

## WRC-12 Implications for Terrestrial Services other than Mobile Broadband

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### Scope

- Areas addressed
  - Aeronautical
  - Amateur
  - Maritime
  - Radiodetermination
  - Public protection & disaster relief
- Background
- Issues
- Implication of WRC-12 Decisions



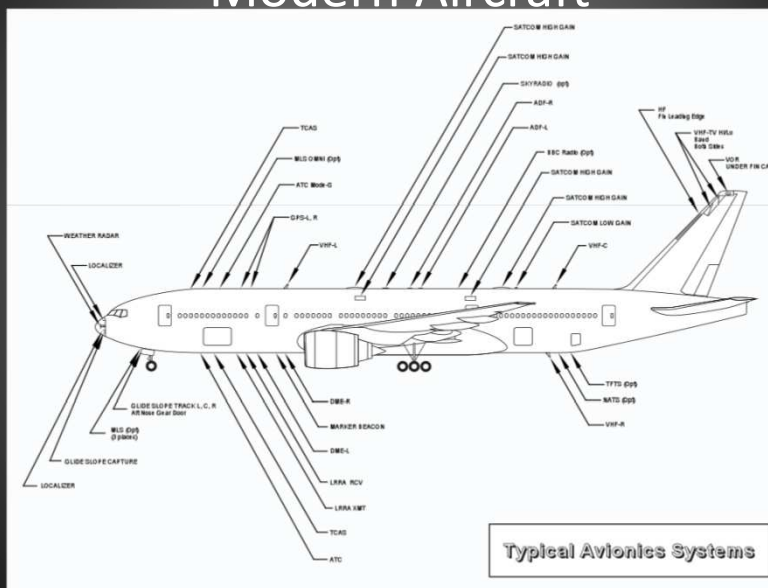
## Background

- Regulated by ICAO
- Number of Aircraft
  - 312,000 Active General Aviation Aircraft
  - 17,770 Passenger Aircraft
  - 26,500 Civil Helicopters
- Commercial Aviation
  - 2.5 Billion Passengers
  - 50 million tonnes of freight
  - Employs 5.5 (33) million
  - Turnover of more than \$1 T
  - GDP \$425 (1500) m
  - Ranked 21<sup>st</sup> country

## Current Technology

- Communications
  - HF (1912)
  - VHF (1930's)
  - Satellite
- Navigation
  - Non-directional beacons (1929)
  - VHF omnidirectional ranging (1951)
  - Distance measuring equipment (1955)
  - GNSS (1991)
  - Instrument landing system (1949/1966 first blind landing)
- Surveillance
  - Radar (Primary & secondary)
  - Automatic dependent surveillance

## Modern Aircraft



## Issues

- Increasing Traffic
- Cost of Flight
  - Track miles
  - Weight
  - CO<sub>2</sub> emissions
  - Delays
- Tried and Tested Technology but Dated
- How to Accommodate Remotely Piloted Aircraft
- Maintain or Increase Safety Levels

## Impact of WRC-12

- WRC-12 Decisions
  - Digital communications
  - Remotely piloted aircraft
- Agenda for WRC-15
  - Wireless Avionics Intra-Communication

## WRC-12 Digital Communications

1 THE GLS

The diagram illustrates the GBAS system. It shows several GPS satellites in orbit. On the ground, there are Ground-Based Augmentation System (GBAS) stations and a Multistandard Receiver. The receiver is connected to the GBAS stations via a VDB data link, which provides corrections and final approach segment data. The system is used for precision approach and landing (PALS) and is shown in conjunction with a satellite-based augmentation system (SBAS) and a ground-based augmentation system (GBAS). The diagram also shows a satellite-based augmentation system (SBAS) and a ground-based augmentation system (GBAS) connected to a satellite-based augmentation system (SBAS) and a ground-based augmentation system (GBAS).

