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February 1, 2010

By Electronic Filing

Ms. Marlene H. Dortch
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Re: In the Matter of Request by the TETRA Association of a Waiver of Sections 90.209, 90.210 and 2.1043 of the Commission's Rules, ET Docket No. 09-234
Ex Parte Filing

Dear Ms. Dortch:

The TETRA Association ("Association") hereby re-files a copy of its Reply Comments, with Attachments, in the above-captioned proceeding.

Due to a technical glitch, ECFS apparently did not accept the attachments to the Association's Reply Comment that was filed on January 29, 2010. This submission is being made to correct that error.

Please direct questions concerning this matter to the undersigned.

Sincerely,
/s/
Laura Stefani
Attorney for the TETRA Association

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Request by the TETRA Association	)	
Of a Waiver of	)	ET Docket No. 09-234
Sections 90.209, 90.210 and 2.1043 of	)	
The Commission's Rules	)	
	)	

REPLY COMMENTS OF THE TETRA ASSOCIATION

The TETRA Association ("the Association"), by its attorneys, hereby submits its reply comments in support of its request for waiver of Sections 90.209, 90.210 and 2.1043 of the Commission's rules ("Waiver Request" or "Request").[1]

Eight parties have filed comments opposing the Association's Waiver Request, including Motorola, which is the one of the largest TETRA manufacturers in the world.[2] These parties, however, have provided no technical analysis to support their claims,[3] nor have they demonstrated that grant of the waiver would increase the potential for harmful interference to any spectrum user. In addition to their opposition, striking a consistent theme, they argue that the issue presented by the TETRA request should be considered in a rulemaking proceeding rather than as a waiver.[4]

The Association demonstrates below that its waiver request provides ample opportunity to examine the technical aspects of permitting TETRA-based devices to operate in the United States. Initiation of a rulemaking proceeding would delay the entry

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[1] *In the Matter of Request by the TETRA Association for Waiver of Sections 90.209, 90.210 and 2.1043 of the Commission's Rules*, Request for Waiver of Sections 90.209, 90.210 and 2.1043, ET Docket No. 09-234 (filed Nov. 20, 2009) ("Waiver Request").
[2] These parties are Motorola, the National Public Safety Telecommunications Council, the Land Mobile Communications Council, APCO, Telecommunications Industry Association, Harris Corporation, Aclara RF Systems, and Skybridge Spectrum Foundation *et al*.
[3] Apart from Aclara RF Systems, which comments are discussed separately below.
[4] A few parties also suggest that the Association lacks standing to bring this Waiver Request, but, whether as a petition for rulemaking or a waiver request, it is appropriate and respectful of Commission resources to permit the Association to act on behalf of its members.

into the U.S. marketplace of a valuable technology and yet provide no additional information to the Commission or benefit to the public.

Throughout the past two years, the Association has been approached by potential users and user groups, including UTC and the API, inquiring about the availability of TETRA in the U.S.[5] Thus, the Association recognized the immediate need for a wider choice of radio technologies than presently available in the United States and made the effort to introduce TETRA in the most expeditious manner available, that is, through the instant Request. In this regard, the Association understands the opposition to its Request from radio manufacturers who will face competition from TETRA-based radios, even when that opposition is implausible given their statements and actions outside the U.S. The Association also understands the interference concerns expressed by certain user associations, particularly when those concerns are heightened by the manufacturers that the users have relied upon for many years. The Association addresses the concerns of both groups below.

Suffice it to say, however, that TETRA co-exists without interference problems with other technologies throughout the world. The TETRA standard was created by an international Standards Development Organization ("SDO") with contributions from many radio manufacturers, including Motorola, Ericsson, Marconi, Nokia and others. The standard was explicitly designed to co-exist with other digital and analog technologies, whether from dedicated bands or by operating alongside other technologies in the same bands. The adjacent channel coupled power specification set by the TETRA standard, and recognized by the FCC as a method of managing interference, is designed to permit that degree of co-existence without causing interference. In its Request and in these comments below, the Association has shown that grant of the Request will not cause harm to other users. Opponents have not provided any valid reason why the waiver should not be granted.

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[5] *See* Attachment A (letter from UTC); *see also* Comments of Bay Electronics and Comments of Sepura plc (both noting a need for TETRA in the U.S. by utilities).

DISCUSSION

That the TETRA standard differs from the Part 90 technical requirements does not mean that there is an increased likelihood of interference or incompatibility, but only that interference protection can be provided in a different way. Based on the technical information in the record of this proceeding, the Commission has sufficient basis for granting the Association's waiver request.

Action on a Waiver Request rather than a Petition for Rulemaking is an Appropriate Process

The Commission's rules allow it to waive its regulations for good cause shown, subject to the provisions of the Administrative Procedures Act ("APA").[6] Here, all APA requirements for a notice and comment proceeding have been met and all interested parties have been given a meaningful opportunity to participate and provide relevant technical information to inform the Commission's decision.

A two-step rulemaking proceeding – *i.e.*, a proceeding initiated by a party's petition for rulemaking then followed by a proceeding initiated by a Commission notice of proposed rulemaking – would serve only to delay by multiple years the introduction into the United States of a technology that is being used to great public benefit all over the world. The only interest served by such a delay would be maintaining a less than competitive *status quo.*

Response to Objections

The Association's technical showing demonstrates that there will be no risk of harmful interference to other devices. TETRA was explicitly designed to coexist with analog and digital technologies. To avoid interference into adjacent channels, an adjacent channel coupled power ("ACCP") specification was created to ensure that spurious radiation from the technology was kept at a very low level. This specification was considered to be an effective protection and is simply an alternative to the "masks" set out in the Commission's rules. Indeed, as discussed further below, this same mechanism is used by the FCC for operations in the 700 MHz band. The Waiver Request seeks only an exception to the part of the masks that is within the occupied

[6] *See* 47 C.F.R. § 1.925.

channel, and does not seek any relaxation of the adjacent channel performance, which TETRA meets with a very high margin.

Specifically, at the frequency center, TETRA offers considerably better performance than offered by the Part 90 emission masks.[7] TETRA devices deviate from the Part 90 emission masks just at the edge of the TETRA occupied bandwidth, and elsewhere TETRA is well within the masks.[8] The small excursion outside the masks that would occur at 10 kHz contains a great deal less power than the integrated power that TETRA saves within the adjacent channel by staying so far below the masks in that area, even before the TETRA emission spectrum is multiplied by the adjacent channel receiver's input filter.[9] Critically, as compared to the legacy analog systems presently used by utilities that are seeking to switch to TETRA, the shape of the receiver response is such that there is low sensitivity at the allocated band edges but much more sensitivity at the center where TETRA offers considerably better performance than the Part 90 masks. As such, co-existence will not be an issue.

Several comments support this conclusion. Bay Electronics notes that TETRA "looks to meet the requirements of the FCC rules, and the requirement not to cause harmful interference. In fact, it looks cleaner than some previously accepted digital systems."[10] And Wireless Engineering Systems and Technology ("WEST"), which reviewed the technical issues raised in the comments upon request from Sepura, concludes that TETRA technology not only meets the intent of the FCC masks but also would *reduce* the likelihood of interference.[11] WEST's analysis finds that "[f]or all tested FCC approved (type accepted) digital equipment types (this includes EDACS, iDEN and OpenSky) the test data shows that the Tetra system generates less interference."[12]

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[7] Attachment to Waiver Request
[8] *Id.*
[9] *Id.*
[10] Comments of Bay Electronics at 2 (noting also that "[a]fter reading the comments thus far, I can only say that each and every manufacturer filing comments against, has at least one reason to keep TETRA out of the US, and it is not the fact that they are worried about interference and proper waiver filings.").
[11] Comments of Wireless Engineering Systems and Technology (WEST), ET Docket No. 09-234 (filed Jan. 28, 2010) ("WEST Comments").
[12] *Id.* at 2.

