International Telecommunication Union

WP5A-WP5B-WP5C
WORKSHOP ON THE PREPARATIONS FOR WRC-15

WRC 2015 AGENDA ITEM 1.3

An Introduction by

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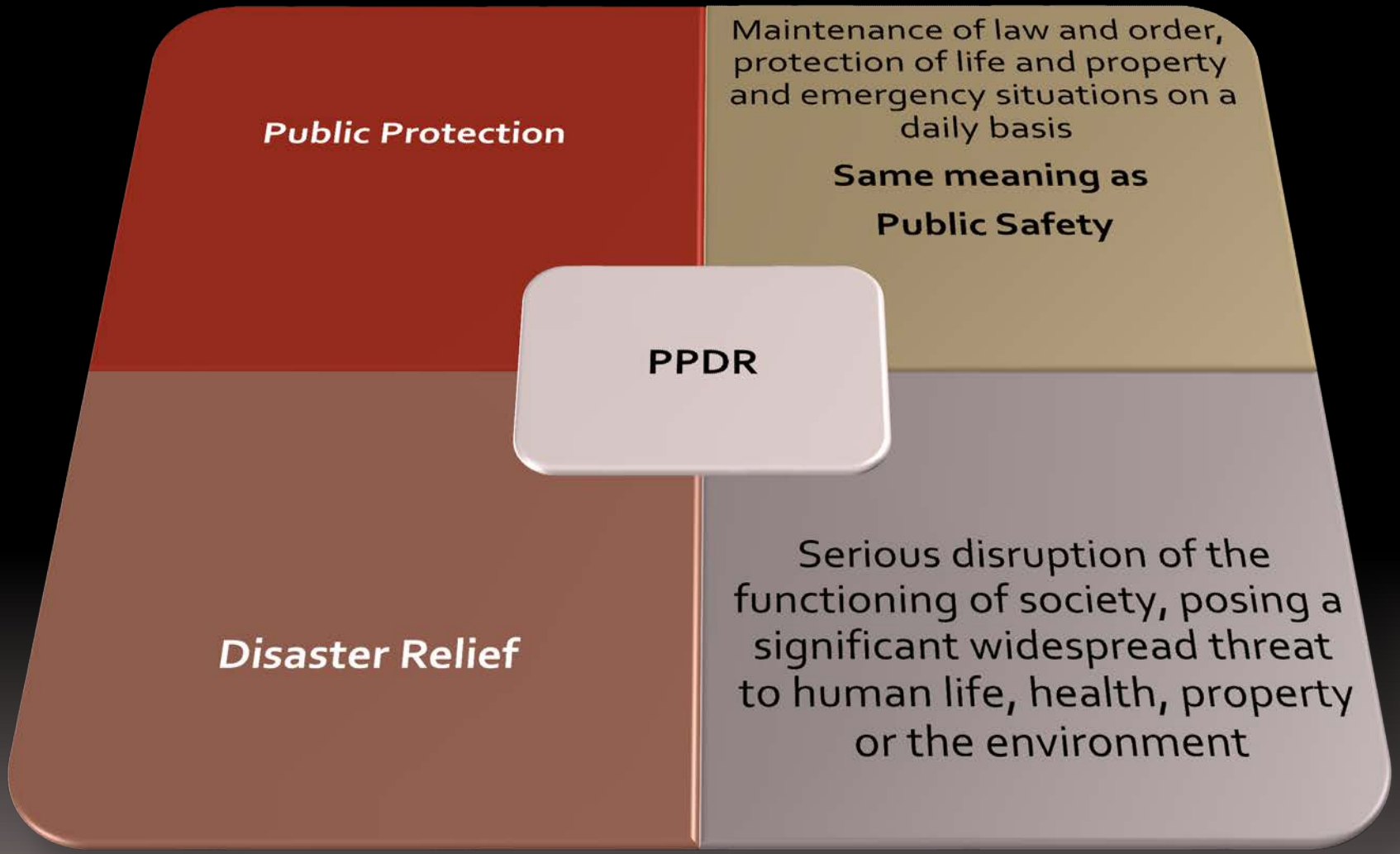
Broadband PPDR – Agenda 1.3 WRC 2015

This presentation provides background on Resolution 646 and the studies that need to be carried out to prepare the CPM text for this agenda item including activities within ITU-R study groups as well as studies by the administrations and regional bodies!

- Background of Agenda item 1.3 (WRC-15) and Res. 646 (WRC-03)
- **Need for Broadband PPDR**
- Status of Broadband PPDR spectrum in three ITU-R Regions
- Proposed Studies by WP5A under Agenda item 1.3 (WRC-15)

What is PPDR


Public Protection
Maintenance of law and order, protection of life and property and emergency situations on a daily basis
Same meaning as
Public Safety
PPDR
Disaster Relief
Serious disruption of the functioning of society, posing a significant widespread threat to human life, health, property or the environment

BACKGROUND OF AGENDA ITEM 1.3 (WRC-15) & RES. 646 (WRC-03)

ITU-R Studies under Res. 646

WRC 2000 approved agenda item 1.3 for WRC -2003.

to consider identification of globally/regionally harmonized bands, to the extent practicable, for the implementation of future advanced solutions to meet the needs of public protection agencies, including those dealing with emergency situations and disaster relief, and to make regulatory provisions, as necessary, taking into account Resolution **645 (WRC-2000)**

Studies were carried out under agenda item 1.3 of WRC -2003.by ITU-R WP8A Working Group 3 under Dr. Alan Jamieson of New Zealand.

A new Report ITU-R M.2033 was developed that provided details of the requirements of PPDR!

Agenda 1.3/WRC-03

WP 8A WG3 on PPDR

Report M.2033

Report M.2014

WRC 2003 adopted Res. 646

Resolution 646 approved by WRC -2003 included identified Regional harmonized frequency bands

Administrations are encouraged to consider the following identified frequency bands/ranges or parts thereof for PPDR:

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 agreed countries of Region 1.

Region 2: 746-806 MHz, 806-869 MHz, 4 940-4 990 MHz

Region 3: 406.1-430 MHz, 440-470 MHz, 806-824/851-869 MHz, 4 940-4 990 MHz and 5 850-5 925 MHz (some countries in Region 3 have also identified the bands 380-400 MHz and 746-806 MHz for public protection and disaster relief applications).

