Conference Preparatory Meeting for WRC-15
Geneva, 23 March - 2 April 2015

INTERNATIONAL TELECOMMUNICATION UNION

PLENARY MEETING

Source: Document CPM15-2/TEMP/33

Revision 1 to
Document CPM15-2/220-E
1 April 2015
Original: English

Working Group 1

PROPOSED MODIFICATION TO THE DRAFT CPM REPORT

CHAPTER 1, AGENDA ITEM 1.3

(**WP 5A / WP 5B, WP 5C, WP 5D**, (WP 1B), (WP 4A), (WP 4B), (WP 4C), (WP 6A), (WP 7B), (WP 7C), (WP 7D))

*1.3 to review and revise Resolution **646 (Rev.WRC-12)** for broadband public protection and disaster relief (PPDR), in accordance with Resolution **648 (WRC-12)**;*

Resolution **648 (WRC-12)**: *Studies to support broadband public protection and disaster relief.*

1/1.3/1 Executive summary

For WRC-15 agenda item 1.3 there are four proposed methods. These methods can be summarized as follows:

- Method A proposes that no change will be made to Resolution **646 (Rev.WRC-12)**, other than editorial amendments to Footnote 1 of Resolution **646 (Rev.WRC-12)** and the text surrounding it, and updated references to ITU-R Reports. The broadband PPDR requirements will be addressed through ITU-R studies.
- Method B proposes that the requirements of broadband PPDR would be addressed in the revision of Resolution **646 (Rev.WRC-12)** in accordance with Resolution **648 (WRC-12)**.
- Method C also proposes revision of Resolution **646 (Rev.WRC-12)** and further proposes that all referenced frequency bands/ranges for PPDR operations from Resolution **646 (Rev.WRC-12)** be removed and be replaced with a cross reference to the latest version of Recommendation ITU-R M.2015, which will contain the recommended regionally harmonized frequency bands/ranges for PPDR operations.
- Method D proposes that the requirements of PPDR, including broadband PPDR, would be addressed by including a global tuning range and regional ranges in the revision of Resolution **646 (Rev.WRC-12).** Further details and explanation on regionally harmonized arrangements in those ranges, and specific frequency arrangements adopted by individual administrations, are described in the most recent version of Recommendation ITU-R M.2015.

1/1.3/2 Background

Resolution **646 (Rev.WRC-12)** on Public Protection and Disaster Relief (PPDR), encourages administrations, for the purpose of achieving regionally harmonized frequency bands/ranges for advanced public protection and disaster relief solutions, to consider certain identified frequency bands/ranges or parts thereof when undertaking their national planning.

The benefits resulting from the use of regionally or internationally harmonized frequency bands have been well documented in the Resolution and in many studies and reports. These benefits include, among others, achieving economies of scale and expanded equipment availability, possibly increasing competition and improved spectrum management and planning. In emergency and disaster relief situations, the benefits of harmonization also include enhanced cross-border circulation of equipment and increased potential for interoperability of communications when a country receives assistance from other nations.

Since the initial adoption of Resolution **646** in 2003, major technological developments in radiocommunications have taken place. Moreover, the use of PPDR data applications in certain countries has increased – a trend which continues to grow. New broadband mobile technologies, such as 3GPP's Long-Term Evolution (LTE), have emerged, for which today there are already practical applications, and PPDR agencies increasingly recognize the importance of video and broadband to carry out their activities more efficiently. In addition, some countries have designated new frequency bands for broadband PPDR that are currently not identified in Resolution **646 (Rev.WRC-12)**.

It has also been recognized that, during disasters, wireless video systems are rolled out more rapidly than fibre or cable networks. In various parts of the world, governments and PPDR institutions are using high-speed wireless video networks to enhance the safety of officers and increase their effectiveness in saving lives. In this context, new scenarios of applications and demand for public safety communications have emerged. WRC-15, under agenda item 1.3, will review and revise, as appropriate, Resolution **646 (Rev.WRC-12)** for broadband PPDR in accordance with Resolution **648 (WRC-12)**.

1/1.3/3 Summary of technical and operational studies, including a list of relevant ITU-R Recommendations

List of Relevant ITU-R Recommendations and Reports

Reports ITU-R M.2033[1], M.[PPDR] and ITU-R M.2291

Recommendations ITU-R M.1826, M.2009 and M.2015

Other technical and operational studies

Region 1

ECC Report 199, "User requirements and spectrum needs for future European broadband PPDR systems (Wide Area Networks) May 2013".
(http://www.erodocdb.dk/Docs/doc98/official/pdf/ECCREP199.PDF)

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[1] Depending on the results of Report ITU-R M.[PPDR], Report ITU-R M.2033 will be suppressed and would no longer be referenced in this section.

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Region 2

Phoenix Center Policy Bulletin No. 26, "Public Safety or Commercial Use? A Cost/Benefit Framework for the D Block" March 2011 (http://www.phoenix-center.org/PolicyBulletin/PCPB26Final.pdf).

Defence Research and Development Canada, "700 MHz Spectrum Requirements for Canadian Public Safety Interoperable Mobile Broadband Data Communications" February 2011. (http://cradpdf.drdc-rddc.gc.ca/PDFS/unc122/p535072_A1b.pdf)

Region 3

APT Report on "PPDR Applications Using IMT-Based Technologies and Networks" April 2012. (APT/AWG/REP-27)

– This report provides the technical requirements for using IMT based technologies and networks in PPDR applications. The PPDR requirements of IMT-based technologies and networks are reviewed and some methods of adapting for PPDR application using IMT-based technologies and networks are addressed.

APT Report on "Technical Requirements for Mission Critical Broadband PPDR Communications" September 2013. (APT/AWG/REP-38)

– This report provides an outline of the technical requirements of mobile wireless broadband communications systems to meet mission critical broadband PPDR requirements. It presents a high-level framework and broad rationale, along with a fundamental set of recommended operational and functional requirements that might be found useful to regional administrations for a variety of purposes.

TRPC "Public Protection and Disaster Relief (PPDR) Services and Broadband in Asia and the Pacific: A Study of Value and Opportunity Cost in the Assignment of Radio Spectrum" May 2013. (http://trpc.biz/wp-content/uploads/PPDR-_Report_June-2013_FINAL.pdf)

1/1.3/4 Analysis of the results of studies

The documents in section 1/1.3/3, in particular ECC Report 199, APT/AWG/Report 38 Appendix 4 and Report ITU-R M.[PPDR], summarize the studies carried out on PPDR broadband spectrum requirments. These studies, providing examples from China, Israel, CEPT, UAE, and Motorola Solutions indicate a need for harmonized spectrum. Broadband PPDR spectrum bandwidth requirements vary to a significant extent between countries, regardless of whether the PPDR network is owned/operated by a government PPDR agency, commercial entity or a hybrid commercial/government solution. These studies indicate a need for a spectrum bandwidth of 20 MHz (e.g.10+10 MHz) or more in some countries for broadband PPDR. Some other administrations may have differing bandwidth requirements.

Region 1

In accordance with their studies, CEPT is expecting that in some countries narrowband PPDR technology will continue to play an important role in the medium term (i.e. at least in the next 10-15 years), even when future broadband technologies may be capable of meeting mission critical voice requirements.

Region 2

In view of the new requirements for PPDR in Region 2 that have arisen ahead of WRC-15, CITEL approved Recommendation PCC.II/REC.41 (XXII-13), on "Public protection and disaster relief (PPDR) based on International Mobile Telecommunications (IMT) systems", several Region 2 countries have considered using the 700 MHz band for PPDR.

Region 3

APT Report 27 concludes that the mobile broadband PPDR systems based on IMT have a critical role to play in effectively and efficiently satisfying local, national, and international public safety objectives. PPDR organizations need to be able to communicate among themselves as well as with the community at large, many times across jurisdictional boundaries, in order to meet modern day challenges. There are several different approaches that PPDR organizations could take in relation to using IMT technologies for their broadband wireless needs, ranging from dedicated PPDR networks to operating as virtual private networks (VPNs), on a preferential basis, on commercial IMT networks. Regardless of the approach chosen, the availability of funds to deploy such infrastructure needs to be addressed as they may involve varying levels of expenditure. The effectiveness of such expenditure in providing PPDR organizations a broadband mobile capability through the use of IMT technologies will however be undermined if the pursuit of regional harmonization of spectrum bands for PPDR applications and the relevant technology standards are not continued.

APT Report 38 encourages administrations to adopt common technology, technical features and functional capabilities, as well as harmonized spectrum arrangements as far as practicable, to maximize the potential for regional cooperation and cross-border inter-working. Further, pursuit of such harmonization is expected to lead to greater market size to the benefit of manufacturers/vendors, government agencies, and PPDR management and operational staff.

1/1.3/5 Methods to satisfy the agenda item

1/1.3/5.1 Method A: Editorial updating to Resolution 646 (Rev.WRC-12)

Under this method, no change will be made to Resolution **646 (Rev.WRC-12)**, other than editorial amendments to Footnote 1 of Resolution **646 (Rev.WRC-12)** and the text surrounding it, and updated references to ITU-R Reports. The broadband PPDR requirements will be addressed through ITU-R studies appropriately, as indicated in Section 1/1.3/6.1.

