

DRAFT PRINCIPLES FOR NATIONAL APPROACH TO COOPERATIVE INTELLIGENT TRANSPORT SYSTEMS

Purpose

The purpose of our submission to the Office of Future Transport Technology consultation on draft principles for national approach to cooperative intelligent transport systems (C-ITS) is to provide support and feedback to the office regarding the principles, with a focus on the implications of these principles on the role of space and geospatial technologies in the future of C-ITS in Australia.

Our submission is based on FrontierSI's significant industry expertise and knowledge within the field of precise positioning using the Global Navigation Satellite Systems (GNSS). Recently FrontierSI undertook extensive industry research as part of Geoscience Australia's Positioning Australia program. The objective of the upcoming report to be published at www.frontiersi.com.au is to review how precise positioning information is being delivered to users and clarify how these technologies could be used to provide GNSS corrections to the mass market in Australia. The insights from this process, as well as close to 20 years experience in collaborative technology development and utilisation, have informed our feedback on each of the proposed principles.

Background

[FrontierSI](http://www.frontiersi.com.au) is a collaborative research and innovation social enterprise that operates across Australia and New Zealand, with not-for-profit status. Using our deep expertise in spatial mapping, infrastructures, positioning, geodesy, analytics, and standards, we drive innovation through collaboration. Our partnership comprises private sector companies, universities, and federal and state government departments. We deliver significant benefits to governments, industry and the community. Our mission is to provide the connection point, partnerships, trusted collaborative model and expertise to provide high impact solutions to complex, multi-stakeholder challenges. FrontierSI has almost 20 years of history of working on large-scale national and international initiatives which use and distribute space-based data and remains an active participant in the space industry. Our relevant activities and achievements are summarised in the Appendix and online at www.frontiersi.com.au.

Key Points

FrontierSI makes the following key points into the “*Draft Principles for a National Approach to Co-operative Intelligent Transport Systems (C-ITS) in Australia*” document through the lens of our core capabilities in Global Navigation Satellite System (GNSS), Spatial Data Infrastructure (SDI) and Earth Observation (EO).

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?

FrontierSI supports a strong leadership position by Government in order to accelerate the move towards C-ITS. A unified position from government, backed by agreed standards and investment, will provide stability and confidence for industry across the C-ITS sector to invest and innovate with confidence.

One very good example of how standards can make an industry work better for everybody is to be found in road tolling. All the toll roads in Australia follow the same standards for in-vehicle electronic tolling tags. This has meant that road users with a tag can drive on any toll road in the country and manage their charges through one tolling account.

FrontierSI suggest that Principle 1 should be extended to cover the standards that govern key C-ITS technology, as well as the C-ITS environment currently included in the principle.

Building on FrontierSI’s experience working with multiple state governments on physical infrastructure and digital infrastructure, we suggest that while individual jurisdictions should be able to decide the pace and scale of their investments within reason, that the C-ITS benefits will be maximised if a year can be set for a minimum set of capability to be deployed across all jurisdictions.

We endorse the position set out within Principle 2 regarding a C-ITS environment that operates irrespective of the make/model of the technology or automobile. In support of this, FrontierSI recommend that certain elements of the environment are provided by government itself to ensure consistency, open and equitable access, and certainty on long term support.

We support principle 4 and would go further to suggest that at the earliest possible time specific standards are recommended and then mandated.

Further to this, and recognising the critical importance that positioning technologies will play in the C-ITS solution as outlines in the WPS report, FrontierSI recommend that adopting solutions utilising the billion dollar investment the Australian government directing towards precise positioning technology through Geoscience Australia’s Positioning Australia program will enable a fair, accurate, reliable and cost-effective access to precise positioning information for all users.

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?

Over the course of our 20 year history, FrontierSI have consistently worked towards the goal of delivering centimetre level positioning accuracy to anyone in Australia and New Zealand in an open and accessible manner. This has required substantial investment in fundamental and applied research, development, and utilisation activities. This has only been possible through the collaboration, investment and support of all of Australia’s jurisdictions for positioning infrastructure, and positioning correction services. We are proud to see Geoscience Australia’s efforts to utilise and deploy the outcomes of our work through their billion-dollar Positioning Australia program. Through Positioning Australia, GNSS paired with corrections delivered via the Internet or satellite communications permits

national coverage of positioning services with an accuracy of several centimetres or better. These services will open up a wide range of positioning applications for new industries (e.g. intelligent transport systems, location-based services, IoT and more) and enable existing industries to improve productivity, efficiency, safety, and knowledge. To support these new and existing users and maximise the data potential, it is essential that the positioning data, products, and services are Findable, Accessible, Interoperable and Reusable (FAIR). By focusing on the standards and technologies being used to provide accurate and reliable positioning solutions, Positioning Australia aims to accelerate the industry adoption and uptake of precise positioning in Australia.

With our positioning solutions seeing an ongoing life and home within Geoscience Australia, FrontierSI now expect to substantially increase our involvement in ensuring that this critical technology is used and adopted in critical sectors of the Australian economy, with transportation overall and C-ITS specifically being key areas for our investment, interest and effort.