Identification of spectrum bands

Regional Harmonization

Further Studies by ITU-R

Cross Border movement

ITU-R Studies for implementation of Res . 646

From 2003 till date ITU is continuously working on preparing reports and recommendations on PPDR:

- RESOLUTION 647 (WRC-07) – Spectrum management guidelines for emergency and disaster relief Radiocommunication
- ITU-R Recommendation M.1826 (2007) - "Harmonized frequency channel plan for broadband public protection and disaster relief operations at 4 940-4 990 MHz in Regions 2 and 3"
- RECOMMENDATIONS ITU-R M.2015- Frequency arrangements for PPDR systems in UHF bands in accordance with res. 646 (WRc-03) and ITU-R M.2009 – Radio Interface Standards for use by PPDR operations in some parts of the UHF band in accordance with resolution 646 (WRc-03)

Why New Agenda for PPDR

The focus in 2003 was to identify bands for mission critical voice and data for PPDR agencies. The broadband applications particularly video were thought to be relevant only for hot spot coverage

Over last few years, many broadband technologies, particularly IMT based technologies such as LTE have been customized to meet the needs of Public safety agencies

It has been eight years since WRC adopted the last PPDR Resolution – Resolution 646. The time is right for review of this resolution

Agenda 1.3 WRC-2015

to review and revise Resolution 646 (Rev.WRC-12) for broadband public protection and disaster relief (PPDR), in accordance with Resolution 648 [COM6/11] (WRC-12);

Resolution 648 [COM6/11] (WRC-12): Studies to support broadband public protection and disaster relief

The Resolution invites ITU-R

to study technical and operational issues relating to broadband PPDR and its further development, and to develop recommendations, as required, on:

- technical requirements for PPDR services and applications;
- the evolution of broadband PPDR through advances in technology;
- the needs of developing countries,

WRC-15 to Review and Revise Res. 646

ITU-Studies for Broadband PPDR

Evolution of Broadband PPDR

Needs of Developing countries

NEED FOR BROADBAND PPDR

Need for Video

Video surveillance and usage by the PPDR agencies has become crucial to saving lives.

Video helps experts in safe locations or command centers, (Cold Zones) to manage and provide guidance to those in Containment or hot Zones

Video application support for Incident and Event Management has been largely unavailable so far due to limited spectrum

Video increases officer safety by enabling interactive consultation with experts remotely for on site advice and support

Video dramatically reduces collateral damage to property through increased knowledge/awareness of special concerns

Video from site portable cameras carried into containment, (Hot Zones) or confined spaces can be sent to commander and remote experts.

Broadband Application Example

A BARRICADED SUSPECT TAKES HOSTAGES

DECISIONS MADE IN THE FIRST MINUTES WILL DETERMINE THE OUTCOME

Resources will be dynamically prioritized for the most critical responders, and real-time shared situational awareness will empower the coordinated response across multiple agencies.

INTELLIGENT VIDEO STREAMING	REMOTE OPERATIONS	RAPID FILE TRANSFER	MUTUAL AID PUSH-TO-TALK
▪ Prioritized perimeter and scene video ▪ Sniper video streams delivered to command	▪ Remotely operate surveillance devices ▪ Control bomb disposal robots	▪ Download images, floor plans, manuals ▪ Situational updates sent every 5 minutes	▪ FBI coordinates with PTT over LA-RICS LTE ▪ LTE cellular call to emergency center

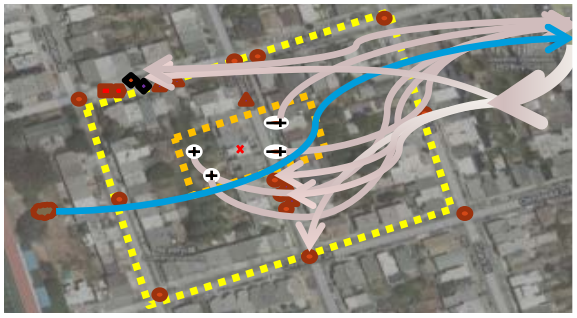
BROADBAND APPLICATION EXAMPLE

LIFE CYCLE OF AN INCIDENT – BARRICADED SUSPECT

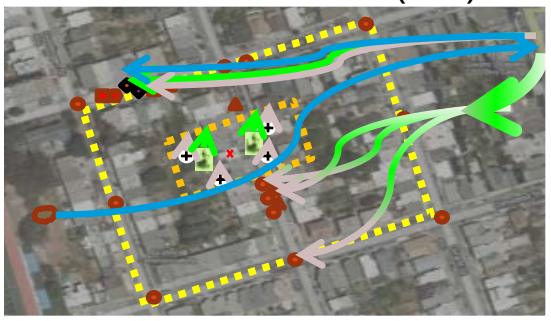
Incident Starts (t=0)

Secure Perimeter (t=15)

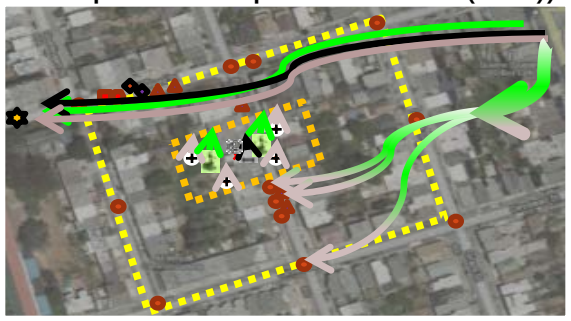
Special Response Arrives (t=60))



Special Response Deploys (t=65)



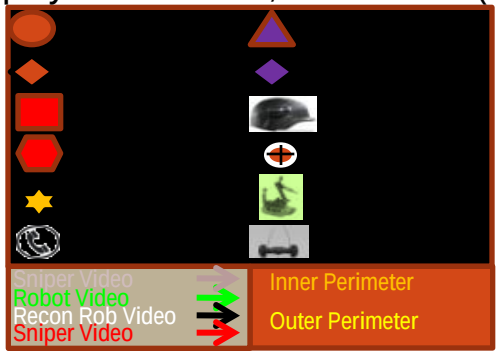
Deploy Large Robot (t=90)



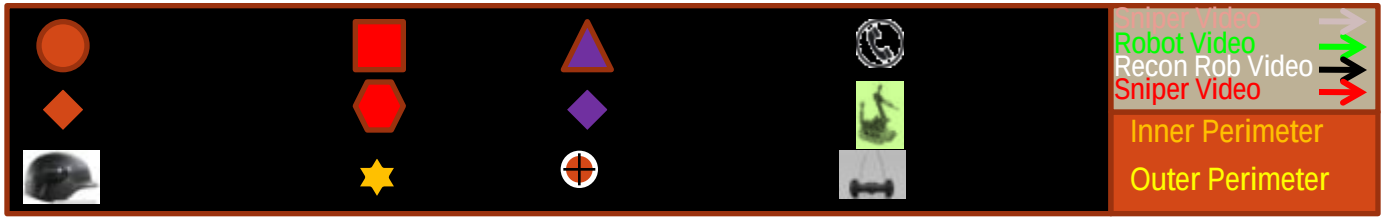
Deploy Throw Phone, Recon Robot(t=120)