Nonetheless, a number of user groups and radio manufacturers have opposed the Association's Request. Their oppositions can be grouped as follows:

- User Groups, including APCO, NPSTC
- Manufacturers, including Harris, Motorola and TIA
- Commercial Users, including Aclara and Skybridge Spectrum Foundation

The Association addresses each group in turn.

User Groups:

It is understandable that certain user groups, especially those involved in public safety, would be wary of any new technology that could possibly lead to increased interference.[13] Nonetheless, the technical showing made in the Request and in these comments should be sufficient to allay those concerns.

For example, APCO expresses concern about the use of ACCP as a means of interference protection, yet this already is in use by the FCC for 700 MHz band spectrum used by the public safety community.[14] In adopting use of ACCP, the FCC explained why it is useful:

> [a]s wireless communications evolve, the complexity of determining compatibility between different types of systems increases and ACCP is an industry-developed method to assess compatibility within the complex channel environment resulting from the initial *Refarming Report and Order*.[15]

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[13] Given the decisions made in the public safety community to achieve interoperability through the use of a single technology and that Project25 has been chosen for that purpose, however, the TETRA Association does not plan to market TETRA technology to public safety users in the United States.

[14] *See* 47 C.F.R. 90.543.

[15] *Development of Operational, Technical and Spectrum Requirements for Meeting Federal, State and Local Public Safety Agency Communication Requirements through the Year 2010*, Sixth Notice of Proposed Rulemaking, 17 FCC Rcd 19303 at n.5 (2002). The Commission also noted that "ACCP is an emission limit based upon the absolute and relative levels of coupled power as a function of frequency that ensures that the adjacent channel interference potential of transmitters at various bandwidths is consistent and predictable." (The Commission subsequently adopted the term "ACP.").

In fact, in that proceeding, the Wireless Radio Section of the Telecommunications Industry Association filed comments recommending the use of ACCP.[16] Given the precedent set by the FCC in adopting ACCP/ACP for modern digital technologies, as well as TIA's support for it, concern expressed about its use in this proceeding is misplaced.

The filing from NPSTC is similar in many respects to that of APCO in expressing concern about the potential for interference and, in particular, to relaxing the rules that protect against adjacent channel interference. However, in common with other submissions, NPSTC does not take into account the fact that TETRA's adjacent channel performance is better than many other technologies that already are approved for use in the U.S. Indeed, radiation from TETRA transmissions into the adjacent channel is substantially below the levels already permitted by the current FCC limits.[17]

The Association recognizes the concerns of the public safety community regarding interoperability, but notes that TETRA already is in use in many other countries within the same bands that are home to other analog and digital technologies used by public safety, including Project 25 ("P25"). The attached brief analysis by the Association indicates just a few of countries in which coexistence has been demonstrated.[18] The government of New Zealand, among others, after a technical consultation issued guidelines for the sharing of the 800 MHz band by analog, TETRA and P25 technologies, for example.[19] As well, the Association is aware that in the U.K. a nationwide TETRA network has been in operation alongside a P25 public

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[16] *See* 17 FCC Rcd 19303 at ¶ 4 and n.8.

[17] Regarding the "near/far" problems that were raised, these are well-recognized issues that need to be taken into account during any spectrum planning and frequency co-ordination process. The issue does not occur as a result of using TETRA technology but will occur wherever low sites and high sites are mixed regardless of the technology employed, and particularly when there is a high density of base stations operating at low power to create many smaller cells. While TETRA has a cellular structure, the cell sizes are much larger than, for example, GSM or CDMA. This means that the opportunity for a near/far effect is much reduced. Moreover, good adjacent channel power performance actually minimizes the likelihood of interference in this situation, and, as already demonstrated, TETRA's ACCP performance is better than many technologies that are already in use in North America.

[18] *See* Appendix A, below.

[19] *See* Attachment B (Ministry of Economic Government, Radio Spectrum Management, "Engineering guidelines for trunked radio systems in the 800 MHz TS band" (June 2008)).

safety (Customs and Excise) network for years, with no reported instances of interference.[20] These showings of co-existence of TETRA and P25 in other countries should ally public safety concern.

With respect to LMCC's statement that "relaxing the authorized bandwidth and/or emission masks puts more energy in adjacent channels," the Association notes that the energy produced in an adjacent channel is significantly less than that which is allowed under the Part 90 rules and that if the LMMC's concerns are based on this premise then their concern is unfounded.

Manufacturers:

Harris asserts that the Commission has adopted specific bandwidth, emission mask, and certification rules as a result of extensive data and testing. This is well recognized by the Association. However, the masks currently in use were in fact created in an analog environment and have not been updated to account for more spectrum efficient technologies. Indeed, as noted above with respect to ACCP/ACP, the FCC has moved away from such masks with the rules for the 700 MHz band.

Motorola by its own admission is a major supplier of land mobile radio equipment worldwide and has participated in the development of the TETRA standard. It should be noted that Motorola, contrary to its position in this proceeding, has stated in a submission to the Australian Government that modern TETRA equipment can coexist in the same bands as other technologies without causing harmful interference.[21] The contradictions in its response to this Request are clear. Motorola is comfortable to supply equipment in countries where ACCP/ACP is accepted as a means of protecting against interference and yet argues that it is not safe in the U.S. Motorola participates in the creation of a standard that uses ACCP/ACP and yet claims that it is not safe. Motorola also claims that ACCP/ACP is no substitute for masks and yet states "ACP and emission masks are

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[20] In that instance, both the TETRA and the P25 equipment were supplied by Motorola.

[21] *Australian Communications and Media Authority, Spectrum Proposals: 403-520 MHz, Proposals for Future Arrangements in the 400 MHz Band*, Motorola Response (dated June 22, 2009) (stating that "a trunking only band is unnecessary, even for TETRA. . . . The tighter specifications for newer [TETRA] equipment means that transmitted energy now fits within the spectral limits of the channel allocation thereby negating the need for this outdated and inefficient practice.") (found in Attachment C hereto).

fundamentally the same from the standpoint that they act to limit transmitter out-of-band power to a known amount independent of receiver technology." [22]

Moreover, Motorola cites its experience with its own with iDEN technology as a justification for denying the waiver request. However, Motorola provides no evidence that TETRA has caused interference in other parts of the world or that iDEN specifications are similar to TETRA. In fact, a report commissioned by Sepura from Wireless Engineering Systems and Technology clearly differentiates the iDEN experience from the entry of TETRA-based products into the U.S, noting that iDEN systems required far more base station sites to support a larger customer base.[23] Moreover, the report notes that that TETRA systems are not even capable of providing the type or service or amount of traffic demand as iDEN systems.[24]

Commercial Users:

Aclara has made a technical analysis of the impact on its services of allowing TETRA to be used in its frequency band and has concluded that interference would be caused if 25 kHz TETRA licenses were issued on 12.5 kHz channel centers. While this concern is more one of effective spectrum planning and frequency coordination rather than any issue presented by the Request, the Association concurs with Aclara's analysis and has no objection to their request to avoid such allocations.

The TETRA Association has been in contact with the Skybridge Spectrum Foundation for some time and is aware of its desire to make TETRA technology available to its users, particularly in the transportation industry. Although, Skybridge raises the issue of Motorola's intellectual property, the Association believes that this issue is not relevant to the issues presented by its Request.

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[22] Comments of Motorola at n.13.
[23] WEST Comments at 3.
[24] *Id.*

CONCLUSION

Not one commenter has put forth any material reason that interference would increase if the waiver is granted or explained how other users would be threatened by interference by TETRA devices. While some parties seek additional technical analysis and even field testing, this must be seen as a delaying tactic. Additional testing would not accomplish anything in this instance in which a fully vetted technology has been operating all over the world alongside other technologies for years without harmful interference to other users.