- New allocations to AM(R)S
  - 112-117.975 MHz
  - 960-1164 MHz
  - 5091-5160 MHz
- Allowed the Introduction of
  - Ground based augmentation system
  - Data link services
  - Airport surface communication system
- Impact
  - Reduced gate to gate time
  - Reduced fuel burn

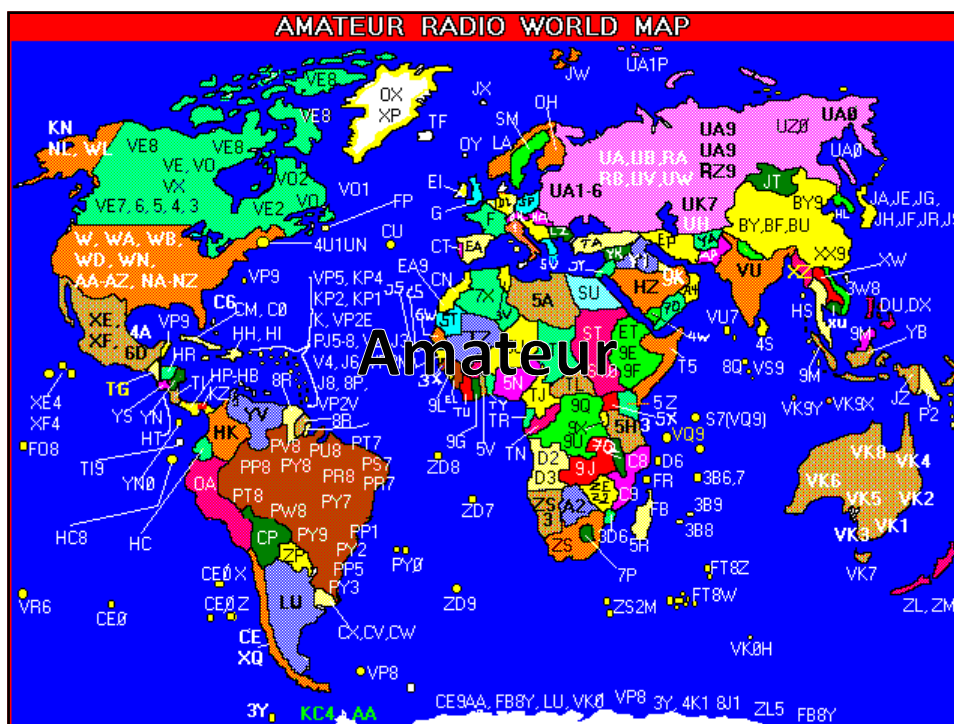
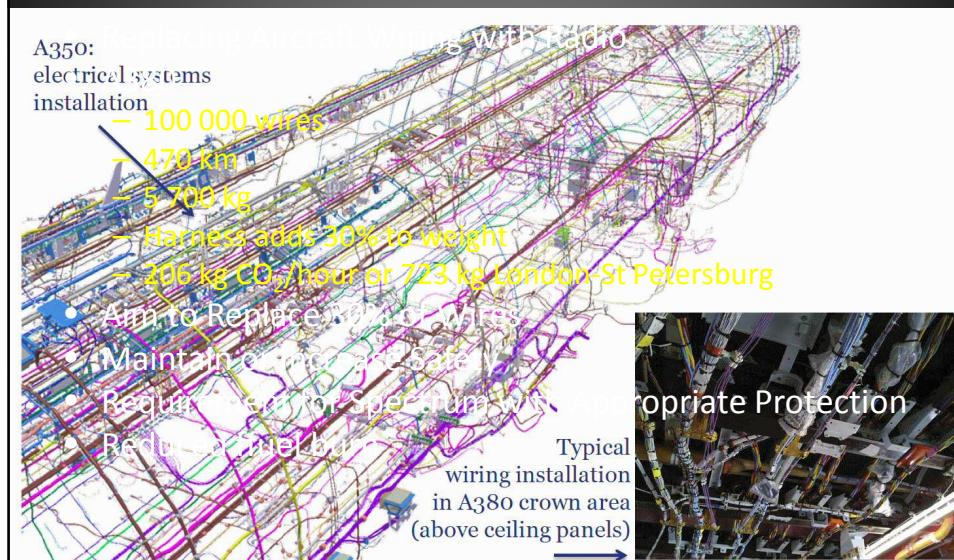
## WRC-12 Remotely Piloted/Unmanned Aircraft