Advantages

- This method fulfils the objectives of review and revision of Resolution **646 (Rev.WRC-12**), as stated in Resolution **648 (WRC-12)**.
- This method provides sufficient flexibility to administrations by addressing broadband PPDR requirements through ITU-R studies.
- This method maintains the approach agreed in the *resolves* part of Resolution **646 (Rev.WRC-12)** in which the requisite frequency bands/ranges are harmonized to the extent possible on the international/regional level for public protection and disaster relief applications.

Disadvantages

- This method will not fulfil the objective of Resolution **648 (WRC-12)**, which recognized that it is timely "to consider the future direction of spectrum needs of public safety and disaster management agencies" and called on WRC-15 to "take appropriate action with regard to revision of Resolution **646 (Rev.WRC-12)**".

- There will be no guidance to administrations and manufacturers to encourage regional/ international harmonization of frequency ranges for wide area mobile broadband PPDR.
- Additional regionally harmonized frequency ranges/bands for broadband PPDR will not be included for Region 1 and Region 3 in *resolves* 2 of Resolution **646 (Rev.WRC-12)**. In addition, *invites ITU-R* 2 of Resolution **646 (Rev.WRC-12)** specifically calls on ITU-R "to conduct further appropriate technical studies in support of possible additional identification of other frequency ranges to meet the particular needs of certain countries in Region 1". Such identification will not be done unless Resolution **646 (Rev.WRC-12)** is suitably modified as called for in Resolution **648 (WRC-12)**. In particular in Region 3, the band 746-806 MHz is included for some countries but this part of the APT 700 MHz band (698-806) is not part of the harmonized frequency range.
- This method would not recognize the use of certain frequency arrangements of the 700 MHz band for broadband PPDR applications for some countries in Region 2.

1/1.3/5.2 Method B: Modify Resolution 646 (Rev.WRC-12) to include spectrum for broadband PPDR and frequency bands/ranges to facilitate harmonization

Under this method, requirements of broadband PPDR would be addressed in the revision of Resolution **646 (Rev.WRC-12),** as indicated in Section 1/1.3/6.2.

Considering the growing use of mobile broadband communications, including mobile video applications, additional spectrum for PPDR mobile broadband is needed, so that administrations may assign RF spectrum for broadband PPDR. Spectrum below 1 GHz is suitable for such applications, despite the current broadcasting primary status throughout Region 1. Moreover, spectrum may also be needed for broadband PPDR at frequencies above 1 GHz bands, in order to combine RF spectrum with good coverage and penetration characteristics (below 1 GHz), together with RF spectrum (above 1 GHz) that adds capacity. Common RF spectrum will enable efficient deployment and will ease coordination and harmonization between different PPDR agencies and will advance international aid during disasters and major events. In addition to the benefits of scale production, regional harmonization will improve interoperability among first responders and will drive suitable devices and standards dedicated to broadband PPDR.

Some administrations are of the view that administration-specific frequency bands/ranges for public protection and disaster relief (PPDR) solutions should not be included in "*recognizing g)*" footnote 3 (see option b) as it is outside the scope of Resolution **646 (Rev.WRC-12)**. In particular, Egypt objects to option a) in footnote 3 in *recognizing g)* of Resolution **646 (Rev.WRC-12)** to refer to specific use of the frequency band 806-824/851-869 MHz within any country in Region 1, and does not recognize any use of this frequency band for PPDR operations.

Some other administrations are of the view that additional countries specific frequency use is within the scope of Resolution **646 (Rev.WRC-12)** noting that the current version of this Resolution already includes administration frequency use, therefore option a) in footnote 3 is to be maintained.

Advantages

- This method satisfies agenda item 1.3 and the *resolves* part of Resolution **648 (WRC-12)** to review and revise Resolution **646 (Rev.WRC-12)** for broadband public protection and disaster relief (PPDR). The method can also fulfil *invites ITU-R* 2 of Resolution **646 (Rev.WRC-12)** that specifically calls on ITU-R "to conduct further appropriate technical studies in support of possible additional identification of other frequency ranges to meet the particular needs of certain countries in Region 1". Such

identification can be done under this method by suitable modification of Resolution **646 (Rev.WRC-12)** as called for in Resolution **648 (WRC-12)**.

- This method can facilitate regional harmonization of frequency bands/ranges for broadband PPDR by identifying frequency bands/ranges that are suitable for the deployment of mobile broadband PPDR systems. As indicated in section 1/1.3/4, various studies in section 1/1.3/3, in particular ECC Report 199, APT/AWG/Report 38 and Report ITU-R M.[PPDR] indicate a need for harmonized spectrum to meet the needs of PPDR agencies.
- This method facilitates, through harmonized frequency bands/ ranges, the development of economies of scale for broadband PPDR equipment; and this will address the needs of developing countries for cost-effective PPDR equipment. Studies indicate that adoption of common technology, technical features and functional capabilities, as well as harmonized spectrum arrangements, can maximize the potential for regional cooperation and cross-border inter-working and lead to greater market scale to the benefit of PPDR agencies and increase the safety and security of the public.
- With this method, it will be possible to reflect the recommendations for spectrum harmonization for broadband PPDR in Region 2 contained in Recommendation PCC.II/REC.41 (XXII-13).

Disadvantages

- Changes to the preferred frequency ranges may complicate the harmonization of broadband PPDR systems creating the potential for harmful interference situations to and from PPDR operations worldwide through global circulation of equipment.
- Resolution **646 (Rev.WRC-12)** already reflects the requisite preferred harmonized frequency bands/ranges for broadband PPDR applications requirements. Additional broadband PPDR requirements may be accomplished through ITU-R studies.
- Countries of Region 1 planning to introduce PPDR mobile broadband services in the low end of the 700 MHz range may have to bilaterally coordinate with neighbouring countries still transmitting high power terrestrial broadcasting on Channel 48. Some countries in Region 2 have already planned and deployed broadband PPDR networks based on frequency ranges currently shown in Resolution **646 (Rev.WRC-12)**.
- Changes to these established frequency ranges may complicate the harmonization of broadband PPDR systems between administrations in cross-border regions as well as introduce issues of interoperability.
- This method does not accurately reflect the harmonized PPDR frequency ranges in Region 2, since the 380-399.99 MHz band cannot be used for PPDR by some administrations in Region 2 due to their extensive essential government mobile use, including aeronautical.

1/1.3/5.3 Method C: Modify Resolution 646 (Rev.WRC-12), excluding PPDR frequencies through non-mandatory reference to Recommendation ITU-R M.2015

Under this method, requirements of broadband PPDR would be addressed in the revision of Resolution **646 (Rev.WRC-12)** appropriately, as indicated in Section 1/1.3/6.2.

Studies carried out by ITU-R in accordance with Resolution **648 (WRC-12)** led to the development of a new ITU-R Report. This Report ITU-R M.[PPDR] addresses relevant information on PPDR; either narrow, wide or broadband. It also contains information on the evolution of applications supported through the provision of broadband PPDR and may be subject to further revision.

Technical requirements from Report ITU-R M.[PPDR] supporting harmonization will be reflected in the revision of Resolution **646 (Rev.WRC-12)** through a non-mandatory reference to Recommendation ITU-R M.2015.

In this method all referenced frequency bands/ranges for PPDR operations from Resolution **646 (Rev.WRC-12)** will be removed and be replaced with a cross reference to the latest version of Recommendation ITU-R M.2015 which will contain the recommended regionally harmonized frequency bands/ranges for PPDR operations.

Advantages

- Satisfies the *invites ITU-R* parts of Resolutions **646 (Rev.WRC-12)** and **648 (WRC-12)** and also covers the *resolves* of Resolution **648 (WRC-12)** to review and revise Resolution **646 (Rev.WRC-12)** for broadband PPDR.
- Provides flexibility for each administration to choose related bands for their PPDR operations by keeping harmonization of common technology, technical features and functional capabilities, as well as harmonized spectrum arrangements.
- Streamlines the information needed for the future consideration of regulatory and technical details towards PPDR operation by placing relevant information in appropriate ITU-R deliverables.

Disadvantages

- Removal of the listed spectrum ranges from *resolves* 2 of Resolution **646 (Rev.WRC-12)** would raise the potential for more frequent changes in identified spectrum ranges, leading to uncertainty for PPDR equipment manufacturers, PPDR system operators and incumbent spectrum users across multiple spectrum bands. This method will remove the stability of the bands/ranges identified for PPDR as revisions to ITU-R Recommendations can be made anytime. This will discourage investment in the development of PPDR equipment for meeting the needs of PPDR agencies. This method is un-implementable as ITU-R working parties, on their own and without guidance from the Radio Regulations, cannot decide which band to develop frequency arrangements for broadband PPDR. This will therefore defeat the whole purpose of Resolution **646 (Rev.WRC-12)**.
- Resolution **648 (WRC-12)** only calls for revision of Resolution **646 (Rev.WRC-12)** to meet the needs of broadband PPDR. There is no provision in this agenda item for changing the bands/ranges for narrowband/wideband already identified in Resolution **646 (Rev.WRC-12)**. Any change to the bands/ranges contained in *resolves* 2 of Resolution **646 (Rev.WRC-12)** for PPDR applications other than broadband is outside the scope of agenda item 1.3 (WRC-15).
- This method removes the guidance to ITU-R working parties as to which frequency bands/ranges should be used to develop frequency arrangements for PPDR. It will result in the introduction of non-harmonized bands/ranges for PPDR and defeat the purpose of Resolution **646 (Rev.WRC-12)**. It isolates into a single study group important decisions on spectrum usage that would affect spectrum bands and users across multiple radiocommunication services. It could lead to identification of additional preferred frequency ranges without appropriate technical studies, creating the potential for harmful interference situations to and from PPDR operations worldwide through global circulation of equipment.