Accordingly, the Association urges the Commission to act expeditiously and grant a waiver of Sections 90.209, 90.210 and 2.1043, as set forth in the Waiver Request.

Respectfully submitted,

The TETRA Association

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Laura Stefani
GOLDBERG, GODLES, WIENER & WRIGHT
1229 19th Street, N.W.
Washington, D.C. 20036
(202) 429-4900
Its Attorneys

January 29, 2010

Appendix A

Below is a table providing examples of where TETRA and Project 25 co-exist or is planned.

Country	**Regions**
Columbia	Bogota Cali Bucamarnga
Russia	Moscow (10 BS, 60 frequencies, digital + analogue modes) St. Petersburg Kazan UFA
Latvia	Not using same sites but TETRA overlaps the P25
Kazahkstan	Have both
China	Beijing
New Zealand	
Saudi Arabia	
Brazil	Rio de Janeiro
Turkey	TETRA pilot with the Police. P25 already in use
UK	Nationwide Public Safety network using TETRA, nationwide P25 network for UK Customs and Excise. Both supplied by Motorola.

ATTACHMENT A

William R. Moroney
President & Chief Executive Officer

Direct Line: 1.202.833.6801
E-Mail: bill.moroney@utc.org

May 21, 2008

Mr. Phillip Kidner
Chief Executive Officer
TETRA Association
Association House - South Park Road
MacClesfield, Cheshire SK11 6SH
United Kingdom

Re: TETRA Technology in the United States

Dear Phil:

Thank you very much for your visit to our offices in April and for participating in our Annual Conference earlier this month. We appreciate your updating our members about all the great things TETRA is doing around the world – except in the United States.

The purpose of this letter is to reiterate the long-held desire of UTC and its members to see TETRA technology made available here, as well.

The Utilities Telecom Council, celebrating its 60th anniversary this year, is an international trade association representing the information communications technology interests of electric, gas and/or water utilities. In the United States, over 500 utilities belong to UTC, as do all the major energy and water trade associations representing virtually all the investor-, government- and cooperatively-owned utilities. Our members range in size, from large utilities covering tens of thousands of square miles of territory and serving millions of customers, to rural utilities, serving only a few thousand customers. All of these entities are involved in the provision of critical public services throughout the United States.

All of our members have a need for critical communications routinely and in times of crisis. Moreover, they face an increasing need for efficient, cost-effective communications technology, providing both voice and data capabilities, to meet infrastructure growth and Smart Grid-related needs. These requirements are generally common throughout the sector, but include capabilities such as: simultaneous voice and data transmissions; the flexibility to create talk groups, have point-to-point calls and communicate directly when outside the infrastructure; the ability to create emergency priorities; and location information. Moreover, utilities need a technology that is interoperable and spectrum-efficient, with equipment available from multiple manufacturers.

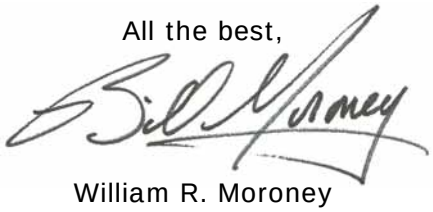
UTC and its member utilities investigate continuously the available technologies that would meet these requirements. For some years, these investigations have led us to a sincere interest in TETRA technology as a viable solution in meeting our requirements. We also note that TETRA is already deployed by users of critical communications in our industry – including many of our international members – and others in more than 100 countries around the world. However, we are aware that our members currently cannot consider proposals from any TETRA manufacturer, from the USA or otherwise, to offer equipment based on this technology. This remains a source of frustration to UTC and its members.

We support efforts of the TETRA Association to overcome this barrier to critical infrastructure industries' ability to select the best technology to meet their needs.

If there are any questions concerning this issue, please do not hesitate to contact us.

Good luck with the Tetra World Congress in Hong Kong. It is with sincere regret that we cannot be there this year; but, please know that we are with you in spirit. I look forward to seeing you again at our European Utility Telecom Conference this November in Lisbon, if not sooner. Until then,

All the best,



William R. Moroney
President & Chief Executive Officer
Utilities Telecom Council

ATTACHMENT B

Engineering guidelines for trunked radio systems in the 800 MHz TS band

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Executive brief

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6. Conclusions

Appendix A

View document as PDF

Available as Engineering guidelines for trunked radio systems in the 800 MHz TS band [97 kB PDF]

To view or print this document you will require PDF viewing software such as Adobe Acrobat Reader. If you are experiencing problems downloading our forms, make sure you have updated your PDF reader to the latest version.

Executive brief

In June 2008, the Ministry of Economic Development circulated a technical report entitled *Land Mobile Radio Systems operating in the 800 MHz band: engineering and compatibility considerations between APCO, TETRA & Analogue FM trunking networks.* The purpose of the report was to fine tune the results of the peer review process initiated by the discussion paper Digital Land Mobile in the 800 MHz Band: An Engineering Discussion Paper.

The technical report proposed engineering recommendations for the licensing of TETRA, APCO and analogue land mobile trunked radio systems in the 800 MHz TS band. It considered coexistence issues, emission characteristics of the systems concerned and the current arrangement of the analogue TS band. Submissions in response to the report supported the Ministry's proposals and provided further suggestions on engineering issues.

1. Purpose

Currently, the 800 MHz TS band is used solely for analogue trunked land mobile services. An initial consultation process identified that digital trunked land mobile services should be accommodated in this band, and that there is demand to assign digital land mobile services in the TS band.

A subsequent report provided recommendations in regards to engineering and technical compatibility criteria to be applied when certifying licenses for digital services in the land mobile TS band (813 - 819 MHz paired with 858 - 864 MHz).

This paper documents submissions in response to the report and identifies the proposed approach to engineering licences for coexistence between TETRA, APCO and Analogue FM land mobile radio in the 800 MHz TS band.

2. Background

The Ministry released in May 2007 an engineering discussion paper with the purpose of consulting industry on the potential introduction of digital trunk radio technologies in the 800 MHz TS band. This consultation process was put in place to address an expressed interest from band users in deploying new and more efficient technologies. The outcomes of this consultation were published in December 2007, identifying the following key aspects:

- TETRA and APCO P25 were identified as the preferred digital technologies;
- digital technologies to share the band with analogue systems;
- maintaining existing band plans and including a provision to allow 12.5 kHz channels;
- updating operational policy to permit digital land mobile emissions in the 800 MHz TS band;
- ensuring coexistence between digital standards and incumbent analogue systems.

This last point on technology coexistence became an outstanding engineering issue requiring further analysis. In order to address this point, a technical report was prepared and circulated for consideration by parties that had indicated an interest in the 800 MHz TS band. This technical report built upon, and fine tuned the results obtained in the initial consultation paper. This was required in order to ensure interference mitigation between multiple digital technologies and minimal impact on existing analogue services.

3. Submissions

Peer review of the report *Land Mobile Radio Systems operating in the 800 MHz band: Engineering and compatibility considerations between APCO, TETRA & Analogue FM trunking networks*, yielded five submissions.

The parties who provided submissions were:

Full name of Submitter
Kordia Ltd
Motorola Inc. Ltd
Team Talk Ltd
TL Parker Ltd
Radiotronics Ltd

A breakdown of the responses to the technocal report is provided in Appendix A.

4. Analysis

The technical report posed several recommendations for consideration. This section discusses these recommendations in relation to the comments received.

-

4.1 Recommendation 1

To efficiently cater for the introduction of APCO P25 phase 1, a channelling plan with a 12.5 kHz raster is implemented in conjunction with the existing 25kHz plan.

The majority of reviewers agree with the proposed recommendation. Further, one reviewer suggested that the majority of services would use 25 kHz channel spacing. 12.5 kHz APCO channels should be introduced depending on popularity.

