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# Communications for Public Protection and Disaster Relief

## *Overview and Vision Towards the Future*

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Inovação



instituto de telecomunicações

*creating and sharing knowledge for telecommunications*

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# Outline

- ❖ Broad Band Public Protection Disaster Relief (BB-PPDR) Networks
- ❖ Long Term Evolution (LTE) for BB-PPDR Networks
- ❖ Prioritization
- ❖ Spectrum Management
- ❖ Conclusions



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# Public Protection and Disaster Relief

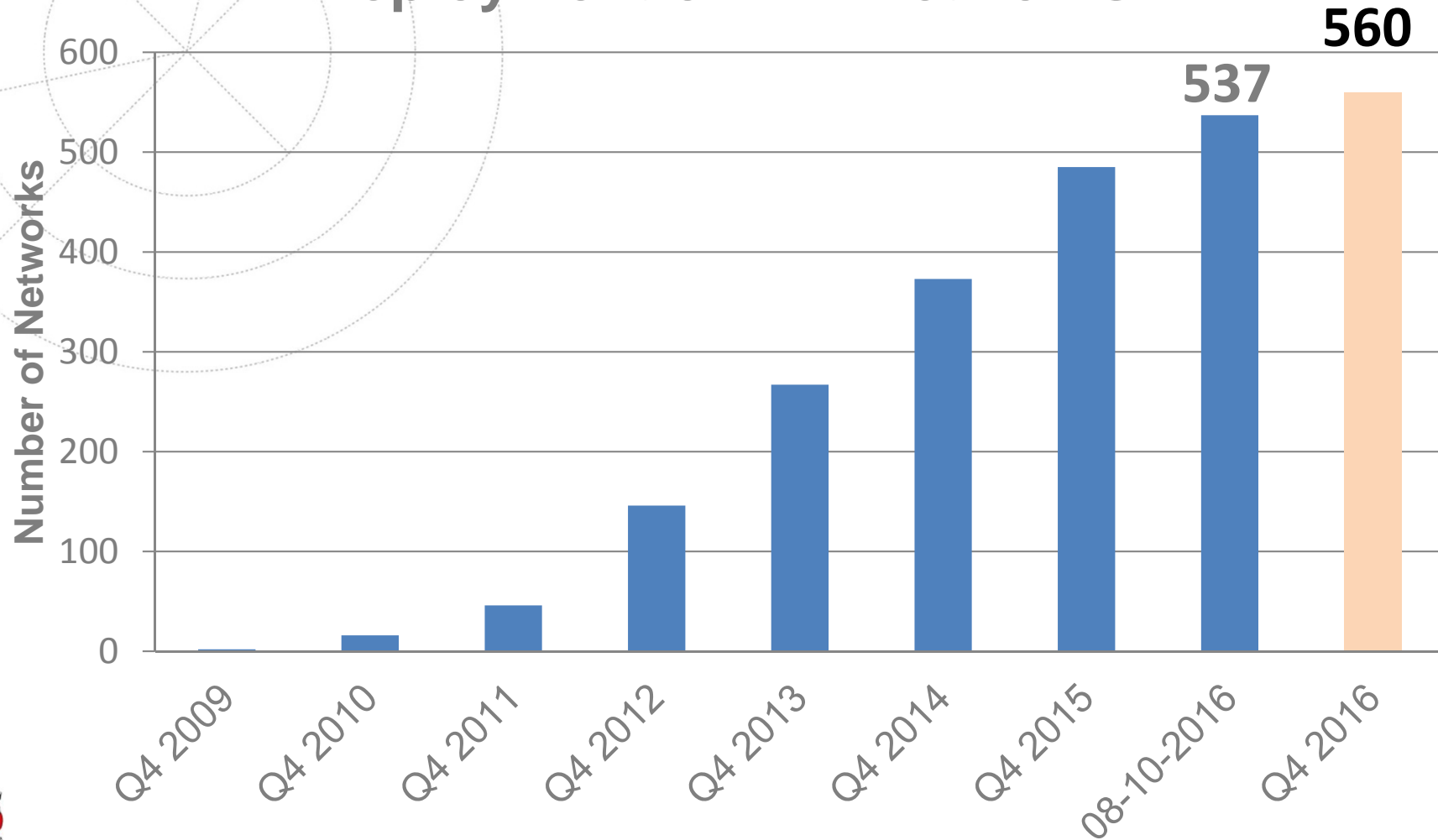
## Some Characteristics of PPDR Networks:

- ❖ Fast Call Set-up
- ❖ Group Calls
- ❖ Good Coverage
- ❖ Reliability
- ❖ Security



# LTE Networks Evolution

## Deployment of LTE Networks



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Timeline



# SWOT for BB-PPDR

## STRENGTH

- ❖ Worldwide deployment
- ❖ CAPEX/OPEX reduction
- ❖ Good coverage
- ❖ Context cell size

## WEAKNESSES

- ❖ No proven functionality

## OPPORTUNITIES

- ❖ Development of new features
- ❖ New markets
- ❖ Contribution to LTE maturity

## THREATS

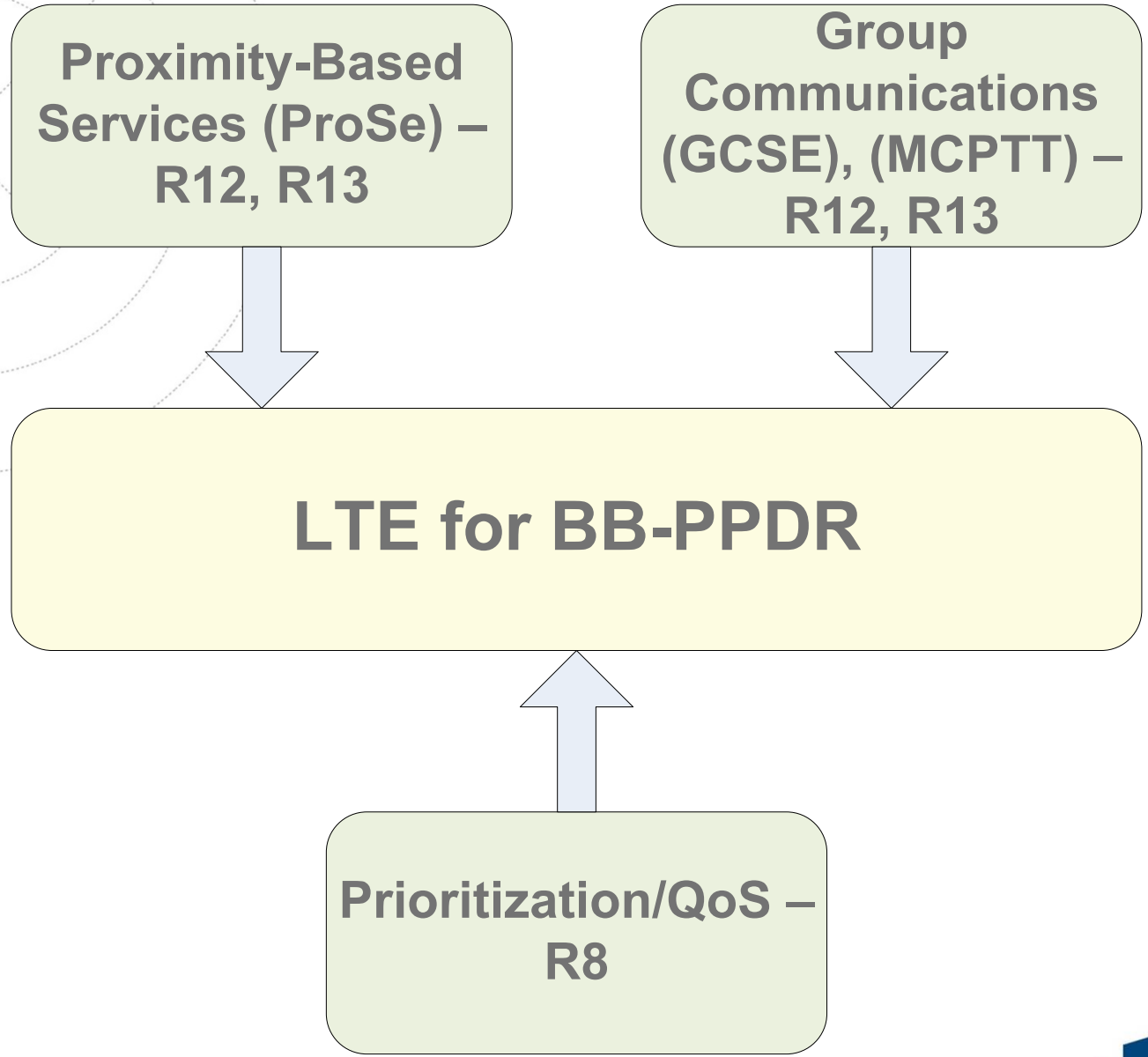
- ❖ Legacy systems
- ❖ No budget for migration
- ❖ Migration plan



