Submission to the Commonwealth Government's Royal Commission into Australia's National Natural Disaster Arrangements

28 April 2020

in collaboration with

Australian Radio Communications Industry Association

Australasian Critical Communications Forum

International Council on Systems Engineering

Australian control room network Association

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22 April 2020

1.0 Introduction

The University of Melbourne's Centre for Disaster Management and Public Safety (CDMPS)[1] in conjunction with the following partners welcomes the opportunity to provide this Submission in response to the Commonwealth Government's Royal Commission into Australia's National Natural Disaster Arrangements:

- Australian Radio Communications Industry Association (ARCIA)[2]
- Australian Critical Communications Forum (ACCF)[3]
- International Council on Systems Engineering (INCOSE)[4]
- Australian Control Room Network Association (ACRNA)[5]

This Submission is made by the partners in the context of their respective roles in the critical communications sector and in particular the *mission critical (public safety) communications Ecosystem (the Ecosystem)* and the role it performs both routinely and in times of natural disasters and pandemic such as we are experiencing at the present time.

This Ecosystem underpins the capacity and capability of Australia's Public Safety Agencies (PSAs) and their First Responders to keep Australians and their communities' safe by delivering exceptional public safety outcomes in terms of enhanced community safety resilience and decision making.

In this Submission the Ecosystem is considered to comprise the following components:

- The Triple Zero service
- Public Safety Agency Communication Centres
- Radio – Wireless networks
- Interfaces
- Spectrum
- Standards
- Human Resources

[1] http://research.unimelb.edu.au/cdmps
[2] www.arcia.org.au

[3] https://criticalcommsforum.com.au/
[4] www.incose.org

[5] https://acrna.org/

The outcomes from this Royal Commission together with the respective Inquiries by Australian State and Territory Governments into the 2019-20 Bushfires will contribute to the outcomes and recommendations arising from a series of similar Inquiries and other Commonwealth Government and Departmental consultative initiatives over the past decade - Submissions to which have contributed to the production of a large body of knowledge about the Ecosystem.

The preparation of this Submission has drawn upon this body of knowledge and information in the public domain as well as the global network of government bodies, public safety agencies, associations and industry bodies developed by the partners.

This Submission also notes the Terms of Reference for the Royal Commission and the Inquiries by Australian State and Territory Governments are either directly or indirectly based upon the traditional Prevention, Preparedness, Response and Recovery (PPRR)[6] model used in Australian emergency management coupled with the more contemporary component of *Resilience.*

2.0 Purpose and Recommendations

The purpose of this Submission is twofold:

- Highlight policy decisions already taken by the Australian Government and implemented through legislation or through the Council of Australian Governments (COAG)[7] to initiate action across a range of initiatives that will require the Ecosystem to provide *operational support* to Departments and Agencies at Federal, State and Territory levels of government to achieve the expected policy outcomes;

- Build upon and reinforce previous recommendations made to the Australian Government through its Committee structure, Departments and Agencies to continue to raise the profile, understanding and awareness of the Ecosystem to the benefit of all Australians;

And by doing so make the following recommendations to the Commission:

(a) The Australian Government formally recognise in legislation Australia's mission critical (public safety) communications Ecosystem as *Critical Infrastructure*;

(b) The Australian Government formally recognise in legislation the role of the Ecosystem in providing an *essential service*[8] to Australia's Public Safety Agencies supported by specialist industries and *supply chains* functioning efficiently and competitively in an *international standards based* public safety market.

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[6] For the purposes of this report the PPRR model will be considered interchangeable with the European Personal Protection and Disaster Recovery (PPDR) model

[7] https://www.coag.gov.au/

[8] "Essential services" in the context of this report means services, by whomsoever rendered and whether rendered to the government or to any other person, the interpretation of which would endanger the life, health or personal safety of the whole or part of the population.

(c) The Australian Government provide a legislative, regulatory, governance and administrative framework within a *federated national model* to facilitate; the seamless operation of the Ecosystem; enabling its effective contribution to the delivery of public safety outcomes meeting the expectations of all Australians; while protecting the health and wellbeing of Australia's *First Responder community*[9].

(d) The Australian Government initiates the development of a whole of Ecosystem *RoadMap* underpinned by a systems approach for use in consultative processes with Key Stakeholders facilitating the transparent monitoring and reporting of the evolution of the Ecosystem.

(e) The Australian Government initiate a national *"Fit for Purpose"* assessment of existing Public Safety Agency Communications Centres for both current and future connectivity with; the Next Generation Triple Zero Call Service; existing and planned Land Mobile Radio (LMR) networks; and the proposed Public Safety Mobile Broadband (PSMB) capability including both intra State/Territory and cross border interoperability.

In making these recommendations to the Commission it is recognised that there will be significant hurdles to be overcome in the co-ordination of the consideration of the recommendations across the many channels of bureaucracy at Federal and State/Territory level however in the era of reform coming out of the current pandemic crisis and in the context of the need for preparation for the 2020 – 21 and future Fire Seasons there should be an attempt to capture this significant opportunity.

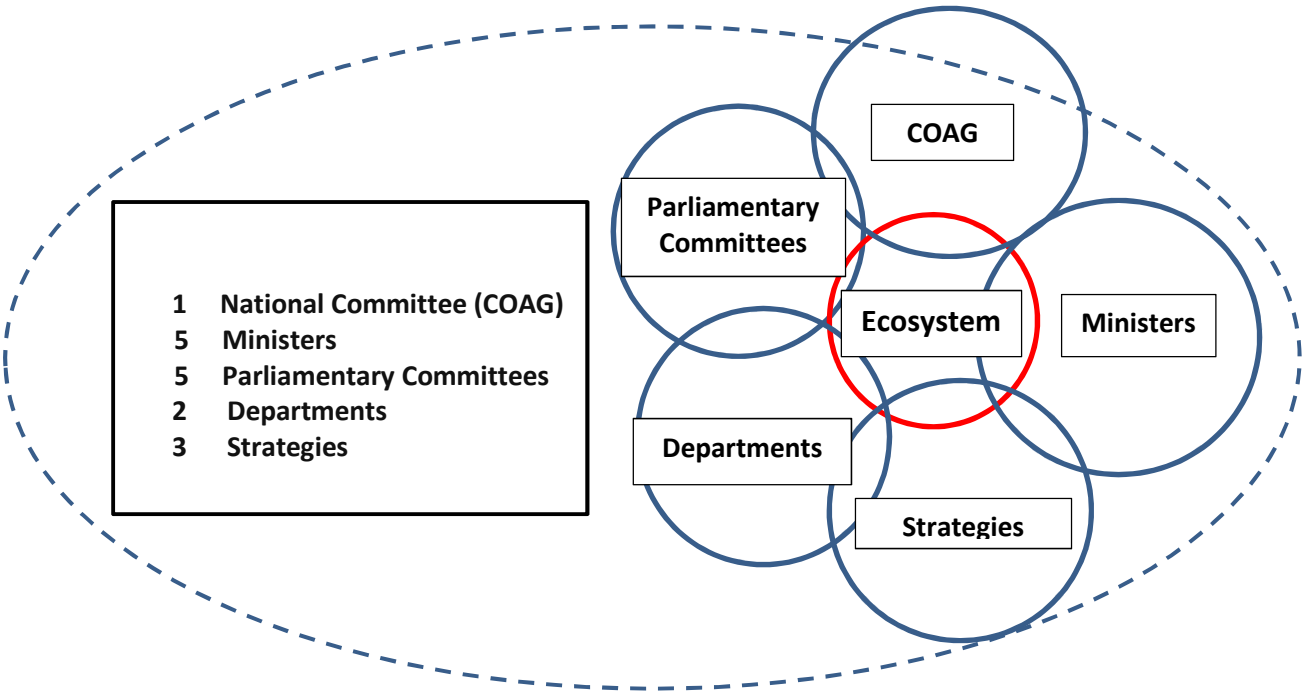
3.0 Governance Administration and Strategy Environment

The recommendations made in this Submission have been developed based upon an analysis of the linkages between the governance, policy and strategy spheres defining the environment in which the Ecosystem currently exists and functions as shown in Figure No 1.

The analysis involved a search of the Australian Government bureaucracy and its associated websites for governance, administration and strategy responsibilities associated with *"communications"* in urban and regional Australia that connect with and underpin public safety, emergency management, disaster management and national security.

The results of this analysis identified the following *complex environment in which the Ecosystem has to operate to support Australia's PSAs and their First Responders and keep all Australians safe.*

[9] Police, Fire, Ambulance and State Emergency Services, Lifesaving Australia and Australia's National Security Agencies



The Ecosystem Policy Environment
Figure No 1.

(a) Council of Australian Governments

The Council of Australian Governments (COAG) supported by the COAG Council system

(b) Commonwealth Government Ministers

There are five Commonwealth Government Ministers responsible for the Ecosystem

- Minister for Infrastructure, Transport and Regional Development
  The Hon Michael McCormack MP
- Minister for Communication and the Arts
  The Hon Paul Fletcher MP
- The Hon Alan Tudge MP
  Minister for Population, Cities and Urban Infrastructure
- The Hon Mark Coulton MP
  Minister for Regional Health, Regional Communications and Local Government
- The Hon David Little Proud MP
  Minister for Emergency Management

(c) Committees of the Australian Parliament

There are five Committees of the Australian Parliament associated with the Ecosystem, two in the House of Representatives and two in the Senate and one Joint Committee. These are:

- The Communications and the Arts Standing Committee: This Committee has been previously known as Communications, Communications Information Technology and the Arts, and Communications Transport and the Arts, Communications Transport and Economic Reform.

- The Infrastructure, Transport and Cities Standing Committee. This Committee has been previously known as Infrastructure and Communications, and Infrastructure, Transport, Regional Development and Local Government.

- Environment and Communications Legislation Committee

- Environment and Communications References Committee

- The Parliamentary Joint Committee on Intelligence and Security

(d) Strategies

- The Critical Infrastructure Resilience Strategy - released in 2015 and *due for review in 2020*

- National Strategy for Disaster Resilience adopted by COAG in February 2011

- National Disaster Risk Mitigation Framework released April 2019 adopted by COAG in March 2020 in conjunction with the National Partnership on Disaster Risk Management

(e) Departments

- Department of Infrastructure, Transport and Regional Development[10]

The Department provides policy advice, programs and regulation across a wide range of areas including infrastructure planning and coordination, regional policy and coordination and national policy on cities.

Early in 2020 Machinery of Government changes saw the Department become responsible for "Communications" and the Australian Media and Communications Authority (ACMA) moved into the Department and placed under the Deputy Secretary Communications.

The ACMA functions have been separated with those relating to "Spectrum" being grouped with the National Broadband Network under *Communications Infrastructure* and the remainder of the ACMA

[10] https://www.infrastructure.gov.au/

being grouped with Australia Post under *Communications Services and Consumer*. These changes can be seen in the Departments' organisational structure[11].

The ACMA is the independent statutory authority tasked with ensuring most elements of Australia's media and *communications* legislation, related regulations, and *numerous derived standards and codes of practice* operate effectively and efficiently, and *in the public interest*.

While this change reinforces the Departments' policy and regulatory roles these changes could be expected to be of concern to Australia's radio and telecommunications sectors and hence the Ecosystem under consideration in the Submission.

- Department of Home Affairs[12]

The Department of Home Affairs brings together Australia's federal law enforcement, national and transport security, criminal justice, emergency management, settlement services and immigration and border related functions, working together to keep Australia safe.

The Department of Home Affairs[13] now houses the Cyber Security Centre and the Trusted Information Sharing Network (TISN)[14] both of which have responsibilities related to *critical infrastructure* and in turn to *communications*.