- CNPC Links Between RPA/UA and the Remote Pilot
- WRC-12 Decisions
  - 5030-5091 MHz
  - Allocated to AM(R)S (line of sight link)
  - Allocated to AMS(R)S (beyond line of sight link)
  - Changed the co-ordination procedure for AMS(R)S
- Impact
  - Allowed ICAO to start work on SARPs for RPAs/Uas
  - Introduction of RPAs/UAs into non-segregated airspace
- WRC-15 Agenda Item
  - Use of ESS for RPAs/UAs

The diagram illustrates the communication links between a Remote Pilot, an Unmanned Aircraft System (UAS), and a Ground Station. It shows a Remote Pilot connected to a UAS via a line of sight link. The UAS is connected to a Ground Station via a beyond line of sight link. The Ground Station is connected to a satellite via a satellite link. The diagram also shows a satellite-based augmentation system (SBAS) and a ground-based augmentation system (GBAS) connected to a satellite-based augmentation system (SBAS) and a ground-based augmentation system (GBAS).



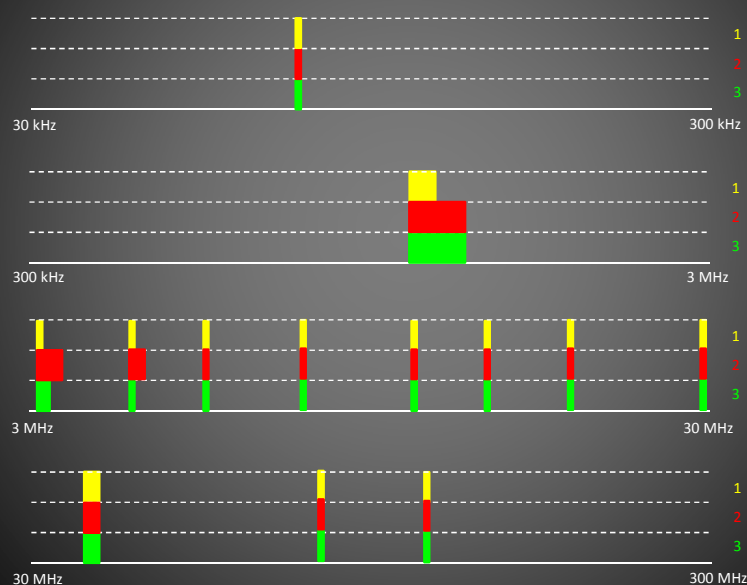
## WRC-15 WAIC



## Background

- Started in the Late 19<sup>th</sup> Century
- Oldest Radio Service
- IARU Formed in 1925
- Hobby
- Experimentation
- Provides a Emergency Service where Requested

