Principles for a National Approach to C-ITS — Industry Response

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Prepared by RFI Australia a C-ITS Australia member in co-operation with Syntony GNSS with whom RFI is an ANZ partner.

1. Introduction to respondents

RF Industries Pty Ltd/RFI Technology Solutions (RFI)
RFI is a major participant in the Australian and global telecommunications marketplaces. The company has a deep involvement in every aspect of the market from design and development through to manufacture and supply and on towards detailed system and network design, integration, commissioning and ongoing support.

In the complex realm of Radio Frequency(RF) Management RFI has advanced technical and operational skills which are leveraged across every aspect of the radio communications markets supporting Land Mobile Radio for industry and emergency services.

RFI is active around the globe taking Australian products to more than fifty international markets with some 20% of all revenues to offshore customers.
The broad range of product is combined with top class engineering skills to provision superior and cost effective solutions to all sectors of the wireless industry.

Significantly in the C-ITS and ITS markets RFI have designed, supplied and provided fully functional networks into more than 70 km of road tunnels in Australia. These networks provide AM/FM/ and DAB rebroadcast services with public announcement break-in, offer comprehensive coverage Emergency Services Organisations and Operational/Maintenance services and provide multi-band, multi-carrier mobile phone services in 4G/5G network space.

RFI have designed, supplied, installed and commissioned more than 5,000 separate projects in Australia to deliver enhanced coverage of wireless networks into indoor, underground or other difficult environments enabling validated and reliable coverage for consumers and mission critical users across the country and internationally.

SYNTONY
Syntony are based in Toulouse, France and acknowledged as a global leader in the RNSS[1] simulation, GNSS[2] receivers and underground GPS location markets.

With a heritage based on 15 years research and design and collaborations with industry leaders, Syntony was formed to create a portfolio of products and integrated solutions that are recognized and recommended for their uniqueness, high performance and competitiveness.

2. Context of RFI and Syntony involvement in the value chain for C-ITS & associated use cases.

Network coverage and connectivity, including for denied environment through Using synthetic indoor GPS for in-tunnel and other underground locations of vehicles, people, and assets, a technology to be soon standardized in the frameworks of the 5GAA and advocated into the 3GPP standardisation evolution efforts

RFI has been involved for decades in providing coverage solutions to government, critical industries and industrial enterprises. This includes radio and rebroadcasting solutions for in-tunnel and other denied environments that form part of modern transport corridors. These solutions in part serve to convey time and location stamped data commonly used above ground by users into and within denied locations. GNSS is crucial for the same location information to be exchanged in denied areas.

GNSS/GPS access and location-based services are transforming the society and have now become an important service for critical users, enterprises and the general public: GPS has become a key element for safety, security, navigation and evolving industrial processes. However, radio waves from GNSS satellites cannot penetrate through the earth and into environments like tunnels and these systems and applications have been unusable in underground infrastructures.

At Syntony GNSS, a company based in France, we have a solution to this with our SubWAVE technology platforms. SubWAVE is an infrastructure solution designed for indoor location which broadcasts, GPS-like signals in the area where geo-positioning is needed.
Syntony has become a gamechanger in the GNSS field with its SDR-software approach to the reception and simulation of satellite signals. Syntony GNSS created in 2015, has now an international footprint with customers in more than 20 countries.
SubWAVE is the first underground GPS coverage extension solution to be used in road tunnels. The solution, which is compatible with existing GPS receivers, recreates GPS coverage in places such as road tunnels, subways, railway tunnels and mines, allowing people and assets to be accurately located as easily as if they were outdoors, with indoor-outdoor seamless transition.

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[1] Radio-navigation satellite services
[2] Global navigation satellite systems

It also assists with navigation, locating people in an emergency, monitoring worker safety, and time synchronisation. As of today, SubWAVE has been chosen by many customers or tunnel operators around the world, in countries like Sweden, France, Canada, Finland, Spain, Italy, South Africa or Japan.

Making GPS work underground means providing GPS signals, together with very precise timing and native emergency call location: it is already a strong advantage over Bluetooth or Wi-Fi. Providing GPS signals in denied locations means creating a radio frequency environment that allows 100% of existing GPS/GNSS chipsets deployed in a multitude of devices of any ground receivers (PMR, smartphones, embedded receivers (automotive, train, etc)) to compute their position, exactly as if they were in view of the GNSS/GPS satellites. SubWAVE GPS signals have this unique characteristic and can be broadcasted through in-tunnel radio or 4G/5G telecommunication infrastructures, called DAS: Distributed Antenna Networks.
On top of emitting a standard GPS/GNSS signal in a tunnel in full compatibility with existing receivers, the SubWAVE Continuous mode enables GPS receivers to precisely calculate their position in an underground area, similarly to outdoor RTK mode. When GPS receivers are under the coverage of a Leaky Feeder, they will compute their positions, according to their location along the Leaky Feeder. Therefore, positions will be updated continuously when moving along the Leaky Feeder. Position accuracy, without any augmentation process, will be similar to outdoor, on average.