4.0 Policy Decisions – Previous and Current

The policy context for Australian governments and subsequently COAG decisions relating to the Ecosystem has progressively and significantly changed in recent years driven by a focus on national security, cyber threats, terrorism, domestic and community violence and violence against First Responders as well as natural disasters such as bushfire, flooding and now a pandemic.
The nature of the recommendations in this Submission therefore addresses current and future *public policy* issues regarding the evolution of the Ecosystem to ensure the existence of an appropriate *operational response* capability and capacity related to the PPRR model rather than directly addressing the complex technologies embedded within the Ecosystem and its components.

As previously stated over the past decade Government and Departmental initiatives have *independently* addressed matters associated with the evolution of the Ecosystem influencing public policy, strategy, legislation, and regulatory settings and hence the safety of all Australians without necessarily acknowledging: the existence of the Ecosystem and understanding its individual components; the need for embedded integrated technologies enabling end to end system

[11] https://www.infrastructure.gov.au/department/about/files/org_chart.pdf
[12] https://www.homeaffairs.gov.au/

[13] https://www.homeaffairs.gov.au/about-us/our-portfolios/national-security/security-coordination/critical-infrastructure-resilience
[14] https://www.tisn.gov.au/

operation; its support by specialist industries requiring access to discrete resources; and supply chains in an international standards based public safety market.

These Government and Departmental initiatives have contributed to produce a body of knowledge that has been drawn upon in the preparation of this Submission to provide evidence to support the recommendations being made to the Commission and should be utilised in the development of public policy and strategies regarding the Ecosystem.

The following section of this Submission provides evidence of policy decisions made that are related directly to the evolution of the Ecosystem in support of the recommendations being made to the Commission. Greater detail of the Ecosystem and its components and those specific initiatives mentioned in this section will be explained in greater detail in later sections of this Submission.

(a) Next Generation Triple Zero

In July 2014 a review of the national Triple Zero operator was announced by the Minister for Communications to explore how the service could be improved and continue to offer a world class and technologically adaptable service. In conjunction with the Minister's announcement the Department of Communications released a Discussion Paper as part of the review's public consultation process.

In August 2015 the Department of Communications released the results of the review which included the key recommendation that:

"The Commonwealth should seek to postpone the 2016 tender for the Emergency Call Person for up to two years so that long term policy and technology objectives, including location-based information capability and timing for transition of Triple Zero to an IP based environment, can first be resolved."

In June 2017, the Australian Government announced that a Request for Tender would be issued to deliver a new Triple Zero service.

On 21 November 2019 the Federal Government announced that Australia's evolution to a nationwide NG Triple Zero Emergency Call Handling will be provided by a technology platform involving call handling systems and solutions for use by Australia's Emergency Call Person (ECP) as the initial answer point for the entire population of Australia.

The Ministerial statement regarding this announcement advised that *"Delivering more advanced emergency call handling services is critical to improving our* ***national public safety infrastructure*** *and* ***ensuring all Australians have the fastest possible access to emergency assistance when they need it most".***

The NG Triple Zero service will be one of two major transformational projects for the Ecosystem – the other being a public safety mobile broadband (PSMB) capability for Australia's Public Safety Agencies which is discussed later in this Submission.

To this point in time it has been understood that both these projects were being progressed separately by the Department of Communications and the Arts and the Department of Home Affairs.

The announcement of the award of a contract for the NG Triple Zero platform needs to be considered in the context of the interface(s) that need to be put in place to be able to receive and transfer both voice and data from the Emergency Call Person to Public Safety Agency Communications Centres for analysis and the interface(s) from these Centres using the public safety mobile broadband capability to First Responders in the field.

(b) House of Representatives Standing Committee on Infrastructure, Transportation and Cities

In March 2016 the Standing Committee released its report[15] on "*The role of smart ICT in the Design and Planning of infrastructure"* which included the following recommendations relating to ***critical infrastructure and emergency response systems***:

- *Recommendation 4: The Committee recommends that* ***the Australian Government recognise public safety communications systems as critical infrastructure****, and continue to support the development of these systems, including funding research, promoting implementation, and* ***providing national coordination.***

- *Recommendation 5 The Committee recommends that* ***the Australian Government continue to support the development of disaster planning and emergency response systems****, including funding research, promoting implementation, and* ***providing national coordination****.*

It appears that 5 years later there has never been a Government response to the Standing Committee's Report or its recommendations even though those recommendations should form the cornerstones for government policy and strategy relating to the evolution of the Ecosystem and the Terms of Reference for the Commission's Inquiry.

In March 2019 the Standing Committee released its report on *Innovating Transport across Australia - Inquiry into automated mass transit*[16]. In the process of giving evidence to this Inquiry about the need to consider the future evolution of the Ecosystem the importance of understanding the status of the recommendations made in the Committee's 2016 Report was raised but there has been no response to date.

The Government's response to the House of Representatives Standing Committee on Infrastructure, Transportation and Cities Report on *The role of smart ICT in the Design and Planning of infrastructure* should be provided to advise if the Report's recommendations are accepted or rejected.

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[15] https://www.aph.gov.au/Parliamentary_Business/Committees/House/ITC/Smart_ICT/Report

[16] https://parlinfo.aph.gov.au/parlInfo/download/committees/reportrep/024279/toc_pdf/InnovatingTransportacrossAustralia.pdf;fileType=application%2Fpdf

(c) The Australian Government's Security of Critical Infrastructure Bill

On 23 January 2017 the Australian Government launched the ***Critical Infrastructure Centre*** which subsequently identified ***Australia's most critical infrastructure*** as being electricity, water, ports and ***communications***.

The Security of Critical Infrastructure Bill 2017[17] identified the Australian ***telecommunications systems and networks are part of our national critical infrastructure and form the backbone for many other critical infrastructure sectors*** and services.

In October 2017 the Federal Attorney General announced views were being sought on new legislation to help manage the complex and evolving ***national security risks from foreign involvement in Australia's critical infrastructure.***

The government introduced the Security of Critical Infrastructure Bill 2017 to the Senate on 7 December 2017 to manage the complex and evolving ***national security*** risks of sabotage, espionage and coercion posed by foreign involvement in Australia's ***critical infrastructure***.

The Bill was referred to the Parliamentary Joint Committee on Intelligence and Security[18] with a report due by March 2018.

The *Security of Critical Infrastructure Act 2018* came into law on 11 July 2018 to strengthen the Government's ability to protect Australia's *"critical infrastructure assets"*

(d) The Australian Government's Telecommunications Sector Security Reforms Legislation

Communications as considered in the Security of Critical Infrastructure Bill 2017 was subsequently transferred to the ***Telecommunications Sector Security Reforms Legislation*** and came into Law on 18 September 2018.

The Legislation introduced obligations on carriers and carriage service providers to *do their best* to protect networks and facilities from unauthorised access and interference.

Cyber security is a major risk for the Ecosystem because of its use by Public Safety Agencies and the nature of the data it may transfer and exchange in the future utilising commercial carrier networks.

In any Service Delivery Model for the Ecosystem involving a commercial partner Public Safety Agencies should not be expected to accept that the commercial partner will only *do their best* to protect the Ecosystem from cyber or physical attack which may have implications for the Ecosystem itself.

[17] http://criticalcomms.com.au/content/industry/article/canberra-reviews-critical-infrastructure-security-1039888649#ixzz52t4JmQd7

[18] https://www.aph.gov.au/Parliamentary_Business/Bills_Legislation/Bills_Search_Results/Result?bId=r6016

The level of protection needs to be addressed in conjunction with the Cyber Security Centre in the context of understanding the need for *public safety grade cyber security infrastructure in the Ecosystem* and by comparison to the cyber security arrangements being included in similar international public safety Ecosystems currently being developed.

(e) The Australian Government's Home Affairs and Integrity Agencies Legislation Bill 2017

In 2017 the Australian Government announced its intention to establish a new of Home Affairs Department to form a super portfolio of ***national security*** Agencies keeping all Australians safe.

The Home Affairs and Integrity Agencies Legislation Amendment Act came into Law on 10 May 2018 establishing the new Home Affairs Department bringing together the management and coordination of Australia's ***national security, intelligence and emergency management agencies.***

In previous iterations of the public safety mobile broadband capability the Federal Government has required provision be made for Agencies such as the Australian Federal Police and the predecessors of Australian Border Force. It is assumed that this requirement will remain in the capability and therefore both the capability and the Ecosystem need to be identified as being linked to the Department of Home Affairs which may require its own specific service delivery model.

(f) The Australian Competition and Consumer Commission Domestic Mobile Roaming Declaration Inquiry

In October 2017 the Australian Competition and Consumer Commission (ACCC) concluded its public inquiry into whether to declare a domestic mobile roaming service in Australia announcing that it was not satisfied that the declaration would promote the long-term interests of end-users[19].

However ***the ACCC's preliminary view was that the supply of a roaming service is technically feasible*** noting domestic and international commercial roaming arrangements that have been, or currently are, in place in Australia.

In late 2017 the NSW Telco Authority on behalf of Australia's governments and territories issued a Request for Tender (RFT) relating to a ***national Public Safety Mobile Broadband (PSMB) capability.***

The RFT noted that roaming or interconnection is an area of specific interest that should be addressed in RFT responses. In a Service Delivery Model with a commercial partner the ability of Public Safety Agencies to roam across Australia's commercial mobile networks to achieve the best level of coverage and capability relevant to the response to an incident would be a significant advantage.

The analysis of the responses to the RFT identified a Mobile Virtual Network Operator/Radio Access Network (MVNO/RAN) sharing model as the preferred PSMB Service Delivery Model which would deliver multi-carrier roaming in metro and regional areas benefiting from the overlapping coverage and redundancy of multiple carrier networks and address areas that require an expansion of existing

coverage and would generally apply in rural and remote areas. This capability would be of major benefit in regional and rural areas threatened by bushfire.

On 24 October 2018 the NSW Telco Authority commenced a market engagement process releasing a RFP ***from the telecommunications industry*** to undertake the development of a national Proof of Concept test environment for the MVNO/RAN Service Delivery model across urban, regional and remote locations in Australia over six to 12 months expected to begin in early 2019. *Note: It is expected that the current coronavirus pandemic would have impacted this timetable.*

The PoC is to address the PSMB capability to roam across commercial networks and the agreements that will need to be in place to support this capability and consider the financial implications of these capabilities and agreements.

It would be expected that confirmation of this roaming requirement, its availability and cost, would be discussed with the ACCC and included in advice to COAG about the PSMB capability.

In Europe Public Safety Communications Europe [20](PSCE) identified the need for the review of European Union policy and regulation regarding mobile telecommunications, and the potential for infrastructure sharing for the delivery of mission critical applications/services, networks and devices on the basis that *no EU policy* currently identified the need for critical mobile applications, networks and devices for operation and roaming across all European countries

(g) The Australian Competition and Consumer Commission Australian Communications Study

In October 2017 the ACCC released its draft Report on the Australian Communications Study.

This ACCC Study is relevant to the Ecosystem because it references the current commercial carriers likely to be considering their role in the PSMB capability and also the National Broadband Network (NBN).

The NBN is relevant to the Ecosystem because of its possible role in backhaul for the PSMB capability and its progressive replacement of the ability for the public to use a direct line to contact the Triple Zero Call Service or an Emergency Information Line with a VoIP application. This concern is particularly relevant in high risk areas of Australia subject to natural disasters such as bushfires and flooding.

As previously mentioned the next phase of the evolution of the Ecosystem will be driven by Next Generation Triple Zero and the PSMB capability as *transformational enhancements* utilising commercial telecommunications systems and networks both of which will be receiving and carrying multimedia data essential to the *operational response* capacity and capabilities of PSAs and other agencies involved in the protection of Australians and their communities.