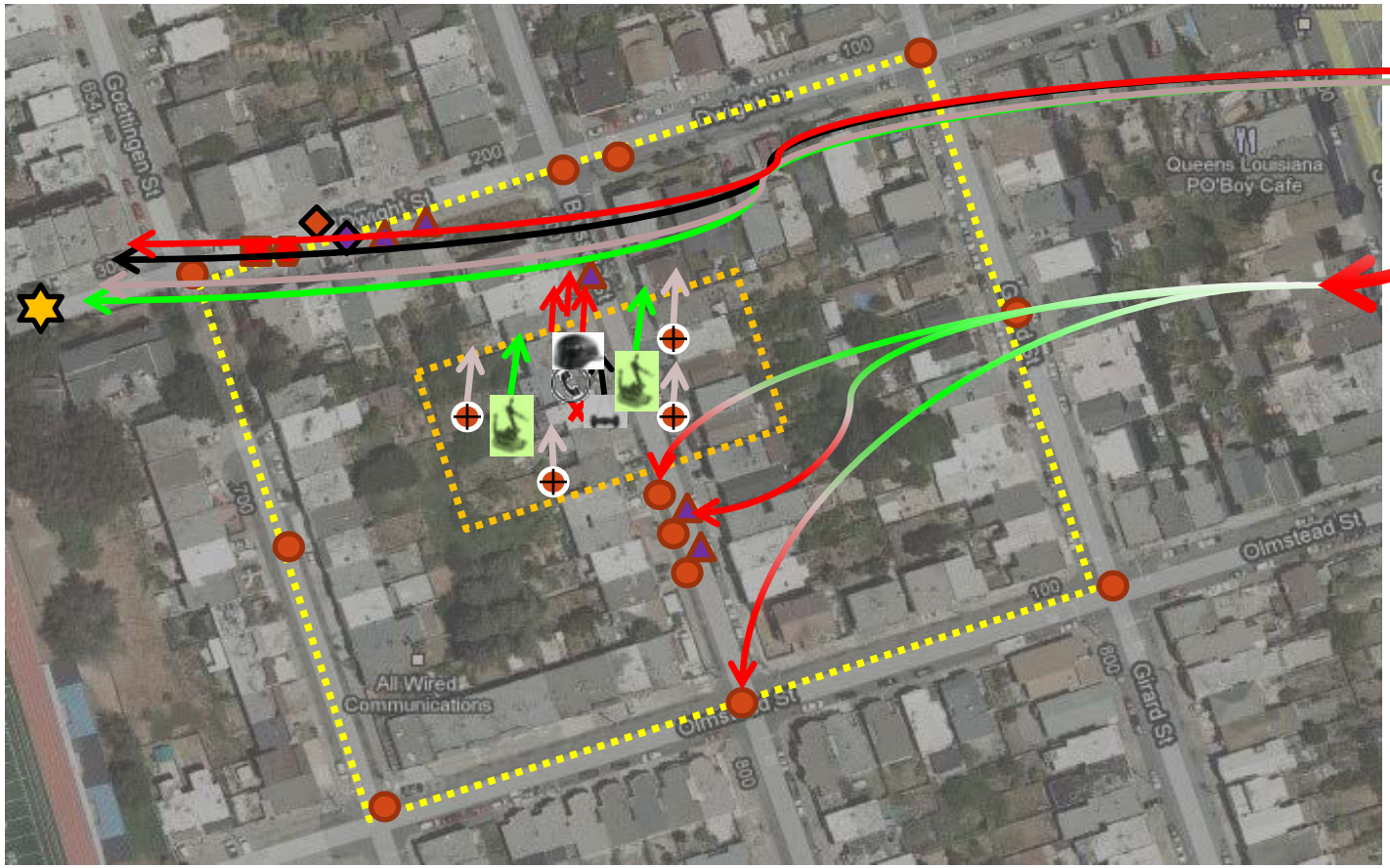
Negotiation (t=125)

Entry Team Deploys (t=240)



