Riedel Communications:

Subject: Response to ACMA Public Consultation

Date: 31.1.2022

Exploring future use of the 1.9 GHz band-consultation 40/2021

Introduction

Riedel Communications, founded in 1987, designs, manufactures, and distributes innovative mission critical real-time networks for video, audio and communications. Its products are used for broadcast, pro-audio, event, sports, theatre and security applications worldwide. The company is known for pioneering digital audio matrix systems, as well as SDI and IP-based media networks. Riedel is headquartered in Wuppertal, Germany and employs over 700 people in 20 locations throughout Europe, Australia, Asia and the Americas.

DECT in mission critical communications

DECT is one of ETSI's most successful standards. Introduced in the late 1990's, it is now found in a wide range of mission critical point to point or point to multipoint applications. The technology has a built-in dynamic channel assignment and an automatic frequency planning function in 20Mhz of license exempt spectrum.

ISM band technologies like Wi-Fi cannot offer the same Quality of Service (reliability) required for intercom systems supporting large events due to the unpredictable nature of the public's use of Wi-Fi.

DECT is much more reliable for voice communication as it assigns channels dynamically, ensuring connections are held until terminated and makes optimal use of valuable spectrum. Wi-Fi is a shared medium with potentially thousands of users in a relatively small area sharing bandwidth regardless of application on a best effort basis (e.g. at a Sporting event). While DMR (Digital Mobile Radio) is also used to connect teams in similar applications, it only provides simplex voice connections with one person getting to speak at a time. This has major safety implications for example in a Formula One pit stop where duplex communication is a must to ensure safety cues or other essential communications can happen simultaneously in a non-blocking manner. For such high-density professional intercom service networks that require robust 100% reliable radio connectivity with low latency, DECT is the technology of choice. To connect large teams of technicians, security staff, musicians, referees, coaching staff, and support the provision of blue light services, it is hard to see beyond this technology.

This contribution underscores the importance of retaining radio spectrum for this technology and indeed increasing that spectrum as outlined below.

Riedel is a global player in audio intercom, with products like Bolero that use DECT technology. Riedel's DECT products support a thriving Australian cultural industry (e.g., Theatres and concert houses (Sydney Opera House), Convention Centres (Adelaide) and universities.

Bolero also plays an integral part in some of the worlds and Australia's most high-profile sporting events like Formula One (Melbourne), the FIFA World Cup, the Olympics, and the Americas cup to name but a few.

As so many other frequency bands have been moved from PMSE to mobile applications*, Riedel and a range of suppliers like Bosch Security Systems, Clearcom, and GreenGo are using this technology and have (and continue to) invest heavily in its ongoing development and innovation.

DECT is the technology of choice for multiple industries and plays an important role in serving public interests. These interests go beyond the organisation of large sporting and cultural events and can be found in mission critical use scenarios in hospitals, nuclear power plants, and factory floors.
Any limitation in the current capacity of the DECT spectrum would have hugely detrimental effects on Riedel's ability to offer the services as described in **Annex I**, and that of Australia to host such events.

We would expressly welcome the extra bandwidth and capacity afforded by the 1900-1920MHz band to enhance customer experience and product quality. To make optimal use of DECT-2020, we believe the whole 1880-1920MHz band should be made available for it on a secondary basis, ensuring that existing Legacy DECT installations in the 1880-1900MHz band and in the 1900-1920MHz band are protected using the Listen before talk functionality.

Annex 1 (Page 9/10): (A non-exhaustive) list of Riedel Bolero installations underscoring the importance that DECT has for many of Australia's most high-profile cultural and sporting events as well as for fixed installations at educational and broadcasting institutions or in Houses of Worship such as Hillsong.

ACMA Public Consultation Response from Riedel:

Issue for comment 1:

- What is the relevance of the Personal Handy-phone System (PHS) and should this use be retained?