1/1.3/5.4 Method D: Modify Resolution 646 (Rev.WRC-12), to include suitable global and regional tuning ranges for PPDR operations with their specific frequency arrangements and any national use covered through non-mandatory reference to Recommendation ITU-R M.2015

Under this method the proposed revision of Resolution **646 (Rev.WRC-12)** would address requirements of PPDR operations, as invited by Resolution **648 (WRC-12)**, as indicated in Section 1/1.3/6.4.

This method also takes account of major technological breakthroughs as well as the evolution of existing technologies that have taken place since its initial adoption in 2003. The proposed revisions recognize that the use of data applications has gone beyond voice applications and is now supporting high speed data, Internet access and video applications, a trend that is considered to be continuously growing. The proposed changes support the emerging IMT-based mobile broadband technologies that can be used in PPDR operations, as described in Report ITU-R M.2291.

In order to provide further flexibility on the future handling of global and regionally harmonized PPDR use, it is proposed that Resolution **646 (Rev.WRC-12)** should consist of global and regional frequency tuning ranges covering the bands and frequencies currently contained in Resolution **646 (Rev.WRC-12)** and those as indicated for harmonization of PPDR at WRC-15. In addition, country-specific usages, which are not in line with this Resolution's goal of harmonization, are removed.

The frequency tuning ranges shown in *resolves* 2 are for consideration by regional organizations and administrations for their PPDR operations. Further details and explanations on regionally harmonized use of those ranges, such as the specific bands and frequency arrangements adopted by individual administrations and the regional organizations are provided in Recommendation ITU-R M.2015 as a non-mandatory reference. A non-mandatory reference is added to Recommendation ITU-R M.2015, which will continue to contain the recommended frequency arrangements for the regionally harmonized frequency ranges for PPDR operations, as well as this country-specific usage. It should be noted that spectrum identified for IMT may be considered as a solution for regionally harmonized measures.

Advantages

- Satisfies the *invites ITU-R* parts of Resolutions **646 (Rev.WRC-12)** and **648 (WRC-12)** and also covers the *resolves* of Resolution **648 (WRC-12)** to review and revise Resolution **646 (Rev.WRC-12)** for broadband PPDR.
- Focuses on global as well as regional harmonization of frequency tuning ranges for PPDR by identifying frequency tuning ranges that are suitable for the deployment of PPDR systems, which may ease coordination and harmonization between different PPDR agencies and advance international aid during disasters and major events. The method will enable individual administrations to reflect their country-specific usage in Recommendation ITU-R M.2015.
- Facilitates, through harmonized frequency tuning ranges, the development of economies of scale for broadband PPDR equipment; and this will address the needs of developing countries for cost-effective PPDR equipment. Studies indicate (see Report ITU-R M.[PPDR] and Report ITU-R M.2291) that adoption of common technology, technical features and functional capabilities, as well as harmonized spectrum arrangements, can maximize the potential for regional cooperation and cross-border interworking and lead to greater market scale to the benefit of PPDR agencies and increase the safety and security of the public.

Disadvantages

– The proposed tuning range (700/800) for global harmonization is not precise and is subject to varying interpretations.

– It will be difficult for agreement to be reached within ITU-R as to which bands could be included or not in Recommendation ITU-R M.2015 for harmonized frequency arrangements within the proposed global tuning range of 700/800 MHz

– The inclusion of individual country specific PPDR frequency arrangements in the ITU-R Recommendation may result in the introduction of non-harmonized bands/ranges for PPDR and defeat the purpose of Resolution **646 (Rev.WRC-12)**.

1/1.3/6 Regulatory and procedural considerations

1/1.3/6.1 For Method A: Editorial updating to Resolution 646 (Rev.WRC-12)

MOD

RESOLUTION 646 (REV.WRC-~~12~~15)

Public protection and disaster relief

The World Radiocommunication Conference (Geneva, ~~2012~~2015),

considering

…

g) that new technologies for wideband and broadband public protection and disaster relief applications are being developed in various standards organizations~~1~~;

…

m) that the Tampere Convention on the Provision of Telecommunications Resources for Disaster Mitigation and Relief Operations (Tampere, 1998), an international treaty deposited with the United Nations Secretary-General and related United Nations General Assembly Resolutions and Reports are also relevant in this regard[1],

…

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1 ~~For example, a joint standardization programme between the European Telecommunications Standards Institute (ETSI) and the Telecommunications Industry Association (TIA), known as Project MESA (Mobility for Emergency and Safety Applications) has commenced for broadband public protection and disaster relief. Also, the Working Group on Emergency Telecommunications (WGET), convened by the United Nations Office for Humanitarian Affairs (OCHA), is an open forum to facilitate the use of telecommunications in the service of humanitarian assistance comprising United Nations entities, major non-governmental organizations, the International Committee of the Red Cross (ICRC), ITU and experts from the private sector and academia.~~ ~~Another~~A platform for coordination and to foster harmonized global Telecommunication for Disaster Relief (TDR) standards is the TDR Partnership Coordination Panel, which has ~~just~~ been established under the coordination of ITU with participation of international telecommunication service providers, related government departments, standards development organizations, and disaster relief organizations.

recognizing

...

g) that currently some bands or parts thereof have been designated for existing public protection and disaster relief operations~~, as documented in Report ITU-R M.2033~~[3];

…

noting

...

c) that public protection and disaster relief agencies and organizations have ~~an initial~~a set of requirements, including but not limited to interoperability, secure and reliable communications, sufficient capacity to respond to emergencies, priority access in the use of non-dedicated systems, fast response times, ability to handle multiple group calls and the ability to cover large areas as described in Report ITU-R M.~~2033~~[PPDR];

1/1.3/6.2 For Method B: Modify Resolution 646 (Rev.WRC-12) to include spectrum for broadband PPDR and frequency bands/ranges to facilitate harmonization

MOD

RESOLUTION 646 (REV.WRC-~~12~~15)

Public protection and disaster relief

The World Radiocommunication Conference (Geneva, ~~2012~~2015),

considering

a) that the term "public protection radiocommunication" refers to radiocommunications used by responsible agencies and organizations dealing with maintenance of law and order, protection of life and property and emergency situations;

b) that the term "disaster relief radiocommunication" refers to radiocommunications used by agencies and organizations dealing with a serious disruption of the functioning of society, posing a significant widespread threat to human life, health, property or the environment, whether caused by accident, natural phenomena or human activity~~, and whether developing suddenly or as a result of complex, long-term processes~~;

c) the growing telecommunication and radiocommunication needs of public protection agencies and organizations, including those dealing with emergency situations and disaster relief, that are vital to the maintenance of law and order, protection of life and property, disaster relief and emergency response;

d) that many administrations wish to promote interoperability and interworking between systems used for public protection and disaster relief (PPDR), both nationally and for cross-border operations in emergency situations and for disaster relief;

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[3] 3-30, 68-88, 138-144, 148-174, 380-400 MHz (including CEPT designation of 380-385/390-395 MHz), 400-430, 440-470, 764-776, 794-806 and 806-869 MHz (including CITEL designation of 821-824/866-869 MHz).

e) that ~~current~~ legacy public protection and disaster relief ~~applications~~ systems are mostly narrow-band supporting voice and low data-rate applications or wideband with data rates below 1 Mbit/s, typically ~~in~~ for systems with a channel bandwidth~~s~~ between ~~o~~f 25 to 100 kHz or less;

f) that, although ~~there will continue to be~~ narrow-band and wideband systems continue to be used for meeting PPDR requirements, many PPDR agencies have stated a need for ~~future applications will be wideband (indicative data rates in the order of 384-500 kbit/s) and/or~~ broadband applications ~~(indicative~~ with data rates in the order of 1-100 Mbit/s~~)~~ for systems requiring ~~with~~ larger channel bandwidths of 5 MHz and above ~~dependent on the use of spectrally efficient technologies~~based on International Mobile Telecommunications (IMT) technologies;

g) ~~that new technologies for wideband and broadband public protection and disaster relief applications are being developed in various standards organizations[1];~~that some administrations have started using IMT technologies such as LTE and LTE-Advanced to meet the needs of their PPDR agencies for data and multimedia capabilities; and considering that Report ITU-R M.2291 provides details of the capabilities of IMT technologies for meeting broadband PPDR requirements;

h) that continuing development of new technologies and systems, such as International Mobile Telecommunications (IMT) and Intelligent Transportation Systems (ITS), may be able to support or supplement advanced public protection and disaster relief applications;

i) that disasters and emergency events require response not only from PPDR agencies but also from humanitarian agencies;