The initial consultation process identified that there is an interest in APCO P25 (phase 1) systems. The implementation of a channelling plan with a 12.5 kHz raster allows APCO P25 to take place from the outset, providing a more efficient allocation of channels (figure 1). The current 25 kHz channel raster will remain in place, catering for the current analogue service, TETRA and other future 25 kHz applications as required. The current block allocation matrix will also remain in place.

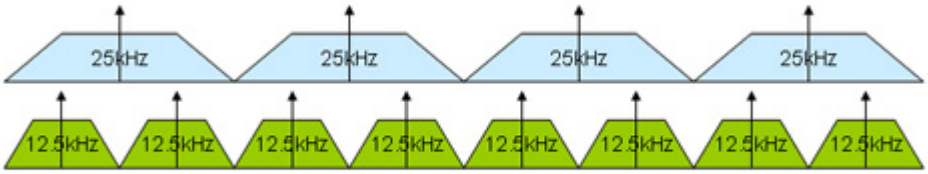

Figure 1. Overlay of 12.5 kHz channels (TSN channels) on current 25 kHz TS band

-

4.2 Recommendation 2

To promote RF efficiency, a digital trunked dispatch system permitted to operate in the TS-band, must have a minimum number of digital voice channels equivalent to the current minimum number of analogue voice channels. In other words, a single TETRA 25 kHz channel assignment, or three APCO P25 (phase 1) 12.5 kHz channel assignments are considered equivalent to an analogue trunked system (with three RF channel assignments).

The majority of reviewers agree with this recommendation. In regard to this recommendation, one reviewer indicated that trunked systems usually employ one channel for control, affecting spectrum efficiency. In this regard, it suggested considering the implications of the advent of APCO phase 2 channel sizes.

Currently, APCO systems allow either 25 kHz or 12.5 kHz configurations. In order to ensure the orderly and efficient allocation of 12.5 kHz APCO channels, an overlayed12.5 kHz raster has been identified as appropriate. Future APCO phase 2 platforms may involve TDMA (12.5 kHz channels) or FDMA (6.25 kHz) techniques to allow an increased number of voice channels. However, these techniques are still under development and standards are not available. The Ministry will review the impact of such developments once standards have been finalised.

-

4.3 Recommendation 3

To adopt an overlay of digital channels on the existing analogue channel raster, and preserve the current block and channel assignment scheme.

All reviewers agreed with this recommendation.

-

4.4 Recommendation 4

To consider adopting the rule that, in faded conditions, the DAQ 3.4 (BER 2%) coverage area contour (106dBm) of a service should be at least 5 km away from a base station operating in the 1st adjacent channel.

The majority of reviewers agree with the proposed recommendation.

One reviewer proposed applying an additional engineering rule to address ambiguities in regards to fortuitous coverage. It suggests that the determination of the faded -106 dBm coverage contour can be a difficult task considering the New Zealand topography. It was proposed that, in addition to recommendation 4, it would be necessary to implement a rule to exclude fortuitous coverage from interference protection.

Another reviewer suggested that diverse local topography impacts coverage contours and that adjacent channel interference issues should be resolved by Approved Persons based on their experience.

PIB 38 (Sections 3.3 & 3.7) prescribes guidelines to help Approved Persons in making a professional judgement when determining the compatibility of new and existing mobile radiocommunications services. This approach was adequate when a single analogue equipment standard was in use. However, to ensure coexistence between TETRA and APCO/ analogue services, a more precise approach is considered necessary to provide a reasonable expectation for frequency re-use.

-

5. Summary of outcomes

This section summarises the outcomes obtained from the review. The engineering guidelines obtained as a result will be included in the relevant section of PIB 38.

-

5.1 General

1. To efficiently cater for the introduction of APCO P25 phase 1, a channelling plan with a 12.5 kHz raster is implemented in conjunction with the existing 25 kHz plan. 12.5 kHz channels will be named “TSN” for “narrow band”. (Figure 1)
2. To preserve the current block and channel assignment scheme (band plans, TS 800 MHz), digital channels are overlaid on the existing analogue channel raster. The maximum EIRP limit of the band (21.8 dBW) remains unchanged.
3. To promote RF efficiency, a digital trunked dispatch system permitted to operate in the TS-band, must have a minimum number of digital voice channels equivalent to the current minimum number of analogue voice channels. In other words, a single TETRA 25 kHz channel assignment, or three APCO P25 (phase 1) 12.5 kHz channel assignments are considered equivalent to an analogue trunked system (with three RF channel assignments).

   Later when it becomes available, two APCO P25 (phase 2) 12.5 kHz channel assignments will be considered as equivalent.

-

5.2 Engineering guidelines (to be included in PIB 38)

a. Coverage area

The coverage area of a base station is the area of service within which the licensee has a reasonable expectation of protection from harmful interference. This is defined by a continuous contour equivalent to a signal level of -106 dBm or a theoretical coverage area with a radius of 58 km*, whichever is the smaller. See Figures 2 and 3.

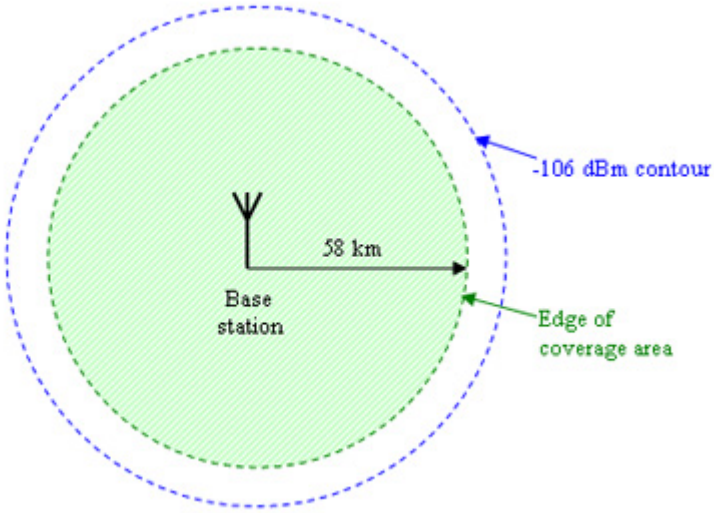

Figure 2 - Without terrain limitation, a 58 km radius applies

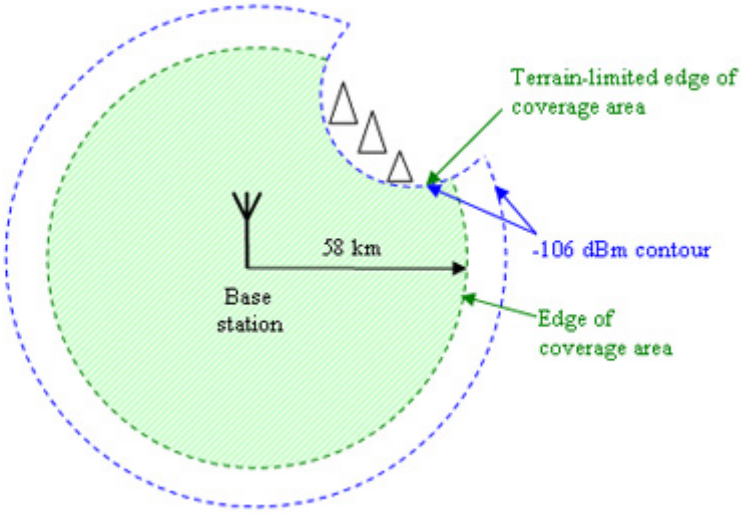

Figure 3 - With terrain limitation, the smaller -106 dBm area applies

b. Co-channel re-use distance

The re-use distance is the distance required to ensure a suitable grade of service between co-channel services. Generally, the re-use distance is constrained by topographic obstructions. See Figure 4.