Riedel Communications Response:

Comment 1:

Riedel sees PHS as a low-capacity legacy technology used primarily in Japan that has low relevance for Riedel in Australia. For information: PHS is being phased out in Japan by 2023.

Issue for comment 2:

- What is the interest in the use of new technologies to provide a service?

Riedel Communications Response:

Comment 2:

New services are necessary and if possible, should be supported by an ITU region or even worldwide frequency availability, and a highly competitive eco-system of technology, silicon and affordable systems for a wide market access.

For production intercoms and enhanced cordless phone services within enterprise, private and public venues, DECT is already an ideal technology and the eco-system of choice including a state of the art specification which has been enhanced to include DECT-2020 to address many new application markets in Industrial IoT MMTC (Massive Machine Type Communication), PMSE (Program Making and Special Events – *where much spectrum has already been lost to mobile**), as well as URLLC (Ultra Reliable Low Latency Communications) for audio and enterprise communications. The 1880-1900MHz frequency spectrum should as a minimum be protected but additional spectrum availability would allow for bigger, more exciting global events that require a substantial intercom infrastructure and greater spectral capacity.

- *After the Digital Dividend of 2013, radio spectrum for PMSE applications in the band 694-790MHz was re-purposed and auctioned for 4G mobile use.

Spectrum Sharing

The DECT industry continues to contribute to spectrum sharing studies in Europe, and other regions. Recent experience gained in Japan where DECT, PHS and sXGP (Unlicensed LTE) a.k.a. MulteFire do not share similar channel access schemes, makes spectrum sharing extremely difficult as well as being an inefficient use of spectrum. The eco-system around DECT has been constructed over many years by system integrators, chip manufacturers and RF engineers and contains DSP (Digital Signal Processing), RF (Radio Frequency) and stack software, optimised for a wide range of professional applications, such as intercom, conferencing, and wireless headsets and microphones. As an unlicensed LTE technology, sXGP can profit more readily from the greater available spectrum of the 2,4GHz and 5,8GHz ISM bands.

- a) How much spectrum is required to provide the service?

DECT is highly spectrally efficient, accommodating many different services e.g. Telephony, PMSE, Audio, Enterprise Communications, Conferencing and Intercom in 20MHz of spectrum with an inbuilt channel allocation system which supports the self-organisation of a DECT network. For high end event management such as Formula 1 racing where up to 1400 Radio channels are in use in the pit stalls during a race, and 120 Bolero DECT beltpacks which means the existing DECT frequency band is already operating at capacity. Extending the bandwidth with (1900-1920MHz) would serve to substantially improve this service in density and robustness and address a whole new range of applications.

- b) What interservice considerations need to be undertaken for the service to be deployed?

The DECT technology accommodates many different services. These all share the same channel access scheme, and interference avoidance techniques. It would be important for “legacy DECT” (DECT NG, DECT Evolution and DECT ULE) services to retain primary use in the1880-1900MHz band with the possibility of using the 1900-1920MHz band for extended capacity. As DECT-2020 supports Listen Before Talk technology, this could also avail of all spectrum from 1880-1920Mhz but using its Detect And Avoid capability would protect Legacy DECT installations in the 1880-1900MHz band. Regional WBS services could feasibly be accommodated in the 1900-1920MHz band if the channel access scheme is compatible with that of DECT. (see Diagram 1).

- c) What are the deployment scenarios for the service?

DECT-2020 is specified so that legacy DECT and DECT -2020 will co-exist in the 1880-1920 MHz band (using the same channel access scheme -see Diagram 1 below). As a 5G ITU-R approved IMT-2020 technology, DECT-2020 will address many” new” applications in Industrial IoT (MMTC and URLLC), PMSE, Audio, and Enterprise communications. Legacy DECT will continue to address many of the same segments in its current form. A complete replacement of Legacy DECT by DECT-2020 is not foreseen in the short to medium term.

