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| **Radiocommunication Study Groups** |  |
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| Received: 1 February 2016  Question: [ITU-R 229-4/5](http://www.itu.int/pub/R-QUE-SG05.229) | **Document 5D/12-E** |
| **2 February 2016** |
| **English only**  **GENERAL ASPECTS** |
| Ericsson Canada, Inc. | |
| PROPOSED Working document towards a preliminary draft new Report M.[IMT.TV-600] “TELEVISION distribution using terrestrial International Mobile Telecommunication (IMT) networks in the frequency range 470-698 MHz” | |
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# 1 Introduction

At WRC-15 the band 470-698 MHz or parts of it were identified for use by IMT in a number of countries in Regions 2 and 3; refer to the Article 5 table of allocations footnotes 5.idR2a, 5.idR2b and 5.idR3 in the [WRC-15 Provisional Final Acts](http://www.itu.int/pub/R-ACT-WRC.11-2015/en). Since this band is also allocated to the broadcasting service, it offers the possibility of synergistic deployments for the distribution of television content.

Work has already been conducted in a number of organizations (e.g., EBU, CITEL) to examine the digital television transition and opportunities for application convergence between broadcasting and broadband networks to distribute audio-visual content. In particular [Report ITU-R M.2373](http://www.itu.int/pub/R-REP-M.2373) examines the capabilities of IMT systems to deliver audio-visual services, especially, given the increasing desire by users to consume such content at any time, in any place with their preferred device. It examines those user requirements as well as some of the requirements from the audio-visual content providers and examines the use cases where IMT offers advantages over other audio-visual delivery systems, and evaluates the capabilities of the system in meeting those requirements. However, the content of Report ITU-R M.2373 is not band-specific; therefore it is now timely to investigate the opportunities presented by the identification for IMT in frequencies within the range 470-698 MHz, as more countries extend their transition from analog to digital television broadcasting.

This contribution is intended to initiate the development of a working document to address these issues and help develop transition plans and effective network deployments for the delivery of television content.

# 2 Proposal

Ericsson proposes that WP 5D initiates the development of a working document towards a preliminary draft new Report M.[IMT.TV-600] “Television distribution using terrestrial International Mobile Telecommunication (IMT) networks in the frequency range 470-698 MHz” as shown in [Attachment 1](#att1).

Furthermore, it would be useful to liaise with WP 6A at an early stage, therefore [Attachment 2](#att2) proposes a draft liaison statement for consideration by WP 5D.

A detailed workplan for the development of a working document towards a preliminary draft new Report ITU-R M.[IMT.TV-600] is proposed in [Attachment 3](#att3).

List of attachments:

[**Attachment 1**](#att1)**:** Working document towards a preliminary draft new Report M.[IMT.TV-600] “Television distribution using terrestrial International Mobile Telecommunication (IMT) networks in the frequency range 470-698 MHz”

[**Attachment 2**](#att2)**:**  Proposed draft liaison statement to WP 6A.

[**Attachment 3**](#att3)**:**  Detailed workplan for the development of a working document towards a preliminary draft new Report ITU-R M.[IMT.TV-600] “Television distribution using terrestrial International Mobile Telecommunication (IMT) networks in the frequency range 470-698 MHz”.

Attachment 1

Working Document towards a Preliminary Draft   
New Report ITU-R M.[IMT.TV-600]

Television distribution using terrestrial International Mobile Telecommunication (IMT) networks in the frequency range 470-698 MHz

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# 1 Introduction

This Report addresses the opportunities presented by the IMT identification within the frequency range 470-698 MHz in order to provide guidance on the development of transition plans and effective network deployments for the distribution of television content.

# 2 Background and motivation

At WRC-15 the band 470-698 MHz or parts of it were identified for use by IMT in a number of countries in Regions 2 and 3, refer to the Article 5 table of allocations footnotes 5.idR2a, 5.idR2b and 5.idR3 in the [WRC-15 Provisional Final Acts](http://www.itu.int/pub/R-ACT-WRC.11-2015/en) *[Editor’s Note: update reference when the new edition of the RR is published]*. Since this band is also allocated to the broadcasting service, it offers the possibility of synergistic deployments for the distribution of television content.