## Allocations Below 300 MHz

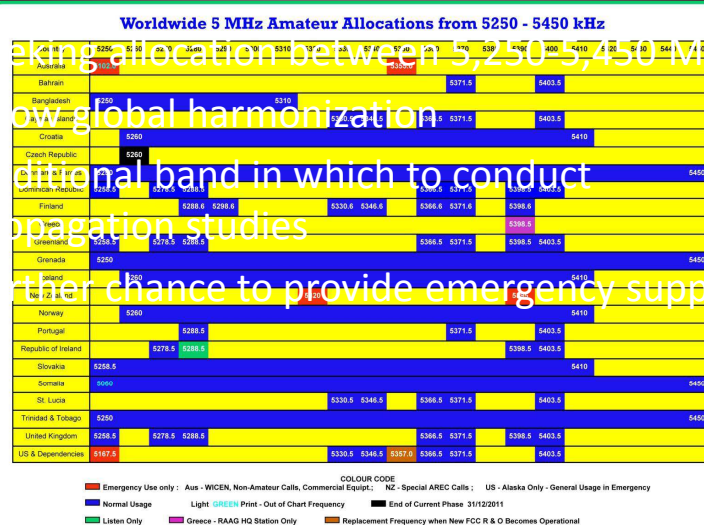


## WRC-12 Amateur @ 500 kHz

- Allocation 472-479 kHz
- Restrictions applied
- Benefit
  - Additional allocation
  - Filled a gap between LF and MF allocations
  - Added regulatory status for existing operations

## WRC-15 Amateur @ 5 MHz

- Seeking allocation between 5,250-5,450 MHz
- Low global harmonization
- Additional band in which to conduct propagation studies
- Further chance to provide emergency support



Extract courtesy of G4MWO / The 5 Mhz Newsletter

Data as at 7th February 2012





## Background

- Regulated by the IMO
- >30,000 Ships of 1,000 tonnes or above
- 80% International Trade
- 7.7 Billion Tons
- \$380 Billion Global Economy
- 5% World Trade

## Issues

- Assignment Congestion
  - On-board vessels
  - In port and dock areas
  - Busy sea lanes (e.g. Dover straights)
- Any Change Requires WRC Action
- Reduce Fuel Usage
- Increasing Numbers of Vessels
- Need to Update Technology
- Mix of Pleasure and Freight Ships
- Improving Safety

## Impact of WRC-12

- WRC-12 Decision
  - Appendix 17
  - Port & ship security
- WRC-15 Agenda Item
  - On-board Communications
  - AIS Enhancement

## WRC-12 Appendix 17

- Modified Appendix 17
  - Allocation of 5 channels for AIS
  - Experimental until 2016
- Impact
  - Step towards modernisation of maritime communications
  - Increased communications capacity