Figure 4 - Re-use distance to protect existing co-channel services.
Co-channel services isolated by topography

In areas where the local topography may not provide sufficient levels of obstruction loss between co-channel services, the proposed service must protect existing services to a minimum C/I of 18 dB* at the edge of the existing coverage area. See Figure 5.

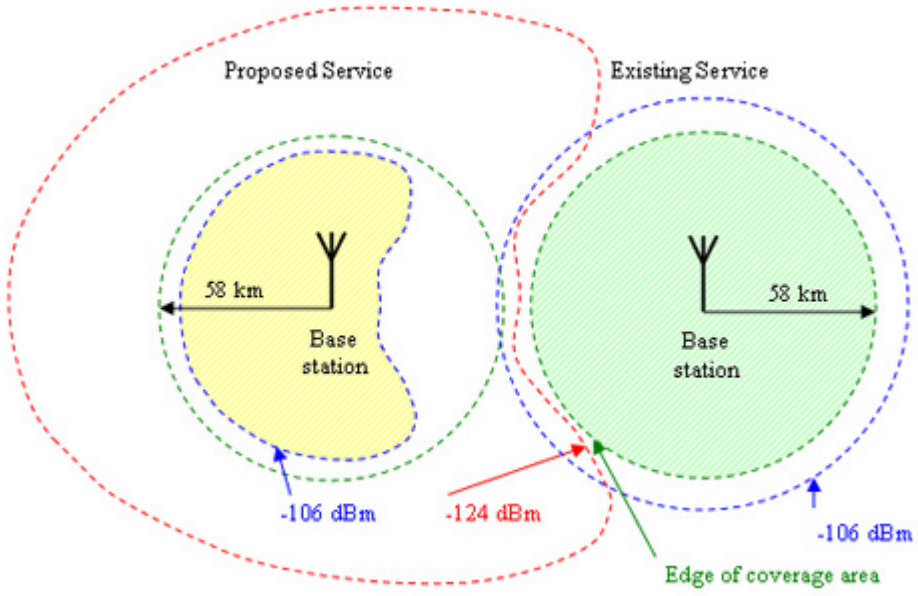

Figure 5 - Re-use distance to protect existing co-channel services.
Insufficient topographic obstruction.

To comply with the minimum C/I of 18 dB at the edge of coverage of existing services, the proposed service must constrain the interfering impact of its transmission by other means. In the example above, a modified horizontal radiation pattern (HRP) is used to achieve the required C/I ratio.

c. Protecting first adjacent channel services

In non co-sited situations – with services sharing a substantial overlapping coverage area – it is recommended that between analogue FM, APCO and TETRA base stations, the new base station be spaced at least 5 km away from the edge of the coverage area of the existing service. In situations where the local terrain and clutter provide sufficient obstruction loss, this measure can be relaxed provided that an equivalent co-channel C/I of 18 dB is maintained by the proposed service at the edge of the coverage area of existing services. Where the new service is TETRA, and has an adjacent channel leakage ratio of -55 dB, the C/I for the first and second adjacent channel is -37 dB, and where the proposed service is APCO P25, with an ACLR of -60 dB, the first and second adjacent channel C/I is -42 dB. See Figure 6.

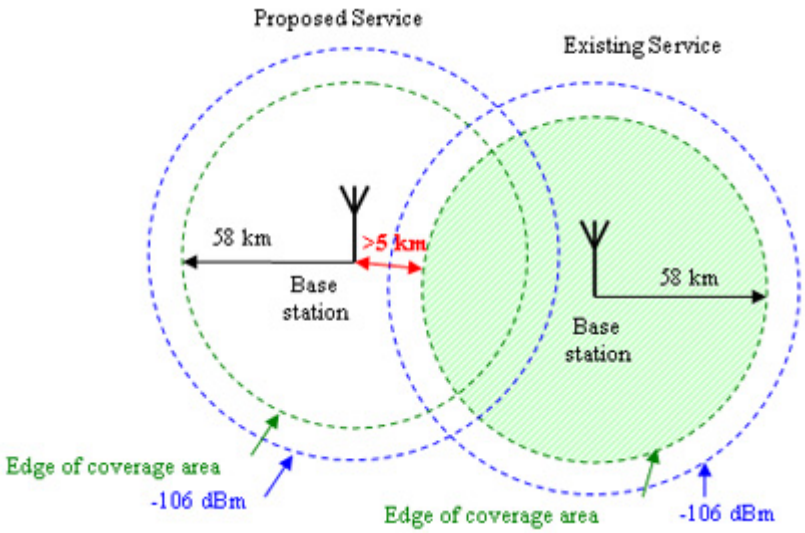

Figure 6 - Protecting existing first adjacent channel (±25 kHz) services.

Co-channel, first and second adjacent channels, etc, in this document refer to the 25 kHz raster, not the 12.5 kHz sub-channels.

d. Protected C/I

In some instances, the above guidelines may not be optimal when considering specific characteristics of the local topography, especially in large and flat terrains. In such cases, the above distances can be adapted, provided that the proposed service complies with the minimum C/I of 18 dB at the edge of the coverage area of the existing service.

Explanatory notes:

* The C/I level of 18 dB has been obtained considering dynamic conditions (fading) for analogue, APCO and TETRA systems. This figure takes into account the C/I requirements to maintain a Delivered Audio Quality (DAQ) grade of 3.4 (as specified in TSB88.1, table A-1). This value is also used in ITU-R SM.337-4 (table 1), where a calculation example is given for determining frequency and distance separation between land mobile services in the UHF band.

Detail of C/I specifications (extract from TSB88, table A-1):

Modulation type(channel spacing)	**Static** ref / C N	**DAQ 3.4** BER% / C (I+N)
Analogue FM ± 5kHz (25kHz)	12 dB SINAD / 4 dB	20 dB
Analogue FM ± 4kHz (25kHz)	12 dB SINAD / 5 dB	22 dB
C4FM (IMBE) (12.5kHz)	5% / 7.6 dB	2% / 17.7 dB
CQPSK (IMBE) (12.5kHz)	5% / 7.6 dB	2% / 17.7 dB
CQPSK (IMBE) (6.25kHz)	5% / 7.6 dB	2% / 17.7 dB
TETRA (25kHz)	5% / 8 dB	2% / 16 dB

-

6. Conclusions

The Ministry will implement the recommendations outlined in Section 5 to provide a reasonable balance between the protection of existing services and allowing the deployment of digital land mobile technology in the 800 MHz TS band. For this effect, the engineering guidelines provided in section 5.2 will be included in the Land Mobile - Trunk dispatch section of PIB 38.

The current channel block allocation matrix used for analogue land mobile will be maintained (band plans, TS 800 MHz). In addition, an overlaid raster with 12.5 kHz channels (TSN channels) will be introduced to allow efficient allocation of APCO P25 – phase 1 channels.

-

Appendix A

Summary of reviewers comments

Submitter	Recommendation 1	Recommendation 2	Recommendation 3	Recommendation 4

Kordia	Agrees	Agrees. Further proposes that future licences include minimal technical performance specifications to ensure spectrum efficiency.	Agrees	Suggests that fortuitous coverage needs addressing. It recommends that, in addition to rule of -106 dBm protected contour, a maximum radius of protection to exclude fortuitous coverage must be specified.
Motorola	Agrees	Agrees	Agrees	Agrees
Team Talk	Suggests that the majority of services will use 25 kHz channel spacing. 12.5 kHz APCO channels should be introduced depending on popularity.	Notes that trunked systems usually employ one channel for control, affecting spectrum efficiency. In this regard, it suggests considering the implications of the advent of APCO phase 2 channel sizes.	Agrees	Suggests that protecting a -106dBm coverage contour would be difficult taking into account the variety of real life propagation scenarios. Adjacent channel issues should be resolved by AREs/ARCs based on their experience and licence information available.
TL Parker Ltd	Agrees	Agrees	Agrees. Emphasises the need for maintaining the analogue channel allocation due to site infrastructure already in place.	Agrees
Radiotronics Ltd	Agrees	Agrees	Agrees	Agrees

ATTACHMENT C

MOTOROLA

Motorola Response to:

Australian Government
Australian Communications and Media Authority

Spectrum Proposals: 403–520 MHz

Proposals for future arrangements in the 400 MHz band

Prepared by: Michael Hill
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Context

Radiocommunications are vital to Australia's diversified and growing economy.