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# PPDR features in LTE



# Prioritization

Access Priority

Control access to network resources: radio channels

Admission Priority

Decide activation/modification/de-activation of link bearers

Data Plane QoS Configuration

Control latency, losses of established link bearers



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# Access Priority

- ❖ The Purpose is to Control Access to Network Resources
- ❖ It is given to each User Equipment a Class Number, as follows:
  - Class 0 to 9: Is attributed to each UE a Class 0 to 9
  - Class 10: Is used for an Emergency Call
  - Class 11: For Public Land Mobile Network (PLMN) use
  - Class 12: Security Services
  - Class 13: Public Utilities
  - Class 14: Emergency Services
  - Class 15: For PLMN Staff



# Admission Priority

- ❖ It refers to the decision to establish /change or not a bearer.
- ❖ Through the Allocation and Retention Priority (ARP) parameter, the decision process will be accomplished.
- ❖ The ARP parameter has 15 priority levels, as follows.
  - ARP priority levels from 0 to 8: assigned for priority services.
  - ARP priority levels from 9 to 15: allocated when a UE is roaming.



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# Data Plane QoS Configuration

- ❖ The QoS configuration of the user plane: throughput, packet loss, delay, scheduler priority is performed by the QoS Class Identifier (QCI) and Guaranteed Bit Rate (GBR) parameter.
- ❖ There are 9 QCI values, defined by the following parameters:
  - Resource Type (GBR, non-GBR)
  - Priority
  - Packet Delay Budget
  - Packet Error Loss Rate