SubWAVE Continuous can be proposed with an augmentation service. This is performed by as an onboard correction, thanks to additional information provided locally, which will compute a position with higher accuracy, like what is done with Differential GPS (DGPS) or RTK services for outdoors. This service is named SubWAVE indoor RTK and provides a meter position accuracy, soon to be decimetre, with the usage of the newly available GNSS signals.
With such GNSS/GPS signal coverage extension in underground areas, any kind of professional can do their job inside tunnels similarly to outside, whether they use GPS equipped receiving devices on PMR systems like TETRA, P25 or DMR; cellular mobile (3G/4G5G), or personal navigators.
The same applies to locating people when calling 000, 911 or 112 for an emergency, or more globally for providing navigation information using any available standard navigation systems or specific professional navigators. Therefore, a significant demand exists to enable GPS services without the need for users to change existing GPS/GNSS receivers or smartphones and ensure a seamless continuity between GPS signals received outside and inside tunnels.

Availability of GPS/GNSS inside tunnels and denied coverage areas allows existing C-ITS applications to operate and new C-ITS application developments requiring GPS information for navigation, positioning, and precise time synchronization.

Since 2019, Syntony GNSS has been members of the 5GAA organisation[3]. 5GAA connects major players in the automotive industry and vehicle manufacturers with the core objective to develop and standardize end-to-end solutions for future mobility. One of the means is to present liaison papers to 3GPP in order to set the standard for better integration of relevant technology into 5G. (Working Group 4: Standards and Spectrum).

Within WG 5, with the support of Vodafone and Ericsson, Syntony GNSS is working on the integration of SubWAVE Indoor RTK aiding data within the next 3GPP Release. (18 or 19). Indeed, that information is an extension of A-GPS data that are already standardised in 3GPP. We highly recommend that Australia collaborate in the work of 5GAA and 3GPP to derive the benefits of these worldwide standardisation bodies. In addition, as standards evolve via 3GPP (e.g. CVX, 6G) backward and future compatibility is maximised.

3. Response to DITRDCA questions.

Q1 Are principles for a national approach to C-ITS in Australia necessary? And if so, are the [draft principles](), *as articulated, sufficient to inform investment by industry in C-ITS?*

RFI and Syntony strongly support a national approach to C-ITS and also advocate that Australia follows global standardization work being undertaken by organisations like 5GAA, 5GIA, NGMN through 3GPP[4], ETSI[5], etc for C-V2X[6]. By aligning with the connectivity standards the greatest harmonization of technology solutions and interoperability will be possible and likely economic optimization on a global scale. Standards will help drive innovation across the ecosystems and ensure other 3GPP standardization work for connectivity can be leveraged including specific functionalities for critical industry sectors supported through MCX[7] and FRMCS[8] standards already part of 3GPP. 3GPP work on non-terrestrial network standardisation may also play an important part in the C-ITS future solutions.

Q2. Over the next 5 years, to what extent does your organisation anticipate moving into a C-ITS role or increasing its involvement in C-ITS?

Our key existing customers in critical industries are acutely aware that their users and current and future vehicle and connectivity investments will evolve towards C-ITS technologies. Wireless communications and GNSS coverage will be required above ground and also in denied environments to support not only V2X but other critical functional and operational technologies. RFI and Syntony will continue to invest in innovations to support these future needs of end users. For these reasons both organisations are members of, and active participants in relevant industry associations influencing future global standardisation efforts.

Q3. How might C-ITS impact other vehicle connectivity systems in Australia, including vehicle/OEM connectivity, vehicle/cloud connectivity, heavy vehicle telematics systems, mapping systems, etc?

3GPP standards incorporate V2X amongst other functionality spanning consumer to mission/business critical and rail industries. By aligning with global standardisation efforts backward and forward compatibility is maximised across the functionalities supporting sector use cases including V2X.