Radiocommunications are essential for agencies involved in the defence or national security of Australia, law enforcement or the provision of emergency services. Two-way radio also provides the communication infrastructure for a wide range of industries ranging from agriculture, mining & construction through to transportation & hospitality.

Motorola is a major supplier of radiocommunications equipment to governments, emergency services organisations, the mining industry, the energy industry, manufacturing sectors, transportation, tourism, telecommunications carriers and telecommunications service providers.

Motorola is a strong supporter of standards based technology and spectrum harmonisation with other major markets in Europe and the Americas. This support helps to ensure that up-to-date radiocommunications equipment is readily available. Use of standards based technology reduces the costs to the manufacturers and service providers, maximises competition, and results in lower costs for consumers

Motorola supports the ACMA and its requirement to fulfil the object of the Radiocommunications Act 1992.

Motorola has been a leader in the field of two way radio communications for decades, excelling in the research and development, production, marketing and efficient operation of radio communications equipment and systems all over the world. Motorola's brand is indeed synonymous with high quality radio communication products and services. As a world-wide operation with close operator links Motorola believes that its accumulated experience qualifies it well to comment on this discussion paper.

The primary commercial interest of Motorola has been, and will continue to be, in the design, manufacture and supply of communications equipment and systems. Motorola knows that issues relating to the allocation of radio frequency spectrum impact directly on the demand for its communications products and the issues discussed here are particularly relevant.

Motorola is therefore pleased to have the opportunity to comment on what it considers to be the critical issues raised by the Australian Communications and Media Authority's invitation to comment. Motorola especially welcomes the government's commitment to a full consultation process.

ACMA Summary (from the discussion paper)

This paper prompts discussion on a number of issues pertaining to use of the spectrum between 403 and 520 MHz. The objectives that are presented in the initial section of this paper, which range from the determination of a government band to improving efficiency in the band, are met by the proposals that are outlined in this summary. ACMA hopes that new arrangements encourage market forces to work more freely in the band which will allow ACMA to minimise its role in management of the band and provide certainty to users regarding the long term future of the band.

Responses to this paper will be used to develop detailed strategies for future use of this spectrum. After developing these strategies a further public consultation will be conducted and a third discussion paper developed. This will cover key areas not covered in this paper such as migration and implementation strategies and detailed information on:

- the migration of users to smaller channel bandwidths
- the migration of incumbent users to other parts of the band
- the migration of government users into consolidated spectrum
- time frames associated with various migration strategies
- changes to licence fees
- regional and metropolitan variations regarding migration and time frames
- changes to the 400 MHz Band Plan and RALIs LM8, FX16 and FX17.

Comment is sought on the issues raised in this paper (consolidated below) and any others considered relevant to stakeholders.

Motorola Responses.

Motorola has provided comment, where appropriate, to each of the ACMA's proposals in the following sections.

1. ACMA proposes in the 400 MHz band to:

- **implement a 6.25 kHz compatible channel raster for all land mobile segments (both single and two frequency segments) in the 400 MHz band**
- **permit aggregation of channels to 12.5 kHz unconditionally**
- **permit aggregation of channels greater than 12.5 kHz. Justification would be required in HDAs and MDAs with the spectral efficiency of the proposed use (25 kHz analog systems would not be supported) and the availability of alternatives as key considerations.**
- **prohibit 25 kHz systems in HDAs and MDAs within 5 years.**

Motorola supports the ACMA's proposal to increase the efficient use of spectrum by reducing the allowable bandwidth per allocated channel from 25 kHz to 12.5 kHz in the landmobile segments of the band. Motorola also supports the ACMA's references to permitting channel aggregation and the use of equipment that employs modulation techniques which provide an operational equivalency of 6.25 kHz (that is four (4) communications paths in 25 kHz or two (2) communications paths in 12.5 kHz).

2. ACMA proposes in the 400 MHz band:

- **to reduce the minimum channel size for all narrowband fixed segments (point to point and point to multipoint) in the 400 MHz band to 12.5 kHz with aggregation of channels permitted where justified**
- **to prohibit 25 kHz analog voice point-to-point systems in HDAs and MDAs within 5 years.**
- **no change for wideband systems.**

Motorola supports the ACMA's proposal to increase the efficient use of spectrum by reducing the allowable bandwidth per allocated channel from 25 kHz to 12.5 kHz in the fixed segments of the band. Motorola also supports the ACMA's references to permitting channel aggregation where justified.

3. ACMA does not propose to adopt mandatory channel sharing or loading obligations on land mobile services.

Motorola supports the ACMA's rejection of mandatory channel sharing or loading obligations in the landmobile segments of the band.

4. ACMA proposes to identify additional segments within the 400 MHz band to be used exclusively for trunking. This proposal is discussed further in Chapter 6.

Motorola is not an advocate for the partitioning of spectrum within bands for specific uses or users. This practice rarely allocates the optimum amount of spectrum within the partitioned segment and therefore most often reduces the efficient use of spectrum by creating congestion of one side of the artificial boundary and under utilisation on the other side. Evidence of this phenomenon is clearly seen when comparing the congested 400 MHz spectrum up to the boundary of the under utilised 500 MHz spectrum licensed segment.

Motorola supports the proposed change to provide a band segment in the 450-470 MHz land mobile segemnt with a 10 MHz transmit to receive paring arrangement. This will allow the operation of TETRA in this segment.

However, a trunking only band is unnecessary, even for TETRA. It is true that older generations of TETRA base station equipment employed designs that "spilled" energy into the adjacent channels, thereby creating the need for the allocation of contiguous blocks of spectrum. The tighter specifications for newer equipment means that transmitted energy now fits within the spectral limits of the channel allocation thereby negating the need for this outdated and inefficient practice.

If the new 10 MHz transmit to receive pairing is created, this will permit the use of the band segment by most of the currently available technologies, whether trunked or not.

5. ACMA does not propose to vary the existing minimum data rates for narrowband fixed service data applications.

Motorola supports the ACMA's proposal.

6. ACMA proposes to undertake a process to implement revised changes to assignment and coordination procedures based on the following core concepts, for:

Land mobile

- a review of re-use distances with a view to reduction
- the option to use topographical information in the assignment process

Point-to-point

- the option to use topographical information in the assignment process

Point-to-multipoint

- the option to use topographical information in the assignment process

Single frequency systems

- restricting or quarantining high power single frequency systems
- permitting high power single frequency in exceptional cases only
- regional variations allowing the use of high power SFS in some areas.

Area-wide high duty cycle data systems

- identifying dedicated channels for area-wide, high duty cycle data systems

Motorola supports the ACMA's proposal for:

- **Land mobile;**
- **Point-to-point;**
- **Point-to-multipoint; and**
- **Single frequency systems.**

Motorola wishes to highlight the fact that the ACMA's proposal for Area-wide high duty cycle data systems, whilst it may be suitable for the referenced semi-permanent fixed locations, it may not suitable for many mobile data applications.

7. ACMA proposes:

- **the identifying spectrum for a 10 MHz duplex split in 450–470 MHz (refer to Chapter 6)**
- **no duplex split changes in 470–518 MHz**

Motorola supports the ACMA's proposal to create a "TETRA friendly" 10 MHz duplex split in 450-470 MHz segment of the land mobile radio band.