~~*i*~~*j)* that some commercial terrestrial and satellite systems are complementing the dedicated systems in support of public protection and disaster relief~~, that the use of commercial solutions will be in response to technology development and market demands and that this may affect the spectrum required for those applications and for commercial networks~~;

~~*j*~~*k)* that Resolution 36 (Rev. Guadalajara, 2010) of the Plenipotentiary Conference urges Member States to the Tampere Convention to take all practical steps for the application of the Tampere Convention and to work closely with the operational coordinator as provided for therein;

~~*k*~~*l)* that Recommendation ITU-R M.1637 offers guidance to facilitate the global circulation of radiocommunication equipment in emergency and disaster relief situations;

~~*l*~~*m)* that some administrations may have different operational needs and spectrum requirements for public protection and disaster relief applications depending on the circumstances;

~~[1] For example, a joint standardization programme between the European Telecommunications Standards Institute (ETSI) and the Telecommunications Industry Association (TIA), known as Project MESA (Mobility for Emergency and Safety Applications) has commenced for broadband public protection and disaster relief. Also, the Working Group on Emergency Telecommunications (WGET), convened by the United Nations Office for Humanitarian Affairs (OCHA), is an open forum to facilitate the use of telecommunications in the service of humanitarian assistance comprising United Nations entities, major non-governmental organizations, the International Committee of the Red Cross (ICRC), ITU and experts from the private sector and academia. Another platform for coordination and to foster harmonized global Telecommunication for Disaster Relief (TDR) standards is the TDR Partnership Coordination Panel, which has just been established under the coordination of ITU with participation of international telecommunication service providers, related government departments, standards development organizations, and disaster relief organizations.~~

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n) that some administrations are of the view that additional spectrum needs to be identified to meet the growing needs of mobile broadband PPDR, ~~including mobile multimedia applications;~~

o) that some administrations are of the view that common RF spectrum will enable efficient deployment and will ease coordination and harmonization between different PPDR agencies and will advance international aid during disasters and major events; and considering that, in addition to the benefits of scale production, regional harmonization will improve interoperability among first responders and will drive suitable devices and standards dedicated to broadband PPDR;

~~*m*~~*p)* that the Tampere Convention on the Provision of Telecommunications Resources for Disaster Mitigation and Relief Operations (Tampere, 1998), an international treaty deposited with the United Nations Secretary-General and related United Nations General Assembly Resolutions and Reports are also relevant in this regard[1]~~,~~;

q) that in Region 2, CITEL has recommended frequency arrangements for the use of the 700 MHz band for PPDR and those PPDR frequency arrangements are determined by administrations;

r) that in Region 2, some countries are using the band 380-399.9 MHz for narrowband PPDR,

recognizing

a) the benefits of spectrum harmonization such as:

– increased potential for interoperability;

– a broader manufacturing base and increased volume of equipment resulting in economies of scale and expanded equipment availability;

– improved spectrum management and planning; and

– enhanced cross-border coordination and circulation of equipment;

b) that the organizational distinction between public protection activities and disaster relief activities are matters for administrations to determine at the national level;

c) that national spectrum planning for public protection and disaster relief needs to have regard to cooperation and bilateral consultation with other concerned administrations, which should be facilitated by greater levels of spectrum harmonization;

d) the benefits of cooperation between countries for the provision of effective and appropriate humanitarian assistance in case of disasters, particularly in view of the special operational requirements of such activities involving multinational response;

e) the needs of countries, particularly the developing countries[2], for low-cost communication equipment;

f) ~~that the trend is to increase the use of technologies based on Internet Protocols;~~that the adoption of IMT should be encouraged for broadband PPDR because of the spectral and other operating efficiencies that these technologies offer;

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[1] The Working Group on Emergency Telecommunications (WGET), convened by the United Nations Office for Humanitarian Affairs (OCHA), is an open forum to facilitate the use of telecommunications in the service of humanitarian assistance comprising United Nations entities, major non-governmental organizations, the International Committee of the Red Cross (ICRC), ITU and experts from the private sector and Academia.

[2] Taking into account, for example, the ITU-D Handbook on disaster relief.

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g) that currently some bands or parts thereof have been designated for existing public protection and disaster relief operations~~, as documented in Report ITU-R M.2033~~[3];

~~*h) that for solving future bandwidth requirements, there are several emerging technology developments such as software-defined radio, advanced compression and networking techniques that may reduce the amount of new spectrum required to support some public protection and disaster relief applications;~~

~~*i*~~*h)* that in times of disasters, if most terrestrial-based networks are destroyed or impaired, amateur, satellite and other non-ground-based networks may be available to provide communication services to assist in public protection and disaster relief efforts;

~~*j*~~*i)* that the amount of spectrum needed for public protection on a daily basis can differ significantly between countries, that certain amounts of spectrum are already in use in various countries for narrow-band applications, and that in response to a disaster, access to additional spectrum on a temporary basis may be required;

j) that studies carried out indicate broadband PPDR spectrum bandwidth requirements vary to a significant extent between countries, regardless of whether the PPDR network is owned/operated by a government PPDR agency, commercial entity or a hybrid commercial/government solution;

k) that certain amounts of spectrum are already in use in various countries for narrow-band applications, and that in response to a disaster, access to additional spectrum on a temporary basis may be required for narrow-band PPDR operations;

~~*k*~~*l)* that in order to achieve spectrum harmonization, an approach~~solution~~ based on regional frequency ranges[4] may enable administrations to benefit from harmonization while continuing to meet national planning requirements;

~~*l*~~*m)* that not all frequencies within an identified common frequency range will be available within each country;

~~*m*~~*n)* that the identification of a common frequency range within which equipment could operate may ease the interoperability and/or inter-working, with mutual cooperation and consultation, especially in national, regional and cross-border emergency situations and disaster relief activities;

~~*n*~~*o)* that when a disaster occurs, the public protection and disaster relief agencies are usually the first on the scene using their day-to-day communication systems, but that in most cases other agencies and organizations may also be involved in disaster relief operations;~~,~~

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[3] Option a:

3-30, 68-88, 138-144, 148-174, 380-400 MHz (including CEPT designation of 380-385/390-395 MHz), 400-430, 440-470, 764-776, 794-806 and 806-869 MHz (including CITEL designation of 821-824/866-869 MHz), 791-801/832-842 MHz (Qatar) and 806-824/851-869 MHz (Israel).

Option b:

3-30, 68-88, 138-144, 148-174, 380-400 MHz (including CEPT designation of 380-385/390-395 MHz), 400-430, 440-470, 764-776, 794-806 and 806-869 MHz (including CITEL designation of 821-824/866-869 MHz).

[4] In the context of this Resolution, the term “frequency range” means a range of frequencies over which a radio equipment is envisaged to be capable of operating but limited to specific frequency band(s) according to national conditions and requirements.

p) that some countries in Region 1 have identified certain parts of the frequency range 694 to 790 MHz for broadband PPDR deployments,

noting

a) that many administrations currently use certain frequency bands below 1 GHz for narrow-band and some for broadband public protection and disaster relief applications and some administrations also use certain frequency bands above 1 GHz for broadband PPDR applications;

b) that applications requiring large coverage areas and providing good signal availability would generally be accommodated in lower frequency bands and that applications requiring wider bandwidths would generally be accommodated in progressively higher bands;

c) that it would be efficient to use the lower frequency bands, e.g. around 300 MHz, in some countries in Region 3;

~~*c*~~*d)* that public protection and disaster relief agencies and organizations have a~~n initial~~ set of requirements, including but not limited to interoperability, secure and reliable communications, sufficient capacity to respond to emergencies, priority access in the use of non-dedicated systems, fast response times, ability to handle multiple group calls and the ability to cover large areas as described in Report ITU-R M.2033*, Report ITU-R M.2291 and Report ITU-R M.[PPDR];

~~*d) that, while harmonization may be one method of realizing the, in some countries, the use of multiple frequency bands can contribute to meeting the communication needs in disaster situations;*~~

e) that many administrations have made significant investments in public protection and disaster relief systems;

f) that flexibility must be afforded to disaster relief agencies and organizations to use current and future radiocommunications, so as to facilitate their humanitarian operations~~,~~;

g) that broadband PPDR services can be realized and deployed in the frequency bands identified for IMT,

emphasizing

a) that the frequency bands identified in this Resolution are allocated to a variety of services in accordance with the relevant provisions of the Radio Regulations and are currently used intensively by the fixed, mobile, mobile satellite and broadcasting services;

b) that some administrations are of the view that only some of the frequency bands/ranges identified in *resolves* 2 of this Resolution are suitable for supporting broadband PPDR applications;

c) that flexibility must be afforded to administrations:

– to determine, at national level, how much spectrum to make available for public protection and disaster relief from the bands identified in this Resolution in order to meet their particular national requirements;

– to have the ability for bands identified in this Resolution to be used by all services having allocations within those bands according to the provisions of the Radio Regulations, taking into account the existing applications and their evolution;

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* Note: Depending on the results of Report ITU-R M.[PPDR], Report ITU-R M.2033 will be suppressed and would no longer be referenced in this noting.