[20] www.psc-europe.eu

In summary the narrative illustrated in the referenced legislation provides evidence that the Ecosystem *needs to be formally recognised as part of Australia's critical communications capability* supported by existing legislation and accommodated in any amended or new Legislation in a manner consistent with the stated policy position "***telecommunications systems and networks are part of our national critical infrastructure and form the backbone for many other critical infrastructure sectors and services***

4.1 National Disaster Risk Reduction Framework

In April 2018 the National Disaster Risk Reduction Framework was published as a multisector collaboration led by the National Resilience Taskforce within the Department of Home Affairs. This Framework is designed to guide Australia's efforts to reduce disaster risk associated with natural hazards and therefore is considered to be relevant to the Commission's Terms of Reference.

The Framework establishes a 2030 vision, goals and priorities broadly aligned to the Sendai Framework and the 2030 Sustainable Development Goals[21], and outlines foundational strategies for action to meet these Goals across the five years from 2019 – 2023. The Framework will be reviewed and updated at the end of this five-year period to ensure its relevance and accuracy across the remaining years to 2030.

The Framework illustrates the relationship between the National Strategy for Disaster Resilience and the National Disaster Risk Reduction Framework allowing identification of individual components of the Framework considered relevant to the Ecosystem and hence its relevance to the *operational response* capacity and capabilities to bushfires (and other natural disasters) as being:

- Critical Infrastructure
- Emergency Management
- Standards and Codes
- Essential public services
- Telecommunications
- Energy

All these components of the Framework are relative to the Ecosystem and its role as *critical infrastructure.*

On 3 March 2020 COAG agreed to endorse the National Disaster Risk Reduction Framework[22]; signed an Agreement[23] with the Commonwealth, State and Territory Governments on the National

[21] The University of Melbourne launched its Blue Print for Disaster Management linked to SDGs at the United Nations In August 2018 https://unimelb.edu.au/__data/assets/pdf_file/0003/2894412/ABlueprintforDisasterManagementSupportingtheSDGs-v2.pdf

[22] file:///C:/Users/User/Documents/Frameworks%20and%20Roadmaps/national-disaster-risk-reduction-framework%20-%20April%202019.pdf

[23] https://www.coag.gov.au/sites/default/files/communique/national-partnership-agreement-disaster-risk-reduction.pdf

Partnership on Disaster Risk Reduction Framework; and asked Emergency Management Ministers to develop a National Action Plan to implement the Framework in consultation with other COAG councils and forums. The Partnership Agreement provides $261 million to fund implementation of risk reduction initiatives arising from the Agreement.

The COAG Communique under the heading of "*Healing and rebuilding from the 2019-20 bushfires"*[24] also announced that the COAG Leaders had agreed to take immediate action across three streams of risk reduction work:

- Improving the resilience of the ***national telecommunications network***;
- Asking the Building Ministers' Forum to consider how to ***adapt the built environment to future climate and hazard conditions***; and
- Asking the ***Australian Data and Digital Council***, in consultation with the ***Ministerial Council for Police and Emergency Management*** to **improve *national natural hazard data and intelligence*** to enable the ***development of new information products such as a national fire map.***

COAG's timing of the adoption of the Framework and Agreement provides additional context for the Terms of Reference for the Commission as well as the State Inquiries into the 2019-20 bushfires and provides an appropriate point of reference for the outcomes and the implementation of recommendations arising from both the current and previous Bushfires Inquiries relating to risk reduction.

Adoption of this point of reference will also allow the on-going assessment in-line with the Framework of the effectiveness of the implementation of recommendations from the Commonwealth and State Inquiries contributing to reduce disaster risk and limit the impact of disasters associated with natural hazards on Australian communities and economies by delivering on the priorities, five-year outcomes and 2030 goals of the Framework.

Importantly the COAG decisions regarding adoption of the Framework, the Framework itself and the three streams of risk reduction work provide connectivity to the Ecosystem and support to the recommendations made in this response.

5.0 Critical Infrastructure

This section of the Submission addresses the broader definition of Critical Infrastructure as a component of the National Disaster Risk Reduction Framework. In the period from 2015 to the present time the definition of "Critical Infrastructure" has emerged in legislation and continued to evolve in parallel with the evolution of the Ecosystem.

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[24] https://www.coag.gov.au/sites/default/files/communique/communique-13-march2020_0.pdf

The establishment of the Critical Infrastructure Centre[25] within the Department of Home Affairs saw the statement about critical infrastructure shown in Figure No 2 adopted and used in subsequent policy development regarding what constitutes Australia's critical infrastructure leading into other matters such as cyber security**.**

> *"Critical infrastructure underpins the functioning of Australia's society and economy and is integral to the prosperity of the nation. Commonwealth and state and territory governments share the following definition of critical infrastructure:* ***'those physical facilities, supply chains, information technologies and communication networks which, if destroyed, degraded or rendered unavailable for an extended period, would significantly impact the social or economic wellbeing of the nation or affect Australia's ability to conduct national defence and ensure national security'.*** *Secure and resilient infrastructure ensures we have continuous access to services that are essential for everyday life, such as food, water, health, energy, communications, transport and banking. It also supports productivity and helps to drive the business activity that underpins economic growth".*

Figure No 2: Critical Infrastructure Statement produced by Australia's Critical Infrastructure Centre

This Statement further strengthens the complexity of the governance, administration, strategy and environment illustrated in Figure No 1 in which decisions related to the Ecosystem and its role in providing *operational response capacity and capability* to Australia's Public Safety Agencies in accordance with PPRR continuum.

6.0 Australia's Mission Critical (Public Safety) Communications Ecosystem

Figures No 3 and 4 illustrate the complexity of the Ecosystem from both an evolutionary and technical perspective *currently* comprising following components:

- The Triple Zero Service
- PSA Communication Centres
- PSA Land Mobile Radio Networks and the proposed PSMB capability
- PSA devices
- The interfaces between these components
- Spectrum
- Standards
- PSA human resources

In a manner similar to the growing complexity of the policy and strategy environment the Ecosystem is progressively moving from an analogue or digital *voice* environment, to a *digital data* and *IP based environment* within the mainstream of information communications and technologies.

[25] https://www.ag.gov.au/Consultations/Documents/critical-infrastructure-bill/CIC-factsheet-what-is-the-critical-infrastructure-centre.pdf

This movement will require adjustments to policy and strategy ahead of these changes occurring e.g. the Public Safety Mobile Broadband (PSMB) capability currently in the process of being procured will be a *transformative* component of the Ecosystem built upon the expectation of innovation in its use in service delivery by Public Safety Agencies resulting in enhanced decision making contributing to improved community safety resilience and public safety outcomes.

Figure No 3:
Evolutionary Illustration of Australia's Mission Critical (Public Safety) Communications Ecosystem

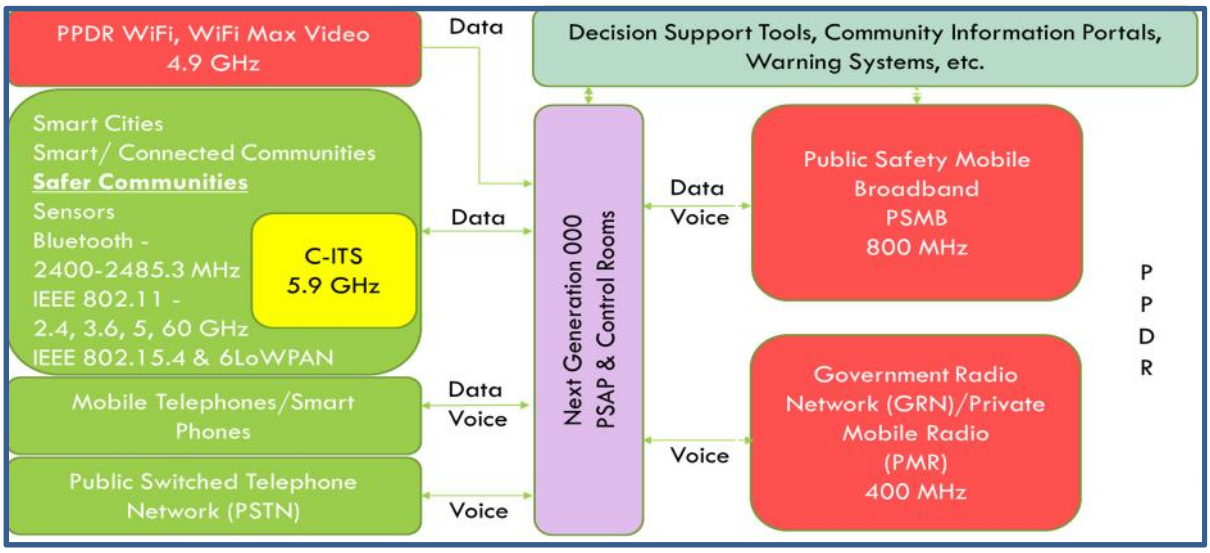

Figure No 4:
Technical Illustration of Australia's Mission Critical (Public Safety) Communications Ecosystem[26]

[26] Ged Griffin Industry Advisor CDMPS University of Melbourne

7.0 The Public Safety Communications Sector

For the purpose of this Submission the Ecosystem is considered as a Sector or "vertical" of a Public Safety Market through which manufacturers and vendors competitively provide products and services that meet the needs of Public Safety Agencies through established procurement processes informed over past years through the issue by government agencies of a series of independent Discussion Papers relevant to the Ecosystem for public comment.

In 2018 an analysis of these responses showed that 145 organisations contributed 203 responses in which Industry Associations were the top contributors with 37 responses (25.5%) followed by specific industry organisations with 35 responses (24.1%) and Government Departments and Agencies with 30 responses (20.7%). Significantly Public Safety Agencies only contributed seven responses or 4.8% of the total responses representing a lost opportunity to make their positions known in relation to the matters being canvased in Discussion Papers and in particular the PSMB capability.

The successful delivery and utilisation of a national capability will depend on an active program of consultation and engagement with PSAs and First Responders. The low level of engagement by PSAs with the Federal Government and its Departments needs to be investigated, identified and addressed in the spirit of collaboration expressed in the Ministerial Statement for the PSMB Early Market Engagement.

In contrast Industry Associations such as ARCIA and the ACCF make a significant contribution to influencing government policy development through the public consultation process used by Federal Government and its Departments.

8.0 The Future for the Ecosystem

In this section of the Submission the key components of the Ecosystem are discussed in both their current state and future evolution.

8.1 3 Digit Call Answering Centres

On 21 November 2019 the Federal Government announced that Australia's evolution to a nationwide Next-Generation Triple Zero Emergency Call Handling will be provided by a technology platform involving call handling systems and solutions for use by Australia's Emergency Call Person (ECP) as the initial answer point for the entire population of Australia.

The ECP is a service provided by Telstra which recently confirmed the nationwide deployment of the NG platform when it announced the opening of a new, 24-hour Triple Zero contact centre in Adelaide. The new 20-position contact centre in Adelaide is connected to the country's other two contact centres in Sydney and Melbourne.

The Hon Paul Fletcher, Australia's federal minister for communications, cyber safety, and the arts "Delivering more advanced emergency call handling services is critical to improving our national public safety infrastructure and ensuring all Australians have the fastest possible access to emergency assistance when they need it most," says.

We'll start in May 2020 with Advanced Mobile Location ("AML"), which enables emergency services personnel to more accurately pinpoint the location of people calling from mobile devices. In the future, we'll have the ability to provide multimedia contact options such as messaging and video calling." says Jane Elkington, principal, Triple Zero, Telstra.

