FCAI Response to ACMA; Proposals for the Introduction of Intelligent Transport Systems into the 5.9 GHz Band in Australia

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Federal Chamber of Automotive Industries

GPO Box 313
Canberra ACT 2601

Phone: +61 2 6247 3811
Facsimile: +61 2 6248 7673

Contact: Mr James Hurnall

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1. INTRODUCTION

The Federal Chamber of Automotive Industries (FCAI) is the peak industry organisation representing manufacturers and importers of passenger vehicles, light commercial vehicles and motorcycles in Australia.

This submission outlines the FCAI's response to that Australian Communications Media Authority (ACMA) paper, *"Planning for intelligent transport systems – Proposals for the introduction of intelligent transport systems into the 5.9 GHz band in Australia."*

The main points in the FCAI's submission are summarised below:

- The FCAI member companies recognise the importance of ITS and its potential benefits for road safety and traffic management.
- The FCAI supports the allocation of the 5.9 GHz band into Australia with the allocation within this spectrum harmonised with the frequency requirements recommended by the European Telecommunications Standards Institute (ETSI) technical report, TR 102 492-2 (noting that the allocation of the control channel has recently been changed).
- The FCAI considers that the ACMA should implement using a staged approach with the initial allocation for the safety related bandwidth of 5875-5905 MHz.
- To avoid any interference with safety related ITS systems the incumbent mobile services in the 5.9 GHz spectrum should be relocated to a different frequency band.

2. THE ACMA PROPOSAL

The ACMA paper considers proposals for the introduction of Intelligent Transport Systems (ITS) into the 5.9 GHz band in Australia to allow the transmission of information between vehicles, and between vehicles and road infrastructure, using dedicated short range communications (DSRC).

ACMA acknowledges that ITS have been developed internationally in the 5.9 GHZ band and that harmonisation with international standards is vital to the introduction of ITS into Australia as this would allow the Australian market to benefit from economies of scale with the production of ITS modules on a global basis.

ACMA proposes that vehicle based ITS units (called on-board units [OBUs] by ACMA) would be covered by a class license. This would allow users to operate devices in designated segments of the spectrum on an uncoordinated and shared basis.

3. FCAI RESPONSE

The FCAI member companies recognise the importance of ITS with its potential to improve road safety and also to reduce congestion and subsequently carbon emissions. The FCAI notes that ACMA references other work to identify the safety benefits of ITS with the potential to reduce crashes by up to 20% (Austroads) and reduce overall carbon emissions from traffic by 5.5 million tonnes (Australian Greenhouse Office).

While the FCAI and member companies agree that ITS has the potential to deliver significant safety and environmental benefits, caution is recommended when quoting such significant benefits as there will be a number of underlying assumptions used in the work to evaluate and project the benefits.

The particular issues raised in the ACMA paper are addressed below:

1. The ACMA invites comment on whether the two land mobile ambulatory initial and four fixed receive licenses in the 5.9 GHz band should be relocated to a different frequency band to facilitate the introduction of ITS; or alternatively, whether these services could continue to operate on a No interference/No protection basis.

To avoid any interference with safety related ITS systems the FCAI considers that the incumbent mobile services in the 5.9 GHz band should be relocated to a different frequency band. Sharing the spectrum with the incumbent mobile services would mean that ITS communication could be delayed due to channel occupancy.

Vehicle-to-Vehicle (V2V) communication is highly dynamic and mitigation technologies cannot improve the interference probability sufficiently, and any interference could result in delay of data exchange. V2V communication has low latency information exchange, and any exchange of safety related information delayed by other applications using the same spectrum could result in adverse safety results leading to lack of consumer confidence in the technology. Consumer confidence in safety technology is important to encourage its implementation and speed of uptake by new car purchasers.

2. The ACMA invites comments on its preliminary view that sharing in the 5.9 GHz band between ITS and incumbent services – other than the fixed and fixed-satellite services and the fixed receive ambulatory initial licenses – could be achieved without altering the regulatory arrangements applicable to current licensees.

The FCAI agrees that sharing in the 5.9 GHz band between ITS and incumbent services (other than fixed and fixed-satellite services) could be achieved within the current regulatory arrangements except in the bandwidth allocated to road safety related ITS.

The FCAI would encourage the ACMA to consider a strategy to migrate incumbent services from the 5875-5925 MHz frequency band, i.e. the European preferred spectrum allocation for safety related ITS.

There is a difference in the ITS channel allocation in Europe and in the USA. As shown in Appendix 2 of the ACMA Discussion Paper, in the US channel number 172 (5855-5865 MHz) is allocated for safety applications while Europe has this spectrum overlapping the ISM band and also for non-specific short range applications. In Europe there is confidence that possible interference is acceptable for non-safety V2V and Roadside-to-Vehicle (R2V) communication.