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– to determine the need and timing of availability as well as the conditions of usage of the bands identified in this Resolution for public protection and disaster relief in order to meet specific national situations,

resolves

1 to strongly recommend administrations to use regionally harmonized bands for public protection and disaster relief to the maximum extent possible, taking into account the national and regional requirements and also having regard to any needed consultation and cooperation with other concerned countries;

Option 1

2 to encourage administrations, for the purposes of achieving regionally harmonized frequency bands/ranges for advanced public protection and disaster relief solutions, to consider the following identified frequency bands/ranges or parts thereof when undertaking their national planning:

– in Region 1: 380-470 MHz as the frequency range within which the band 380-385/390-395 MHz is a preferred core harmonized band for permanent public protection activities within certain countries of Region 1 ~~which have given their agreement~~;

– The frequency range 694-790 MHz, within which parts thereof are preferred for broadband public protection and disaster relief solutions in some countries in Region 1;

– in Region 2[~~5~~]: 380-399.9 MHz, ~~746~~698-806 MHz, 806-869 MHz, 4 940-4 990 MHz;

– in Region 3[6]: 406.1-430 MHz, 440-470 MHz, 806-824/851-869 MHz, and 4 940-4 990 MHz ~~and 5 850-5 925 MHz~~;

Note: Some administrations are of the view that administration-specific frequency bands/ranges for public protection and disaster relief (PPDR) solutions should not be included in the "*resolves* 2" of Resolution **646 (Rev.WRC-12)** since the frequency bands/ranges in Resolution **646 (Rev.WRC-12)** were identified for the purpose of achieving "regionally harmonized" frequency bands/ranges for PPDR. Instead, these should be moved to "*recognizing g)*" footnote 3.

Option 2

2 to encourage administrations, for the purposes of achieving regionally harmonized frequency bands/ranges for advanced public protection and disaster relief solutions, to consider the following identified frequency bands/ranges or parts thereof when undertaking their national planning:

– 2.1 in Region 1:

i) 380-470 MHz as the frequency range within which the band 380-385/390-395 MHz is a preferred core harmonized band for permanent public protection activities within certain countries of Region 1 ~~which have given their agreement~~;

~~[5] Venezuela has identified the band 380-400 MHz for public protection and disaster relief applications.~~

[6] Some countries in Region 3 have also identified the bands 174-205 MHz, 351-370 MHz, 380-400 MHz ~~and~~ 698~~746~~-806 MHz and 1 447-1 467 MHz for public protection and disaster relief applications. Some administrations have concerns with changing the 746-806 MHz band to 698-806 MHz.

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ii) the band 698-713 MHz/753-768 MHz within the frequency range 694-790 MHz and the band 791-801/832-842 MHz within the frequency range 790-862 MHz are the preferred bands for broadband PPDR within certain countries of Region 1;

– 2.2 in Region 2~~[5]~~:

i) 380-399.9 MHz, ~~746~~698-806 MHz, 806-869 MHz, 4 940-4 990 MHz;

– 2.3 in Region 3[6]:

i) 406.1-430 MHz, 440-470 MHz, 806-824/851-869 MHz, and 4 940-4 990 MHz ~~and 5 850-5 925 MHz~~;

Option 3

2 to encourage administrations, for the purposes of achieving regionally harmonized frequency bands/ranges for advanced public protection and disaster relief solutions, to consider the following identified frequency bands/ranges or parts thereof when undertaking their national planning:

a) on a regional basis for public protection and disaster relief applications:

– in Region 1: 380-470 MHz as the frequency range within which the band 380-385/390-395 MHz is a preferred core harmonized band for permanent public protection activities within certain countries of Region 1 ~~which have given their agreement~~;

– in Region 2~~[5]~~: 380-399.9 MHz, 698~~746~~-806 MHz, 806-869 Hz, 4 940-4 990 MHz;

– in Region 3[6]: 406.1-430 MHz, 440-470 MHz, 806-824/851-869 MHz, and 4 940-4 990 MHz ~~and 5 850-5 925 MHz~~;

b) in all Regions the frequency tuning range 698/703-894 MHz (or parts thereof) for broadband public protection and disaster relief applications;

3 that the identification of the above frequency bands/ranges for public protection and disaster relief does not preclude the use of these bands/frequencies by any application within the services to which these bands/frequencies are allocated and does not preclude the use of nor establish priority over any other frequencies for public protection and disaster relief in accordance with the Radio Regulations;

4 to encourage administrations, in emergency and disaster relief situations, to satisfy temporary needs for frequencies in addition to what may be normally provided for in agreements with the concerned administrations;

5 that administrations encourage public protection and disaster relief agencies and organizations to utilize both existing and new technologies, systems and solutions (satellite and terrestrial), to the extent practicable, to satisfy interoperability requirements and to further the goals of public protection and disaster relief;

6 that administrations ~~may~~ encourage agencies and organizations to use ~~advanced wireless~~ broadband PPDR radiocommunication ~~solutions~~systems/applications taking into account *considering h)* and ~~*i*~~*j)* for providing complementary support to public protection and disaster relief;

~~[5] Venezuela has identified the band 380-400 MHz for public protection and disaster relief applications.~~

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7 to encourage administrations to facilitate cross-border circulation of radiocommunication equipment intended for use in emergency and disaster relief situations through mutual cooperation and consultation without hindering national legislation;

8 that administrations encourage public protection and disaster relief agencies and organizations to utilize relevant ITU-R Recommendations in planning spectrum use and implementing technology and systems supporting public protection and disaster relief;

9 to encourage administrations to continue to work closely with their public protection and disaster relief community to further refine the operational requirements for public protection and disaster relief activities;

10 that manufacturers should be encouraged to take this Resolution into account in future equipment designs, including the need for administrations to operate within different parts of the identified bands,

invites ITU-R

1 to continue its technical studies and to make recommendations concerning technical and operational implementation, as necessary, ~~for advanced solutions~~ to meet the needs of public protection and disaster relief radiocommunication applications, taking into account the capabilities, evolution and any resulting transition requirements of the existing systems, particularly those of many developing countries, for national and international operations~~;~~.

~~2 to conduct further appropriate technical studies in support of possible additional identification of other frequency ranges to meet the particular needs of certain countries in Region 1 which have given their agreement, especially in order to meet the radiocommunication needs of public protection and disaster relief agencies.~~

1/1.3/6.3 Method C: Modify Resolution 646 (Rev.WRC-12), excluding PPDR frequencies through non-mandatory reference to Recommendation ITU-R M.2015

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RESOLUTION 646 (REV.WRC-~~12~~15)

Public protection and disaster relief

The World Radiocommunication Conference (Geneva, ~~2012~~2015),

considering

a) that Report ITU-R M.[PPDR] provides comprehensive details of systems and applications supporting PPDR operations in narrow, wide and broadband use, including but not limited to:

– the generic technical and operational requirements relating to PPDR;

– spectrum needs;

– mobile broadband PPDR services and applications including further developments and the evolution of PPDR through advances in technology;

– terms and definitions;

– promotion of interoperability and interworking;

– needs of developing countries;

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b) that Report ITU-R M.2291 provides details of the capabilities of IMT technologies to meet requirements of applications supporting broadband PPDR operations;

~~*a)*~~*c)* that the term "public protection radiocommunication" refers to radiocommunications used by responsible agencies and organizations dealing with maintenance of law and order, protection of life and property and emergency situations;

~~*b)*~~*d)* that the term "disaster relief radiocommunication" refers to radiocommunications used by agencies and organizations dealing with a serious disruption of the functioning of society, posing a significant widespread threat to human life, health, property or the environment, whether caused by accident, natural phenomena or human activity, and whether developing suddenly or as a result of complex, long-term processes;

~~*c)*~~*e)* the growing telecommunication and radiocommunication needs of public protection agencies and organizations, including those dealing with emergency situations and disaster relief, that are vital to the maintenance of law and order, protection of life and property, disaster relief and emergency response;

~~*d) that many administrations wish to promote interoperability and interworking between systems used for public protection and disaster relief, both nationally and for cross-border operations in emergency situations and for disaster relief;~~

~~*e)*~~*f)* that ~~current~~ existing public protection and disaster relief ~~applications~~ applications are mostly narrow-band supporting voice and low data-rate applications~~, typically in channel bandwidths of 25 kHz or less~~ which may continue to be available;

~~*f) that, although there will continue to be narrow-band requirements, many future applications will be wideband (indicative data rates in the order of 384-500 kbit/s) and/or broadband (indicative data rates in the order of 1-100 Mbit/s) with channel bandwidths dependent on the use of spectrally efficient technologies;~~

g) that new technologies for wideband and broadband public protection and disaster relief applications are being developed in various standards organizations, e.g. IMT systems supporting higher data rates and higher capacity for PPDR[1] applications;

h) that continuing development of new technologies and systems, such as International Mobile Telecommunications (IMT) and Intelligent Transportation Systems (ITS) may be able to further support or supplement advanced public protection and disaster relief applications;