8.2 Public Safety Agency Communications Centres

In the Australian context Public Safety Agency Communications Centres are those Centres traditionally operated by the individual PSAs i.e. police, fire, ambulance to receive calls being transferred from the Emergency Call Person as part of the Triple Zero service.

PSA Communications Centres then determine the response required and issue a Dispatch advice across a radio network to First Responders. The Centre will also provide on-going support to the First Responders as required.

The exception to this process is in Victoria where the Emergency Services Telecommunications Authority[27] (ESTA) provides a multi-agency service to Victoria's PSAs by receiving the Triple Zero call and then dispatching a response by the appropriates PSA using PSA pre-determined protocols.

An international example of the same model is Finland's Emergency Response Centre Agency (ERC) manages six Emergency Response Centres (ERCs) receiving calls from throughout Finland to the emergency 112 number that fall within the scope of the rescue, police, social and health services, evaluate the requirements and forward the information to the appropriate authorities.

Globally these Public Safety Agency Communications Centres (Public Safety Answering Points – PSAPs) are a component of the Ecosystem that will come under ever increasing pressure as these Centres are upgraded to Next Generation capacity and capability either to receive calls from a Next General Call Service e.g. NG Triple Zero, or be able to receive and effectively manage multimedia digital communications (voice, data, spatially enabled data and video) as inputs from the public and the transfer the information received in the form of actionable intelligence to First Responders in the field as part of the initiation of an *operational response* and to provide ongoing situational awareness during the response phase.

The technology upgrades to these Centres to perform this increasingly complex role will need to be accompanied by matching human resource skill sets to provide the operational capacity and capability to produce actionable intelligence for transfer to the field. The position of data analyst/scientist will become part of the organisational structure for these Centres. The existence of Centres dedicated to a specific Public Safety Agency should also be expected to be replaced by Centres providing services to multiple Agencies as the scope of specialised services being delivered and decision making is progressively decentralised or "moved to the edge" of the network(s) carrying information and connecting to Personal Area Networks (PANS) supporting individual First Responders contributing to their health and welfare.

Traditionally PSAPS have been seen as operationally focused when in today's world they should be seen as being the public safety "heartbeat" of the cities in which they are located and where the

[27] https://www.esta.vic.gov.au/

nature of their operation they are collecting data related to public safety which can be interrogated using machine learning and artificial intelligence to identify evidence based trends and predictive analysis that can inform policy development. This is especially so for those Centres those have embedded spatially enabled data in their operations.

While this Submission is about public safety communications globally organisations associated with critical infrastructure i.e. other critical infrastructure categories such as electricity, gas, transport etc. recognise their importance of their Control Rooms as a critical component of their businesses and this needs to be the case with the public safety Ecosystem.

This increasing global focus is reflected in the number of Control Room Associations established in recent years to deal with the challenges being faced by these Centres e.g.

- The International Critical Control Rooms Alliance (ICCRA)[28]
- The Australian Control Room Network Association (ACRNA)[29]
- The Collaborative Coalition for International Public Safety (CC:IPS)[30]

The Emergency Response Centre in Finland has announced its membership of TCCA signalling a movement of these types of Centres into industry associations.

8.3 Public Safety Wireless Networks

Globally PSAPs use wireless networks to communicate with First Responders in the field. Currently this communication is done by LMR using the P25 and TETRA Standards. In the future Next Generation PSAPs will also be able to communicate using LTE mobile broadband networks based on 3GPP Standards.

Under the guidance of COAG the foreseeable future will provide the PSMB capability together with the NG Triple Zero platform as new major *transformational* components of the Ecosystem bringing data and video and associated applications and capabilities to strengthen the role of the Ecosystem.

8.4 Land Mobile Radio

Land Mobile Radio (LMR) is more commonly known as two-way radio and provides voice communications in either a one-to-one or one-to-many format giving the ability for all those involved in emergency response to be able to listen to all radio traffic pertaining to their operations and act on the information as it is being broadcast.

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[28] https://www.iccraonline.com/iccra

[29] https://acrna.org/

[30] https://www.bapco.org.uk/our-partners/collaborative-coalition-for-international-public-safety-ccips/

The present Australian networks have been established for many years and have been continually refined and improved to suit the individual needs of both PSAs and commercial organisations and have been proven to be a very reliable tool for public safety and other users of radio communications include local government and essential service providers in transport, energy, the environment and water supply.

These networks have been designed by the PSAs to not only provide excellent radio coverage, but to also have support systems like power supplies and equipment shelters to ensure the fixed equipment can continue to operate for extended periods, certainly a period of several days during emergency situations such as bushfires.

Australian PSAs have traditionally used LMR networks connected to PSAPs through a Console Sub System Interface (CSSI). Both the Networks and the CSSI should conform to the Project 25 (P25) Standards Suite developed and maintained by the Telecommunications Industry Association (TIA) in the United States of America on behalf of the P25 Steering Committee.

According to the P25 Technology Interest Group (PTIG)[31] there are approximately 2800 P25 Networks of various types in existence primarily in the USA and Canada where there are currently 37 vendors supporting the P25 Standard providing products or services for P25 systems in a competitive market. The P25 LMR networks have a high quality voice capability with a limited ability to carry a small amount of data that supports text messaging, remote radio configuration (OTAR), IP connectivity and GPS.

Australia's States and Territories have invested considerable funding into P25 LMR networks, their operation and maintenance and continue to do so through varying contract arrangements e.g. in March 2020 NSW announced a further $217 million investment into the state's mission-critical Government Radio Network[32] (GRN) to consolidate about 70 separate agency radio networks into one network to accelerate the Critical Communications Enhancement Program[33] to reach 96% of populated areas in NSW.

This new funding is in addition to the more than $401 million made available to the upgrade of the GRN since 2016 supporting the proposition that LMR remains the most suitable communications medium for public safety communications and sets the benchmark standards for other technologies because LMR systems:

- Are designed to provide ongoing operations over several days as a general rule making them especially applicable for public safety applications.
- Are able to operate in a stand-alone format in most instances meaning the loss of back-haul or linking with other sites does not necessarily interrupt local operations.
- Are channel selectable to operate in peer-to-peer format when main networks fail as a result of many causes.
- Are able to support messages being understood even if signal clarity is diminished not as experienced operators know the background of messages.
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[31] http://www.project25.org/
[32] https://www.telco.nsw.gov.au/content/government-radio-network-grn
[33] https://www.telco.nsw.gov.au/ccep/ccep-home

- Are power dependent systems designed with ample back-up and support power capacity until power can be restored to the network.
- Are able to continue to operate even when the site has been fire damaged because the inherent safety features of the equipment will often simply reduce transmitter power to protect the equipment from damage but even so the transmissions will still be operating.
- Are designed to *public safety grade requirements* to operate in natural disasters such as bushfire or floods however delays to network site access to re-establish communications are usually due to the inability to access the sites due to external causes, such as dangerous trees in burnt areas or blocked access tracks in forest areas.

Risk mitigation for this significant level of financial investment will rely on the use of an open standards based approach to network design, installation, maintenance and operation as part of the Ecosystem. In this context cross State border interoperability and intrastate network interfacing will be an imperative particularly from a bushfire operational response capability.

However, LMR systems have some inherent disadvantages in the modern world:

- The systems are designed for voice communications and this is their strength, although it must be kept in mind that in emergency situations the human voice can transmit more than just words, inflections and background can also be understood.

- Although LMR systems can transmit some data as part of their transmissions, this is generally limited to short messages such as GPS location details and status messages, they are not able to transmit or receive large amounts of data that is becoming a pre-requisite or modern disaster response. Until now this has not been an issue however in to-days world there is an expectation from the public that detailed data information should be available to all.

- Although not an inherent disadvantage of LMR systems, the fact that most historical public safety networks have been designed to suit the particular PSA has meant that there are interoperability concerns when multi-agency or cross-border situations arise. This can be defined into two general area of concern:

    - The frequency allocations utilised by the various agencies often preclude the addition of other agencies operating frequencies into the radio equipment and it would be very difficult and expensive to have to re-farm the spectrum to provide common frequency allocations for all PSAs across Australia, and

    - There are several equipment standards that can be used, with little or no interoperability between the different standards. Even within the P25 standard there are some areas that are not closely defined and if a manufacturer has 'enhanced' their product offering with an additional option or feature this may then mean the equipment becomes non-standard and so interoperability can be compromised. This situation does exist within the Australian agencies now.

In general LMR systems have served the public safety sector well for many years and continued to be the most reliable communications platform during the recent national disasters. Given the ability of the technology and systems to provide both one-to-many communications and also peer-to-peer communications at times when major systems fail gives First Responders a lifeline that is of benefit under all conditions.

8.5 Public Safety Mobile Broadband

8.5.1 Standards Development for PSMB

Consumer grade mobile broadband networks using Long Term Evolution (LTE) technologies and associated devices have become common place in global societies and are continuing to develop their capabilities using 3GPP Standards.

Over a decade ago the global public safety communications community nominated LTE as the technology to be selected for development for use by PSAs using 3GPP Standards to meet the specific needs of PSAs using LMR capabilities as indicative benchmarks e.g. Direct Mode to produce a Public Safety Mobile Broadband (PSMB) capability.

As the 3GPP public safety standards developed and products became available to the public safety market commercial hype foreshadowed the demise of LMR and the use of LTE for all mission critical public safety communications.

Market maturity has now reached the point where it is generally accepted that LTE is not directly substitutional for LMR from a public safety perspective and that both technologies need to be seen as compatible within the Ecosystem where LMR will continue to provide the mission critical push to talk voice capability and LTE will provide the mission critical 3GPP data and video capabilities for the foreseeable future. 3GPP Standards for mission critical PTT, Data and Video have been completed and the first mission critical PTT applications are now appearing in the market.

Led by the FirstNet Authority[34] in the USA other countries are now in the process of developing and delivering a PSMB capability for their PSAs underpinned by 3GPP Standards and service delivery models utilising commercial mobile networks where applications such as Prioritisation, Pre-emption, Quality of Service and Network slicing are being used to meet the service requirements of PSAs.

Australia has now reached the point of commencing a Proof of Concept for its preferred service delivery model for a PSMB capability and being a late starter has had the opportunity to leverage global learnings from other countries to mitigate risks associated with providing a PSMB capability one of which is culture change within PSAs.

Australia has also had the opportunity to leverage PSMB experience through international and local conferences, industry bodies and academia who have been participating in this space form many years.

[34] https://www.firstnet.gov/

8.5.2 Productivity Commission's Research Report into Public Safety Mobile Broadband

In December 2015 the Productivity Commission delivered its Research Report[35] into Public Safety Mobile Broadband to the Australian Government in response to Government's request that the Commission examine the best way to deliver a *'public safety grade'*[36] mobile broadband capability for use by Australia's Public Safety Agencies noting that these Agencies had made only modest use of mobile broadband to date due to concerns that the quality of commercial services is insufficient to support 'mission critical' situations.

The Commission's Report considered the relative costs, benefits and risks of a range of options, including deploying a dedicated network, relying on commercial networks, or pursuing some combination (or hybrid) of the two.

The Commissions' Report found that on a first principles basis the most efficient, effective and economical way of delivering a public safety mobile broadband capability was by relying on commercial mobile networks and spectrum because the technology required to deliver such a capability existed, although the precise service standards that would be achieved were are uncertain.

The Report also advised that if governments decided to put in place a public safety mobile broadband capability there would be implementation challenges e.g.

- A competitive procurement would be essential to deliver value for money and to reduce the risk of being locked in to a single supplier.
- While interoperability between jurisdictions and agencies was within reach, there will a need for jurisdictions to agree to common interoperability protocols and make arrangements for sharing information and network capacity among agencies.

Roll forward five years and Australia's Public Safety Agencies still do not have access to a public safety mobile broadband capability after a series of false starts however progress continues to be made on a number of fronts.