3. The ACMA invites comments on the issues raised in this Chapter, in particular on the following measures proposed to facilitate coexistence of ITS and fixed services in the 6 GHz band:

   - The relocation of the sole service on the first interleave channel of the 6 GHz fixed service, in order to increase protection of ITS from interference.
   - The proposal that ITS accept any interference from adjacent band fixed links on the first main channel of the 6 GHz fixed service.
   - The proposal that, in order to ensure protection of existing fixed links, the unwanted emissions level of any ITS device be lower than -65 dBm/MHz in the fixed service allocation above 5 925 MHz.

It is expected that in Australia, in urban areas with a high density the ITS transmission power of both on-board units (OBUs) and road side units (RSUs) will be much lower than 33 dBm.

In both the USA and Europe, the transmitted power of ITS communication units is limited to increase the re-usage of the channel and the overall transmission capacity. In Europe, the out of band emission is limited to -65 dBm/MHz in the Spectrum above 5925 MHz, which is a very high requirement on the spectrum mask of the ITS transmitter. Standard IEEE chipsets will not provide such a spectrum mask.

Additionally, in the upper range of the 5.9 GHz spectrum, ITS is not protected from interference from fixed services and a relocation of the existing fixed links should be considered. This could occur on a long term basis, and in the meantime the upper range of the 5.9 GHZ spectrum could be used for very short range communication with low transmission power, which could meet the considered out of band restriction.

4. The ACMA invites comments on the issues raised in this Chapter, in particular on the following measures proposed to facilitate coexistence of ITS and the FSS:

   - That ITS deployments be planned around existing FSS Earth stations, and accept interference from existing services.
   - That new FSS assignments be allowed at sites with existing assignments in this band provided the potential for interference to ITS does not increase.
   - That new FSS deployments be permitted provided they are located so as to avoid interference with likely future ITS deployments in major cities and towns, as well as along major highways.
   - That a one kilometre interference contour be used as a basis for coordination in all cases; except in the case of a new FSS Earth station deployment where the antenna elevation angle is less than 15 degrees.
   - That more detailed coordination be required where less than one kilometre separation distance is proposed between an FSS Earth station and an ITS RSU or major city, town or highway; or where the antenna elevation of the FSS Earth station is less than 15 degrees.

The FCAI does not support coexistence of FSS with ITS in the frequency band allocated to safety related ITS, i.e. 5875-5925 MHz.

5. The ACMA invites comments on the proposal to allow intelligent transport systems to operate in the radiofrequency band from 5 850 to 5 925 MHz.

The proposal to allocate the frequency band from 5850-5925 MHz for ITS harmonised with the European allocation as per TR 102 492-2 is supported by the FCAI (noting that the allocation of the control channel has recently been changed as outlined below).

Compatibility with Europe, with the same partitioning of the spectrum for safety and non-safety related ITS applications, would encourage and facilitate the introduction of OBUs on new vehicles.

While Japan and Korea principally use the 5770-5850 MHz band for ITS, Japanese and Korean car manufacturers also export product to both Europe and North America with ITS systems compatible to both European and US standards. Therefore, harmonisation with the European frequency band should not provide an impediment to continued importation of Japanese or Korean manufactured vehicles.

6. The ACMA invites comment on the desirability, and feasibility, of a staged approach to releasing the 5.9 GHz band for use by ITS.

The FCAI supports a staged approach, with a preference for the 30 MHz of spectrum in the range of 5875-5905 MHz to be allocated first for the control channel and safety related ITS applications.

The proposed staged implementation and a limitation of ITS operation in the band below 5895 MHz does not fit to the latest findings and development in Europe, which is expected to be relevant for Australia. In Europe the ITS spectrum is divided in the following 3 portions:

- 5855-5875 MHz; Non-safety applications
- 5875-5905 MHz; Control channel and road safety/traffic efficiency applications
- 5905-5925 MHz; Reserved for future extension, but limited applicability for safety applications due to possible interference by Fixed Services above 5925 MHz

Allocation of the range 5875-5905 MHz for the control channel and safety related ITS applications is a decision of the European Commission and is to be implemented by all European Union member states. This 30 MHz band is important for the introduction phase of ITS, particularly for safety related applications.

It is our understanding that while it was proposed to introduce the 10 MHz control channel (5885-5895 MHz) in the middle of this 30 MHz bandwidth, in line with the US control channel, the EU decided to introduce the control channel at the upper end of the 30 MHz due to:

- ITS internal adjacent channel interference would lead to a reduced performance in the whole 30 MHz bandwidth.
- At the lower end of the 30 MHz range adjacent channel interference may arise from the neighboured non-safety applications channel and any out of band emissions from ISM applications which could have a negative impact on the performance.