~~[1] For example, a joint standardization programme between the European Telecommunications Standards Institute (ETSI) and the Telecommunications Industry Association (TIA), known as Project MESA (Mobility for Emergency and Safety Applications) has commenced for broadband public protection and disaster relief. Also, the Working Group on Emergency Telecommunications (WGET), convened by the United Nations Office for Humanitarian Affairs (OCHA), is an open forum to facilitate the use of telecommunications in the service of humanitarian assistance comprising United Nations entities, major non-governmental organizations, the International Committee of the Red Cross (ICRC), ITU and experts from the private sector and academia. Another platform for coordination and to foster harmonized global Telecommunication for Disaster Relief (TDR) standards is the TDR Partnership Coordination Panel, which was established under the coordination of ITU with participation of international telecommunication service providers, related government departments, standards development organizations, and disaster relief organizations.~~

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i) that some commercial terrestrial and satellite systems are complementing the dedicated systems in support of public protection and disaster relief, that the use of commercial solutions will be in response to technology development and market demands ~~and that this may affect the spectrum required for those applications and for commercial networks~~;

j) that Resolution 36 (Rev. Guadalajara, 2010) of the Plenipotentiary Conference urges Member States Parties to the Tampere Convention to take all practical steps for the application of the Tampere Convention and to work closely with the operational coordinator as provided for therein;

k) that Recommendation ITU-R M.1637 offers guidance to facilitate the global circulation of radiocommunication equipment in emergency and disaster relief situations;

l) that Report ITU-R BT.2299 provides a compilation of supporting evidence that terrestrial broadcasting plays an important role in disseminating information to the public in times of emergencies;

~~*l*~~*m)* that some administrations may have different operational needs and spectrum requirements for public protection and disaster relief applications depending on the circumstances;

~~*m*~~*n)* that the Tampere Convention on the Provision of Telecommunications Resources for Disaster Mitigation and Relief Operations (Tampere, 1998), an international treaty deposited with the United Nations Secretary-General and related United Nations General Assembly Resolutions and Reports are also relevant in this regard,

recognizing

a) the benefits of spectrum harmonization such as:

– increased potential for interoperability;

– a broader manufacturing base and increased volume of equipment resulting in economies of scale and expanded equipment availability;

– improved spectrum management and planning; and

– enhanced cross-border coordination and circulation of equipment;

b) that the organizational distinction between public protection activities and disaster relief activities are matters for administrations to determine at the national level;

c) that national spectrum planning for public protection and disaster relief needs to have regard to cooperation and bilateral consultation with other concerned administrations, which should be facilitated by greater levels of spectrum harmonization;

d) the benefits of cooperation between countries for the provision of effective and appropriate humanitarian assistance in case of disasters, particularly in view of the special operational requirements of such activities involving multinational response;

e) the needs of countries, particularly the developing countries[2], for ~~low-~~cost-efficient communication equipment;

f) that the adoption of IMT for broadband PPDR has the advantages and efficiencies that are achieved through standardization ~~that the trend is to increase the use of technologies based on Internet Protocols~~;

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[2] ~~Taking into account, for example, the ITU-D Handbook on disaster relief.~~

g) that the most recent version of Recommendation ITU-R M.2015 contains regionally harmonized frequency arrangements, as well as frequency arrangements in certain countries, for public protection and disaster relief~~that currently some bands or parts thereof have been designated for existing public protection and disaster relief operations, as documented in Report ITU-R M.2033[3]~~;

h) that in order to achieve spectrum harmonization, an approach based on regional frequency ranges[1] may enable administrations to benefit from harmonization while continuing to meet national planning requirements;~~that for solving future bandwidth requirements, there are several emerging technology developments such as software-defined radio, advanced compression and networking techniques that may reduce the amount of new spectrum required to support some public protection and disaster relief applications;~~

i) that in times of disasters, if most terrestrial-based networks are destroyed or impaired, amateur, satellite and other non-ground-based networks may be available to provide communication services to assist in public protection and disaster relief efforts;

j) that the amount of spectrum needed for public protection on a daily basis ~~can~~ differs significantly between countries, that certain amounts of spectrum are already in use in various countries ~~for narrow band applications~~, and that in response to a disaster, access to additional spectrum on a temporary basis may be required;

~~*k) that in order to achieve spectrum harmonization, a solution based on regional frequency ranges[4] may enable administrations to benefit from harmonization while continuing to meet national planning requirements;*~~

~~*l*~~*k)* that not all frequencies within an identified common frequency range will be available within each country;

~~*m*~~*l)* that the identification of ~~a~~ common frequency ranges within which equipment could operate may ease the interoperability and/or inter-working, with mutual cooperation and consultation, especially in national, regional and cross-border emergency situations and disaster relief activities~~;~~.

~~*n) that when a disaster occurs, the public protection and disaster relief agencies are usually the first on the scene using their day-to-day communication systems, but that in most cases other agencies and organizations may also be involved in disaster relief operations,~~

~~[3] 3-30, 68-88, 138-144, 148-174, 380-400 MHz (including CEPT designation of 380-385/390-395 MHz), 400-430, 440-470, 764-776, 794-806 and 806-869 MHz (including CITEL designation of 821-824/866-869 MHz).~~

[1] In the context of this Resolution, the term "frequency range" means a range of frequencies over which a radio equipment is envisaged to be capable of operating but limited to specific frequency band(s) according to national conditions and requirements. When different national PPDR networks use a common technical standard, the frequency range includes the possibility of using any number of bands that the technology can use.

~~[4] In the context of this Resolution, the term "frequency range" means a range of frequencies over which a radio equipment is envisaged to be capable of operating but limited to specific frequency band(s) according to national conditions and requirements.~~

noting

a) that many administrations will continue useing frequency bands below 1 GHz for narrow-band ~~public protection and disaster relief~~ systems and applications supporting PPDR and may decide to use the same range for future PPDR systems taking account of the impact of such a new system on existing applications operating in, and adjacent to, the range;

~~*b)* that applications requiring large coverage areas and providing good signal availability would generally be accommodated in lower frequency bands and that applications requiring wider bandwidths would generally be accommodated in progressively higher bands;~~

~~*c*~~*b)* that public protection and disaster relief agencies and organizations have an initial set of requirements, including but not limited to interoperability, secure and reliable communications, sufficient capacity to respond to emergencies, priority access in the use of non-dedicated systems, fast response times, ability to handle multiple group calls and the ability to cover large areas as described in Report ITU-R M.~~2033~~[PPDR];

~~*d*~~*c)* that, while harmonization may be one method of realizing the desired benefits, in some countries, the use of multiple frequency bands can contribute to meeting the communication needs in disaster situations;

~~*e*~~*d)* that many administrations have made significant investments in public protection and disaster relief systems;

~~*f*~~*e)* that flexibility must be afforded to disaster relief agencies and organizations to use current and future radiocommunications, so as to facilitate their humanitarian operations;~~,~~

f) that IMT offers a high degree of flexibility for supporting broadband PPDR applications, and there are a number of different approaches for using and deploying IMT to meet the broadband communication needs of PPDR agencies and organizations, which are outlined in Reports ITU-R M.2291 and ITU-R M.[PPDR];

g) that spectrum identified for IMT may also be considered as a solution for harmonized measures for PPDR operations,

emphasizing

a) that the frequency rangesbands identified in that are covered by this Resolution the most recent version of Recommendation ITU-R M.2015 are allocated to a variety of services in accordance with the relevant provisions of the Radio Regulations and are currently used intensively by the fixed, mobile, mobile satellite and broadcasting several different services;

b) that flexibility must be afforded to administrations to determine:

– to determine, at the national level, how much spectrum to make available for public protection and disaster relief from the bands identified in this Resolution in order to meet their particular national requirementsthe amount of spectrum to be used;

– to have the ability for bands identified in this Resolution to be used by all services having allocations within those bands according to the provisions of the Radio Regulations, taking into account the existing applications and their evolution;

– to determine the need and timing of availability as well as the conditions of usage of the bands identified in the most recent version of Recommendation ITU-R M.2015 this Resolution for public protection and disaster reliefPPDR in order to meet specific regional or national situations;

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c) that not all of the frequency bands listed in the most recent version of Recommendation ITU-R M.2015 may be suitable for every type of PPDR applications (narrowband, wideband or broadband),

resolves

1 to strongly recommend administrations to use regionally harmonized bands for public protection and disaster relief to the maximum extent possible, taking into account the national and regional requirements and also having regard to any needed consultation and cooperation with other concerned countries;

2 to encourage administrations, for the purposes of achieving regionally harmonized frequency bands/ranges for advanced public protection and disaster relief solutions, to consider the ~~following identified~~ frequency bands/ranges or parts thereof when undertaking their national planning as listed in the most recent version of Recommendation ITU-R M.2015;~~:~~

~~– in Region 1: 380-470 MHz as the frequency range within which the band 380-385/390-395 MHz is a preferred core harmonized band for permanent public protection activities within certain countries of Region 1 which have given their agreement;~~

~~– in Region 2[5]: 746-806 MHz, 806-869 MHz, 4 940-4 990 MHz;~~

~~– in Region 3[6]: 406.1-430 MHz, 440-470 MHz, 806-824/851-869 MHz, 4 940-4 990 MHz and 5 850-5 925 MHz;~~

3 that the identification of the ~~above~~ frequency bands/ranges for ~~public protection and disaster relief~~ PPDR, as listed in the most recent version of Recommendation ITU-R M.2015, does not preclude the use of these bands/frequencies by any application within the services to which these bands/frequencies are allocated and does not preclude the use of nor establish priority over any other frequencies for PPDR ~~public protection and disaster relief~~ in accordance with the Radio Regulations;