Motorola is not an advocate for the partitioning of spectrum within bands for specific uses or users. This practice rarely allocates the optimum amount of spectrum within the partitioned segment and therefore most often reduces the efficient use of spectrum by creating congestion of one side of the artificial boundary and under utilisation on the other side. Evidence of this phenomenon is clearly seen when comparing the congested 400 MHz spectrum up to the boundary of the under utilised 500 MHz spectrum licensed segment.

If the new 10 MHz transmit to receive pairing is created, this will permit the use of the band segment by most of the currently available technologies, whether trunked or not.

Motorola supports the ACMA's proposal to leave the duplex split in 470-518 MHz segment unchanged

8. ACMA proposes:

1. **the 403–430 MHz band (less Defence and EPIRB segments) be identified for the exclusive use of federal, state and territory governments**
2. **this band be primarily used to enable interoperability between government agencies providing security, law enforcement and emergency services**
3. **that other federal, state and territory government users be permitted to use the band contingent on the requirements of security, law enforcement and emergency services uses being adequately supported. This use of the spectrum would be determined and prioritised by the states/territories individually without ACMA's prescription**
4. **a segment of this band be identified for federal agency use provided interoperability between government agencies providing security, law enforcement and emergency services can be demonstrated**
5. **the entire block of spectrum should be made available on a state-wide basis as a single licence, with fees payable at an annual amount, independent of the number of devices operated under the licence**
6. **that apparatus licensing be continued to be used to authorise use of the band initially and that spectrum licensing be explored later**

7. **that existing non-government licensees in the 403–430 MHz band transition out of the band within 5 years in high and medium density areas and 8 years in the rest of the country**
8. **that existing government arrangements outside of the 403–430 MHz band be removed no sooner than in 5 years time**
9. **relevant national committees, primarily the NCCGR and LESRSC, determine solutions for interoperability and identify mechanisms that can be used by ACMA to further enhance interoperability objectives via spectrum management arrangements.**

For ease of reference, Motorola has numbered the ACMA's dot points in Q8.

Background:

To avoid confusion, the ACMA's own technology terminology and frequency data from the *"Overview of existing voice radiocommunications used by federal, state and territory agencies"*, provided in Attachment 2 of the discussion paper, has been used here.

For many years, much of the radiocommunications mobile and portable equipment used by many federal, state and territory government agencies in the 400 MHz band has been capable of operating in one of two sub-bands. Either in Range 1 (403-470 MHz) or Range 2 (450-520 MHz).

Much of the mobile and portable equipment also has the capability to operate in all of the following technology "modes": Smartzone P25; Smartzone 4.1; Smartzone 3.0; Astro 25; Analog PMR; and P25.

Using ACMA's attachment 2 and the above information, the following intersystem interoperability capabilities can be seen.

- **Range 1 interoperability (existing):**
  NSW – Police (some), Fire, Ambulance and Other government
  VIC (metro) – Police, Fire and Ambulance
  SA – Police, Fire, Ambulance and Other government
  ACT – Fire, Ambulance and Other government
  NT – Police, Fire, Ambulance and Other government
  QLD – Police (limited capability)
- **Range 2 interoperability (existing):**
  NSW – Police (some)
  WA - Police
  NT – Police, Fire, Ambulance and Other government
  FED – AFP and Customs
  QLD – Police (limited capability)
- **Range 1 and Range 2 – overlap (450-470 MHz)**
  This overlap area, which includes the existing LEPS segment (also known as the "64 channel block") provides varying levels of interoperability to all the government users operating in the 400 MHz band.

Motorola responses to ACMA's proposals (with consideration of the above):

1. **Motorola does not object to the proposal.**
2. **As described above, the vast majority of government agency users already have the capability to interoperate, both from a technical point of view and a spectrum point of view. Motorola notes that this change is substantially unnecessary for reasons of interoperability.**

   Further, Motorola is not an advocate for the partitioning of spectrum within bands for specific uses or users. This practice rarely allocates the optimum amount of spectrum within the partitioned segment and therefore most often reduces the efficient use of spectrum by creating congestion of one side of the artificial boundary and under utilisation on the other side. Evidence of this phenomenon is clearly seen when comparing the congested 400 MHz spectrum up to the boundary of the under utilised 500 MHz spectrum licensed segment.

   Motorola does not object to the proposal.
3. **As mentioned in "2", this is a potential issue created by the imposition of artificial boundary limits for particular groups of users with the band. All government agencies will need to be closely engaged to determine whether or not the proposed allocation is sufficient for current and future spectrum needs.**

   Motorola does not object to the proposal.
4. **As mentioned in "2" and "3", this is a potential issue created by the imposition of artificial boundary limits for particular groups of users with the band. All government agencies will need to be closely engaged to determine whether or not the proposed allocation is sufficient for current and future spectrum needs.**

   Motorola notes that the allocation of spectrum within the 450-470 MHz band would be better suited for interoperability – particularly for federal agencies because their equipment predominantly operates in the 450-520MHz band.

   Motorola does not object to the proposal.
5. **This proposal will create the need to establish "departments" within federal, state and territory jurisdictions that will replicate the many of the functions that currently exist within ACMA. Each of these "departments" will need to work closely with each other to ensure the minimisation of cross border spectrum issues.**

This proposal will also increase the complexity of work for radiocommunications organisations working with federal agencies operating across multiple state and territory jurisdictions. These organisations would have to coordinate with multiple quasi-regulatory bodies instead of one.

Motorola does not object to the proposal.

6. **The eventual establishment of spectrum licensing for the state based government band segment will add further complexities the issues raised in "5".**

   Motorola does not object to the proposal.

7. **As mentioned above, Motorola notes that this change is substantially unnecessary for reasons of interoperability.**

   Motorola does not object to the proposal.

8. **As mentioned above, Motorola notes that this change is substantially unnecessary for reasons of interoperability.**

   Motorola also notes that some commercial entities provide radiocommunications services for exclusive use by government agencies. The spectrum provided for exclusive government use should be treated as though it were government spectrum.

   Motorola does not object to the proposal.

9. **The relevant national committees and the ACMA have been working for many years to determine solutions for interoperability.**

   Inter-state, interoperability capabilities, across UHF government radio networks, for a substantial number of the Australia's government agencies, including emergency services groups, have existed for years. No changes to spectrum are needed and much of the existing mobile or portable radiocommunications equipment can be used. Interoperability for these users is possible today.

9. ACMA proposes no change to existing licensing arrangements supporting point-to-multipoint applications.

Motorola supports the ACMA's proposal.

10. ACMA proposes to undertake a process to implement revised arrangements for the UHF CBRS based on the following core concepts:

- **extension of the CBRS band by 6.25 kHz at the top edge of the band**
- **the reduction to 12.5 kHz channels for CBRS simplex channels;**
- **the retention of 25 kHz channels for the eight (8) existing repeater channel pairs, including the emergency channels and the two (2) existing telemetry/telecommand channels**
- **review the coordination and assignment rules for repeater channels.**

Motorola supports the ACMA's proposals.

11. ACMA proposes:

- **establishing of a minimum of 2 × 5 MHz, 10 MHz split segments to facilitate use of a greater range of technologies: 452.5–457.5 MHz paired with 462.5–467.5 MHz (supporting a range of future options)**
- **identifying 3 MHz paired of the 10 MHz split spectrum for trunking systems**
- **leaving existing single frequency and fixed point-to-point and point-to-multipoint segments in this band untouched**
- **maintaining 9.5 MHz duplex splits in remaining segments.**

In addition ACMA seeks comment on:

- The possibility of maximising the spectrum available for 10 MHz split by identifying additional 10 MHz split spectrum beyond the proposed 2×5 MHz up to a maximum of 2×7.4875 MHz, as shown in Figure 5.