Work has already been conducted in a number of organizations (e.g., EBU, CITEL) to examine the digital television transition and opportunities for application convergence between broadcasting and broadband networks to distribute audio-visual content. In particular, [Report ITU-R M.2373](http://www.itu.int/pub/R-REP-M.2373) examines the capabilities of IMT systems to deliver audio-visual services, especially, given the increasing desire by users to consume such content at any time, in any place with their preferred device. It examines those user requirements as well as some of the requirements from the audio-visual content providers and examines the use cases where IMT offers advantages over other audio-visual delivery systems, and evaluates the capabilities of the system in meeting those requirements. Report ITU-R M.2373 also includes a detailed description of the features of IMT enhanced Multimedia Broadcast Multicast Services (eMBMS) that enable transport of content to multiple users.

Application convergence can be implemented in any band and Report ITU-R M.2373 does not address any specific band. It is now timely to consider the deployment of complementary networks for the distribution of television content in the band 470-698 MHz, made possible by the new IMT identification in this band and the flexibility offered by the co-primary allocation to the broadcasting and mobile services in the countries which have it. In particular, as more countries convert their broadcasting systems to digital television it will be necessary to consider evolution strategies to make the best use of the various modes of distribution of television content for the benefit of consumers, service providers, network providers and content providers.

# 3 Related documents

1 [Report ITU-R M.2373](http://www.itu.int/pub/R-REP-M.2373) − Audio-visual capabilities and applications supported by terrestrial IMT systems (2015).

2 CITEL Technical Notebook “Cooperation and convergence between broadcasting and mobile services using LTE networks” Available: <https://www.citel.oas.org/en/SiteAssets/About-Citel/Publications/Technical_Notebook/P2!R-3339p1_i.pdf>.

3 EBU Technical Report TR 026 “Assessment of Available Options for the Distribution of Broadcast Services”, June 2014. Available: <https://tech.ebu.ch/docs/techreports/tr026.pdf>.

4 ECC Report 224 “Long Term Vision for the UHF broadcasting band” November 2014. <http://www.erodocdb.dk/doks/doccategoryECC.aspx?doccatid=4>

# 4 Vocabulary

*<TBD>*

# 5 Characteristics of the 470-698 MHz frequency range for television distribution

The band 470-698 MHz, or parts of it, are identified for use by IMT in a number of countries in Regions 2 and 3. Since the frequency range 470-698 MHz is also allocated to the broadcasting service the IMT identification is subject to the condition that mobile service stations of the IMT system within the frequency band are subject to agreement obtained under No. **9.21** and shall not cause harmful interference to, or claim protection from, the broadcasting service of neighbouring countries.

Within the frequency range 470-698 MHz, in Region 2 the band 608-614 MHz is allocated to the radio astronomy service on a primary basis.

5.304 *Additional allocation:*in the African Broadcasting Area (see Nos. **5.10** to **5.13**), the band 606-614 MHz is also allocated to the radio astronomy service on a primary basis.

5.305 *Additional allocation:*in China, the band 606-614 MHz is also allocated to the radio astronomy service on a primary basis.

5.306 *Additional allocation:*in Region 1, except in the African Broadcasting Area (see Nos. **5.10** to **5.13**), and in Region 3, the band 608-614 MHz is also allocated to the radio astronomy service on a secondary basis.

5.307 *Additional allocation:*in India, the band 608-614 MHz is also allocated to the radio astronomy service on a primary basis.

**5.312A** In Region 1, the use of the frequency band 694-790 MHz by the mobile, except aeronautical mobile, service is subject to the provisions of Resolution **760** [**COM4/4] (WRC-15)**. See also Resolution **224 (Rev.WRC-15)**.

…

# 6 Deployment scenarios

The purpose of this section is to investigate possible deployment scenarios for IMT in the band 470-698 MHz. Possibilities include:

- Traditional FDD (symmetric or asymmetric) and TDD deployments of IMT systems.

- IMT downlink only, to maximize the capacity for television distribution and minimize interference to adjacent broadcasting systems.

