AUSTRALASIAN RAILWAY ASSOCIATION SUBMISSION

To

Australian Competition and Consumer Commission (ACCC) re the proposed spectrum allocation for 1800MHz in regional Australia

April 2015

THE ARA

The Australasian Railway Association (ARA) is a not-for-profit member-based association that represents rail throughout Australia and New Zealand.

Our members include rail operators, track owners and managers, manufacturers, construction companies and other firms contributing to the rail sector.

We contribute to the development of industry and government policies in an effort to ensure Australia's passenger and freight transport systems are well represented and will continue to provide improved services for Australia's growing population.

The ARA thanks the Australian Competition and Consumer Commission (ACCC) for the opportunity to provide comment in regard to the *proposed spectrum reallocation recommendation for the 1800 MHz band in Regional Areas of Australia*.

This submission is on behalf of the rail industry.

The contact at the ARA is Phil Allan, Director Policy and Advocacy on (02) 6270 4507 or pallan@ara.net.au

15/04/2014

PO Box 4608, Kingston
ACT 2604 Australia

T +61 2 6270 4501
F +61 2 6273 5581

E ara@ara.net.au
W www.ara.net.au

2

SUBMISSION

Broad Comments

The rail industry is very concerned that the proposed auction of the regional 1800 MHz band has the potential to limit use of standards-based radio communications systems used to provide safe and efficient rail operations in regional Australia.

Rail carries significant amounts of freight and passengers in regional Australia and radio communication in the 1800 MHz band is, in the view of the rail industry essential. Current off-the-shelf equipment for rail signaling and control used by rail (and associated industries) requires the 1800 band to deploy interference-free radio systems such as GSM-R and LTE to provide for rail safety and control communications.

Rail safety must be a national priority.

The ARA and the rail industry believe it is in the national interest to have dedicated spectrum for rail to support safe operations, free from interference. The rail industry believes it is against the national interest for rail to have to compete for spectrum.

This is critical not only for existing services but also for future operations where new projects such as the Inland Rail project begin operating.

The rail industry notes:

- The rail industry is adopting high capacity, secure, commercially available telecommunications based on open standards and requires access to spectrum and protection from interference.

- Rail needs to interface with other industries and services such as mines and ports that are following a similar open standard mobile telecommunications strategy.

- Rail (and industry) cannot bid for large amounts of regional spectrum for long periods of time where no business case has been established. Once spectrum has been allocated to other entities, rail (and industry) are then unable to guarantee access to spectrum. A spectrum allocation method to support rail

(and industry) should allow for spectrum access in-between spectrum allocation/reallocation events.

The rail industry has previously discussed the allocation in this band with the ACMA and was of the view that a part of the band would be set aside for rail (and associated industry).

The ARA, on behalf of the rail industry, has argued through a submission to the ACMA, that part of the band proposed for auction be removed from the auction process and dedicated to rail and industry. The rail industry has argued 2 x 5 MHz be quarantined for rail and 2 x 10 MHz adjacent to the rail band for industry more broadly. This would leave 2 x 45 MHz available for auction and a total of 2 x 60 MHz available to other parties such as carriers.

The ARA has been advised of the eight submissions received by the ACMA in response to their discussion paper at least 50% argued for a section of the band to be quarantined for rail and industry (apparatus licensing)

The rail industry believes there is enough regional 1800 MHz spectrum available to allow for both a competitive level playing field for those who should compete for the spectrum (i.e. carriers) and for those who should not compete (i.e. railways and industry). This is not a new concept as in high density areas, where the demand for spectrum is much higher, 15 MHz of spectrum was made available for rail operations.

The rail industry worked with the ACMA on developing practical and harmonised approach to use of 1800 MHz spectrum in metropolitan, regional and remote areas to address rail and related industry current and future needs. This included extensive discussions to address mining radio communications requirements. It was reasoned that there is sufficient metropolitan spectrum in 1800 MHz band for public carriers and 2x15 MHz of spectrum for rail safety and control communications and therefore by extension that rail should have access to spectrum in regional and remote areas.

The rail industry understood from previous discussions with the ACMA in 2013 in relation to the Discussion Paper released in December 2012, that part of the regional and remote 1800 MHz band would be reserved for rail operations. Three of the four

options put forward at the time each had a dedicated part of the band for rail and "other" (channels 14 and 15).