## WRC-12 Port & Ship Security

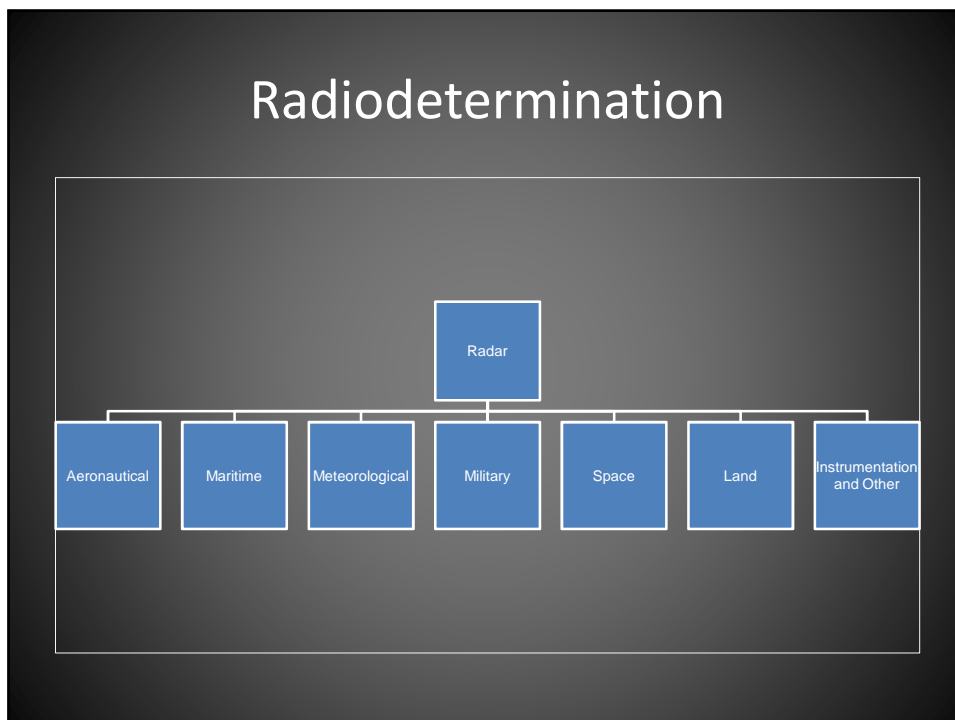
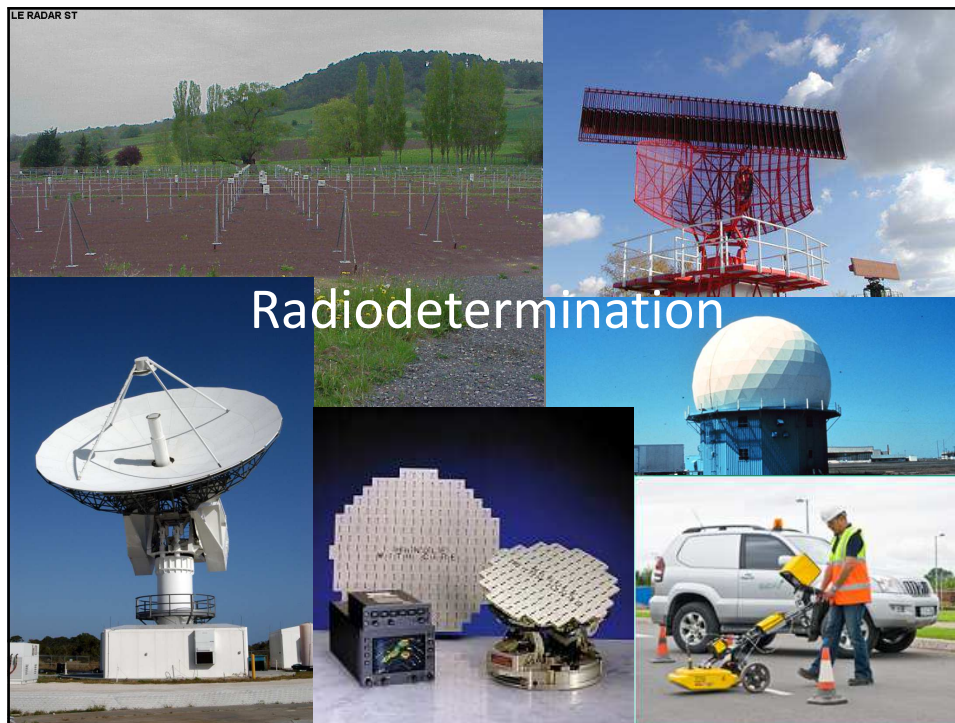
- WRC-12 Decisions
  - Appendix 18 modified:-
    - 495-505 & 510-525 MHz mobile changed to MM
    - 156.7625-156.7875 & 156.8125-156.8375 added mobile satellite for reception of AIS
    - Fixed and mobile use of AIS channels limited to 2025
- Impact
  - Allows longer range tracking of vessels
  - Increased security
  - Faster response in an emergency