…

# 7 Convergence between broadcasting and mobile services: evolution/migration strategies

Since it will take years to realize the maximum potential of the convergence between broadcasting and mobile services it is necessary to provide guidance on evolution/migration strategies. Countries may extend their transition to digital television broadcasting at different paces, and evolving consumer behaviours, such as those described in Report ITU-R M.2373, will have an influence on the preferred mode of distribution of television, depending on the nature of the content and the target audience.

This section is intended to provide such guidance …

# 8 Spectrum sharing and interference mitigation

Studies have already been conducted on spectrum sharing and interference mitigation between broadcasting and mobile broadband deployment in the 700 MHz band. These studies, as well as new studies in the 600 MHz band, will assist in planning the evolution of both the broadcasting service and the mobile service in the frequency range 470-698 MHz.

*[Editor’s Note: List and describe the relevant Recommendations and Reports].*

# 9 Desirable future enhancements for television distribution over IMT

*<TBD>*

# 10 Conclusions

*<TBD>*

**Annexes:**

Annex 1: List of acronyms

Annex 1

List of acronyms

*[Editor’s Note: Upon completion of the draft Report delete those not used and add others as needed]*

AAC Automatic congestion control

AL-FEC Application layer forward error correction

AMR Adaptive multi-rate

BLER Block error ratio

BM-SC Broadcast-multicast service center

CP Cyclic prefix

CRC Cyclic redundancy check

DASH Dynamic adaptive streaming over http

DL Downlink

DL-SCH Downlink synchronization channel

DRM Digital rights management

DTT Digital terrestrial TV

DTTB Digital terrestrial television broadcasting

DVB-T Digital video broadcasting - terrestrial

eMBMS Enhanced multimedia broadcast and multicast service

eNB E-UTRAN Node B, evolved Node B, ‘LTE base station’

EPC Evolved packet core

EPG Electronic program guide

E-UTRA Evolved universal terrestrial radio access network

FDD Frequency division duplex

FEC Forward error correction

FFT Fast Fourier transformation

FLUTE Protocol for the unidirectional delivery of files over the internet, which is particularly suited to multicast networks

FRAND Fair, reasonable and non-discriminatory

GBR Guaranteed bit rate bearer

GPS Global positioning system

HD High definition

HSPA High speed packet access

HTTP Hypertext transfer protocol

IP Internet Protocol

IP-OTT IP over the Top content

LTE Long term Evolution

LTE PDCP/RLC/MAC LTE packet data convergence protocol/radio link control/medium access control

M1 Logical interface between MBMS GW and eNBs

M2 Logical control interface between MCE and eNBs

M3 Interface between MME and MCE

MBB Mobile broadband

MBMS Multimedia broadcast and multicast service

MBMS CP Multimedia broadcast and multicast service cyclic prefix

MBMS GW MBMS gateway

MBMS SAI MBMS service area identity

MBSFN Multimedia broadcast and multicast service single frequency network

MCE Multi-cell/multicast coordination entity

MCH Multicast channel

MCS Modulation and coding scheme

MDT Minimization of drive tests

MIKEY Multimedia Internet KEYing

MIMO Multiple input multiple output

MME Mobility management entity

MNO Mobile network operator

MSK MBMS service key

MSP MCH scheduling period

MTK MBMS traffic key

NCT New carrier type

O&M Operations and maintenance

OFDM Orthogonal frequency division multiplex

PDN Public data network

PSM Public service media

PSS Packet-switched streaming

P-TM Point-to-multipoint

P-P Point-to-point

QCI Qos class identifier

QoE Quality of experience: The overall acceptability of an application or service, as perceived subjectively by the end-user. It includes the complete end-to-end system effects (client, terminal, network, services, etc.) And it may be influenced by user expectations and context.