As such the rail industry has been working under the assumption there would be a dedicated, quarantined part of the Spectrum for rail. At the time the rail industry was surveyed and members across Australia indicated regional 1800 MHz Spectrum was needed for services across the nation including intra and inter-state freight operations and peri-urban passenger operations near capital cities.

The rail industry's position is that there needs to be sufficient spectrum for industry and rail to deploy open standards telecommunication systems.

The rail industry believes a commitment was made and should be honoured by excluding these bands from the auction process or by providing a dedicated band for rail and industry more broadly.

The ACMA has noted that third party arrangements would apply (e.g. rail could purchase a part of the band and "sub-let" to a third party or a carrier could purchase and sub-let to rail). The rail industry does not see this as a practical or realistic option.

The rail industry has a number of concerns with this approach. In the case where a rail company did purchase spectrum at auction with a possibility of using it in the future, it can sublet it in the meantime in order to help to recoup losses, however this is not something that a rail company is set up to do and it is likely that the costs to do so would be greater than the return. So subletting is unlikely to happen from a rail industry perspective.

Further, the part of the rail industry which would use this spectrum is often the below rail manager of a monopoly rail network. These monopoly networks are monitored by a competition authority. To give a specific case of Aurizon, they are the below rail manager of the Central Queensland Coal Network and are monitored by the Queensland Competition Authority (QCA). The QCA determine what Aurizon can charge above rail operators and will only allow investments which can be justified. An investment such as purchasing spectrum which may be used in the future would not be looked upon favourably and the costs could not be passed onto the customers. This particularly applies when the purchased spectrum block covers areas beyond the operational footprint of the railway.

15/04/2014

PO Box 4608, Kingston
ACT 2604 Australia

T   +61 2 6270 4501
F   +61 2 6273 5581

E   ara@ara.net.au
W   www.ara.net.au

5

In the case of a carrier being the band manager the following points are made:

- The mobile systems installed in regional areas by carriers have low levels of availability and certainty of coverage. This could lead to trains being unable to operate at certain times/locations.

- If carriers could upgrade their networks to provide a suitable system for rail the rail company has to pay upfront for this to happen. In remote areas such as where a rail company such as Aurizon operates and based on negotiations that Aurizon has had with carriers, it would cheaper for the rail company to install their own system compared with what the carrier would charge to upgrade and use their network.

- The safety critical signalling systems have long operational lives. The systems installed by carriers have much shorter operational lives. This would likely mean that the rail company would not be able to make full use the life of the signalling system without modifying it in the future.

- It is our experience that carriers will not share base infrastructure such as spectrum, fibres, buildings etc with non-carriers. Their business is in selling telecommunications services higher up the value chain. Whilst it is possible for carriers to sublet spectrum, it is not in their business interests to do so.

- The decision for a rail company to use spectrum is significantly different to the decision for a carrier. A carrier uses the spectrum directly to provide services to customers and is able to easily calculate the value of the spectrum to the company. For a rail company the spectrum is far removed from the customer, and as such it is very difficult to put a value on the spectrum.

15/04/2014

PO Box 4608, Kingston
ACT 2604 Australia

T   +61 2 6270 4501
F   +61 2 6273 5581

E   ara@ara.net.au
W   www.ara.net.au

6

Specific comments

Q1.   What are the likely intended uses of 1800 MHz in regional areas?

The most likely uses will be in areas such as:

- Rail safety and control communications
- Rail Autonomous (eg. Driverless) Train Operation
- Rail Supervised Train Operation
- Mining
- Energy production and metering
- Agriculture

Q2.   What is the optimal allocation of spectrum for the anticipated uses?

Railways will need a continuous 2 x 2 x5 MHz of spectrum along the railway to allow the signalling and protection systems to operate.

One way to manage this is through the ARA (as is already occurring in relation to the RIO section of the 400 MHz band). The railway spectrum is used by all operators on the railway and therefore there is no requirement for each operator to have their own spectrum allocation. Where there are adjacent railways in the same area, the ARA could manage the shared use of that spectrum.

For rail and Autonomous Vehicle operation, elimination of single points of failure is a clear design goal. Therefore dual 2x5 MHz for the whole length of the rail corridor is optimal allocation to design independent overlapping base stations for rail and industry.

An allocation of spectrum to rail would also support the national rail regulator push for better safety outcomes via train protection systems (by providing access to the enabling assets (spectrum) for all the industry). This would also boost interoperability as the regional systems would also be able to operate in urban areas. Further national benefits would accrue as standardised systems are introduced nationwide.