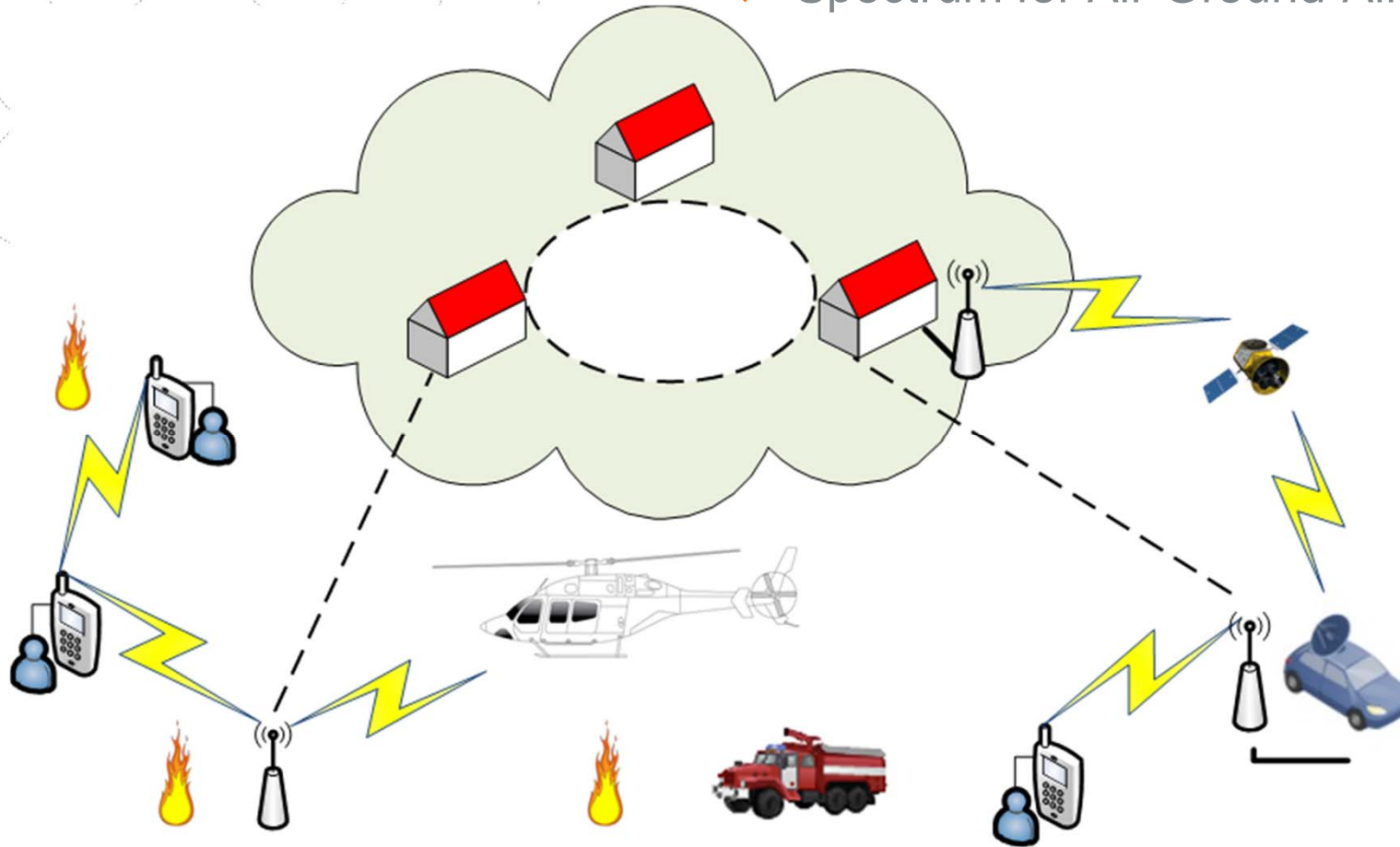


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# Spectrum Needs

- ❖ Spectrum for Wide Area Networks (WAN)
- ❖ Spectrum for Ad-hoc Deployments
- ❖ Spectrum for Backhauling
- ❖ Spectrum for Direct Mode Operation
- ❖ Spectrum for Air-Ground-Air



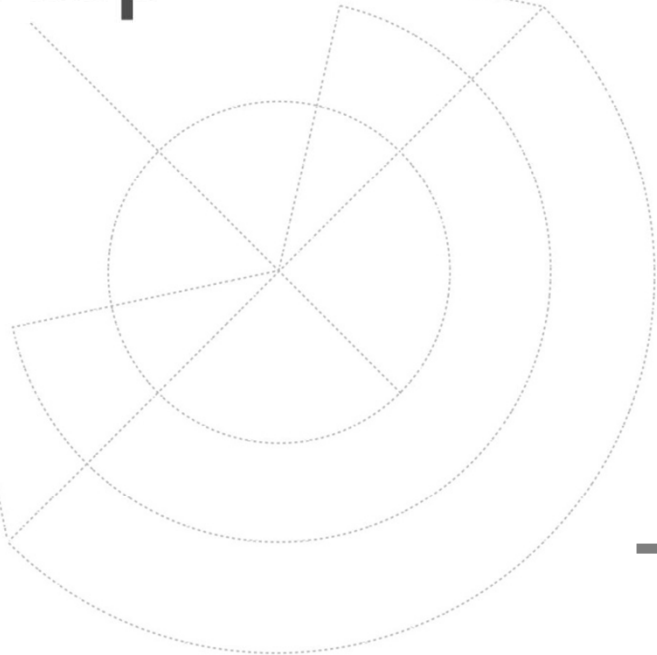
## Conclusions

- ❖ The Broad Band Public Protection Disaster Relief (BB-PPDR) is the new paradigm in Public Safety Networks.
- ❖ It is essential to develop and implement successfully the features: Proximity Based Services (ProSe), Group Communications System Enablers for LTE (GCSE\_LTE) and Mission Critical Push-to-Talk (MCPTT) to a successful transition towards BB-PPDR.
- ❖ The success of the future BB-PPDR networks will depend on overcoming some challenges:
  - The migration from legacy systems to BB-PPDR will require the implementation of an appropriate change management programme.
  - The definition of the BB-PPDR architecture.
  - The analysis, definition and establishment of QoS parameters.
  - The spectrum management on the new BB-PPDR network. Analysis of all possibilities: spectrum sharing, interaction between operators and the National Regulatory Agency (NRA).



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# Thank you, Questions are Welcome

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