How might C-ITS impact other vehicle connectivity systems in Australia, including vehicle/original equipment manufacturer (OEM) connectivity, vehicle/cloud connectivity, heavy vehicle telematics systems, mapping systems, etc?

Ideally C-ITS will not substantially impact the use of other systems that exist at the moment in the short term. However, in the long term it is likely that existing investments in some systems may diminish in favour of OEMs building value added services and technology on top of the government backed C-ITS environment.

There is a small possibility that extensive use of 5.9 GHz DSRC communications may interfere with the existing 5.8 GHz DSRC systems used for electronic road tolling. Early indications are that this would not be the case, but it is a situation that would need to be monitored.

One potentially positive consequence of C-ITS is as an enabler of road user charging to replace other forms of vehicle and fuel taxes. This will become increasingly important as electric vehicles increase in number and do not pay fuel excise. Positioning plays a key role in that different road classes are likely to attract different levels of usage charge.

Many high-end vehicles in Australia already have 4 and 5G communications links to send back data on their performance to the manufacturers. As the number of vehicles increases and C-ITS services are rolled out the capacity of roadside towers will have to be monitored to ensure continuity of service.

Precise positioning almost always relies on the supply of position correction data to achieve centimetre level positioning accuracy. Position correction data can be supplied over a mobile phone data connection or, as FrontierSI has recently shown, through the 5G signal itself. Either way, precise positioning will add a load to comms infrastructure but this is absolutely necessary to ensure some of the benefits of C-ITS are realised e.g. close-quarter vehicle platooning to increase road capacity while maintaining safety.

Consumers and car manufacturers are very conscious of data costs which may appear as yet another charge they have to bear. It is important to start the conversation and develop cost-revenue models early.

Regarding positioning technology utilised in existing mapping and navigation systems, the accuracy and reliability provided by such systems is not sufficient to support an effective C-ITS deployment. Current vehicle systems each access a different combination of GNSS constellations from America, Europe and Asia, with 3-5m+ positioning accuracy, and no clear information on quality or reliability delivered with the positioning information.

Through the Positioning Australia program, the Australian government has invested in creating The Southern Positioning Augmentation Network (SouthPAN), a joint initiative of the Australian and New Zealand Governments that provides Satellite-Based Augmentation System (SBAS) services for Australia and New Zealand. SBAS services are comprised of reference stations, telecommunications infrastructure, computing centres, signal generators, and satellites that provide improved positioning and navigation services in Australia, New Zealand, and its maritime region. Precise positioning from SouthPAN offers accuracy as precise as 10 centimetres: a significant improvement on previous accuracy of 5 to 10 metres.

In addition to the accuracy, by 2028 SouthPAN will also attain safety-of-life certification, which will be enabled due to the integrity information provided alongside the positioning accuracy corrections.

Due to both the substantial accuracy and integrity boosts in the SouthPAN service, FrontierSI recommend that it be considered as a critical system for the future of C-ITS in Australia.

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?

While governance for C-ITS may be new in Australia, Australia and New Zealand governments are very familiar with establishing cross-jurisdictional governance structures to manage data, data infrastructure and physical infrastructure.

The Australian and New Zealand Land Information Council (ANZLIC) is a strong example of this governance. Established in January 1986, ANZLIC arose from the need to focus national coordination of land information management. The role of ANZLIC is to develop policies and strategies to promote accessibility and usability of spatial information. ANZLIC is an advocate for the resolution of national level issues and provides a link between government and industry, academia and the general public. Further information on ANZLIC's governance approach can be found at <https://www.anzlic.gov.au/anzlic-council/anzlic-governance>

Supporting this policy and strategy work, ANZLIC has a standing technical committee known as the Intergovernmental Committee on Surveying and Mapping (ICSM). ICSM's initiatives aim to: avoid unnecessary duplication; and provide a consistent and modern approach to surveying, mapping and charting for national development and defence.

This combination of strategy, policy, and technology advisory may work well to support the C-ITS sector, and FrontierSI would be happy to facilitate a working session between all organisations, working in partnership with organisations such as the iMove CRC and ITS Australia.

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

Regarding C-ITS, FrontierSI recommend that the following activities may be of benefit as part of next steps for this initiative:

- Consultation and engagement to determine requirements for an appropriate C-ITS environment that aligns to the agreed principles;
- Workshops across the critical C-ITS technology areas to discuss impacts, investment and timing for C-ITS deployment;
- Development of recommendations for the adoption of specific C-ITS technical standards and the creation of reference implementations;

- Agreement on how costs will be distributed. C-ITS will incur data transmission costs which have to be paid for. Developing cost and revenue sharing models as early as possible will encourage uptake.;
- Roadmap development with key agreed timelines between jurisdictions regarding minimum capability deployments, even if this capability is staged; and
- Engagement to occur with relevant government departments who can provide supporting infrastructure.

It has been flagged in the WSP “Advice on Strategies to Support C-ITS Deployment” report that positioning technology requires “support through guidelines, testing and infrastructure for positioning accuracy systems encouraging higher accuracy, reliable, cost-effective solutions.”