The current metropolitan spectrum boundaries are restrictive, especially in Queensland where the Brisbane boundary passes just north of Australia Zoo, at Beerwah. Regional

15/04/2014

PO Box 4608, Kingston
ACT 2604 Australia

T   +61 2 6270 4501
F   +61 2 6273 5581

E   ara@ara.net.au
W   www.ara.net.au

7

spectrum would therefore be required to allow urban trains to benefit from these new technologies on the regular runs to Nambour and Gympie North.

Q3.   Are there any other technical factors that the ACCC should take into account in its assessment of competition limits?

Rail is a technology taker. To date, rail safety and control communications systems operate in 900 and 1800 MHz bands only. There is no available spectrum in 900 MHz band and therefore rail is limited to using 1800 MHz band.

From the ACMA regional and national licenses (including 900 MHz band) covering a typical large state, Telstra has about 2x100 MHz spectrum licenses; Optus has 2x50 MHz, VHA has about 2x18 MHz. TPG has 2x10 MHz, Rail has nil, industry has nil, and there is about 2x75 MHz unallocated (see table below)

15/04/2014

PO Box 4608, Kingston
ACT 2604 Australia

T   +61 2 6270 4501
F   +61 2 6273 5581

E   ara@ara.net.au
W   www.ara.net.au

8

Band	Telstra	Optus	Vodafone	Rail	Other	Unallocated
700 2x45	2x20	2x10	Nil	nil	nil	2x15
800 Remote 2x20	2x15	nil	2x5	nil	nil	nil
900 2x25	2x8.2	2x8.2	2x8.2	nil	nil	nil
1800 Regional 2x75	2x15? Less what VF has	nil	Some?	nil	nil	2x60 to be allocated
2100 Regional 2x20	2x5	2x10	2x5	nil	nil	nil
2500 2x70	2x40	2x20	Nil	nil	2x10 TPG	nil
Total FDD Spectrum Licenses	2x103.2	2x48.2	2x18.2	nil	2x10	2x75
National FDD Spectrum Licenses	2x68.2	2x38.2	2x8.2	nil	2x10	2x15

Lower frequency bands allow coverage of large geographic areas for low bandwidth services such as voice and SMS, and low-bit rate data services such as email, messaging, scheduling, and non-interactive web browsing.

Higher frequency bands (1800MHz, 2100MHz and 2500MHz) cover smaller areas and are used to supplement mobile service by providing high capacity data services for interactive browsing and video services.

In summary, carriers require low frequency spectrum for coverage, and high frequency spectrum for data capacity.

Carrier	Coverage	Capacity
Telstra	2x43.2	2x40
Optus	2x18.2	2x20

15/04/2014

PO Box 4608, Kingston
ACT 2604 Australia

T +61 2 6270 4501
F +61 2 6273 5581

E ara@ara.net.au
W www.ara.net.au

9

| VHA | 2x13.2 | nil |
| TPG | nil | 2x10 |

LTE FDD requires separate so-called uplinks and downlinks. Hence a 5 MHz FDD LTE base station requires 2x5 MHz of spectrum.

LTE FDD operates in spectrum allocations of 2x1.4, 2x5, 2x10, 2x15 and 2x20 MHz. 1.4 MHz is not efficient and only used to provide service in legacy 2.5MHz allocations used by GSM-based networks.

An LTE base station can therefore utilise between 2x5 and 2x20 MHz of spectrum. Dual carrier systems increase this to dual 2x5 and dual 2x20 MHz of spectrum however a carrier with 2x20 MHz of spectrum or less is likely to deploy a single 2x20 MHz LTE base station to maximise throughput speed.

Therefore for carriers it is optimal for spectrum to be allocated in lots of 2x20 MHz.

Q4. Are there sectors, other than telecommunications, that are likely to participate in the auction?

If all regional Spectrum were to be auctioned, railways may be forced to bid against carriers to obtain the 2x2 x5MHz spectrum block required. However, the configuration of the block offered places the railways at a significant disadvantage. (eg the Maryborough block, which Queensland Rail would have to buy to allow trains to run to Nambour, extends well into NSW.)

The rail industry notes the proposed Spectrum lots are too large for most potential users. Mining, coal, energy and rail are looking for apparatus licensing in specific locations.

Q7. What are the substitutes for spectrum in the 1800 MHz band in regional areas?