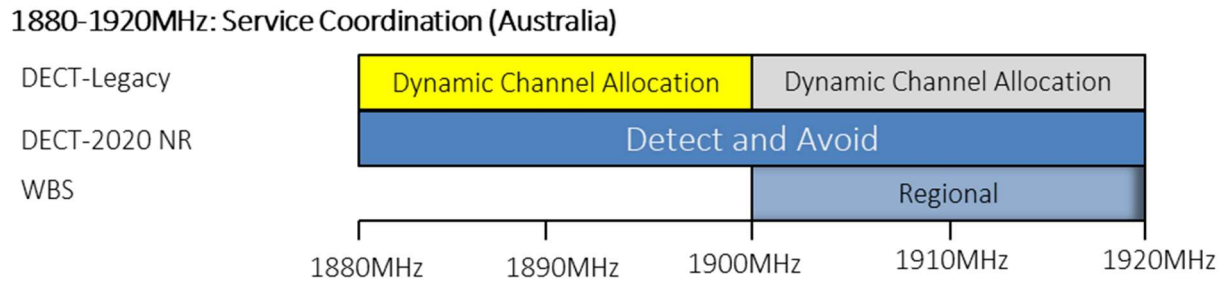


Diagram 1: (**Riedel proposal** for service coordination in the 1880-1900MHz and 1900-1920MHz bands

Issue for comment 3:

- Are services still using DECT or are they transitioning to DECT-2020 NR?

Riedel Communications Response:

Comment 3:

Currently all markets use DECT not DECT-2020 NR as the DECT-2020 NR was only ratified in Q4 2021 and currently there are no commercial chipsets available.

A migration to DECT 2020 beginning in 2023 is assumed once chipsets are available as the new DECT-2020 private 5G network technology will enhance capacity and enable mesh networks introducing new applications in the industrial domain, but also in many PMSE and audio domains. This is not indicative of a general migration to DECT-2020 as a lack of available chipsets today plus associated product development timelines will ensure a gradual migration over the coming years. Also, current DECT still has a roadmap to DECT Evolution and will continue to be a competitive technology in its existing application segments for the next ten years. DECT-2020 will address new market segments in machine to machine and ultra-low latency type applications but also offer capacity enchantments to some legacy DECT projects. With legacy DECT and DECT-2020 designed to co-exist, we can foresee a long-term co-existence.

Issue for comment 4:

Are there any applicable coexistence scenarios not identified?

Are there any scenarios that are unlikely to be practically achievable (and hence the associated planning scenario should be discounted), or are there any that are readily achieved?

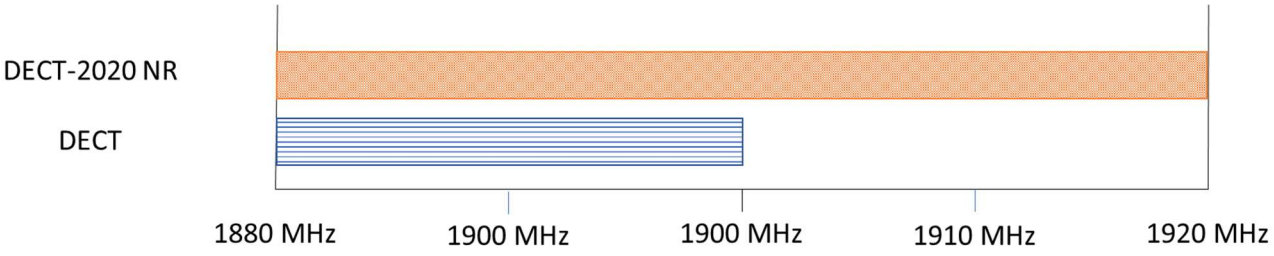
Riedel Communications Response:

Comment 4:

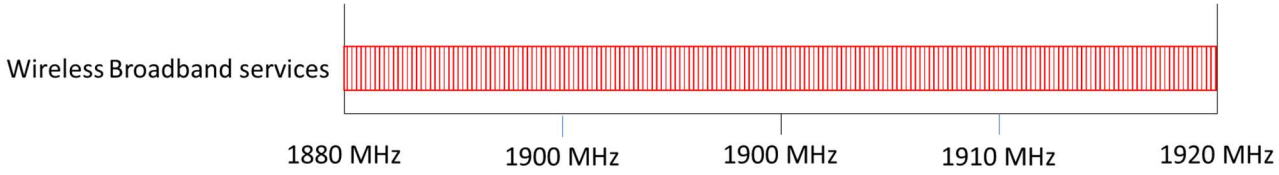
The DECT industry has done extensive research on potential sharing schemes and concludes that the use of a similar channel access scheme makes sharing possible and attainable. Co-existence in the co-channel with technologies that do not share the same channel access scheme leads to spectral inefficiency and to a waste of precious spectrum.

Band Planning Scenarios.

- DECT single use



- Wireless broadband single use



- Scenario 1: Single service/application use of entire band

Questions raised by these scenarios may include: (Single service)

- Will the demand for a single service be sufficient to justify the exclusion of other service types?

Riedel Communications Response:

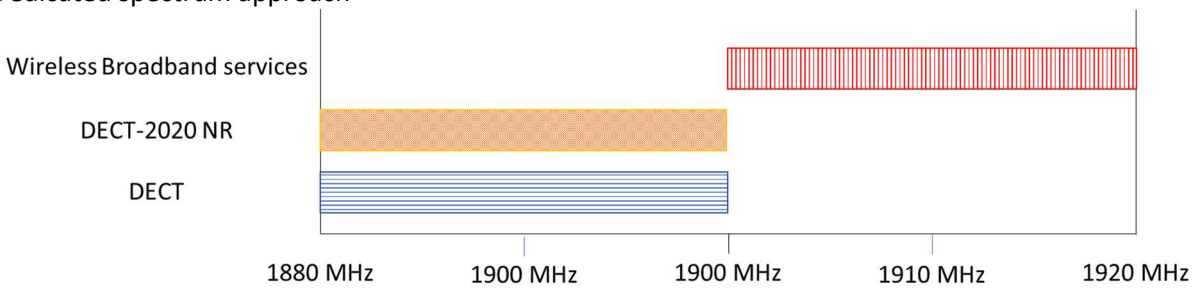
DECT is an established successful technology with a strong eco-system already serving a wide range of services and applications. DECT-2020 has been approved by the ITU-R as a 5G technology (mainly targeting MMTC and URLLC applications) and will enhance the application scope and business potential for a Local Area 5G technology with mesh network capability that addresses low latency markets in Massive Machine Type Communications (Industrial IoT), PMSE, Audio and other lucrative professional markets. We expect DECT-2020 chipsets to be available in 2022/23. Current DECT Chipsets are continuing to innovate.

- What is the impact on services excluded from the band? Can they be accommodated in other bands?

As an example, DECT and sXGP (MulteFire) do not share similar channel Access schemes, making spectrum sharing extremely difficult as well as representing an inefficient use of spectrum. As an unlicensed technology, sXGP (MulteFire) is well positioned to take advantage of the large available spectrum in the 2,4GHz and 5,8GHz ISM bands.

Scenario 2: All services/applications with dedicated, exclusive spectrum

- Dedicated spectrum approach



- ACMA: This scenario also allows for different licensing mechanisms to be used for similar technologies based on the intended application. For example, wireless broadband services may use area-based licensing, while the DECT and DECT-2020 NR may use class licensing.

Riedel Communications Response

Licensing mechanisms that fit the application are sensible. However, the license exempt nature of DECT services has helped to enable thriving residential, enterprise and professional markets based on the use of DECT technology. For the hosting and organisation of large sporting and cultural events in the public interest, using a license exempt technology enables a very efficient use of spectrum, with ad hoc service provision, requiring no frequency planning or supervision. In our opinion, the addition of a licensing overhead as part of a 5G service would hinder innovation and effectively reduce spectrum use. Strict adherence to the DECT specification governing the use of the band has served the DECT industry well in the existing license exempt scheme.

