Australia Public Safety Mobile Broadband (PSMB) National Objectives

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Contents

1 Introduction

Across Australia, the public safety community responds to routine and emergency situations at a moment's notice, regardless of the severity. These situations occur daily in every city, town and shire in the country. The response of the public safety community relies on a communications capability. Coordinated responses, across agency lines, including multiple disciplines, is necessary to protect the communities and citizens the public safety community is charged to serve. In times of emergency, people look to their public safety officials to act swiftly and correctly, to do the things necessary to save lives, help the injured, and restore order. Many emergencies will occur without warning. All require an effective response. Whether the situation is a fire, natural disaster, vehicular collision, act of terrorism, the apprehension of a suspect or something else, a key piece of the public safety response is the ability to communicate. Communications capabilities can span cities, states and territories and in some cases jurisdictional borders. Without reliable and interoperable communications, the safety of Australia's first responders becomes jeopardized and the ability to perform their critical mission is compromised.[1]

Two-way voice radio has been the predominant form of communication employed by public safety in Australia to date. With the advent of wireless broadband, we are at the beginning of the next major epoch in mission critical communication for public safety officers in Australia and the rest of the world. New and emerging threats, natural or man-made, require access to multi-media services including voice, video, text and data to support effective prevention, response and recovery activities. Australia's Public Safety Mobile Broadband (PSMB) capability will provide multi-media services to further improve the effectiveness and safety of first responders.[2]

Recognizing that mobile broadband can be a critical tool for public safety agencies (PSAs), the National Public Safety Mobile Broadband (PSMB) Functional Working Group (FWG) was established in May 2017 by the Inter-jurisdictional PSMB Senior Officials Committee (SOC). The SOC was convened by the Commonwealth Government to 'progress work towards a nationally interoperable PSMB capability and report to the Council of Australian Governments (COAG) in late-2017'. The SOC established the FWG to provide it with support in progressing this body of work. The FWG will, among other things, develop the national PSMB objectives and high-level PSMB requirements for consideration by the SOC.

This document contains the FWG's national PSMB objectives. These draft objectives will inform the development of the draft high-level requirements for Australia's PSMB capability.

[1] Text in this paragraph is based on text in [1], page 8.
[2] Text in this paragraph after [1], page 8.

2 National Objectives

A PSMB capability must provide a communications environment for Public Safety Agencies (PSA)[3] to enable information sharing in real time during field operations, improving interoperability and coordination during multi-agency and inter-jurisdictional responses.

The PSMB national objectives described in this section support the primary mission of Australia's PSAs: the protection of life, health, property, and environment. A PSMB capability must provide services during business as usual operations, planned events, and incident responses (including emergencies).

The ultimate goal of a PSMB capability is to enhance PSAs' situational awareness for a safer, quicker, and more effective response. The PSMB capability needs to be available to PSAs in the circumstances they need it. To do this the capability needs to be reliable, resilient and secure. PSAs also need for the capability to provide for interoperability between them (including for interoperability between PSAs from different jurisdictions).

Australia is part of a global public safety technology ecosystem. This global public safety ecosystem has begun to adopt Long Term Evolution (LTE) technology as the primary technology of choice for support of PSMB. Since the adoption of LTE, public safety agencies world-wide have begun to actively participate in the development and standardization of LTE's public safety features. This open standard wireless technology and others standardized by the 3rd Generation Partnership Project (3GPP) will continue to be enhanced over time. To ensure Australia's first responders benefit from technological advances made in this technology over time, Australian public safety should align with this global trend.

The high-level objectives below identify *what* Australian jurisdictions are seeking from a public-safety grade mobile broadband capability. The objectives do not identity *how* such a public-safety grade capability might be delivered – the objectives are applicable whether the PSMB capability is delivered via commercial operators' networks, networks dedicated to public safety, or hybrids of these approaches. They specify *what the solutions should be designed to achieve* rather than *how the solutions should be designed to achieve the objectives.*

The National PSMB objectives have been determined as follows:

Objective	Objective

[3] Australian PSAs include:

- Police Services (law and order)
- Ambulance Services (paramedic services)
- Fire and Rescue Services
- Rural Fire Services
- State Emergency Services