BARRICADED SUSPECT – ENTRY TEAM DEPLOYS



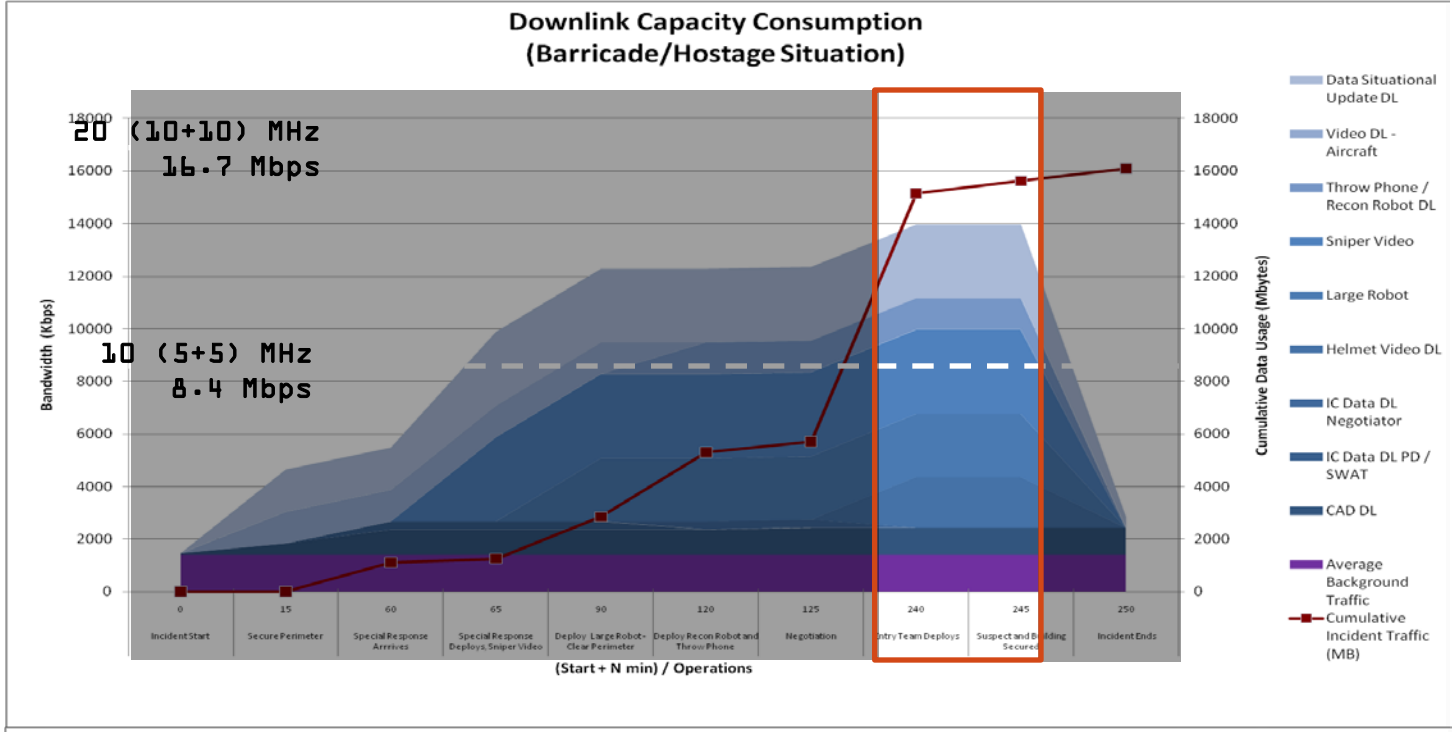


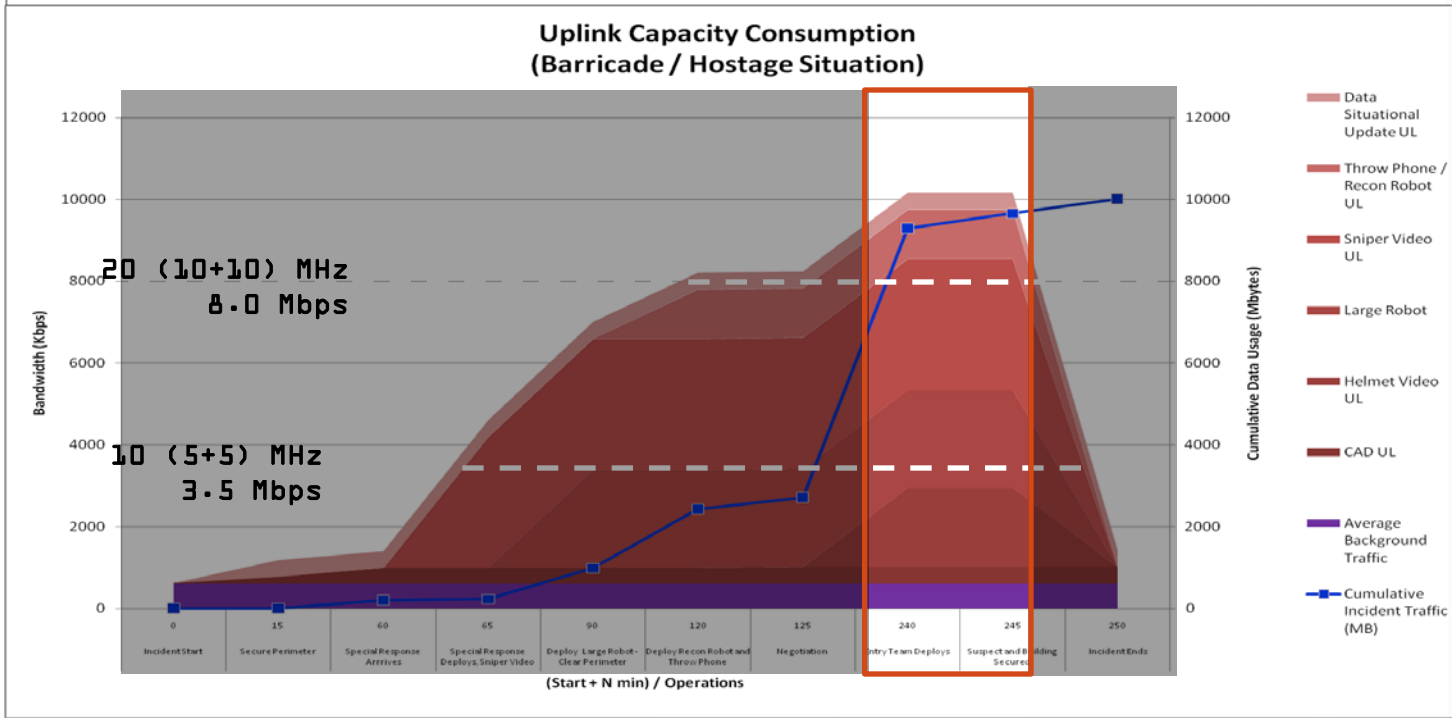
Video Control

Secure Multicast

Time:	240 min
Police:	18
Fire/EMS:	7
SWAT:	30
Negotiators:	2
FBI:	2
Commanders:	2
Cmd/Cntl	
Vehicles :	1

Ten officers make entry with five lower res video feeds on person (helmet).