Given the concerns expressed by the Productivity Commission and the progress with transformational projects within the Ecosystem the Australian Government should initiate a national *"Fit for Purpose"* assessment of existing PSA Communications Centres for future connectivity with the *Next Generation* Triple Zero Call Service, existing Land Mobile Radio networks and the PSMB capability including both intra State/Territory and cross border interoperability.

By 2018 public safety mobile broadband projects were being progressed by a number of countries e.g. USA, United Kingdom, South Korea, Europe, Canada, Norway, Finland, Japan and France.

This week Finland announced its public safety mobile broadband network will be up and running by 2025 after awarding contracts under a 10 year deal to provide the 4G & 5Gradio access network and core systems based upon 3GPP standards. Finland's Emergency Response Centre Agency has also become a member of industry body TCCA[37].

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[35] https://www.pc.gov.au/inquiries/completed/public-safety-mobile-broadband/report

[36] http://www.npstc.org/download.jsp?tableId=37&column=217&id=3066&file=Public_Safety_Grade_Report_140522.pdf

[37] https://tcca.info/

In the United States, Congress allocated $US300M to the Public Safety Research Laboratories (PSCR)[38] in Boulder Colorado to undertake research into what capabilities Public Safety Agencies and their First Responders really needed from a public safety mobile broadband capability. This research was used to underpin the procurement process conducted by the FirstNet Agency to procure and provide the capability in conjunction with commercial network operator AT&T to the USA public safety community.

The PSCR research produced to support FirstNet has proved to be a major success resulting in the development of network capabilities such as Priority, Pre-emption and Quality of Service (PPQoS) and in recent developments network slicing to deliver access to the network by First Responders when and where required.

PSCR representatives have visited Australia and New Zealand over the past two years to attend Comms Connect Conferences[39] to provide briefings and presentations on its research which is now being distributed globally through a series of research challenges and competitions.

The willingness of countries to share information and experiences, good and bad, about the processes they are using to procure public safety mobile broadband capability has been remarkable and Australia has been able to access this information through a number of channels e.g. international and local conferences, alliances formed between industry associations, equipment manufacturers and vendors, standards organisations and academia.

8.5.3 COAG Support and PSMB Status

COAG has progressively approved a level of necessary support for Australia's PSMB capability and to address the issues raised by the Productivity Commission in its advice to Government.

On 5 December 2018 the Prime Minster announced $1.5M funding for a National Project Office to establish the capability within the Ecosystem and to expand a PSMB capability trial across Australia during 2019[40].

On 12 December 2018 COAG met to consider progress on priority economic, social and national security issues to improve the lives and ensure the safety of all Australians[41].

Under the heading of *Crisis and Emergency Management* COAG acknowledged that ***"Australia's Public Safety Agencies need to work with advanced technology and in this context COAG took a significant step towards achieving a federated national PSMB capability with all jurisdictions by agreeing to a Strategic Roadmap[42] that sets out a plan to design, implement and operate the PSMB capability"***.

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38 https://www.nist.gov/ctl/pscr?utm_source=NPSTC+Broadband+Emerging+Technologies+Working+Group+Presentation+on+DiVE+Program&utm_campaign=IWCE&utm_medium=email

39 https://comms-connect.com.au/

40 https://www.pm.gov.au/media/boosting-firefighting-capabilities-and-community-preparedness

41 https://www.coag.gov.au/meeting-outcomes/coag-meeting-communique-12-december-2018

The Public Safety Mobile Broadband National Roadmap identifies that a national PSMB will deliver a communications platform that:

- improves access to information
- provides real-time, automated situational awareness;
- creates a platform for emerging technologies to be integrated into operational practices.

International PSMB Projects have all gone through an extensive planning process reflecting the degree of complexity and the need for extensive consultation and research to underpin project documentation and process and to develop stakeholder management strategies.

The development of "Roadmaps" to convey;

- outcomes from consultation-outreach;
- knowledge from research; and
- report progress in an open and transparent manner

is a model that has been adopted within the international public safety community. Examples of these Roadmaps are as follows:

In the USA the PSCR[43] progressively produced three Roadmaps from consultation-outreach to identify the three PSMB areas of importance to the public safety community that required specific research i.e. Location Based Services (LBS)[44], Public Safety Analytics[45] and User Experience and User Interface (UE/UI)[46] for Devices.

The FirstNet Authority also produced Roadmaps[47] and used creative images as a key communication tool to inform its broad audience of stakeholders from Members of the U.S. Congress to First Responders.

In Europe Public Safety Communications Europe (PSCE) produced a Transition Roadmap[48] for the European Union Interoperable Broadband and Communication Applications and Technology for Public Safety specification through a twelve month process of consultation with public safety representatives from 15 European Countries and NPSTC[49] from the USA.

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[42] https://www.coag.gov.au/sites/default/files/communique/public-safety-mobile-broadband-strategic-roadmap.pdf

[43] https://www.nist.gov/ctl/pscr
[44] https://www.nist.gov/ctl/pscr/location-based-services-publications
[45] https://www.nist.gov/ctl/pscr/public-safety-analytics-publications
[46] https://www.nist.gov/ctl/pscr/user-interface-user-experience-publications

[47] https://www.firstnet.gov/sites/default/files/FirstNet%20Program%20Roadmap%20Executive%20Summary_03112014.pdf

[48] https://www.psc-europe.eu/images/BMAP_FD_PR.pdf
[49] http://www.npstc.org/index.jsp

A RoadMap needs to be produced for the total Ecosystem and each of its components.

COAG also agreed to continue to work towards resolving the spectrum arrangements to support a PSMB capability.

PSMB National Project Management Office

A PSMB National Project Management Office (NPMO) has been established and is hosted by the NSW Telco Authority. The NPMO will undertake the work outlined in the PSMB Strategic RoadMap and is contacting Australia's PSAs for input with this activity being led by the South Australian Police Commissioner.

PSMB Preferred Delivery Model:

To assist in the development of a preferred PSMB Delivery Model a Request For Proposals (RFP) was issued in February 2018. The analysis of the responses to the RFP identified a Mobile Virtual Network Operator/Radio Access Network (MVNO/RAN) sharing model as the preferred PSMB Delivery Model with the following attributes:

- A MVNO model with multi-carrier roaming in metro and regional areas, which will benefit from the overlapping coverage and redundancy of multiple carrier networks and avoid the cost of hardening a single network.

- A RAN sharing model to address areas that require an expansion of existing coverage and would generally apply in rural and remote areas.

- The potential use of Deployable Base Stations in areas beyond the coverage footprints of conventional networks.

- Network Coverage: Coverage and connectivity will be provided through the PSMB Core to commercial MNO RANs and Deployables. Where there is no commercial RAN coverage ACMA allocated spectrum will be used in conjunction with Deployables to provide coverage through connection to MNO RANs and Satellites with a "hopping" capability. The spectrum will also be available for use by commercial networks in conjunction with the Deployables and to allow commercial networks to "light up" Base Stations for use in PSMB coverage.

- Network Resilience: Networks will be hardened to ensure the PSMB capability has sufficient back up power and strengthened infrastructure.

- "Owned" Spectrum: The ACMA has identified 10 MHz (5+5) in the 800 MHz band for the PSMB capability to be used to fill gaps in existing commercial networks.

- Access: Priority access will be provided to PSAs over non-public safety users.

- Services: PSMB features and functionality will support Public Safety Agencies group communications in the field with Mission Critical Push To Talk (MCPTT) and video broadcast to groups.

PSMB Proof of Concept (PoC)

The NSW Telco Authority commenced a market engagement process on 24 October 2018 releasing a RFP to the telecommunications industry to undertake the development of a national PoC test environment for a MVNO/RAN Delivery model across urban, regional and remote locations in Australia over six to 12 months expected to begin in early 2019.

The Proof of Concept will:

- Prove the PSMB technical capability and identify applications e.g. Prioritisation, Pre-emption and Quality of Service, (PPQoS) that will utilise this technical capability.

- Address the PSMB capability to roam across commercial networks and agreements that will need to be in place to support this capability.

- Consider the financial implications of these capabilities.

In November 2019 it was announced that the evaluation of responses to the Proof of Concept RFP had reached a point where it was expected it would be possible to announce the appointment of a commercial partner to undertake the PSMB Proof of Concept. No announcement has been made.

The results from the Proof of Concept will enable the individual States and Territories with the support of their respective Public Safety Agencies to finalise their respective Business Cases to allow the start of the initial roll out of the PSMB capability with minimum infrastructure requirement e.g. PSMB Core plus one Base Station.

PSMB Funding:

The PSMB will be a federated model meeting the needs of Australia's Public Safety Agencies by using a common Core providing the ability to accommodate different needs, implementation timings and budgets of Australia's States and Territories. A national PSMB funding model will be developed through use of the Federated Model under which individual States and Territories will purchase the PSMB capability.

PSMB Next Steps

- Execute the PSMB Proof of Concept
- Gather information about key PSMB cost components and identify national delivery models
- Develop a sustainable implementation funding model
- Spectrum allocation and transition
- Industry engagement and high level technology design
- On-going customer collaboration including validation of the Delivery Model with PSAs.

9.0 Spectrum

The Ecosystem relies heavily on the ability to access spectrum to function and hence spectrum is a core requirement in *operational response* capacity and capability.

Spectrum is the great enabler – this is a statement that is not only very accurate in relation to Australia in the twenty-first century, it is also the critical basis for any review of Australia's natural disaster response and the foundation of any improvements in the overall reaction and responses to future disasters, be they small or on a national basis like the bushfires experienced this past summer and the current coronavirus pandemic.

In previous sections of this Submission there has been mention of many of the aspects of communications that have been subject to inquiries and reviews over the past decade, and from these various sources it is evident that in many cases spectrum has been a critical component of the communications capability involved. This is going to continue into the future and as such it is vitally important that spectrum should be considered as a significant factor and not as an incidental add-on in the Ecosystem.

Land Mobile Radio for government agencies has been traditionally provided in the 400 MHz Band. Historically the responses of Australia's first responder services have relied on narrow-band Land Mobile Radio (LMR) or two-way radio as it is commonly known, as their primary means of communications in both daily operations as well as during emergency or disaster situations.

Over recent years developments in mobile telephony and the ability to utilise higher frequency bands of the electromagnetic spectrum have opened up new opportunities with mobile data being much more readily available and offering new solutions for first responders.

Development of Business Models to support a PSMB capability have progressively moved away from providing a dedicated network built, owned and operated by PSAs, which was the traditional model used with LMR networks, to Business Models incorporating a Mobile Network Operator (MNO) as a commercial partner.

International experience demonstrates that those countries preparing for or proceeding with the introduction of a PSBM capability have selected the 700MHz band for public safety communications use in conjunction with a MNO as a commercial partner.

The Australian Government recently completed the auctioning of all 700MHz spectrum for commercial use. This decision was consistent with its November 2016 decision to accept the recommendation by the Australian Productivity Commission that the least-cost option to provide Australia's public-safety agencies with a PSMB capability is to use a commercial MNO carrier and may have increased competition between carriers for the spectrum auction process knowing that they have Australian PSAs as potential locked-in customers needing a PSMB capability.

While the Government has taken to opportunity generate revenue through the sale of spectrum and the ACMA has applied the concept of Opportunity Cost Pricing (OCP) to spectrum allocation and pricing the consequence of these actions and impact upon PSMB business and service delivery models has not been taken into account.

The ARCIA has been actively engaged with the ACMA on the application of OCP to spectrum for some time and in November 2014 produced a report[50] that determined the economic economic benefits of LMR spectrum use was between $1.99 billion and $3.72 billion per annum compared to an annual OCP of only $39.7 million, indicating the benefits of LMR are at least 10 times greater than the next best alternative providing some indication of the value of PSA LMR networks.