Questions raised by this scenario include:

- Is there demand for each service/application in the band?

Riedel Communications Response

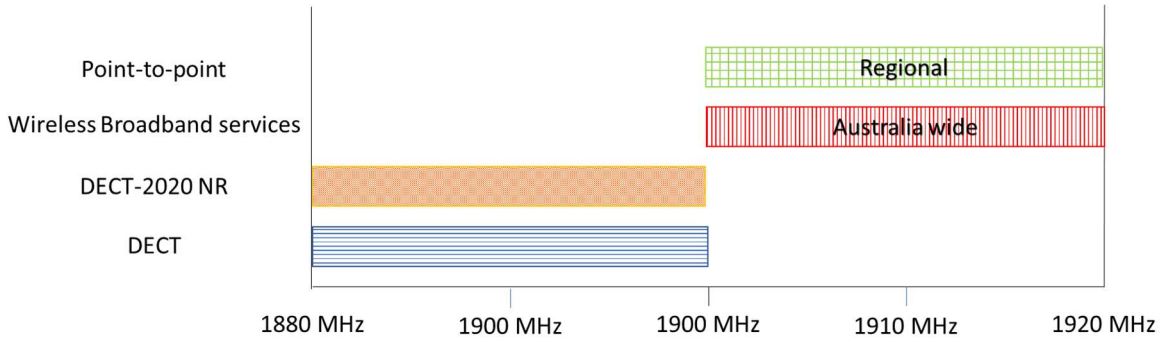
The demand for DECT is underscored by a highly innovative development landscape and diverse range of applications. With DECT-2020 now approved by the ITU-R as a 5G technology (mainly targeting MMTC and URLLC applications), there is huge potential for a Local Area 5G technology with mesh network capability that addresses low latency markets in Massive Machine Type Communications (Industrial IoT), PMSE, Audio and other lucrative professional markets. While sharing 20MHz of spectrum between both technologies is technically feasible, it would lead to inevitable capacity bottlenecks.

- Does this allow enough spectrum for all services/applications?

The approach would not allow sufficient spectrum for DECT-2020 to enhance and grow the applications already supported by current DECT.

- Scenario 3: Geographic separation of services

Figure 1: Geographically separated services



- Questions raised by this scenario include:

Riedel Communications Response

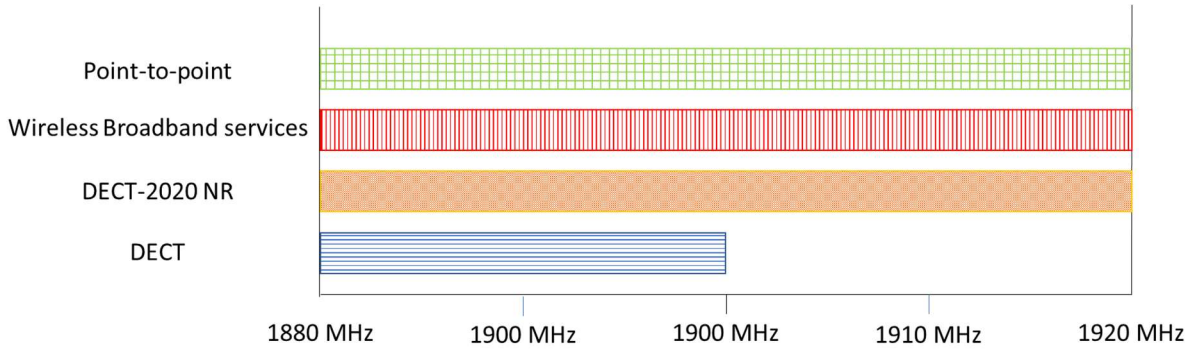
- What is the impact of constraining a service geographically?