Motorola is not an advocate for the partitioning of spectrum within bands for specific uses or users. This practice rarely allocates the optimum amount of spectrum within the partitioned segment and therefore most often reduces the efficient use of spectrum by creating congestion of one side of the artificial boundary and under utilisation on the other side. Evidence of this phenomenon is clearly seen when comparing the congested 400 MHz spectrum up to the boundary of the under utilised 500 MHz spectrum licensed segment.

Motorola supports the proposed change to provide a band segment in the 450-470 MHz land mobile segment with a 10 MHz transmit to receive paring

arrangement. This will allow the operation of TETRA in this segment of the land mobile radio band.

However, a trunking only band is unnecessary, even for TETRA. It is true that older generations of TETRA base station equipment employed designs that "spilled" energy into the adjacent channels, thereby creating the need for the allocation of contiguous blocks of spectrum. The tighter specifications for newer equipment means that transmitted energy now fits within the spectral limits of the channel allocation thereby negating the need for this outdated and inefficient practice.

If the new 10 MHz transmit to receive pairing is created, this will permit the use of the band segment by most of the currently available technologies, whether trunked or not.

In fact, the federal government agencies that currently use this band, and have full interoperability with each other, can continue to operate nationally either with the current 9.5 MHz transmit to receive spacing or with the proposed 10 MHz spacing.

Therefore, based on the above, Motorola does not have a view on the size of the proposed 10 MHz segment.

12. ACMA seeks comment on preferred licensing and allocation options for the proposed 10 MHz duplex frequency split spectrum in the 450-470 MHz band.

Motorola proposes that the licensing and allocation of the foreshadowed 10 MHz duplex frequency split spectrum in the 450-470 MHz band be *apparatus licensed* to maintain compatibility and consistency with the vast majority of the spectrum in the land mobile segments.

Any other solution would create artificial limits within the segment. Motorola is not an advocate for the partitioning of spectrum within bands for specific uses or users. This practice rarely allocates the optimum amount of spectrum within the partitioned segment and therefore most often reduces the efficient use of spectrum by creating congestion of one side of the artificial boundary and under utilisation on the other side. Evidence of this phenomenon is clearly seen when comparing the congested 400 MHz spectrum up to the boundary of the under utilised 500 MHz spectrum licensed segment.

13. ACMA seeks preliminary views on the technical framework to apply to spectrum licences at the upper end of the 400 MHz band.

Motorola view the existing technical framework, particularly as it applies to registration of equipment in the ACMA's database as extremely difficult to work with. So much so, that many ACMA accredited frequency assigners refuse to undertake device registration work.

Motorola proposes the abolition of spectrum licences in the land mobile spectrum. As described in responses to other questions, the creation of artificial boundaries within the land mobile spectrum results in inefficient spectrum utilisation.

Existing spectrum licenses should revert to apparatus licenses when they expire. Occupied channels should be apparatus licensed to existing users if they meet apparatus licensing requirements. Unoccupied channels should be available for allocation according to licensing rules.

14. ACMA seeks views on the appropriate lot size for the continued operation of the 500 MHz spectrum licences.

Motorola proposes the abolition of spectrum licences in the land mobile spectrum. As described in responses to other questions, the creation of artificial boundaries within the land mobile spectrum results in inefficient spectrum utilisation.

Existing spectrum licenses should revert to apparatus licenses when they expire. Occupied channels should be apparatus licensed to existing users if they meet apparatus licensing requirements. Unoccupied channels should be available for allocation according to licensing rules

15. ACMA seeks stakeholder's views on the timing of reallocation of the 500 MHz spectrum licences.

Motorola proposes that existing spectrum licenses should revert to apparatus licenses when they expire. Occupied channels should be apparatus licensed to existing users if they meet apparatus licensing requirements. Unoccupied channels should be available for allocation to other applicants according to licensing rules

16. ACMA seeks views on whether it should recommend to the Minister that a class of service should be declared under section 82(3), and what this class of service should be.

ACMA seeks views on what criteria it should apply when determining under section 82(1) whether any renewal should be offered.

If a declaration under section 82(3) achieves the objective of allowing occupied channels to be apparatus licensed in the public interest to existing users, assuming they meet apparatus licensing requirements, and also allows unoccupied channels to be available for allocation to other applicants according to licensing rules, Motorola supports the proposed recommendation.

17. ACMA seeks views on the types of uses that might be commercially attractive under spectrum licensing if the total bandwidth available to spectrum licensing at the upper end of the 400 MHz band is increased.

ACMA seeks views on whether the total bandwidth available for spectrum licensing at the upper end of the 400 MHz band should be increased.

Motorola does not support the retention or expansion of spectrum licensing in the land mobile spectrum.

Motorola is not an advocate for the partitioning of spectrum within bands for specific uses or users. This practice rarely allocates the optimum amount of spectrum within the partitioned segment and therefore most often reduces the efficient use of spectrum by creating congestion of one side of the artificial boundary and under utilisation on the other side. Evidence of this phenomenon is clearly seen when comparing the congested 400 MHz spectrum up to the boundary of the under utilised 500 MHz spectrum licensed segment.

Motorola proposes the abolition of spectrum licences in the land mobile spectrum. As described in responses to other questions, the creation of artificial boundaries within the land mobile spectrum results in inefficient spectrum utilisation.

Existing spectrum licenses should revert to apparatus licenses when they expire. Occupied channels should be apparatus licensed to existing users if they meet apparatus licensing requirements. Unoccupied channels should be available for allocation to other applicants according to licensing rules

18. ACMA seeks views on whether it should recommend to the Minister that the original s.36 Designation be revoked on the expiry of the licences and that the spectrum be re-allocated under apparatus licences.

ACMA seeks views on whether the new apparatus licences should be technically consistent with the apparatus licences in nearby frequency bands.

Motorola supports this recommendation to the Minister.

Motorola supports the view that the new apparatus licences should be technically consistent with the apparatus licences in nearby frequency bands.

19. ACMA seeks views on whether over-the-counter allocation of these new apparatus licences is suitable outside the high density areas of Sydney and Melbourne.

Motorola supports the view that the new apparatus licences could be offered on a first come, first served basis, in accordance with the licensing rules.

20. ACMA seeks views on the proposal to allow 500 MHz spectrum licensees who are providing spectrum for significant active networks to apply for apparatus licences prior to acceptance of other applications, noting that ACMA may need to change the operational frequencies, or may choose to defer individual applications to a later allocation.

Motorola supports the provision of spectrum for significant active networks and networks declared to be in the public interest prior to the acceptance of other applications.

21. ACMA seeks views on the proposal to accept applications for apparatus licences in this band from non-government licensees in the 403–430 MHz band prior to the acceptance of other applications. Applicants would be offered 12.5 kHz channels.

Motorola supports the provision of spectrum in the following order:
1) for significant active networks and networks declared to be in the public interest prior to the acceptance of applications;
2) from non-government licensees in the 403–430 MHz band; and
3) other applications

22. ACMA seeks views on the proposal to accept applications for apparatus licences in this band from current licensees in the 450–470 MHz band prior to the acceptance of other applications. Applicants would be offered 12.5 kHz channels.

ACMA seeks views on whether this should be a temporary transition or a permanent relocation.

Motorola is not an advocate for the partitioning of spectrum within bands for specific uses or users. And, for the reasons outlined in other responses, sees no technical necessity to relocate users from the 450-470 MHz land mobile segment.

However, if such a move was necessary, the move should be permanent. A temporary relocation will impose undue extra costs on the licensee.

23. ACMA seeks views on the option to perform an auction for remaining apparatus licences in Sydney and Melbourne.

Motorola requires clarification of the proposed auction process, proposed license duration and proposed payment structure before being able to comment.

24. ACMA seeks comment from wireless microphone and biomedical telemetry users on whether or not they operate devices in the 520–526 MHz range under the LIPD Class Licence.

What are the technical specifications (especially tuning range) of wireless microphone and biomedical telemetry devices that operate in the band?

Motorola has no comment on this question.

End of responses.