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[4] Third Generation Partnership Program
[5] European Telecommunications Standards Institute
[6] Cellular-Vehicle to Everything
[7] Mission Critical Everything (Voice, Data, Video)
[8] Future Rail Mobile Communication System

Q4. The draft Principles include a focus on cooperation across industry, government, the research sector, and the community: what structures would be necessary to support the development of an Australian C-ITS system?

We share the view that greater cooperation between all stakeholders is essential to evolve a sustainable C-ITS capability in Australia. From our participation in global standarisation efforts one of our observations is that Australian engagement in these international standards is less obvious than from many other nations.

Q5. After the Principles, what next steps do you think would be most productive?

Ensure government policy and strategy aligns with global standardisation efforts and the benefits this brings through global economies of scale, pace of innovation, interoperability, technology evolution and maximisation of backward and forward compatibility. Australian C-ITS stakeholders should increase cooperation, collaboration, and information exchange with international peers, reducing duplication of effort while establishing areas where Australian industry could contribute complimentary effort.

4. Draft Principles for a National Approach to Co-operative Intelligent Transport Systems (C-ITS) in Australia

As a C-ITS Australia member RFI supports the views and principles being expressed through C-ITS Australia as outlined below for a national approach to C-ITS in Australia.
RFI and Syntony contribute via memberships of The Critical Communications Association and 5GAA their members' efforts towards global standards through the respective market representation partner status held with 3GPP and ETSI.

RFI and Syntony also agree that Co-operative Intelligent Transport Systems (C-ITS) should be interconnected systems of technologies that are globally standardised and interoperable and allow all capable future road vehicles to communicate with other vehicles, road infrastructure and data services, and with vulnerable road users such as pedestrians and cyclists. C-ITS has the potential to deliver improved outcomes in road safety, road productivity, traffic congestion, journey times and environmental sustainability – including in the important areas of public transport, shared mobility and freight – by enabling improved decision-making based on shared information. In the future, C-ITS also has the potential to improve the performance of automated vehicles on the transport network.

RFI would also like to point out that Federal, State and local government agencies including Public Safety, Emergency response organisations and critical industries such as Utilities are important use cases who currently and will like other use cases benefit from future harmonised and standardised C-ITS capability.

RFI and Syntony support the following proposed general principles for a national approach to C-ITS in Australia to enable governments and industry to move forward with no-regrets investment and planning, for consideration by senior officials and infrastructure and transport ministers:

a). Australian governments will work together, and with industry, towards a nationally consistent C-ITS environment with the aim of supporting a seamless experience for road users as they travel across states and territories.

      i). Individual jurisdictions should continue to decide the pace and scale of their respective investments but should commit to national consistency.

b). Maximising the benefits of C-ITS requires an environment where:

      i.) all C-ITS enabled vehicles can communicate with each other, and with C-ITS enabled equipment (including devices used by pedestrians, cyclists, and other road users) and infrastructure, irrespective of make/model;

      ii.) information is able to be transmitted to all C-ITS enabled vehicles, equipment and infrastructure from trusted sources; and

      iii). all road network agencies will be able to collect and share data with the objective of

      supporting C-ITS optimisation across Australian jurisdictions.

c.) Cooperation is key and this work should be agreed upon by governments in consultation with

industry, and include participation by community and research stakeholders.

d.) Harmonising with international approaches, including in relation to spectrum for C-ITS use, helps maximise consumer choice and vehicle availability. As Australia currently bases vehicle safety regulations upon the United Nations Economic Commission for Europe (UNECE) World Forum for the Harmonisation of Vehicle Regulations (Working Party 29) model law1 it should look to harmonise with European approaches in C-ITS.) The focus on the uptake of C-ITS in Australia should be on improving road safety, transport productivity, sustainability, and reducing emissions, including supporting the development of new transport technologies including connected and automated vehicles.

f.) Given the cybersecurity and privacy issues in sharing road and vehicle data, Australia must ensure it has effective and timely solutions to managing the security of systems and messaging and privacy of data in C-ITS.

5. Summary

RFI and Syntony support Australian industry and government endeavours to establish a national approach to C-ITS. We encourage that any national approach is aligned to global standardisation efforts with the benefits these can bring to the nation given our vast geography, and relatively small population.

Our two companies have respectively accumulated significant expertise in the areas of wireless communications, wireless coverage and GNSS. Consequently, we see our capability and current and future solutions can play a role in C-ITS in Australia and across our international business interests.

We would be pleased to contribute further in cooperation with C-ITS Australia and the other local and international industry associations to which we are members who influence global harmonisation through policy and standards.

Thank you for the opportunity to participate and to provide our submission.

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