Entry Team Deploys

Secures Building and Suspect

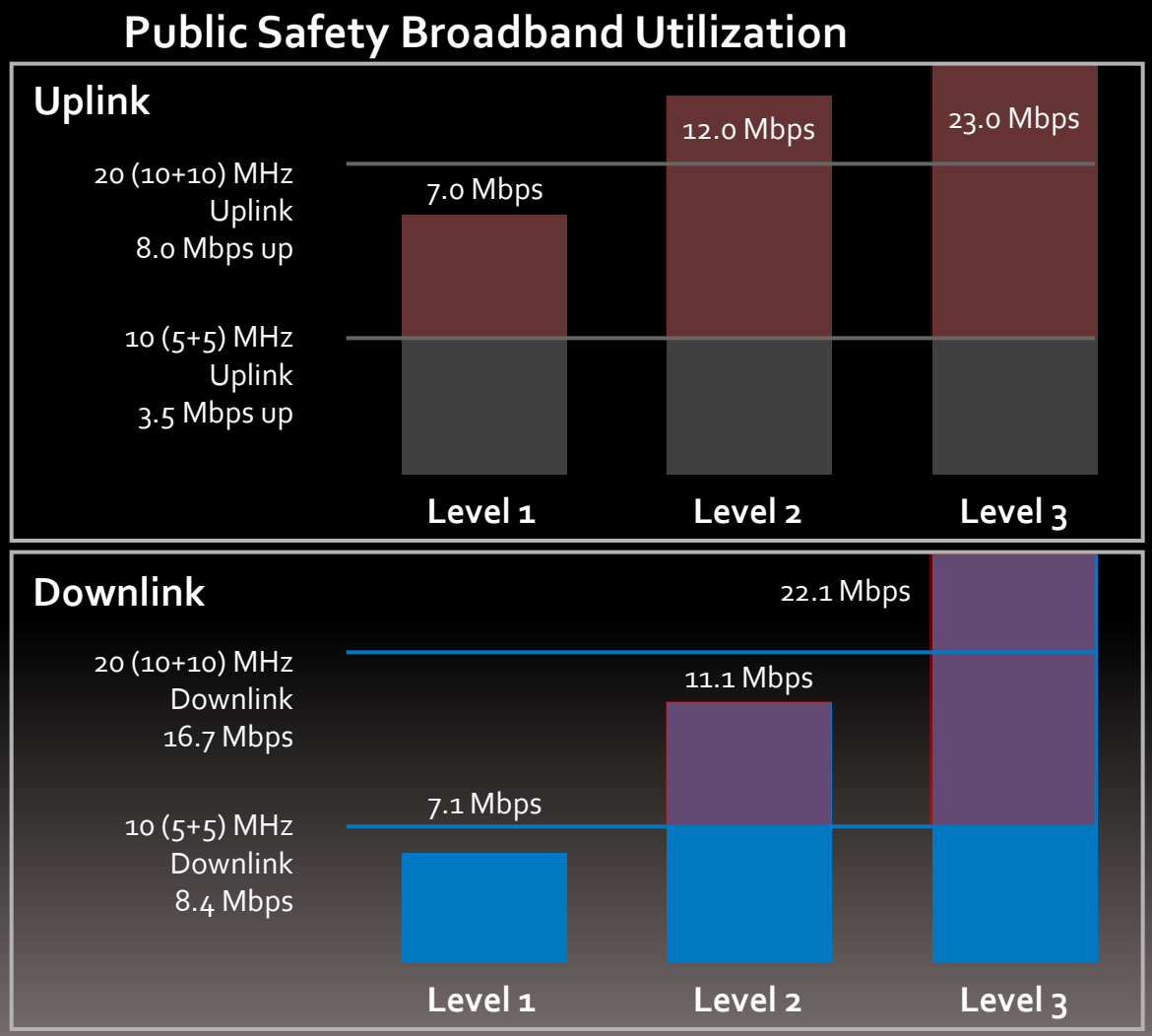
Time:	240 min
Police:	18
Fire/EMS:	7
SWAT:	30
Negotiators:	2
FBI:	2
Commanders:	2
Cmd/Cntl Vehicles :	1

Ten officers make entry with five lower res video feeds on person (helmet).

Incident Broadband Utilization

Acceptable Video Quality

- **Medium severity incidents even at a Level 2 Alarm Level exceed the capacity of a 10+10 MHz channel**
- **Multi-agency applications involve essential data & video services**
  - Data dispatch functions, location & mapping, incident & status
  - Records & database lookups, manuals, building plans, image downloads
  - Tactical video from select vehicles, personnel, and hot zone deployable



Traffic Demand per Incident

- **The main driver for spectrum demand is real time video.**
  - Experience in US has demonstrated benefits of video for improving situational awareness.
  - But need to balance users' aspirations against what is practical.
  - Multiple HD cameras would demand tens of MHz more spectrum or many times more cell sites to achieve national coverage.
  - Other studies and discussion with vendors and users suggest bit rates of 512 – 1024 kbps are sufficient in n
- **Other data applications (e.g. database / Inte demanding, because some latency / content**
- **Our Estimate based on realistic user require data bit rates is 1.2 Mbps downlink and 1.9 M**

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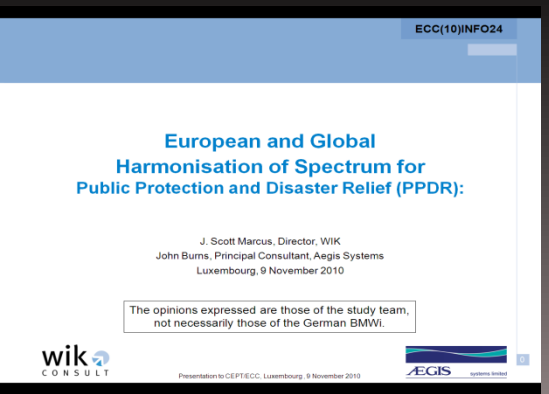
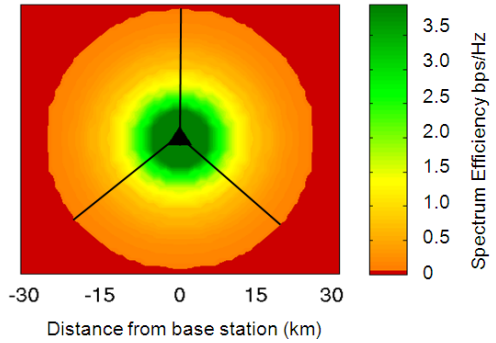
Taken From:



Converting traffic demand to spectrum demand (assuming LTE or similar technology)

- **Spectrum demand per incident depends on spectrum efficiency, which varies depending on where in the cell you are.**



- **We have assumed :**
  - Cell Edge Efficiency = 0.15 bps/Hz
  - Average Efficiency = 1.5 bps / Hz
  - Two incidents in the same cell sector
  - One at the cell edge
  - The other at a location with average spectrum efficiency

Conclusion: Require 10 MHz for the downlink and 15 MHz for the uplink

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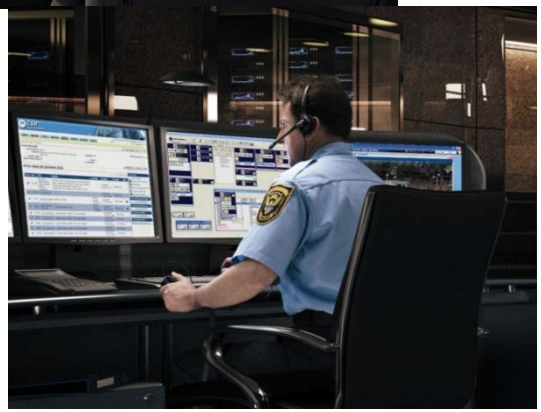
AEGIS systems limited

Need for Situational Awareness…

Increased situational awareness is key in responding to today's public safety situations