No.	
0	Governmental Cooperation - Australian Governments will work co-operatively to develop a federated Public Safety Mobile Broadband Capability (PSMB) in Australia, that takes account of individual jurisdictional circumstances
1	Services - Australia's PSMB capability will support the provision of both mission-critical and non-mission-critical multimedia services
2	Coverage - Australia's PSMB capability will provide, as far as is feasible, coverage that is fit-for-purpose for PSAs
3	Priority - Australia's PSMB capability will be able to: • prioritise between different PSA users; and • where the use case requires this, provides priority access to PSA's when service resources are shared with non-public safety users
4	Capacity - Australia's PSMB capability will be scalable to accommodate public safety needs
5	Availability - Australia's PSMB capability will, as far as is feasible, be available at all times
6	Security - Australia's PSMB capability will have appropriate protective security measures to prevent unauthorised access of information and interference.
7	Interoperability - Australia's PSMB capability will provide nationwide interoperable public safety communications, including communications within and between jurisdictions
8	Devices - Australia's PSMB capability will be accessible on any fit-for-purpose device across multiple operating systems
9	Integration - Australia's PSMB capability will complement and, where appropriate, be integrated with jurisdictional land mobile radio capabilities.
10	Standards - Australia's PSMB capability will be based on open standards, with any proprietary features of the capability reverting to a standardised version once available

75

76 Each of these objectives is described in further detail below.

2.1 PSMB Service Capability Objectives[4]

Situational awareness is essential for effective, safe, coordinated, and efficient public safety responses. From an operational view, relevant information must be delivered to the intended, authorized recipient(s) in a timely manner wherever, and whenever needed.

The level of situational awareness that can be achieved through a PSMB capability is, for the most part, highly dependent on the capabilities offered by the network(s) providing services, end-users devices and supported software applications. PSAs' operational needs are the basis for the following highly desired service capability objectives. (These service capability objectives are not listed in priority order):

- Governmental Cooperation

Coordinated responses, across agency and jurisdictional lines, including multiple disciplines, is necessary to protect the communities and citizens the public safety community is charged to serve. Developing the PSMB capability will therefore require cooperation by all Australian Governments. Further, developing the capability will require taking into account the different approaches to public safety response across Australia's vast and varied geography.

Objective 0: Australian Governments will work co-operatively to develop a federated Public Safety Mobile Broadband Capability in Australia, that takes account of individual jurisdictional circumstances.

- Services

The use of broadband technologies allows for the provision of new applications including voice, video, imagery, data, text, and geo-location services. Some of these applications will be used to support mission-critical public safety operations. Some will be used to support administrative functions (e.g. training). As 3GPP wireless technology continues to evolve, it may be that at some point in the future it will be possible to begin to migrate services currently supported on public safety's Land Mobile Radio networks (e.g. mission-critical push-to-talk) to a public-safety grade mobile broadband service. During the early stages of this evolution period, we envision push-to-talk over LTE to be offered as a non-mission-critical service as the technology is proven.

Objective 1: Australia's PSMB capability will support the provision of both mission-critical and non-mission-critical multimedia services.

- Coverage[5]

[4] Performance objectives will be included in the FWG's High-Level Requirements document.
[5] To the extent feasible, coverage consistent with the existing LMR footprint

First-responders operate across a variety of environments (e.g., metropolitan, regional, remote), in different physical circumstances (indoor, outdoor, underground, at sea, in the air), for different operational situations (e.g., day-to-day, planned events and incident response). A PSMB capability needs to be able to provide PSAs services where and when they need them. Each jurisdiction will develop its own specific coverage requirements and PSMB coverage is expected to expand incrementally over time to those areas current served by LMR (taking into account existing LMR investment lifecycles and funding availability determined through respective jurisdictions' budget processes). Further, PSAs require homogenous service and service continuity across the areas they operate in. Through the minimization of RF coverage holes, the capability should provide services with the highest level of coverage reliability and ensure a guarantee of coverage throughout a service area. *(Please see 2.3.2 and 2.3.3 for the Coverage definitions).*

Objective 2: Australia's PSMB capability will provide, as far as is feasible, coverage that is fit-for-purpose for PSAs.

- Priority

Mobile data capacity is finite. Management of a public-safety grade PSMB capability needs to include the ability to prioritise access between different PSMB users during times of service congestion so that the capacity of the capability is effectively and efficiently allocated. This ability to prioritise access also needs to extend to any circumstances where PSMB capability services are shared with non-public safety users (e.g. members of the public, non-public safety government users). *(Please see 2.3.4 for the Priority Access definition)*

Further, the ability to adjust the quality of service ensures that multimedia traffic is delivered to a prioritized recipient within specified performance levels. This ability needs to be dynamic to reflect the uncertain situations public safety users encounter.

Although QoS is an inherent component of LTE, this capability should allow first-responders, e.g. incident commanders, to adjust the quality of service (including priority levels of users and applications), as a function of the incident and respective roles of on-scene personnel.