As a consequence following channel allocation was decided for Europe:

- 5875-5885 MHz; Service channel for safety applications
- 5885-5895 MHz; Service channel for safety applications with low transmission power for very short distance
- 5895-5905 MHz; Control channel including service announcement and very low latency safety applications

In the USA the control channel is not neighboured to the safety related service channels, which are at the upper and lower end of the ITS band:

- 5855-5865 MHz; Service channel for safety applications
- 5885-5895 MHz; Control channel including service announcement and short messages for low latency safety applications
- 5915-5925 MHz; Service channel for safety applications operated by governmental organizations

In both the USA and Europe, the ITS communication system is considered to be based on ad hoc networking, where the RSUs and OBUs have equal rights. The applied transmission power depends on the density of the communicating units where each unit will send a pulse signal to inform each other about the availability and relative position. Based on this information, a communication unit has to select the appropriate transmission power. As the maximum transmission power is defined as EIRP, the antenna design has no impact on the radiated power, although the application of directional antennas for RSUs could improve the interference situation with fixed services.

A staged approach is acceptable, but the 30 MHz of spectrum in the range of 5875 – 5905 MHz for the control channel and safety related ITS applications should be allocated first.

7. The ACMA seeks comment on its proposal to allow ITS devices to operate up to a maximum EIRP of 33 dBm in high and medium density areas.
8. The ACMA also seeks comment on its proposal to allow ITS devices to operate at a maximum EIRP above 33 dBm in low and remote density areas; and what power limit should be applied in these areas.

The expected communication range of 33 dBm EIRP is 1000m, which should be acceptable for most scenarios in high and medium density areas. The majority of car travel is within urban areas where the average transmission power will be much lower with equipped vehicles and Road-Side Units (RSU).

In more rural or remote areas in Australia, a communication range above 1000m may be required to share information between vehicles or drivers. For long distance communications where information is not as time critical, mobile services could be utilised.

9. The ACMA seeks comment on the most appropriate mechanism for licensing on-board units (OBU) in intelligent transport systems, including the ACMA's preliminary view that they might be most appropriately licensed under the Low Interference Potential Devices (LIPD) Class Licence.

The FCAI agrees that class licensing is the most appropriate mechanism for licensing OBUs.

The FCAI recognises that the class licensing may specify operational and technical parameters such as frequency bands, radiated power limits and out-of-band emission levels.

This should result in the most cost effective and efficient form of licensing without imposing additional costs to the consumer. Any additional costs could delay the introduction of OBUs.

10. The ACMA seeks comment on the most appropriate licensing mechanism for road-side units (RSUs) in intelligent transport systems. This may include comment on proposed methods of providing information should class licensing be the preferred method of licensing.

The FCAI supports the ACMA proposal of applying licensing arrangements and registering the installation of RSUs.

Certification of the RSUs to ensure interoperability with OBUs will be necessary.

4. OVERVIEW OF THE AUTOMOTIVE INDUSTRY

The automotive sector is a globally integrated industry with many product lines sharing platforms and major components to achieve productivity gains from economies of scale. Even with more than one million new vehicles were sold in 2008 and around 900,000 new vehicle sales in 2009, Australia comprises is less than one and a half percent (1.5%) of the global market.

With growth expected to continue in the emerging economic markets of India, China, Russia and Brazil, Australia's share of the world market will decline.

Australia is one of the most open and competitive automotive markets in the world with more than 50 brands, 350 models and 20 source countries. In 2009, around 16% of new vehicles sold were manufactured locally with the remaining 84% of new vehicles imported from various countries and regions of the world including Asia, Europe and Africa.

Table 1 below shows the major countries/regions of origin of new vehicles sold in Australia during 2009.

Table 1 - Country/region of origin of new vehicle sales in 2009

Country/Region of Origin	Percentage of new vehicle sales[1]
Australia	16%
Europe	14%
North America	1%
Japan	36%
Korea	13%
South East Asia (predominately Thailand)	15%
Other (including China and South Africa)	5%

Notes:

1. Based on year to date for October 2009 Vfacts

The motor vehicle is increasingly a global product and one of the most comprehensively regulated products. In considering regulations, the government's role is to balance social and economic benefits with safety and environmental performance.

The FCAI considers that government should base regulations on sound science and economics and that regulation is justified only when there is demonstrated need for government intervention because the market or vehicle manufacturers are not responding to a demonstrated need or new technology. Additionally, vehicle regulations in Australia should be undertaken at a national level and be harmonised with international regulatory standards.

