In our view, it makes no-sense to duplicate precious capital to overbuild an additional physical network infrastructure, where it already exists with commercial carriers. Where commercial carrier coverage exists, it is proposed that their capacity be virtualised, hardened and partitioned and that a PSMB be virtually delivered by collocating and sharing existing sites, power, towers and backhaul.

The existing commercial carrier networks would need to be mandated to ensure that certain minimum levels of hardened network capacity (end to end) would always be available exclusively for the PSA's only

---

[10] http://www.firstnet.gov

to use. Whilst the network is only being used for data, this would not be essential from the start however, this will become a mandatory future requirement, once 3GPP R14 is implemented and we have native VoLTE running over a national PSMB virtual network.

In blackspot or commercially unviable areas, there would be a requirement to invest-in and build, additional new infrastructure. In these areas, PSA's could charge the commercial carriers for their subscribers roaming onto the dedicated PSMB network, if they did and presuming there was sufficient latent capacity, for citizens to use at that time. The extent of this network build really depends on what the Australian public expect and are willing to pay for. To go from covering 95% of the US population to 99%, FirstNet[11] estimates an additional 60% network build. For Australia his could represent a larger investment than the NBN which we suspect the public would not view as fair value for money. That is why we propose a hybrid virtual network solution that encompasses LRDCS. Whilst LRDCS is a relatively new concept, it is being commercially deployed in Australia. BAI can provide further details on a Commercial-in-Confidence basis to the commission, if it wishes to become further appraised of how this could be incorporated into a national PSMB network solution.

It is our firm view that to keep costs to a minimum for the short, medium and long-term, PSA's will need to maintain spectrum ownership and have it professionally managed by an independent arm's length third party. The PPDR network's commerciality would be ideally suited to a PPP/PFI style of specialist independent self-funding operator, similar to that adopted by the UK National Audit Office[12] for a nationwide LMR network. This network will soon be replaced with a PDDR style network however the principles remain the same. BAI has first-hand experience in this area and would be willing to share further comments upon release of the Commission's draft report in late August/early September 2015.

A framework arrangement could be negotiated under the Private Finance Initiative[13] to design, build, finance and operate the service with the federal and state governments agreeing to pay a fee for service over an extended period of time. To ensure operational success, the federal government would have to mandate MVNO rights for this new entity with all commercial carriers, so that PSA's could roam between networks as operational requirements dictated.

Summary

The advent of wireless broadband technology has been one of the most significant technology breakthroughs in the last decade. Backed by a vast global commercial eco-system, this industry is shaping every facet of our lives, and will drive social and economic change around the world. Smartphones and applications that operate on current and emerging wireless broadband networks are rapidly re-defining the information age in which we now live.

Regulatory policies around the world are paving the way for this exciting technology to be made available to PSAs and others charged with protecting life and property.   As noted earlier, allocation of spectrum and funding are central to making these technologies available to Australian PSAs.

As federal and state governments embark on their ambitious plans to enable PSMB, they will do so in a period and environment where worldwide rapid transformation is underway. The ability to leverage new technologies, investigate innovative governance and funding structures and endure challenging public policies will present many exciting challenges.

BAI can provide invaluable industry knowledge, insight into the future digital directions, and technical expertise on this subject. Our organisation strongly supports the federal government in these initiatives and we thank the Commission for the opportunity of participation in this process.

It will be a major achievement of our federation, but one that is vital for the benefit of Australia's citizens, that Federal and state/territory governments as well as PSAs commit to the actions necessary to work together to ensure the building, deployment and operation of the nationwide PSMB network.

---

[11] http://www.firstnet.gov/network
[12] http://www.nao.org.uk/report/public-private-partnerships-airwave
[13] http://www.publications.parliament.uk/pa/cm200102/cmselect/cmpubacc/783/78303.htm

BAI
Level 10, Tower A, 799 Pacific Highway
Chatswood NSW 2067
AUSTRALIA
Phone: +61 2 8113 4600
info@baigroup.com
www.baigroup.com