4 to encourage administrations, in emergency and disaster relief situations, to satisfy temporary needs for frequencies in addition to what may be normally provided for in agreements with the concerned administrations;

5 that administrations encourage ~~public protection and disaster relief~~PPDR agencies and organizations to utilize both existing and new technologies/ ~~and~~ solutions ~~(satellite and terrestrial)~~, to the extent practicable, to satisfy interoperability requirements and to further the goals of public protection and disaster relief;

~~6 that administrations may encourage agencies and organizations to use advanced wireless solutions taking into account *considering h)* and *i)* for providing complementary support to public protection and disaster relief;~~

~~7~~6 to encourage administrations to facilitate cross-border circulation of radiocommunication equipment intended for use in emergency and disaster relief situations through mutual cooperation and consultation without hindering national legislation;

~~[5] Venezuela has identified the band 380-400 MHz for public protection and disaster relief applications.~~

~~[6] Some countries in Region 3 have also identified the bands 380-400 MHz and 746-806 MHz for public protection and disaster relief applications.~~

~~8~~7 that administrations encourage public protection and disaster relief agencies and organizations to utilize relevant ITU-R Recommendations and Reports in planning spectrum use and implementing technology and systems supporting public protection and disaster relief;

~~9~~8 to encourage administrations to continue to work closely with their public protection and disaster relief community to further refine the operational requirements for public protection and disaster relief activities;

~~10~~9 that manufacturers should be encouraged to take this Resolution and related ITU-R Recommendations and Reports into account in future equipment designs, including the need for administrations to operate within different parts of the ~~identified bands~~frequency arrangements described in the most recent version of Recommendation ITU-R M.2015,

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invites ITU-R

1 to continue its ~~technical~~ technical studies and to make recommendations concerning technical and operational implementation, as necessary, for advanced solutions to meet the needs of public protection and disaster relief radiocommunication applications, taking into account the capabilities, evolution and any resulting transition requirements of the existing systems, particularly those of many developing countries, for national and international operations;

2 to review and, as appropriate, revise Recommendation ITU-R M.2015 and other relevant ITU-R Recommendations and Reports~~conduct further appropriate technical studies in support of possible additional identification of other frequency ranges to meet the particular needs of certain countries in Region 1 which have given their agreement, especially in order to meet the radiocommunication needs of public protection and disaster relief agencies~~.

1/1.3/6.4 Method D: Modify Resolution 646 (Rev.WRC-12), to include suitable global and regional tuning ranges for PPDR operations with their specific frequency arrangements and any national use covered through non-mandatory reference to Recommendation ITU-R M.2015

RESOLUTION 646 (REV.WRC-~~12~~15)

Public protection and disaster relief

The World Radiocommunication Conference (Geneva, ~~2012~~2015),

considering

a) that Report ITU-R M.[PPDR] provides comprehensive details of systems and applications supporting PPDR operations in narrow-, wide- and broadband use, including but not limited to:

– the generic technical and operational requirements relating to PPDR;

– spectrum needs;

– mobile broadband PPDR services and applications including further developments and the evolution of PPDR through advances in technology;

– terms and definitions;

– promotion of interoperability and interworking; and

– the needs of developing countries;

b) that Report ITU-R M.2291 provides details of the capabilities of IMT technologies to meet the requirements of applications supporting broadband PPDR operations;

~~*a*~~*c)* that the term "public protection radiocommunication" refers to radiocommunications used by responsible agencies and organizations dealing with maintenance of law and order, protection of life and property and emergency situations;

~~*b*~~*d)* that the term "disaster relief radiocommunication" refers to radiocommunications used by agencies and organizations dealing with a serious disruption of the functioning of society, posing a significant widespread threat to human life, health, property or the environment, whether caused by accident, natural phenomena or human activity, and whether developing suddenly or as a result of complex, long-term processes;

~~*c*~~*e)* the growing telecommunication and radiocommunication needs of public protection agencies and organizations, including those dealing with emergency situations and disaster relief, that are vital to the maintenance of law and order, protection of life and property, disaster relief and emergency response;

~~*d) that many administrations wish to promote interoperability and interworking between systems used for public protection and disaster relief, both nationally and for cross-border operations in emergency situations and for disaster relief;~~

~~*e*~~*f)* that ~~current~~ existing public protection and disaster relief applications are mostly narrow-band supporting voice and low data-rate applications, which may continue to be available~~, typically in channel bandwidths of 25 kHz or less~~;

~~*f) that, although there will continue to be narrow-band requirements, many future applications will be wideband (indicative data rates in the order of 384-500 kbit/s) and/or broadband (indicative data rates in the order of 1-100 Mbit/s) with channel bandwidths dependent on the use of spectrally efficient technologies;~~

g) that new technologies for wideband and broadband public protection and disaster relief applications are being developed in various standards organizations~~[1]~~, e.g. IMT systems supporting higher data rates and higher capacity for PPDR applications;

h) that continuing development of new technologies and systems, such as International Mobile Telecommunications (IMT) and Intelligent Transportation Systems (ITS) may be able to further support or supplement advanced public protection and disaster relief applications;

~~[1] For example, a joint standardization programme between the European Telecommunications Standards Institute (ETSI) and the Telecommunications Industry Association (TIA), known as Project MESA (Mobility for Emergency and Safety Applications) has commenced for broadband public protection and disaster relief. Also, the Working Group on Emergency Telecommunications (WGET), convened by the United Nations Office for Humanitarian Affairs (OCHA), is an open forum to facilitate the use of telecommunications in the service of humanitarian assistance comprising United Nations entities, major non-governmental organizations, the International Committee of the Red Cross (ICRC), ITU and experts from the private sector and academia. Another platform for coordination and to foster harmonized global Telecommunication for Disaster Relief (TDR) standards is the TDR Partnership Coordination Panel, which was established under the coordination of ITU with participation of international telecommunication service providers, related government departments, standards development organizations, and disaster relief organizations.~~

i) that some commercial terrestrial and satellite systems are complementing the dedicated systems in support of public protection and disaster relief, that the use of commercial solutions will be in response to technology development and market demands ~~and that this may affect the spectrum required for those applications and for commercial networks~~;

j) that Resolution 36 (Rev. Guadalajara, 2010) of the Plenipotentiary Conference urges Member States Parties to the Tampere Convention to take all practical steps for the application of the Tampere Convention and to work closely with the operational coordinator as provided for therein;

k) that Recommendation ITU-R M.1637 offers guidance to facilitate the global circulation of radiocommunication equipment in emergency and disaster relief situations;

l) that Report ITU-R BT.2299 provides a compilation of supporting evidence that terrestrial broadcasting plays an important role in disseminating information to the public in times of emergencies;

~~*l*~~*m)* that some administrations may have different operational needs and spectrum requirements for public protection and disaster relief applications depending on the circumstances;

~~*m*~~*n)* that the Tampere Convention on the Provision of Telecommunications Resources for Disaster Mitigation and Relief Operations (Tampere, 1998), an international treaty deposited with the United Nations Secretary-General and related United Nations General Assembly Resolutions and Reports are also relevant in this regard,

recognizing

a) the benefits of spectrum harmonization such as:

– increased potential for interoperability;

– a broader manufacturing base and increased volume of equipment resulting in economies of scale and expanded equipment availability;

– improved spectrum management and planning; and

– enhanced cross-border coordination and circulation of equipment;

b) that the organizational distinction between public protection activities and disaster relief activities are matters for administrations to determine at the national level;

c) that national spectrum planning for public protection and disaster relief needs to have regard to cooperation and bilateral consultation with other concerned administrations, which should be facilitated by greater levels of spectrum harmonization;

d) the benefits of cooperation between countries for the provision of effective and appropriate humanitarian assistance in case of disasters, particularly in view of the special operational requirements of such activities involving multinational response;

e) the needs of countries, particularly the developing countries~~2~~[1], for ~~low-~~cost-efficient communication equipment;

f) that the adoption of IMT for broadband PPDR has the advantages and efficiencies that are achieved through standardization~~trend is to increase the use of technologies based on Internet Protocols~~;

~~2~~[1] Taking into account, for example, the ITU-D updated Handbook on disaster relief (Appendix 1 of the Report of Question 22-1/2).

g) that Recommendation ITU-R M.2015 contains regionally harmonized frequency arrangements, as well as frequency arrangements in certain countries, for public protection and disaster reliefcurrently some bands or parts thereof have been designated for existing public protection and disaster relief operations, as documented in Report ITU-R M.2033[3];

h) that in order to achieve spectrum harmonization, an approach based on regional frequency ranges[2] may enable administrations to benefit from harmonization while continuing to meet national planning requirementsfor solving future bandwidth requirements, there are several emerging technology developments such as software-defined radio, advanced compression and networking techniques that may reduce the amount of new spectrum required to support some public protection and disaster relief applications;

i) that in times of disasters, if most terrestrial-based networks are destroyed or impaired, amateur, satellite and other non-ground-based networks may be available to provide communication services to assist in public protection and disaster relief efforts;

j) that the amount of spectrum needed for public protection on a daily basis can differs significantly between countries that certain amounts of spectrum are already in use in various countries for narrow-band applications, and that in response to a disaster, access to additional spectrum on a temporary basis may be required;

k) that in order to achieve spectrum harmonization, a solution based on regional frequency ranges[4] may enable administrations to benefit from harmonization while continuing to meet national planning requirements;

lk) that not all frequencies within an identified common frequency range will be available within each country;

ml) that the identification of a common frequency ranges within which equipment could operate may ease the interoperability and/or inter-working, with mutual cooperation and consultation, especially in national, regional and cross-border emergency situations and disaster relief activities,;

n) that when a disaster occurs, the public protection and disaster relief agencies are usually the first on the scene using their day-to-day communication systems, but that in most cases other agencies and organizations may also be involved in disaster relief operations,

noting

a) that many administrations will continue use using frequency bands below 1 GHz for narrow-band public protection and disaster reliefsystems and applications supporting PPDR and may decide to use the same range for future PPDR systems taking account of the impact of such a new system on existing applications operating in, and adjacent to, the range;

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[3] 3-30, 68-88, 138-144, 148-174, 380-400 MHz (including CEPT designation of 380-385/390-395 MHz), 400-430, 440-470, 764-776, 794-806 and 806-869 MHz (including CITEL designation of 821-824/866-869 MHz).