The primary substitutes are the 800 MHz, 900 MHz and recently auctioned 700 MHz spectrum blocks. These blocks are all held by the carriers.

Further:

- 2100 MHz and 2500 MHz spectrum can be considered substitutes for 1800 MHz spectrum.

15/04/2014

PO Box 4608, Kingston
ACT 2604 Australia

T +61 2 6270 4501
F +61 2 6273 5581

E ara@ara.net.au
W www.ara.net.au

10

- These are both LTE bands and have cell coverage areas within 25% of 1800 MHz band
- The 2500 MHz band is also a universally supported LTE band for mobile handsets.

Band	Square km	Cell Radius (km)
700	68	4.6
850	58	4.3
900	52	4
1800	15	2.1
2100	12	2
2500	11	1.9

The 1800 MHz band, due to small coverage area, is useful for:

- small areas such as mines, industry, and farms;
- data capacity for towns and business districts;
- linear assets such as rail where coverage beyond rail corridor is not a design goal.

In this regard, 1800 can provide larger coverage compared to the 2100 MHz and the 2500 MHz bands.

Q8.   To what extent are these fully-effective substitutes?

Assuming the same spectrum bandwidths, coverage area and handset support are primary factors to consider:

- the 2100 MHz band has a cell coverage area of about 80% of 1800 MHz band. 2100 MHz is an LTE band however, US LTE handsets are unlikely to support this band and therefore 1800MHz or 2500 MHz band is required for international roaming. 2100 MHz is not nationally allocated.
- The 2500 MHz band has a cell coverage area of about 75% of 1800MHz band. 2500MHz is a universal LTE band. All recent and future handsets are likely to support 2500MHz band.

Therefore the 2500MHz band is a fully-effective substitute for 1800MHz band however where coverage areas exceed 11 square km, 1800MHz is more cost effective.

Q9.   Do you think competition limits are necessary for the 1800 MHz band in regional areas of Australia?

15/04/2014

PO Box 4608, Kingston
ACT 2604 Australia

T   +61 2 6270 4501
F   +61 2 6273 5581

E   ara@ara.net.au
W   www.ara.net.au

11

Yes.

Rail and industry are increasingly using radio spectrum to manage processes. In regional areas, rail and industry require spectrum to manage safety and reduce costs.

Rail and industry are unlikely to be able to compete with carriers

The rail industry is concerned purchasing of all available spectrum by large organisations has the potential to lead to decreased safety of rail operations in regional Australia. While the ARA is aware third party arrangements can be made, as outlined above, there is the risk this will be prohibitive to rail in terms of cost. The rail industry would prefer part of the band be quarantined for rail but acknowledges competition limits would potentially ensure some part of the band is left for rail to purchase.

Q10. If so, what do you think appropriate competition limits would be?

It is difficult for the rail industry to comment but one option is to set an auction limit of 2x15 MHz or a band limit of 2 x 20 MHz per carrier which would allow three carriers to co-exist with sufficient spectrum to provide high capacity service and allow rail and industry to access spectrum.

Q11.   Should existing spectrum holdings be considered in any assessment of competition limits? Please provide reasons for your view.

Given similar cell coverage of 1800MHz to that of 2100MHz and 2500MHz bands, total spectrum holding of these bands should be considered.

15/04/2014

PO Box 4608, Kingston
ACT 2604 Australia

T   +61 2 6270 4501
F   +61 2 6273 5581

E   ara@ara.net.au
W   www.ara.net.au

12

CONCLUSION

The ARA and its members are very concerned about safety and the need for interference free radio communication for passenger and freight services as well as associated industry (mining, coal, energy etc) to ensure rail and industry can deploy standards-based radio communications systems for rail safety and control.

Based on previous discussions with the ACMA, the rail industry strongly believes the only practical way to guarantee safe operations is for part of the regional 1800 MHz band should be quarantined and the auction should proceed with 2 x 45MHz only.

The rail industry believes competition limits should consider spectrum holdings in the 2100 MHz and 2500 MHz bands as these are suitable substitutes for 1800MHz band spectrum.

The ARA would welcome the opportunity to discuss our concerns with the ACCC.

The contact at the ARA is Phil Allan at pallan@ara.net.au or on (02) 6270 4507

15/04/2014

PO Box 4608, Kingston
ACT 2604 Australia

T +61 2 6270 4501
F +61 2 6273 5581

E ara@ara.net.au
W www.ara.net.au

13