## WRC-15 On-Board Communications

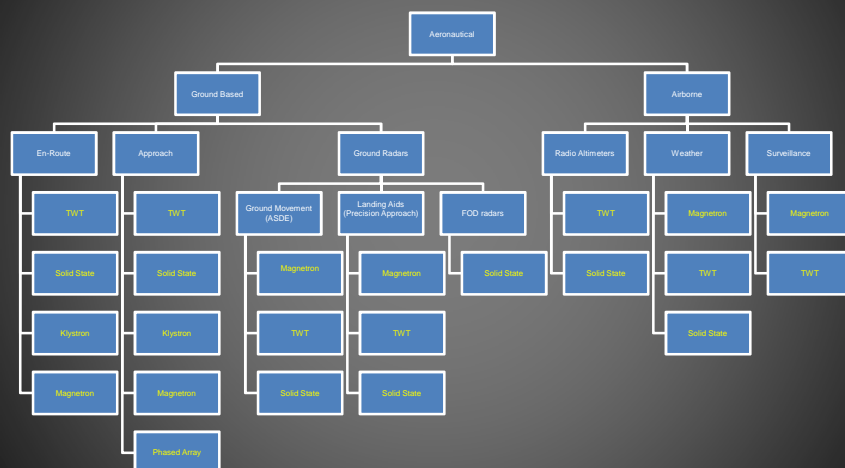
- Ease Congestion
  - On-board ships
  - At docks
  - In ports
- Allow the Further Introduction of Digital Technology
- Improved Operations at Docks & Ports

## WRC-12 Advanced AIS

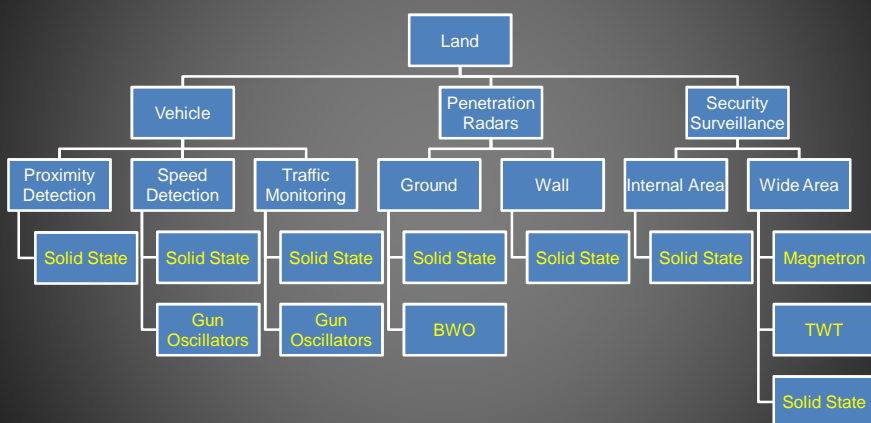
- Study requirements for additional AIS applications
- Identify additional AIS Channels
- Introduction of Two-way Satellite Channels
  - Improved communications
  - Long range vessel tracking
  - Further enhancing security of vessels
- Improved Coverage over the Poles



# Aeronautical Radars



# Land Radars





## Impact of WRC-12

- WRC-12 Decisions
  - Oceanographic radar
  - Space Object detection
  - 15 GHz Synthetic aperture radar
- WRC-15 Agenda
  - Automotive Radar

## WRC-12 Oceanographic Radar

- Various Assignments in the HF Band
- Measurement
  - Wave height
  - Ocean currents
- Practical implications
  - Fish migration
  - Prediction of pollution flow
  - Search and rescue
  - Tsunami prediction