9.1 Dedicated Public Safety Spectrum

At present there are two spectrum segments that are identified as being for public safety use:

- The Australian Communications and Media Authority (ACMA) announced in 2012 that it had reserved 10 MHz (5+5) spectrum in the 800 MHz band for public safety communications.

  Under the Machinery of Government changes previously discussed in 3.0(e) these discussions may now be held in the broader structure of the Department of Transport, Transport, Regional Development and Communications and be based upon the outcomes from the Proof of Concept validation of the proposed Service Delivery Model and the optimum manner in which spectrum may be utilised.

  COAG has committed to addressing the issue of spectrum presumably also based on advice regarding the outcomes from the Proof of Concept. Until then it would seem sensible to retain the from spectrum block comprising the two 5MHz segments in the 850 MHz band.

- In the 4.9GHz band the ACMA (and other international jurisdictions) have set aside a block of frequencies for PPDR operations, the spectrum characteristics mean that this section in the future may be used for localised operations in areas where the PSMB networks may not be suitable. For example, some agencies are already experimenting with utilising this spectrum to provide a 'communications bubble' around appliances or for specific systems planning to provide coverage into areas that are difficult to penetrate, such as in-building coverage or in some cases in conjunction with aerial appliances to extend radio coverage.

  Development of products and applications for this section of PPRR spectrum are still at an early stage and as the PSA's begin to recognise the benefits offered by the band there may be a much higher uptake by agencies and it will become another part of the overall eco-system.

50 http://www.arcia.org.au/images/pdfs/Economic%20_report_%20on_%20the_%20value_%20of_%20LMR_%20services_%20in_%20Australia.pdf

10.0 Standards and Interoperability

10.1 Standards

Like spectrum "open standards" i.e. *non-proprietary* standards are an essential component in achieving seamless interoperability across the Ecosystem to support *operational preparedness and response* capabilities.

In the global public safety market two commercially competitive standards emerged for LMR i.e. Project 25 (P25) in the North American market and TETRA in the European and Asia market and both continue to develop today.

As shown in Figure No. 5 the production of standards is a global commercial business undertaken by Standards Development Organisations (SDOs) that rely heavily on relationships with governments, their agencies and industry (manufacturers and vendors) to identify the need for standardised products and services for specific markets such as the public safety market.

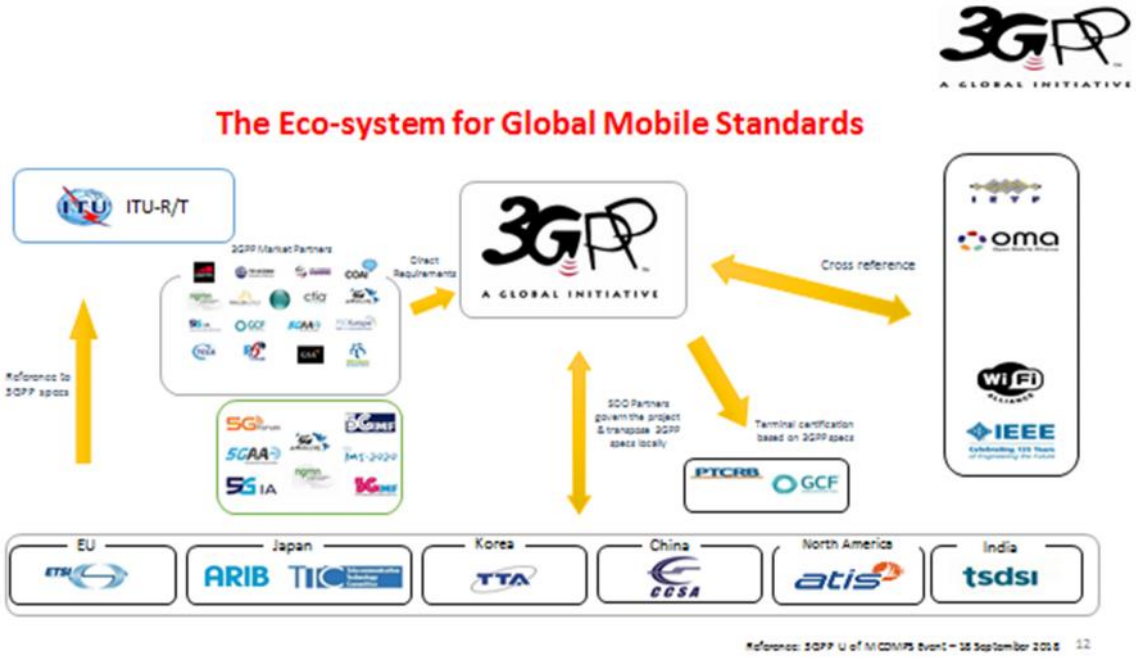

Figure No 5: The Ecosystem for Global Mobile Standards

The emergence of cellular mobile telephony saw the adoption of Long Term Evolution (LTE) as the technology supporting this communications capability which continues to evolve to provide 24/7 real time connectedness and the carriage of vast amounts of data around the world and 3GPP[51] as the SDO to develop the associated standards for the technology.

[51] https://www.3gpp.org/

Through representations from global public safety communications associations 3GPP agreed to create specific *mission critical* standards for the use in the Ecosystem and for use in developing products and services in the public safety market.

The development of 3GPP mission critical standards led to the development of a public safety mobile broadband capability (PSMB) that is currently being rolled out across the USA, the United Kingdom, in the procurement phase in Europe and in the planning phase in Australia.

In parallel with 3GPP production of mission critical standards for public safety 3GPP are producing standards for 5G Vehicle to X (infrastructure) Standards and 5G Industrial IoT Standards with some sharing of information across the sectors.

In recent years 3GPP commenced and completed the development of standardised interworking between the LMR and LTE standards sufficient to allow North American and European SDOs to develop functional interfaces to this interworking capability allowing the development of LMR and LTE interoperability within the Ecosystem.

Acceptance by 3GPP that mission critical standards were required for the Ecosystem and the subsequent 3GPP standardisation efforts have underpinned the global development of a PSMB capability will enable discussion about the future role of 5G in the context of the Ecosystem.

10.2 Coverage

A critical factor in any wireless network is the total area the network provides coverage for which in turn depends on the coverage provided by the individual Base Stations within the network their coverage.

In Australia coverage capability is currently provided by a combination of Government owned LMR networks, the NBN, commercial carriers providing mobile and fixed broadband coverage and in the near future the deployment of 5G networks and Low Earth Orbit satellite networks. Mobile deployable infrastructure is also available to extend coverage in times of emergency such as bushfire. With the rapid and continuing uptake of mobile telephony network coverage and capacity has become even more important and no more so than in regional and rural Australia.

The 2018 Regional Telecommunications Review[52] examined how people use telecommunications services in regional, rural and remote parts of Australia and how regional communities can maximise the economic, social and future opportunities enabled by digital technologies and services. The report sets out that in order to maximise economic and social benefits for regional, rural and remote communities through the use of digital technologies one of the enablers that needs to be in place is access to telecommunications infrastructure.

The report highlights that expanding mobile coverage has clear economic and social benefits, as well as *public safety* benefits for people living, working and travelling in regional and remote areas of

[52] file:///C:/Users/User/Downloads/2018-regional-telecommunications-review-getting-it-right-out-there.pdf

Australia. The Governments response[53] to the Report highlighted the growth in demand for data and the movement of essential government and industry services online.

The unprecedented demand for data is placing pressure on some parts of the NBN and mobile carriers' regional networks. With the regional rollout of the NBN almost complete, future telecommunications investments will be targeted to complement the NBN.

The Government has committed $380 million to the Mobile Black Spot Program[54] to invest in telecommunications infrastructure to improve mobile coverage and competition across Australia which under the first five rounds of the Program (Round 1, Round 2, the Priority Locations Round, Round 4 and Round 5), the Government's commitment has generated investment of more than $836 million, delivering a total of *1,229 new base stations across Australia*. Round 5 includes 33 base stations that specifically target Public Interest Premises such as economic centers and *emergency services facilities.*

Importantly the Black Spot Program should be considered part of the Ecosystem because it establishing additional infrastructure for the future PSMB capability discussed elsewhere in this Submission given the PSMB Service Delivery Model assumes the ability for PSAs to be able to roam across carrier networks. Coupled with the continuing expansion/upgrading of LMR networks and the resolution of interstate and cross border network interoperability cross border the Ecosystem's wireless coverage capability should be being progressively increased in a coordinated and prioritized manner. This proposition needs to be tested in the *"Fit for Purpose"* assessment made in Recommendation (e) to the Commission.

10.3 Electricity Supply

Electricity and telecommunications are recognised as being critical infrastructure and they are required to provide their services in unison at times of emergency and in particular with major emergencies and disasters such as bushfire.

Both LMR and LTE wireless networks require continuous power supply and as previously discussed are designed to be public safety grade with battery backup for a limited period of time and be accessible to base station sites for both routine maintenance and/or re-instatement after a natural disaster. Likewise the importance of reliable energy supplies to the total Ecosystem cannot be overstated which requires stability in the national energy grid as renewable power sources are progressively introduced.

The recent bushfires highlighted the impacts of loss of electricity to several rural communities across the nation. A clear example was the extended period of loss of electricity supply to Mallacoota in Victoria and other rural centres in both New South Wales and Queensland.

[53] file:///C:/Users/User/Downloads/aus-gov-response-2018-regional-telecommns-indt-comm-rep-2018-reg-telecomms-review-getting-it-right-out-there.pdf

[54] https://www.communications.gov.au/what-we-do/phone/mobile-services-and-coverage/mobile-black-spot-program

Both smoke and heat can affect high tension/high voltage lines and can have major impacts, on not just rural communities but also major cities. Both the Black Saturday and the Hazelwood Mine Fires in Victoria are examples of the threats to major power delivery to larger sections of the community.

The close relationships between electricity providers and the PSAs in these types of circumstances is a crucial attribute of resilient communities. The ability of power providers to convey the gravity of the implications these types of emergencies present and to perform repairs and maintenance are a key to efficient recovery efforts.

The channels of communication between electricity providers (and other key service providers) and the PSAs should be maintained and enhanced.

10.4 Implications for other key Community Service Delivery industries

It would be beneficial for the Commission to scan (at a high level) the various business continuity measures that have been enacted by key community service delivery sectors as a result of the current pandemic and declared states of emergency.

The adaptive nature of industry solutions may provide valuable insights and lessons for future fire and other emergencies across the PPRR continuum and national resilience networks across health, transport, communications, energy, and water and cyber sectors would share such information in these circumstances.

10.5 Service Industry Control and Communications Centres

Critical Infrastructure service providers e.g. electricity, telecommunications, water and gas maintain extensive communications networks not unlike those in the public safety communications Ecosystem. These networks are end to end commencing with Call Centres to cater to their customer needs and concluding with their field response to service disruptions and all and can be affected in a major event such as fire or flood or weather

Many of these service providers rely of remote sensing equipment with backhaul to Control Centres over both private and commercial communications networks. To highlight the importance of these networks the impact of a major fire cutting the remote data sensing networks to either water or gas could be catastrophic. Remote sensing of pressure within both these systems is critical. In the case of gas supply the possibility of an explosive event and the resulting loss of supply and with water a similar loss of supply or the real possibility of sewerage on the streets.

Direct links should be established between these service providers and the Ecosystem and could even be considered extensions of the Ecosystem in times of emergency to ensure the rapid dissemination of time sensitive critical information and facilitate both the response and recovery efforts.