Constraining services geographically only makes sense when a region is the only reason for the use of the technology. Otherwise, it would limit the potential for innovation and efficient use of spectrum that is afforded by having a ubiquitous access to DECT.

- How do trends/demand for allocations vary geographically?

In our experience, DECT is used in all walks of life, and regions. It is not a typical urban technology and has found more and more use cases in outdoor use scenarios. Annex 1 provides many examples of such scenarios currently relying on DECT for services in the Australian public Interest.

- Scenario 4: Sharing of spectrum by services/applications
- Co-channel services



- Questions raised by this scenario include:

Riedel Communications Response

- Does the sharing of spectrum by services cause inefficiencies?

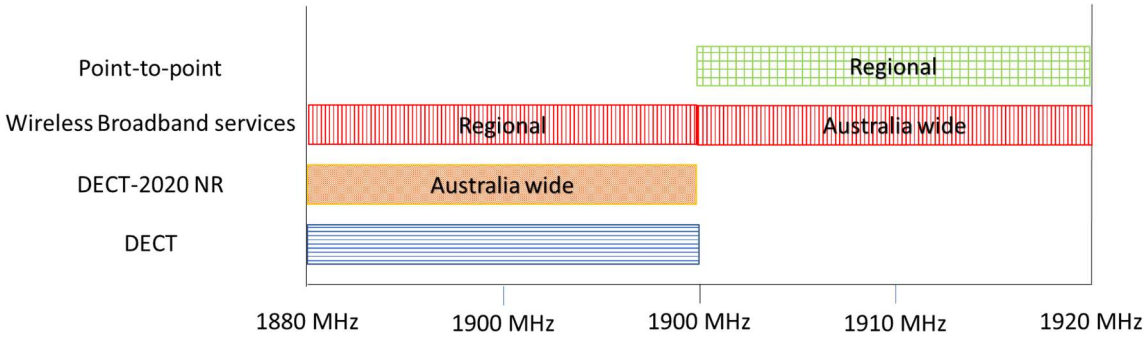
The DECT industry continues to contribute to spectrum sharing studies in Europe, and other regions. Recent experience gained in Japan where DECT, PHS and sXGP (Unlicensed LTE) a.k.a. MulteFire do not share similar channel access schemes, makes spectrum sharing extremely difficult as well as

being an inefficient use of spectrum. The eco-system around DECT has been constructed over many years by system integrators, chip manufacturers and RF engineers and contains DSP (Digital Signal Processing), RF (Radio Frequency) and stack software, optimised for a wide range of professional applications, such as intercom, conferencing, and wireless headsets and microphones. As an unlicensed LTE technology, sXGP can profit more readily from the greater available spectrum of the 2,4GHz and 5,8GHz ISM bands.

- Are there any services that can coexist with minimal impact on spectrum efficiency?

Riedel: Services that share a similar channel access scheme, ensure an optimal and efficient use of spectrum. Legacy DECT contains DECT, DECT-NG (CAT-iq), ULE and DECT Evolution. These all share the same channel access scheme as DECT-2020 making an ideal spectrum sharing environment.

- Scenario 5: Combination or hybrid approach of other scenarios
- Combination of all considerations



- All questions raised in the previous scenarios would be relevant to this scenario.
- Based on the current domestic and international considerations, and considering the planning scenarios and the questions the different scenarios raise, we invite comment on the following:

Issue for comment 5:

Riedel Communications Response

- What are possible planning scenarios and industry views on the overall future use of the 1.9 GHz band and its services?

Please refer to Riedel's proposal in Diagram 1 (Page 3)
For Riedel, DECT is a key technology in global markets (Americas, Europe, APAC and Australia). Riedel would like to underscore how critically important this technology is for the whole industry and the role it plays in serving public interests.
Any limitation in the current capacity of the DECT spectrum would have hugely detrimental effects on the broadcast, live performance, events, and sports sectors and would severely limit ability to offer the services as described in Annex I, and that of Australia to host such high-profile events.