As economies of scale are critical in the automotive industry all manufacturers have tended to limit the number of locations any one model is produced and that model is then cross-shipped to markets where there is demand. This approach benefits initially the manufacturer through reducing costs and ultimately the consumer by improving affordability and increasing product choice.

The introduction of individual or unique national or state standards and regulatory requirements can seriously affect this approach through increasing production cost, which must be passed along to the consumer, without necessarily improving safety or environmental performance.

5. PRODUCT DEVELOPMENT IN THE AUTOMOTIVE INDUSTRY

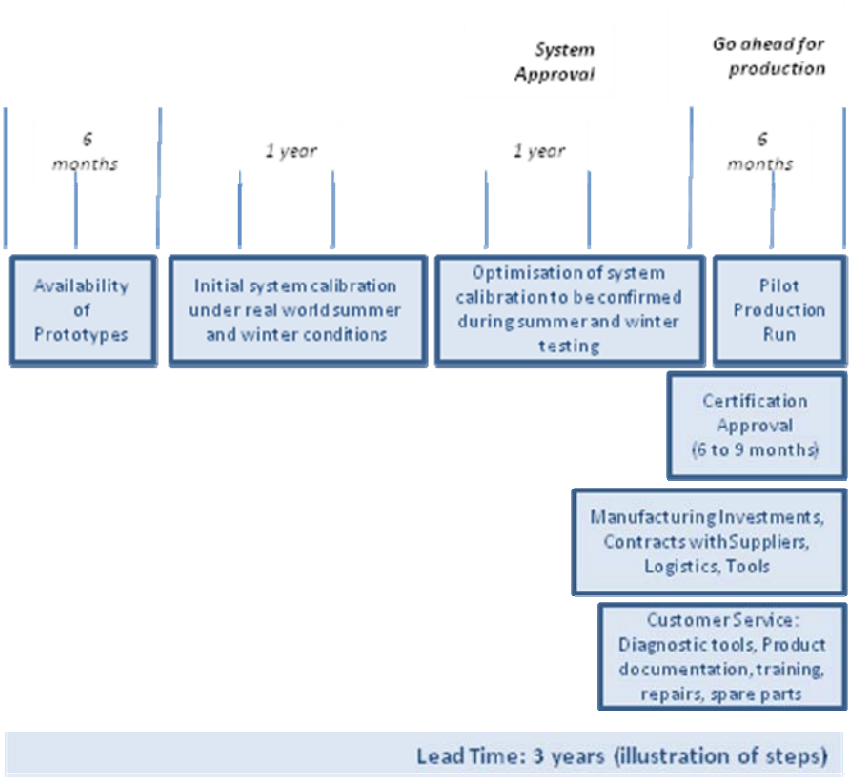
The vehicle industry is a global industry and product development plans are prepared to align with the introduction of international regulations.

Product development and research is a finite resource within each FCAI member. As it takes up to three years to bring a known technology to mass production, development plans are aligned with the introduction of new or upgraded models or the introduction of international regulations.

The three year product development period comprises (as outlined in the diagram below):

- Development of prototype – six months.
- Initial calibration of system in all weather and seasonal conditions – one year. It is important to undertake extensive testing to assess performance of a new system in all weather and seasonal conditions, especially in a country like Australia with a wide range of seasonal conditions and climates.

- Optimization of system in all weather and seasonal conditions – one year.
- Pilot production run – six months.



The above diagram also shows the activities undertaken during the last 12-18 months of system development to gain the necessary regulatory approvals invest in any manufacturing changes, enter into contract with suppliers and the activities required for maintenance of the new system once in service.

6. CONCLUSION

The FCAI members recognise the importance of ITS and its significant potential to both improve safety and reduce traffic congestion. The automotive sector is a globally integrated industry and the Australian industry represents less than 1.5 per cent of annual global sales. Therefore, to provide the benefits of new technology, Australian vehicle regulations and standards should be undertaken at a national level and harmonised with international regulatory standards.

Accordingly, the FCAI supports the ACMA proposal to align with Europe and allocate the 5.9 GHz band for ITS. Allocation within this spectrum should also be harmonised with the frequency requirements recommended by the European Telecommunications Standards Institute (ETSI) technical report, TR 102 492-2 (noting that the allocation of the control channel has recently been changed).

It is appropriate to implement the allocation of the 5.9 GHz band for ITS through a staged approach with the initial allocation for the safety related bandwidth of 5875-5905 MHz. To avoid any interference with safety related ITS systems the incumbent mobile services in the 5.9 GHz spectrum should be relocated to a different frequency band.

V2V communication is highly dynamic and interference could result in delay of data exchange. Any delay in exchange of safety related information could result in adverse safety results leading to lack of consumer confidence in the technology. Consumer confidence in safety technology is important to encourage its implementation and speed of uptake by new car purchasers.