10.6 Interoperability

The USA based SAFECOM[55] was formed in 2001 after the terrorist attacks of September 11, 2001 as part of the Presidential E-Government Initiative to improve public safety interoperability, allowing First Responders to communicate effectively before, during, and after emergencies and disasters.

The SAFECOM Interoperability Continuum is shown in Figure No 4

The Framework is intended to assist emergency response agencies and policy makers to plan and implement interoperability solutions for data and voice communications.

The Continuum's elements include governance, standard operating procedures, technology, training/exercises, and usage of interoperable communications.

It is expected that the Continuum would be well known to Australia's emergency management community and it continues to be accepted and actively used in the USA and it equally applies in Australia.

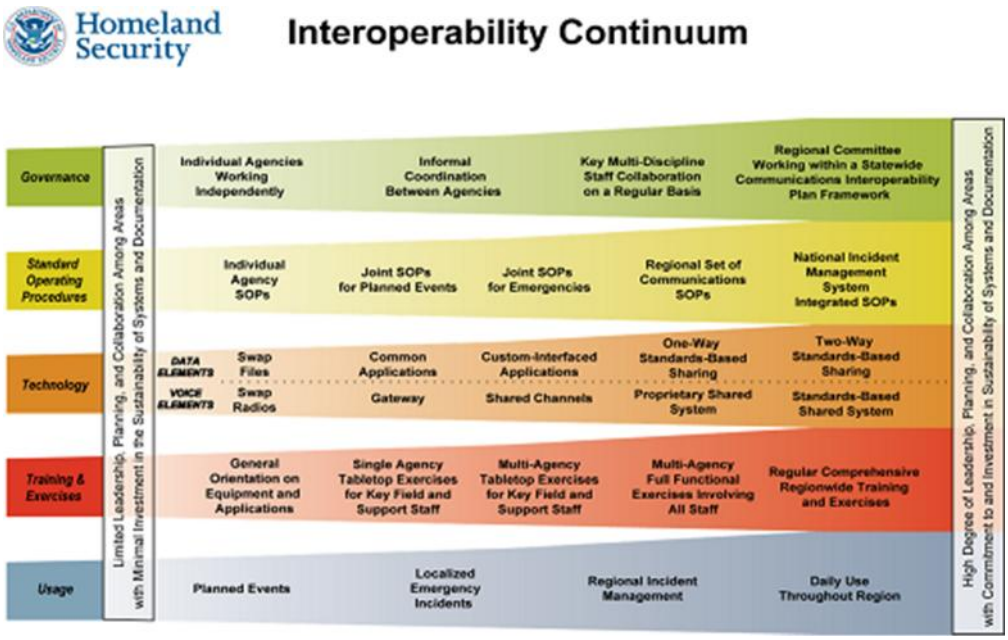

Figure No 6: The SAFECOM Interoperability Continuum

PSA Communication Centres perform both an inbound and outbound role i.e. the receipt of calls from the public for assistance using rapidly disappearing fixed line telephony or rapidly increasing mobile telephony and the transfer of the information produced by the analysis of these calls to nominated PSAs for operational response. This transfer of information relies on the existence of open standards based interfaces through which this information can be transferred.

[55] https://www.dhs.gov/safecom/about-safecom

In the LMR world there are key interfaces that provide this capability as follows:

- Console Sub Station Interface (CSSI) – connects the Communication Centre to LMR (P25) networks and field based First Responders and their radios which contain P25 feature sets e.g. voice.

- Integrated Sub System Interfaces (ISSI) – provides the capability to connect P25 networks together to extend communications connectivity to First Responders.

Cross border communications at State Borders between LMR networks has previously been raised as an issue in Bushfire Inquiries and it should be expect to be an issue the 2019-20 Bushfires. It is understood that cross border interoperability has been previously addressed by having trucks equipped with radios from opposite States to provide a form of cross border communications and a degree of interoperability.

Development of the P25 ISSI Standard is continuing in the USA to meet the movement of local networks joining larger or State-wide networks.

It is unknown if any form of ISSI has been attempted between State networks but it is suggested that a trail of a P25 Standard ISSI be undertaken using expertise and advice sourced from the Cybersecurity and Infrastructure Security Agency (CISA)[56] within the Department of Homeland Security.

The PSMB RFI appropriately states that "open standards" are to be applied to the PSMB capability and this approach needs to be maintained in all future steps to procure the capability for Australia's PSAs and First Responders.

As part of the planning process to progress for the PSMB capability the level of participation in the development of the global Standards underpinning the mission critical public safety communications Ecosystem should be reviewed.

11.0 Future Demand - *moving from minutes to seconds to real time to prediction*

The degree of 24/7 connectedness of our world is only going to increase as new technologies are developed to meet consumer demand for products and services to support future perceived needs based around "in real time" experiences i.e. in public safety terminology *operational response* capability *moving from minutes to seconds to real time to predictive*.

The developing market for this notion of "*moving from minutes to seconds to real time to predictive"* can be seen in many sectors e.g.

- New technology from Monash University can accurately find faults in power networks in a split second and within 10m of the fault and slash the duration of blackouts whereas pinpointing powerline faults can usually take hours under existing methods of detecting problems in high risk rural networks in Victoria. Five of Victoria's 11 Black Saturday bushfires were started by power line faults. - Herald Sun 5 April 2020 P22.

[56] https://www.cisa.gov/sites/default/files/publications/20190130%20ISSI-CSSI%20Primer%20FINAL%20508C.pdf

- In late 2019 Dataminr entered the Australian Market providing Australian and New Zealand businesses with an Artificial Intelligence Platform for real-time event and risk detection. Dataminr detects the earliest signals from publicly available information across social media, blogs, information sensors, and the deep/dark web and generates the earliest real-time alerts.

  With Dataminr's capabilities, private and public sector organisations are able to solve real-world problems: corporate enterprises are uncovering the earliest signs of high-impact events and emerging risks, and government organisations and NGOs are accelerating emergency and humanitarian response on local and global scales.

Experience has shown that as these products and services are taken up spectrum demand increases dramatically and current policy development and strategy clearly indicates that the public safety community has to learn to co-exist with and leverage these technologies on the basis of being able to gain spectrum access when and where required through increasingly sophisticated and automated network management.

It therefore becomes an essential requirement that Australia's PSAs are involved in the governance administration and strategy environment described earlier for the Ecosystem and be recognised in outcomes such as the National Disaster Risk Reduction Framework.

A suggested starting point might be involvement in the review of the Critical Infrastructure Resilience Strategy - released in 2015 and *due for review in 2020.*

11.4 Public Safety Internet of Things

The Internet of Things is a collection of physical objects or "things" such as *sensors* that enables the collection of data for a specific purpose and the transmission or exchange of this data using networks to help people make better and more informed decisions to get the best possible outcomes.

The Internet of Things is considered the single biggest technical innovation opportunity to hit the world in decades. It is estimated that there are currently about 5 billion items wirelessly connected to the internet worldwide and in three years that number is projected to swell to 50 billion internet-connected data-producing devices.

The Internet of Things has also gained traction over recent years in the global public safety community as PSMB projects have continued to progress with the expectation that PSAs will use this capability to produce innovative applications of the capability in service delivery to the communities they protect e.g. the use of UAVs. The Internet of Things or as it has become known in the public safety community as the "Public Safety Internet of Things" will have a natural connection to and role to perform in the Ecosystem and its evolution.

In the USA the National Public Safety Telecommunication Council (NPSTC)[57] has led the way in providing advice and guidance to PSAs about "Public Safety Internet of Things" through two publications:

[57] http://www.npstc.org/index.jsp

- PSIoT Use Cases Report – June 2019[58]
- PSIoT Outreach Report – April 2020[59]

11.5 Spatial Data Infrastructure

As previously mentioned the PSMB capability is about the transport of "data" (text, images, video, spatial, temporal) of which a large percentage is expected to be spatially enabled or will become spatially enabled as part of utilising machine to machine learning and artificial intelligence in PSA functional applications and public safety "Apps" aimed at enhancing PSA and First Responder decision making.

The emerging SDO for spatial data use in the Ecosystem is the Open Geospatial Consortium[60] (OGC) which is an international industry consortium of over five hundred companies, government agencies and universities participating in a consensus process to develop publicly available interface standards.[61]

The integration of spatial data has become pervasive within our current society. The ability to locate, route, respond, and identify features are now fundamental to PSAs . The current reliance on two-dimensional data (maps) is quickly evolving within a smart cities type context to location information in three dimensions (X, Y and Z).

The ability visualize a location in a virtual simulation has already been identified as a future imperative for PSAs. A clear example is a fire response unit being able to view a virtual image of a multi-story building with knowledge that the seat of the fire is on the tenth floor in Unit 12 (which is located on the south west corner) with a basic virtual image of the layout. This provides contextual information to plan the attack on the fire prior to even getting to the scene. Bushfire modelling is also reliant on 3 dimensions with fire generally travelling upslope far more quickly than downslope (as is fire smoke plume modelling).

The use of spatial data infrastructure in land management and administration has rapidly matured over the past decade and is rapidly evolving to incorporate 3D digital models known as Digital Twins.

A digital twin is a digital representation of the real world, with analytic tools used to visualise and model past, current, and future scenarios. e.g. the Fisherman's Bend redevelopment Melbourne where the Fisherman's Bend digital twin will allow 3D modelling over time, in locations above and below the ground to drive better, data driven decisions for planning and infrastructure development.

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58 http://www.npstc.org/download.jsp?tableId=37&column=217&id=4195&file=NPSTC_PSIoT_Use_Cases_Report_190616.pdf

59 http://www.npstc.org/download.jsp?tableId=37&column=217&id=4273&file=PSIOT_Outreach_Report_200417.pdf

60 http://www.opengeospatial.org/ogc

By embedding the use of a Digital Twin in the planning approval legislation and regulation for multi-story developments and the requirement that developers provide location co-ordinates (X, Y and Z) for individual apartments/offices could see the creation of a capability that could be used in PSAPs to accurately locate the source of Triple Zero calls from these locations. This capability would also contribute to creating actionable intelligence utilising geospatial information and imagery to inform the operational response and situational awareness for First Responders – a process that could be ultimately automated – and provide improved health and welfare for First Responders.

12.0 Training and Networking

In the next 5-10 years the Ecosystem will rapidly evolve driven by the technologies addressed in this Submission and by emerging technologies and technologies not even conceived of at this point. Process automation will occur at each point in the Ecosystems business and service delivery models as new technologies, public safety applications and artificial intelligence is introduced.

This evolution will also be driven by "data" of a type and volume not previously experienced or expected as the Ecosystem matures to accommodate matters relating to national security, where data processing is occurring across the Ecosystem from the Triple Zero operator to the First Responder at the scene of an incident.

This Submission has addressed the changes that will need to be made in PSA Communication Centres and mentioned the need for "data scientists" – these changes also need to occur in Incident Control Centres established during natural Disasters like bushfire and flood.

Every component of the Ecosystem needs to be assessed to determine the skill sets and the training needs to support both the operational and maintenance needs of that component in the context of the total Ecosystem – from TAFE apprenticeships to University graduates and very point in between.

This assessment needs to also drive the development and delivery of training programs that support the human resources that are employed (or volunteer) across the Ecosystem not just so they can perform the role of expected of them but also to look after their mental health and wellbeing at every point in the Ecosystem – because this is high stress 24/7 work environment where training simulations and the use of virtual reality may even add to stress levels.

Importantly these resources should also be able to access training that provides certified qualifications consistent with their chosen career path across the Ecosystem.

The training needs mentioned are not unique to Australia but are global because public safety communications is a global community performing the same function – saving lives through a unique career choice. Ecosystem training programs should embrace international multidimensional networking as part of career development so that the staff at ESTA in Victoria know the staff at the Emergency Response Centre in Finland and that they will be both experiencing the changes that public safety mobile broadband will bring to their workplace and have the opportunity to share the lessons learned.