Objective 3: Priority - Australia's PSMB capability will be able to prioritise between different PSA users; and where the use case requires this, provides priority access to PSA's when service resources are shared with non-public safety users

- Capacity

PSAs operate in different types of situations (day-to-day operations, planned events and incident responses including emergencies). The PSMB capability needs to provide scalable services for these different types of operational situations. This includes accommodating the nature of PSAs' operational activities which often involve a high concentration of public safety users in a localised area (rather than users being dispersed equally across the operational area). The

resulting PSMB load, due to both the number of responders and traffic demand, is expected to be managed, through proper network engineering and optimization, quality of service, and resources management mechanisms available, *(Please see 2.3.5 for the Capacity scalability definition).*

Objective 4: Australia's PSMB capability will be scalable to accommodate public safety needs.

- Availability

The ability of public safety responders to access PSMB services when required is vital for the effective conduct of their operations [6]. A public-safety grade mobile broadband capability needs to have very high levels of availability from an end-user perspective.

The high-availability should leverage LMR engineering best practices and be comparable to the availability of existing public-safety grade LMR networks.

Objective 5: Australia's PSMB capability will, as far as is feasible, be available at all times.

- Security

PSA operations can involve the transmission of sensitive information (including personal information) that needs to be protected from unauthorized access. The PSMB capability itself also needs to be protected against interference, including from those seeking to disrupt the capability's performance.

Objective 6: Australia's PSMB capability will have appropriate protective security measures to prevent unauthorised access of information and interference.

- Interoperability[7]

Whether interoperability is required for inter-agency communications or inter-State roaming, the use of a standardized commercial technology such as LTE, with its rigorous vetting, eases inter-operability issues that have plagued the LMR industry for decades. Interoperability must address not only inter-connectivity, but also device capabilities, 'roaming' agreements, applications, procedures, standards evolution, and standards compliance.

The interoperability capability is one of the most critical enablers of cross-regional or mutual aid communications driving the evolution of public safety networks.

[6] Most, if not all, public safety personnel operate in shifts
[7] Interoperability is impacted by legal aspects, regional policies, and agreements, which are outside the scope of this statement of objectives.

Objective 7: Australia's PSMB capability will provide nationwide interoperable public safety communications, including communications within and between jurisdictions.

- Devices

Public safety devices are built to more stringent requirements than devices typically built for consumer market. Public safety devices must support long battery life, public safety-specific ergonomic features (e.g., large buttons to support operation by glove-wearing firefighters), stringent environmental and ruggedization specifications. Devices must be available in a diverse form factors, reflecting the diverse nature of public safety response. With LTE and its quicker standardization pace, new network releases may lead to new device firmware, or new hardware.

The capability should allow agencies, via firmware or operating system upgrade, to continue to operate devices after a network is upgraded to new 3GPP releases[8]. This backward compatibility will allow public safety to avoid the costs associated with the devices themselves and training personnel to use new devices.

Objective 8: Australia's PSMB capability will be accessible on any fit-for-purpose device across multiple operating systems.

- Integration

Public safety operations in the near to medium term at least will require the use of Land Mobile Radio (LMR) based voice and narrowband data services as well as mobile broadband services. PSAs' operations need to integrate the push-to-talk functionality provided by these different services to support effective operations. The capability shall allow communications between one or more LTE mission-critical PTT users and one or more LMR users.

Objective 9: Australia's PSMB capability will complement and, where appropriate, be integrated with jurisdictional land mobile radio capabilities.

- Standards

Developing a PSMB capability based on open standards (such as 3GPP standards) increases the likelihood of the capability being more cost effective and efficient. For example, from an effectiveness perspective it removes a barrier to technical interoperability that proprietary technology might impose, and also provides PSAs with access to greater levels of innovation. From an efficiency perspective, open standards are more likely to generate market competition which could decrease costs to governments.

[8] With the understanding that the user may not benefit from all new features, which may impede application interoperability

The adoption of proprietary features should be limited to circumstances where the feature/functionality is not currently provided through open standards.

Objective 10: Australia's PSMB capability will be based on open standards, with any proprietary features of the capability reverting to a standardised version once available [9].

3 References

[1] "Recommended Minimum Technical Requirements to Ensure Nationwide Interoperability for the Nationwide Public Safety Broadband Network", Technical Advisory Board for First Responder Interoperability, May 22, 2012. (https://ecfsapi.fcc.gov/file/7021919873.pdf)

4 List of Acronyms

3GPP	3rd Generation Partnership Project
COAG	Council of Australian Governments
FWG	Functional Working Group
kbps	kilobits per second
LMR	Land Mobile Radio
LTE	Long Term Evolution
Mbps	Megabits per second
PSMB	Public Safety Mobile Broadband
RF	Radio Frequency
SOC	Senior Officials Committee

[9] The alternative is to wait until the availability of standards