QoS Quality of service

RRC Radio resource control

RTCP Rtp control protocol

RTP Real time protocol

SCTP/IP S common transport protocol

SDL Supplemental downlink

SFN Single frequency network

SGmb Reference point for the control plane between BM-SC and MBMS GW

SGi-mb Reference point for the user plane between BM-SC and MBMS GW

SIM GSM subscription identity module

SINR Signal to interference + noise ratio

Sm Reference point for the control plane between MME and MBMS GW

SRTP Secure real-time transport protocol

SYNC MBMS synchronization protocol

TCP Transmission control protocol

TDD Time division duplex

*TCP* Cyclic prefix length

*Tu* Useful symbol time

UDP User datagram protocol

UE User equipment

UHD Ultra high Definition

UL Uplink

UP User plane

USD User service description

Attachment 2

PROPOSED DRAFT LIAISON STATEMENT TO wORKING pARTY 6a

(COPY FOR INFORMATION TO THE ITU-D/ITU-R Joint Group for Resolution 9 (Rev. Dubai, 2014))

Television distribution using terrestrial International Mobile Telecommunication (IMT) networks in the frequency range 470-698 MHz

Working Party 5D (WP 5D) has initiated the development of a working document towards a preliminary draft new Report M.[IMT.TV-600] “Television distribution using terrestrial International Mobile Telecommunication (IMT) networks in the frequency range 470-698 MHz”.

The objective is to address the opportunities presented by the IMT identification in the band 470-698 MHz, or parts of it, in order to provide guidance on the development of transition plans to effective network deployments for the distribution of television content.

Attached is the current version of the working document. WP 5D invites WP 6A to provide comments.

WP 5D plans to complete the preliminary draft new Report at its Meeting No. 28, currently scheduled for 3-11 October 2017. The next meeting of WP 5D (Meeting No. 24) will be held from 14-22 June 2016.

WP 5D looks forward to the cooperation of WP 6A in the development of this draft new Report.

**Attachment:** Working document towards a preliminary draft new Report M.[IMT.TV-600] “Television distribution using terrestrial International Mobile Telecommunication (IMT) networks in the frequency range 470-698 MHz”

**Status:** For action.

**Contact:** <TBD> **E-mail:** <TBD>

Attachment 3

Detailed workplan for the development of a working document towards a preliminary draft new Report ITU-R M.[IMT.TV-600] “Television distribution using terrestrial International Mobile Telecommunication (IMT) networks in the frequency range 470-698 MHz”

Source: <TBD>

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| **Title** | “Television distribution using terrestrial International Mobile Telecommunication (IMT) networks in the frequency range 470-698 MHz” |
| **Identifier** | M.[IMT.TV-600] |
| **Document type** | Report |
| **WP 5D Lead Group** | WG General Aspects |
| **SWG Chair** |  |
| **Editor** |  |
| **Focus for scope and work** | This Report addresses the opportunities presented by the IMT identification within the frequency range 470-698 MHz in order to provide guidance on the development of transition plans and effective network deployments for the distribution of television content. |
| **Related documents** | [Report ITU-R M.2373](http://www.itu.int/pub/R-REP-M.2373) − Audio-visual capabilities and applications supported by terrestrial IMT systems (2015).  [Question ITU-R 229-4/5](http://www.itu.int/pub/R-QUE-SG05.229) |
| **Milestones** | **Meeting No. 23 (23 February – 2 March 2016, Beijing, China)**   1. Consider the received contributions 2. Develop a detailed work plan 3. Produce first version of working document towards a draft new Report 4. Send a liaison statement to WP 6A. 5. Call for contributions in the WP 5D chairman’s report.   **Meeting No. 24 (14-22 June 2016, [TBD])**  1 Continue to develop the working document based on input contributions  2 Consider liaison activity.  **Meeting No. 25 (4-12 October 2016, [TBD])**   1. Consider the received contributions 2. Consider any necessary liaison statements 3. Produce a new version of the working document towards a draft new Report 4. Review and revise the workplan as required   **Meeting No. 26 (14-22 February 2017, [TBD])**   1. Consider the received contributions 2. Consider any necessary liaison statements 3. Review and revise the workplan as required   **Meeting No. 27 (13-21 June 2017, [TBD])**   1. Consider the received contributions 2. Produce a relatively stable version of the draft Report 3. Consider any necessary liaison statements   **Meeting No. 28 (3-11 October 2017, [TBD])**   1. Consider the received contributions 2. Consider any necessary liaison statements 3. Targeted finalization of the draft new Report ITU-R M.[IMT.TV-600] |

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