13.0 Conclusion

It is believed that the content of this Submission has provided evidence to support its stated purpose:

- Highlight policy decisions already taken by the Australian Government and implemented through legislation or through the Council of Australian Governments (COAG)[62] to initiate action across a range of initiatives that will require the Ecosystem to provide *operational support* to Departments and Agencies at Federal, State and Territory levels of government to achieve the expected policy outcomes;

- Build upon and reinforce previous recommendations made to the Australian Government through its Committee structure, Departments and Agencies to continue to raise the profile, understanding and awareness of the Ecosystem to the benefit of all Australians:

The Submission has also provided evidence to support the recommendations made to the Commission regarding actions the Australian Government should take to strengthen Australia's National Natural Disaster Arrangements and provided advice about both short term and long term initiatives in support of these recommendations.

The University of Melbourne Centre for Disaster Management and Public Safety and its Partners in the preparation of this Submission would appreciate the opportunity to discuss the evidence presented with the Commission.

For further information about this Submission or its content please contact:

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[redacted]

[62] https://www.coag.gov.au/

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Ian Miller - Executive Officer
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27th April 2020

Royal Commission into Natural Disaster Arrangements,
Locked Bag 2000,
Manuka, ACT 2603

Attn: The Commissioner.

Dear Sir,

The Australian Radio Communications Industry Association (ARCIA) is pleased to be able to work with the University of Melbourne Centre for Disaster Management and Public Safety (CDMPS) and the Australian Critical Communications Forum (ACCF) in preparing and presenting the following submission. ARCIA is recognised by the Australian Communications & Media Authority as the peak industry body representing the Land Mobile Radio (LMR) industry in Australia and we have a strong working relationship with the ACMA in spectrum management areas. Over recent years we have worked closely with the ACMA and many of Australia's Public Safety Agencies through our various members to facilitate the extensive and efficient communications networks that exist today.

As we look back on the disasters of the past fire season, and then look outwards towards other jurisdictions we can see some of the future needs for communications being developed at present. Above all there is one common thread that is developing and is highlighted within our attached submission, there is an urgent need for the multiple facets of communications to be recognised as one composite communications eco-system. The following points reflect the developing needs for first responders and their communications requirements into the future –

- Today, emergency communications centers (ECCs and control rooms) have only a few essential functions, they receive voice calls (and, in some locations, text messages) from people who need response to a public safety incident, they dispatch first responders, and they manage a variety of databases and other sources of information to support the work of first responders in the field, for example vehicle registration or wants/warrants data.
- NG-000 will have many facets, one of which is enabling the public to interact via video, send files, images and video clips to ECCs. Tele-communicators in the ECC will need to triage such information – just as they triage voice calls today – and send appropriate content to responders in the field, via PSMB and other communications platforms.
- In addition, responders are becoming connected via the Internet of Things. Responders have wearable IoT (smartwatches, SCBAs etc.), they use wireless-enabled devices (ECGs, body-worn video cameras) and their vehicles are connected. This is a whole additional class of streaming data which needs, to some extent, to be monitored and triaged to keep responders safe.
- Furthermore, communities are becoming "smart" – they are deploying IoT on streetlamps, sensors in the street, cameras in public spaces, drones and other sensors. This creates an additional flood of data for improving the operation of these communities. Our public utilities (electricity, water, wastewater, gas etc.) are probably controlled or will be controlled by a smart grid. But also these sensors and control devices also have a public safety purpose and need to be monitored and controlled somewhere.

- Modern public and commercial buildings are becoming “smart”, being outfitted with sensors and control systems to improve their operations. If a public safety incident occurs in or near a building, the IoT data streams and control mechanisms in that building could be made available to ECCs and first responders to improve their response.
- Finally, the bushfire disasters and even the current pandemic crisis highlights the need for responders to directly contact residents of a community during certain kinds of incidents. An ambulance crew may be dispatched on a medical emergency for a patient who is showing symptoms of COVID19. The responding medics may want to establish a video chat link with the patient before actually entering the residence. Such a chat – over the PSMB – keeps the medics somewhat safe while still allowing them to triage and handle the situation.

All of these examples highlight the fact that we are now developing a reliance on the total eco-system of communications options for disaster response and relief, our populations are now expecting that public safety agencies can respond to incidents using the same technologies that our citizens utilise every day. This means that any review of communications must examine all aspects of the eco-system together, and any recommendations must be framed in such a way that they address all aspects of wireless communications together. Even the historical division between telecommunications and radio-communications have now faded and virtually all modern communications are based on ‘wireless’ communications.

In closing we would highlight the fact that in general the communications utilised during the disaster performed as well as they possibly could have under the circumstances, the traditional LMR services relied on so heavily by the public safety agencies were as resilient and efficient as they were designed to be. Looking to the future it is essential that there is recognition that the traditional narrowband voice radio networks must continue to be supported as there is recognition in many jurisdictions around the world that LTE will support LMR services for many years yet, they will not be a replacement, they will be an enhancement.

We commend the submission to your earnest consideration and we look forward to responding to any queries that may arise out of the information we have supplied or that may be supplied by other respondents.

Yours sincerely,
Australian Radio Communications Industry Association (ARCIA) Inc.

Hamish Duff - President

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28th April 2020

Royal Commission into Natural Disaster Arrangements,
Locked Bag 2000,
Manuka ACT 2603

Attn: The Commissioner.

Dear Sir,

The Australasian Critical Communications Forum (ACCF) is pleased to support the University of Melbourne Centre for Disaster Management and Public Safety (CDMPS) and the Australian Radio Communications Industry Association (ARCIA) as a partner in their preparation and submission in Response to the Commonwealth Government's Royal Commission into Australia's National Natural Disaster Arrangements.

The Submission made by CDMPS and partners is in the context of our respective roles in the critical communications sector and in (the ecosystem) and the role it performs both routinely and in times of natural disasters and pandemic such as we are experiencing at the present time.

The Australasian Critical Communications Forum ("ACCF"), a chapter of The international Critical Communications Association (TCCA), was formed in 2001 and is recognised as the critical industry standardisation body representing and advocating for business and mission critical stakeholders involved in providing and supporting wireless networks throughout Australia that support essential and critical operations. Our ACCF membership is spread around all Australian States and Territories and includes a wide spectrum from multi-national companies to smaller businesses.

TCCA/ACCF members are drawn from governments that include Public Protection and Disaster Relief (PPDR) organisations, operators and industry from across the globe. The organisation is closely involved with international standardisation bodies such as ETSI and 3GPP. Our members actively contribute in ETSI/3GPP working groups particular in the mission critical (public safety) communications ecosystem and support international interoperability testing. ETSI/3GPP rely heavily on relationships with governments, their agencies and industry (manufacturers and vendors) to identify the need for standardised products and services for specific markets such as the public safety market.

The TCCA/ACCF works closely with other local industry associations in Australia such as the Australian Radio Communications Industry Association ("ARCIA") who support the broader Land Mobile Radio sector in Australia.

As we look back on the disasters of the past fire season and the current COVID19 pandemic we see the need for the most optimum communications tools required and the future technology being developed though our involvement in TCCA and international standardisation bodies and PPDR organisations.

There is one common message that is highlighted within the CDMPS submission, that there is an urgent need for the multiple facets of communications to be recognised as one composite communications eco-system.

The following reflect the developing needs for first responders and their communications requirements into the future as highlighted in the CDMPS response we underpin the following

- Emergency Communications Centres (ECCs) and NG-000 enabling the public to interact via video, send files, images and video clips to ECCs, and ECC send appropriate content to responders and public in the field, via PSMB and other communications platforms.
- Emergence of 4G and 5G mission critical Broadband technologies – refer the PSMB initiative for Public Safety organisations in Australia.
- "Open standards" i.e. non-proprietary standards are an essential component in achieving seamless interoperability across the ecosystem to support operational preparedness and response capabilities that are critical for Australian Police and Emergency Service organisations
- Emergence of "Smart Cities" through technology 5G, IoT.

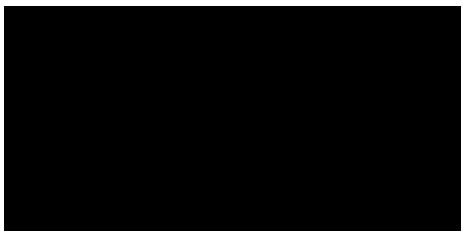
  Communities becoming "smart" – deploying 5G, IoT to traffic lights, on streetlamps, public transport, sensors in the street, cameras in public spaces, drones and other sensors. This will create an additional flood of data for improving the safety of these communities. Public utilities (electricity, gas, water etc.) can be controlled by a smart grid. These activities and control devices have a public safety purpose and need to be monitored and controlled through ECCs.

The nature of the recommendations in the CDMPS submission addresses current and future public policy issues regarding the evolution of the ecosystem to ensure the existence of an appropriate operational response capability and capacity related to the PPRR model rather than directly addressing the complex technologies embedded within the ecosystem and its components.

Looking ahead we recognise that the traditional Land Mobile Radio (LMR) narrowband voice radio networks must continue to be supported and enhanced. There is recognition in many jurisdictions around the world that Broadband 4G 5G (LTE) will support LMR services for many years yet, they will not be a replacement, but as an enhancement, initially by allowing LMR and LTE to interwork in a unified way as part of the transition to fully integrated mission critical broadband (LTE) operations in the future "fit for purpose". This profound transformation will happen, and everyone in the Public Safety Safety and Emergency organisations need to understand what these changes may be.

We endorse the CDMPS submission for your consideration and look forward to assist in any matters and respond to any queries that may arise out of the information we have supplied.

Yours sincerely,



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28th April 2020

Royal Commission into Natural Disaster Arrangements,
Locked Bag 2000,
Manuka, ACT, 2603
Australia

Attn: The Commissioners.

Dear Commissioners,

The International Council on Systems Engineering (INCOSE) is pleased to be able to work with the University of Melbourne Centre for Disaster Management and Public Safety (CDMPS), the Australian Radio Communications Industry Association (ARCIA), the Australian Critical Communications Forum (ACCF) and the Australian Control Room Network Association (ACRNA) in preparing and presenting the following submission.

INCOSE is a not-for-profit organization that develops and disseminates the interdisciplinary principles and practices that enable the realization of successful systems. Its vision is for a better world through a systems approach. Its 18,000+ members have tackled complex societal and technical challenges in many domains. Some of these are particularly relevant to this Royal Commission into Natural Disaster Arrangements: critical infrastructure, telecommunications, power and energy, and transportation.

The common thread within our attached submission is that there is an urgent need for the multiple facets of communication to be recognised as one composite system of systems. It is a complex system with evolving stakeholder needs, environmental threats and technological opportunities.

Given lives are at stake, Australians need and expect the most effective approaches to planning, developing, implementing and operating this complex mission critical (public safety) communications system of systems. The multiple constituent systems have disparate owners and operators making it difficult to manage effectively as a cohesive system.

A systems approach copes effectively with such complexity. It guides development of holistic solutions that function and perform in their operating environment to meet stakeholder needs. It ensures a myriad of diverse solution elements interact in an integrated, dependable, secure way to meet end-to-end objectives. It is the art and science of creating whole solutions to complex problems.

In recommendation (d) of our submission, we therefore commend a systems approach to the ongoing development and implementation of the mission critical (public safety) communications roadmap.

We look forward to responding to any queries that may arise out of the information we have supplied or that may be supplied by other respondents.

Yours sincerely,
International Council on Systems Engineering (INCOSE)

John Risson – Chair, INCOSE Telecommunications Working Group