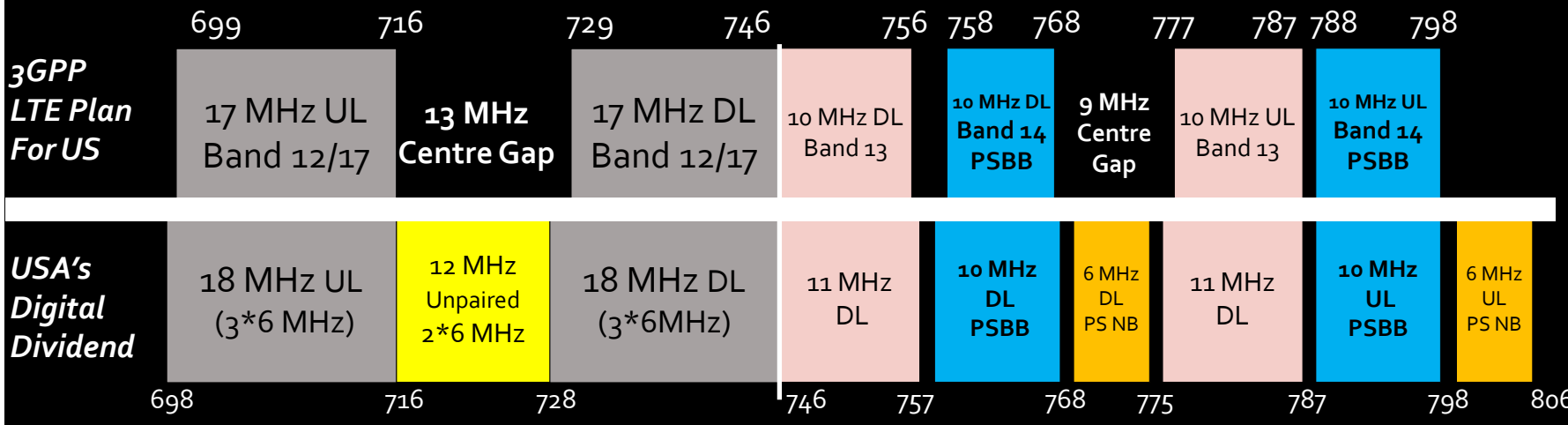
Broadband Technology coupled with today's smart devices provides enhanced situation awareness to the first responders

These include augmented reality, intelligent sensing, en-route mapping of deployed assets, automated case processing, etc.



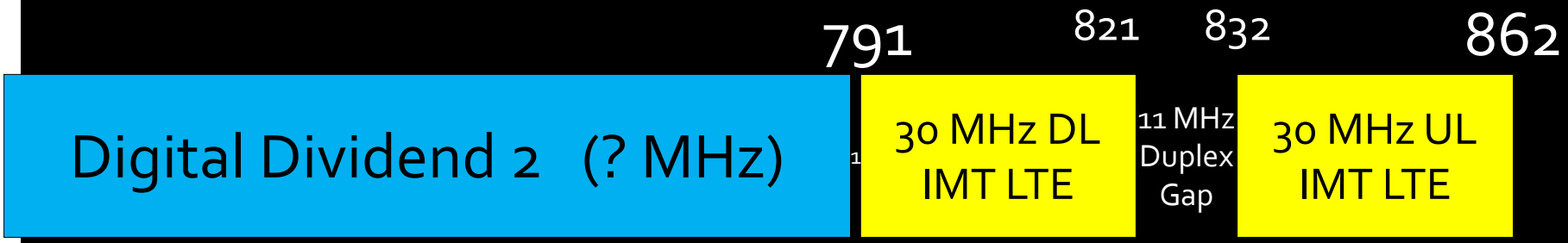
CURRENT STATUS OF BROADBAND PPDR SPECTRUM IN ITU-R REGIONS 1,2,3

Broadband PPDR spectrum in Region 2



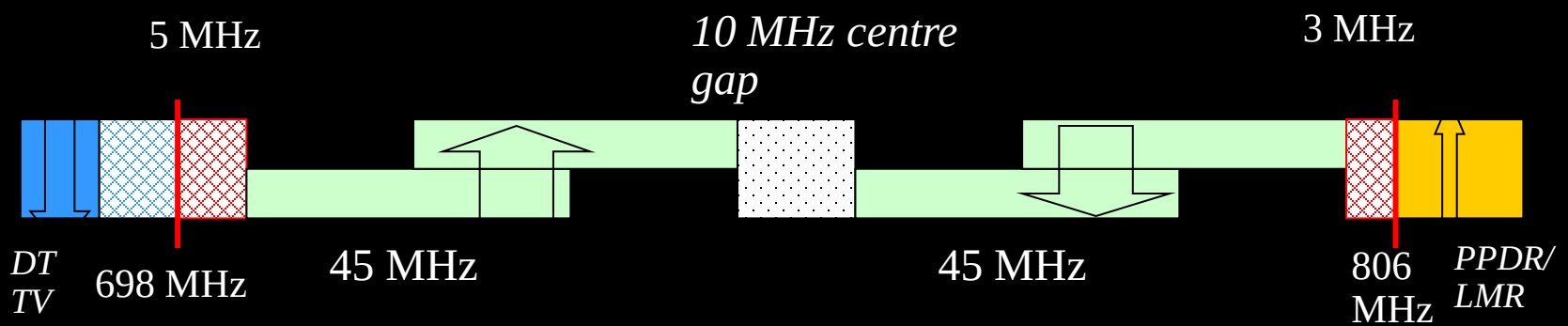
- United States was the first country to allocate Broadband Public safety spectrum.
- Initially 5+5 MHz spectrum was allocated by the USA for dedicated Broadband Public safety spectrum. Earlier this year US Congress passed a law allocating the additional 5+5 MHz dedicated PSBB spectrum.
- Recently Canada has also indicated its intention to follow a similar allocation

Broadband PPDR spectrum in Region 1



- Europe's 700 MHz digital dividend is only 30+30 MHz and all of this will be allocated to Public cellular operators.
- Broadband PPDR spectrum in Region 1 may be found in Digital Dividend 2 which is expected beyond 2015
- Some countries in Europe are looking at some interim solutions in the lower frequency bands around 400 MHz. However, sufficient broadband spectrum may not be available in those bands