FrontierSI has undertaken substantial work in this regard for multiple industries, including aviation, utilities, and maritime. As an independent, not-for-profit, we would welcome the opportunity to combine global current and future practice, alongside our deep understanding of Australia’s positioning capabilities, to provide this support to the C-ITS initiative.

Appendix: About FrontierSI

FrontierSI delivers significant benefits to governments, industry and the community using our deep expertise in spatial mapping, infrastructures, positioning, geodesy, analytics, and standards.

FrontierSI's mission is to provide the connection point, partnerships, trusted collaborative model and expertise to deliver high impact solutions to complex, multi-stakeholder challenges.

Our partners include research agencies, government departments and private sector companies' global leaders in spatial information in positioning and applied geodesy, spatial infrastructure, and rapid spatial analytics. Our work is improving location information, increasing data accessibility, improving service delivery, and delivering new ways to generate answers through automation.

FrontierSI is the successor organisation to the Cooperative Research Centre for Spatial Information (CRCSI), through which submissions were also provided to the 2017 Review of Australia's Space Industry Capability and 2016 Review of the 1998 Space Activities Act and 2001 Space Activities Regulations.

Through a strong track record in downstream space applications research and development with Australia's key industry sectors, FrontierSI has practical experience in-house and within our partner base to develop user-based solutions using satellite imagery to a range of industries and markets - from agriculture to mining, to banking - and provide real-life examples of how space-derived information and services can offer growth opportunities to businesses. Also, we have a track record in engaging with industry and end-user communities, working through a design thinking approach to better help them identify their problems and pain points, and how these can be addressed through space-related services and technology.

A selection of our Space related activities and achievements is highlighted below:

- Joint Statement of Strategic Intent and Cooperation with the Australian Space Agency. In August 2019 FrontierSI signed a Strategic Intent and Cooperation Agreement with the Australian Space Agency which sets the shared objective of growing a globally responsible and respected space sector in Australia, promoting investment and development in national space capability - particularly in areas of competitive advantage, helping open the door internationally for our research and industry sectors, supporting the creation of jobs, and enabling industry growth through the adoption of Space derived services that will improve the day-to-day lives of all Australians.
- Next Generation Positioning, Navigation and Timing (PNT) Infrastructure. FrontierSI and its partners are assisting Geoscience Australia in creating the next generation of robust, reliable, ubiquitous positioning systems. Positioning Australia is an integrated national positioning capability to accelerate the adoption and development of location-based technology and applications in Australia. It builds upon world-leading research that has focused on the system and sensor integration; development of error models and error mitigation systems; quality assurance and signal integrity; technology testing and evaluation; and the demonstration, implementation and benefits measurement of these technologies in cross-sector applications. Positioning Australia builds upon previous work of the SBAS (Satellite Based Augmentation System) Testbed, and the National Positioning Infrastructure Capability (NPIC). FrontierSI also has carried out international collaborations, such as the QZSS satellite augmentation signal demonstration program with the Japanese Space Agency (JAXA).
- Earth Observation. We are a global leader in remote sensing demonstrated by our role in developing industry-leading reports and training materials on Earth Observation with the Australian Government. FrontierSI has coordinated the development of the Digital Earth Australia (DEA) Industry Strategy, which engaged more than 500 individuals, and led to the creation of the DEA Labs, aimed to open an avenue to help the private sector to develop EO-

related services and applications. DEA is a world-class analysis platform for satellite imagery and other Earth Observations hosted by Geoscience Australia which provides an Australian Inquiry into Developing Australia's Space Industry businesses with access to standardised analysis-ready-data (ARD), analytic capability and tools to innovate to produce new products and services. Through our industry partners, we have engaged in capacity building across the Pacific and South-East Asia through the Pacific Island Sea Level Rise Capacity Building project in Tonga, Papua New Guinea, Samoa Vanuatu, which was awarded a United Nations Award at the Paris COP21 Climate Change Congress in 2015. FrontierSI was a stakeholder contributor to the development of the Bushfire Earth Observation Taskforce Report, which examined the decisions required to undertake bushfire risk management and analysed the satellite imagery data needed to support those decisions.

- Investment in Space-based Research . FrontierSI is a Core Partner of the SmartSatCRC, formed in July 2019 to conduct translational research in advanced telecommunications and IoT connectivity, intelligent satellite systems and Earth observation next-generation data services to create game-changing technologies and generating know-how that will make Australian industry more competitive. FrontierSI became actively involved in the initial stages of the bid development process for SmartSatCRC, shaped research program and user definition and plays a lead role in the earth observation program leading several EO based projects.
- National Engagement. FrontierSI has coordinated national engagement at a sectoral level. We led the development and continue to drive the implementation of the 2026 Spatial Industry Transformation and Growth Agenda (2026 Agenda), a 10-year national industry growth roadmap to grow the spatial sector across the economy. We are working group members of the newly formed 2030 Space and Spatial Working Group which aims to develop a space and spatial roadmap that highlights the strategic importance of a robust Australian space and spatial capability, outlines the steps required to realise an integrated area and spatial ecosystem that will be a critical national asset, and identifies industry growth opportunities and actions to grow the Space and spatial sectors.