[2] In the context of this Resolution, the term "frequency range" means a range of frequencies over which radio equipment is envisaged to be capable of operating but limited to specific frequency band(s) according to national conditions and requirements.

[4] In the context of this Resolution, the term "frequency range" means a range of frequencies over which a radio equipment is envisaged to be capable of operating but limited to specific frequency band(s) according to national conditions and requirements.

~~*b)* that applications requiring large coverage areas and providing good signal availability would generally be accommodated in lower frequency bands and that applications requiring wider bandwidths would generally be accommodated in progressively higher bands;~~

~~*c*~~*b)* that public protection and disaster relief agencies and organizations have an initial set of requirements, including but not limited to interoperability, secure and reliable communications, sufficient capacity to respond to emergencies, priority access in the use of non-dedicated systems, fast response times, ability to handle multiple group calls and the ability to cover large areas as described in Report ITU-R M.~~2033~~[PPDR];

~~*d*~~*c)* that, while harmonization may be one method of realizing the desired benefits, in some countries, the use of multiple frequency bands can contribute to meeting the communication needs in disaster situations;

~~*e*~~*d)* that many administrations have made significant investments in public protection and disaster relief systems;

~~*f*~~*e)* that flexibility must be afforded to disaster relief agencies and organizations to use current and future radiocommunications, so as to facilitate their humanitarian operations~~,~~;

f) that Recommendation ITU-R M.2015 contains specific frequency arrangements to provide for narrow-, wide-, and broadband PPDR operations as identified by individual countries as well as by regional organizations;

g) that IMT offers a high degree of flexibility for supporting broadband PPDR applications and there are a number of different approaches for using and deploying IMT to meet the broadband communications needs of PPDR agencies and organizations, which are outlined in Reports ITU-R M.2291 and ITU-R M.[PPDR];

h) that spectrum identified for IMT may also be considered as a solution for harmonized measures for PPDR operations,

emphasizing

a) that the frequency ~~bands~~ ranges that are covered by the *resolves* part of ~~identified in~~ this Resolution are allocated to a variety of services in accordance with the relevant provisions of the Radio Regulations and are currently used intensively by ~~the fixed, mobile, mobile satellite and broadcasting~~several different services;

b) that PPDR applications in the ranges listed in *resolves* 2 are intended to operate in the mobile service;

~~*b*~~*c)* that flexibility must be afforded to administrations to determine:

– ~~to determine, at national level,~~ how much spectrum to make available at a national level for public protection and disaster relief from the ~~bands~~ ranges that are covered by the *resolves* part of ~~identified in~~ this Resolution in order to meet their particular national requirements; as well as

~~– to have the ability for bands identified in this Resolution to be used by all services having allocations within those bands according to the provisions of the Radio Regulations, taking into account the existing applications and their evolution;~~

– ~~to determine~~ the need and timing of availability as well as the conditions of usage of the bands identified in ~~this Resolution~~the most recent version of Recommendation ITU-R M.2015 for ~~public protection and disaster relief~~PPDR in order to meet specific regional or national situations~~,~~;

d) that not all of the frequency bands listed in the most recent version of Recommendation ITU-R M.2015 may be suitable for every type of PPDR applications (narrow-band, wideband or broadband);

e) that when planning the use of PPDR in the 400 MHz range, administrations should take into account the provisions contained in RR No. **5.266** and in RR No. **5.267** and Resolution **205**,

resolves

1 to strongly recommend administrations to use regionally harmonized bands for public protection and disaster relief to the maximum extent possible, taking into account the national and regional requirements and also having regard to any needed consultation and cooperation with other concerned countries;

2 to encourage administrations to consider the 700/800 MHz frequency tuning ranges[3] as described in the most recent version of ITU-R M.2015, or parts thereof, for the provision of PPDR solutions in order to achieve global harmonization;~~, for the purposes of achieving regionally harmonized frequency bands/ranges for advanced public protection and disaster relief solutions, to consider the following identified frequency bands/ranges or parts thereof when undertaking their national planning:~~

3 to encourage administrations to consider the following regionally harmonized frequency tuning ranges, or parts thereof, for their planned and future PPDR operations:

– in Region 1: 380-470 MHz;

– in Region 2: 4 940-4 990 MHz;

– in Region 3: 406.1-430 MHz, 440-470 MHz, 4 940-4 990 MHz;

~~– in Region 1: 380-470 MHz as the frequency range within which the band 380-385/390-395 MHz is a preferred core harmonized band for permanent public protection activities within certain countries of Region 1 which have given their agreement;~~

~~– in Region 2[5]: 746-806 MHz, 806-869 MHz, 4 940-4 990 MHz;~~

~~– in Region 3[6]: 406.1-430 MHz, 440-470 MHz, 806-824/851-869 MHz, 4 940-4 990 MHz and 5 850-5 925 MHz;~~

4 that specific information on the frequency arrangements for public protection and disaster relief in these ranges, as well as the specific details of the Regions and/or administrations be described in Recommendation ITU-R M.2015;

~~3~~5 that the inclusion~~identification~~ of ~~the above~~ frequency ~~bands/~~ranges for public protection and disaster relief in this Resolution, as well as the inclusion of frequency arrangements for PPDR operations in these frequency ranges, as described in the most recent version of Recommendation ITU-R M.2015, does not preclude the use of these ~~bands/~~frequencies by any application within the services to which these ~~bands/~~frequencies are allocated and does not preclude

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[3] In the context of this Resolution, the term "frequency tuning range" means a range of frequencies over which radio equipment is envisaged to be capable of operating but limited to specific frequency band(s) according to national conditions and requirements.

~~[5] Venezuela has identified the band 380-400 MHz for public protection and disaster relief applications.~~

~~[6] Some countries in Region 3 have also identified the bands 380-400 MHz and 746-806 MHz for public protection and disaster relief applications.~~

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the use of nor establish priority over any other frequencies for public protection and disaster relief in accordance with the Radio Regulations;

~~4~~6 to encourage administrations, in emergency and disaster relief situations, to satisfy temporary needs for frequencies in addition to what may be normally provided for in agreements with the concerned administrations;

~~5~~7 that administrations encourage ~~public protection and disaster relief~~PPDR agencies and organizations to utilize both existing and new technologies, systems and solutions ~~(satellite and terrestrial)~~, to the extent practicable, to satisfy interoperability requirements and to further the goals of public protection and disaster relief;

~~6 that administrations may encourage agencies and organizations to use advanced wireless solutions taking into account *considering h)* and *i)* for providing complementary support to public protection and disaster relief;~~

~~7~~8 to encourage administrations to facilitate cross-border circulation of radiocommunication equipment intended for use in emergency and disaster relief situations through mutual cooperation and consultation without hindering national legislation;

~~8~~9 that administrations encourage public protection and disaster relief agencies and organizations to utilize relevant ITU-R Recommendations and Reports in planning spectrum use and implementing technology and systems supporting public protection and disaster relief;

~~9~~10 to encourage administrations to continue to work closely with their public protection and disaster relief community to further refine the operational requirements for public protection and disaster relief activities;

~~10~~11 that manufacturers should be encouraged to take this Resolution and related ITU-R Recommendations and Reports into account in future equipment designs, including the need for administrations to operate within different parts of the frequency arrangements described in the most recent version of Recommendation ITU-R M.2015~~identified bands~~,

invites ITU-R

1 to continue its technical studies and to make recommendations concerning technical and operational implementation, as necessary, for advanced solutions to meet the needs of public protection and disaster relief radiocommunication applications, taking into account the capabilities, evolution and any resulting transition requirements of the existing systems, particularly those of many developing countries, for national and international operations;

2 to ~~conduct further appropriate technical studies in support of possible additional identification of other frequency ranges to meet the particular needs of certain countries in Region 1 which have given their agreement, especially in order to meet the radiocommunication needs of public protection and disaster relief agencies.~~review and, as appropriate, revise Recommendation ITU-R M.2015 and other relevant ITU-R Recommendations and Reports.