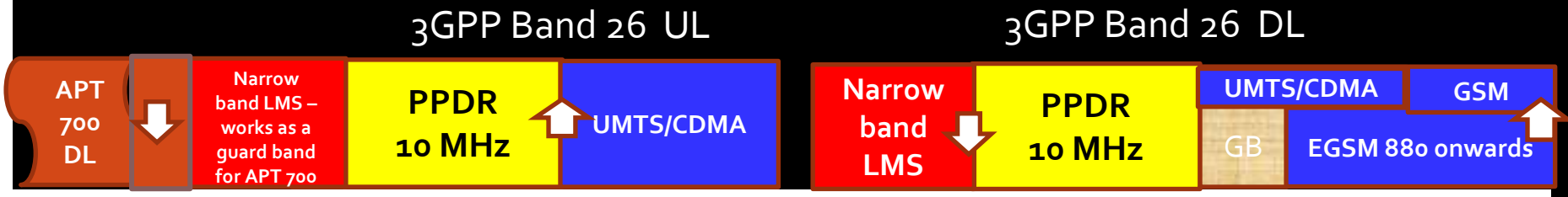
Broadband PPDR spectrum in Region 3



APT Harmonised FDD Arrangement of 698-806 MHz band

- Many Asian countries will adopt APT band plan for 700 MHz Digital Dividend.
- Some countries in Asia will allocate the Lower 10+10 MHz (703-713/758-768) for Broadband PPDR
- The advantage of the lower portion is that it will provide buffer for the DTV below 698 MHz in terms of co-existence and protection to the TV services

Other Broadband PPDR Spectrum Options



- Some Asian countries (e.g. Australia, Singapore) are also looking at the 800 MHz band, which has been planned by 3GPP for LTE under Band 26. Within this band, any 10+10 MHz could be used for Broadband PPDR
- Some Region 3 countries are also considering use the US band plan. Within the US 700 MHz band, 3GPP Band 13 or 14 could be used for Broadband PPDR for which PSLTE devices are already available
- One Region 3 Country is considering 1.4 GHz Band while Some countries are also looking at 2.3 GHz IMT Band

PROPOSED STUDIES UNDER AGENDA ITEM 1.3 (WRC-15)

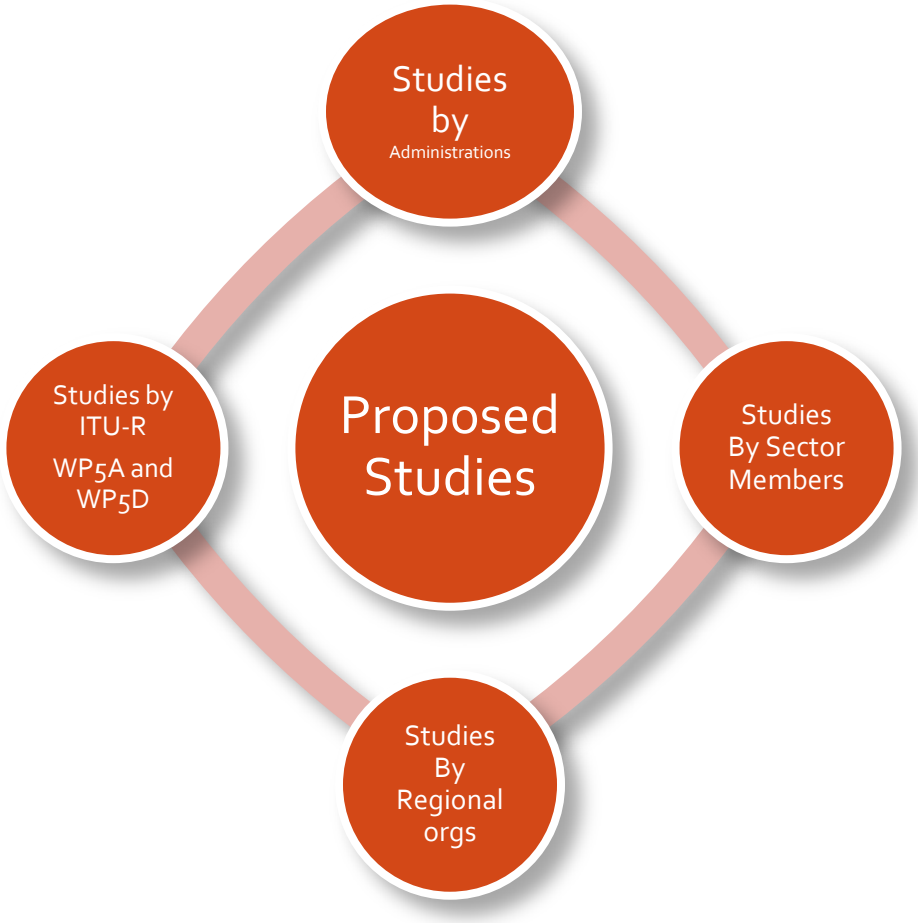
Studies under Agenda 1.3 WRC-2015

Studies under this agenda item will be lead by ITU-R, WP5A.