On extended band 1900-1920MHz**:**
Riedel would expressly welcome the extra bandwidth and capacity afforded by the 1900-1920MHz band to improve customer experience and product quality. To make optimal use of DECT-2020, we believe the whole 1880-1920MHz band should made available for it on a secondary basis, ensuring that existing Legacy DECT installations in the 1880-1900MHz band (See Annex I). and in the 1900-1920MHz band are protected.

- a) How much spectrum is required (distinguishing between the minimum viable and desirable) to provide the service?

For DECT-2020, at least 20 MHz of spectrum.40 MHz is desirable.

- b) Is there a clear geographical delineation – for example, metropolitan or regional – for the service?
- c) Is there or will there be equipment readily available for the service?

DECT-2020 Chipsets will be available in 2022/23. Current DECT Chipsets are continuing to innovate.

- Riedel would like to extend its gratitude to ACMA for the possibility of responding to this paper. We remain open to any potential follow-on questions.

Annex I: (Riedel Communications)

January 12. 2022.
For the Discussion Paper:
Exploring future use of the 1.9 GHz band - consultation 40/2021 | ACMA
As per request in the response, Riedel Communications has made an unequivocal statement to ACMA that this band is critically important for many important segments of Australian society and public interest.

This Annex includes a non-exhaustive list of examples of Riedel's Bolero installations (using DECT) in Australia.
The list is segmented into logical themes. See below.
Also see RIEDEL » Catalogue & Updates for a wide range of references.

Global (small selection):

- Summer and Winter Olympic Games
- Commonwealth Games
- Formula 1 World Championship
- Football World Cup
- Eurovision Song Contest
- e-Sports: Riot Games, Blizzard Entertainment

Annex 1: List of Riedel Communications Australian Installations.

Sporting:

- Americas Cup (see graphics below)
- Sail GP Sydney
- Australian Formula 1 Grand Prix
- Supercars Championship
- Australian Football League
- National Rugby League
- A-League Soccer
- Tennis Australia
- Australian Open Tennis
- Cricket Australia
- Sydney Cricket Ground
- Stadium Australia (Accor Stadium)
- Western Sydney Stadium (CommBank Stadium)
- Brisbane Cricket Ground (The Gabba)
- Perth Stadium (Optus Stadium)

Cultural:

- Sydney Opera House (Theatre Installation)
- Arts Centre Melbourne (Theatre Installation)
- Her Majesty's Theatre (Theatre Installation)
- Vivid Sydney
- Sydney New Year's Eve Celebrations
- Australia Day Celebrations, Sydney
- Adelaide Convention Center (see Article Page 16)
- Adelaide Festival Centre
- Belconnen Arts Centre
- Brisbane Convention & Exhibition Center
- HOTA, Home of The Arts (Gold Coast)
- Melbourne Convention & Exhibition Centre

TV-Broadcasting:

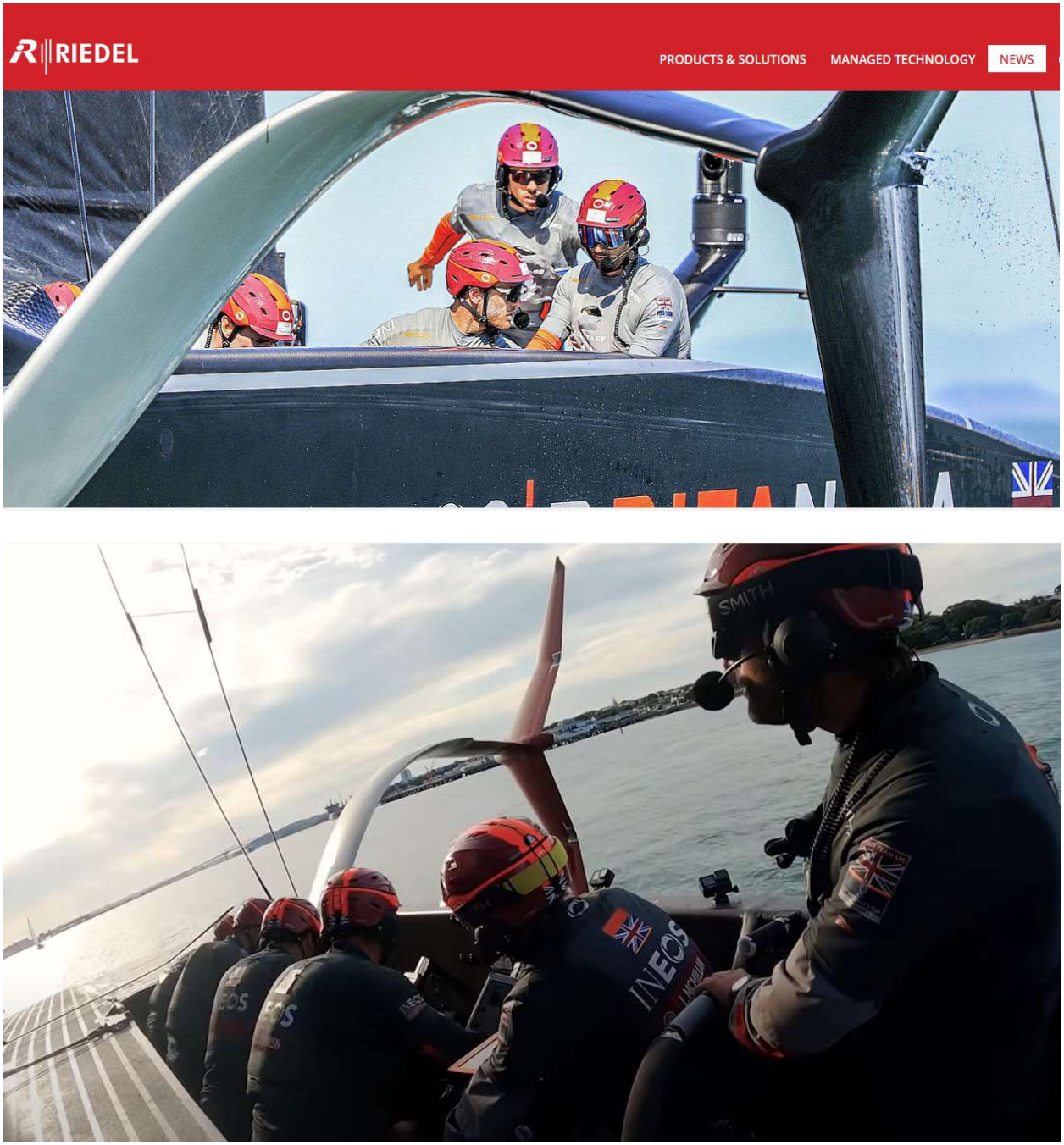
- Nine Network (Channel 9)
- Seven Network (Channel 7)
- Australian Broadcasting Corporation (ABC)
- Sky News Australia
- NEP Outside Broadcast
- Gravity Media Outside Broadcast
- Videocraft Outside Broadcast
- Endemol Shine
    - *(Survivor, Big Brother, MasterChef, Lego Masters, etc...)*
- Thoroughbred Racing Productions
- Racing NSW

Educational:

- Edith Cowan University
- Monash University
- National Institute of Dramatic Arts
- Queensland Conservatory of Music
- Royal Melbourne Institute of Technology (Facility Installation)
- Sydney Conservatory of Music
- Western Australian Academy of Performing Arts (WAAPA)

Houses of Worship:

- Hillsong Church (National) (see Article page 8)
- Gateway Church
- Planetshakers Church



Above: Riedel Bolero in Use at the Americas Cup.