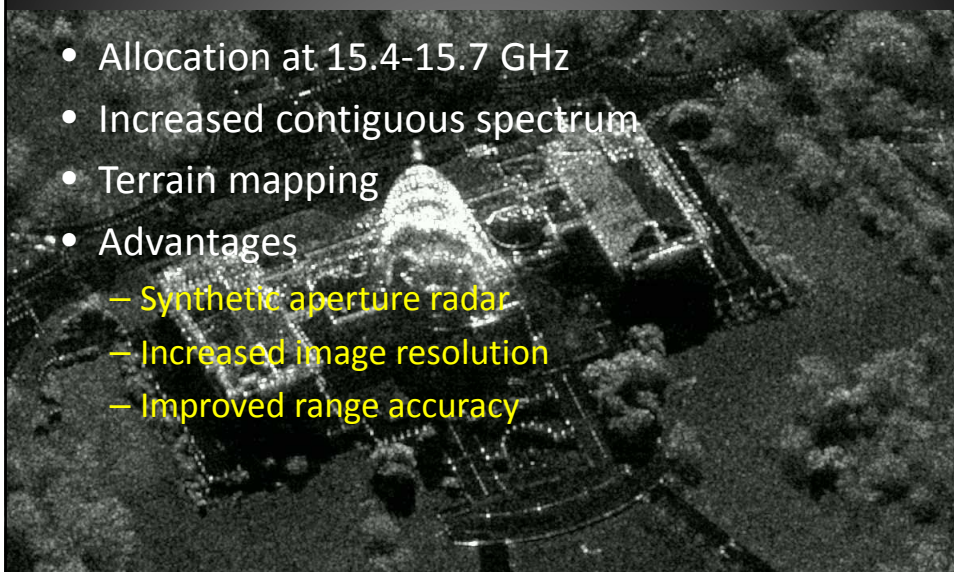
## WRC-12 Space Object Detection

- Allocation of 152-154 MHz
- Developed for Military Applications
- Civil Uses for Detection of:
  - Asteroids
  - Remote space sensing of satellites
    - Natural
    - Artificial
  - Debris detection



## WRC-12 15 GHz Radar

- Allocation at 15.4-15.7 GHz
- Increased contiguous spectrum
- Terrain mapping
- Advantages
  - Synthetic aperture radar
  - Increased image resolution
  - Improved range accuracy



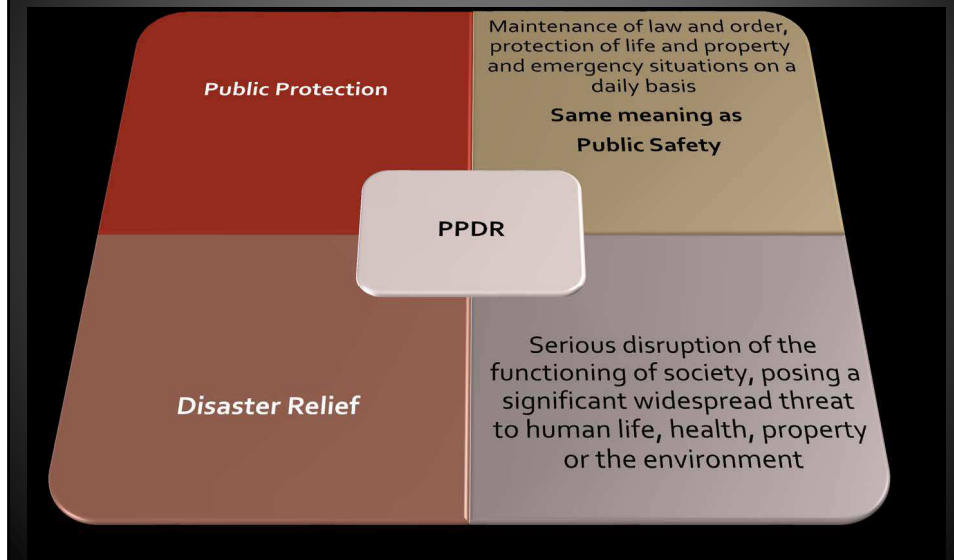


## WRC-15 Automotive Radar

- 3,500 Deaths Every Day on the Road
- Seek an Allocation Around 78 GHz
- Improved Road Security
  - Pedestrian detection
    - Road-side
    - Crossing
  - Motorcyclists in blind spots
  - Vehicle separation



## What is PPDR



## History of PPDR

- Agenda item for 2003
- Result in Resolution 646
  - Addressed voice and data
  - Identification of spectrum bands
  - Regional harmonization
  - Improved cross boarder movement
- Continued studies in ITU

## Need for an Agenda item

- Need for video
  - Improved situational awareness
  - Safety of human life
- Improved International Harmonization
  - Improved aid support
  - Cost reduction

## What needs to be done?