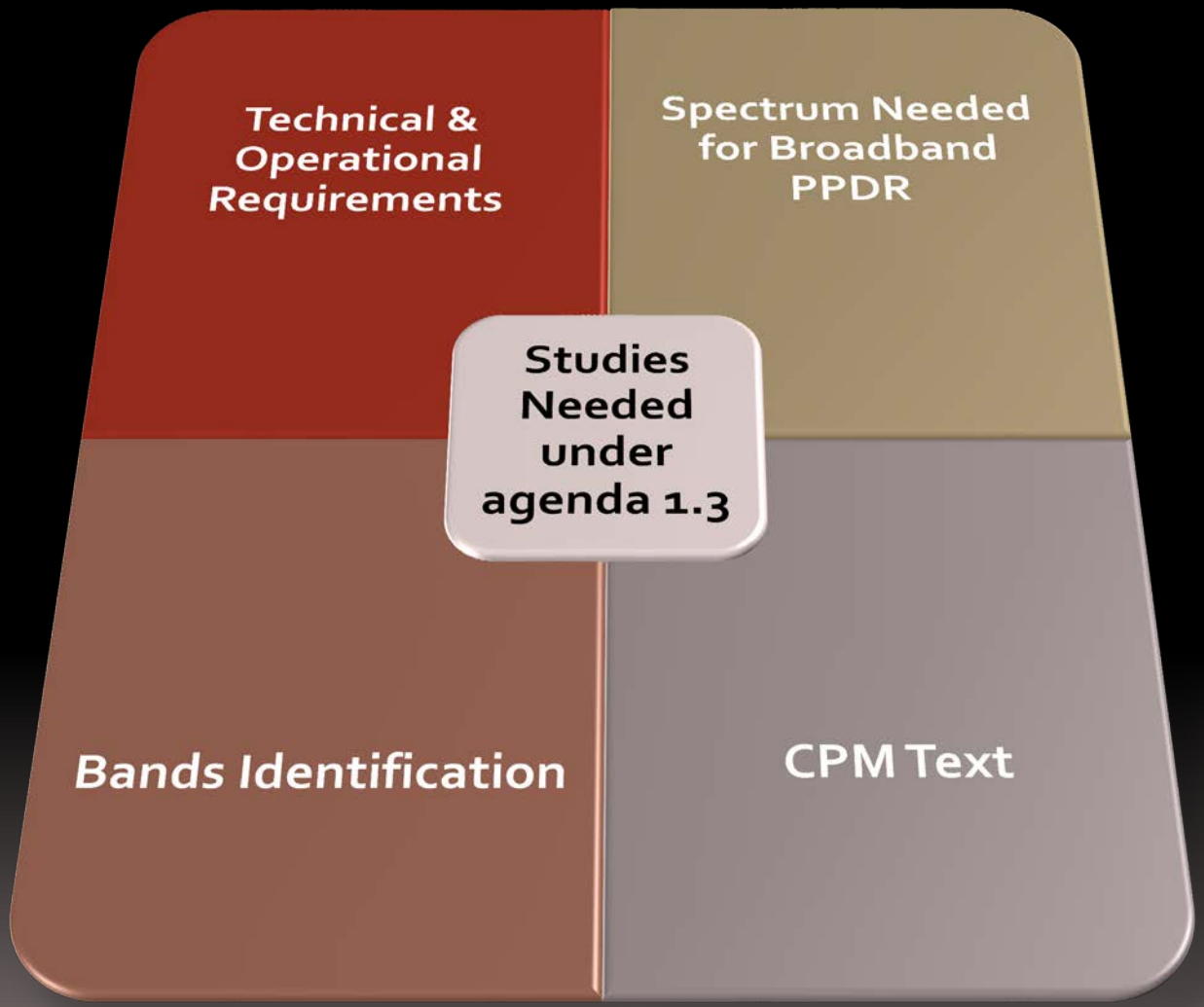
WP5A has approved to resurrect the WG3 on PPDR within WP5A to direct these studies

WP5D also has a work item to study the use of IMT technologies for meeting broadband needs of PPDR

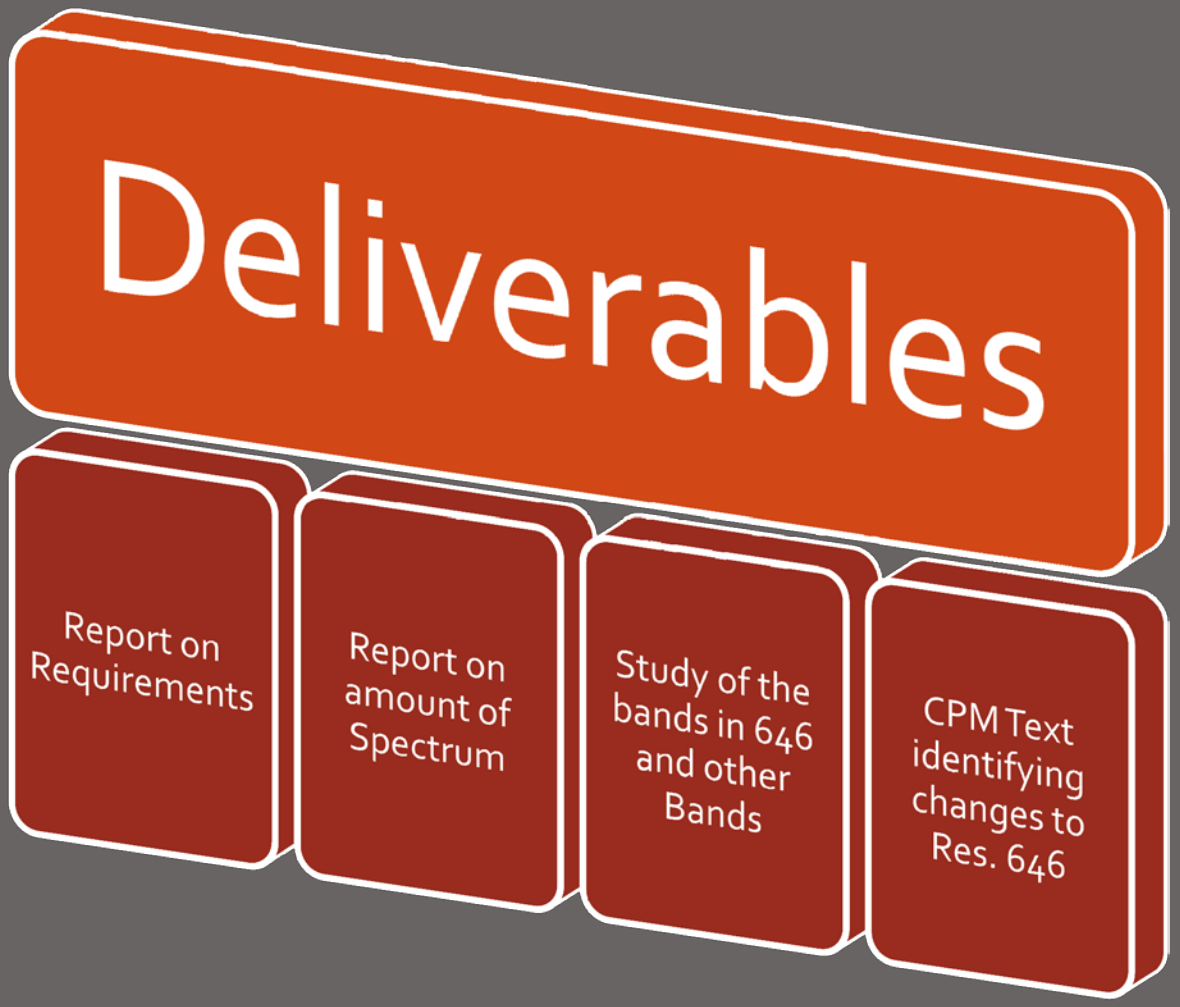
Regional bodies such as AWG, APG, FM-49, CITEL are also conducting various studies to support the needs of broadband PPDR Spectrum



Studies under Agenda 1.3 WRC-2015



Studies under Agenda 1.3 WRC-2015



Summary

WRC-15 Agenda item 1.3 calls for studies to Review and Revise Resolution 646 (Rev.Wrc-12)

Resolutions 648 (WRC-12) lays down the proposed frame work of the studies to be done under this agenda.

Studies in WP5A will result in drafting of the CPM text to review and Revise Resolution 646 (Rev. WRC-12)

Thank You

Questions/Comments

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