EU PPDR communications Status of Play

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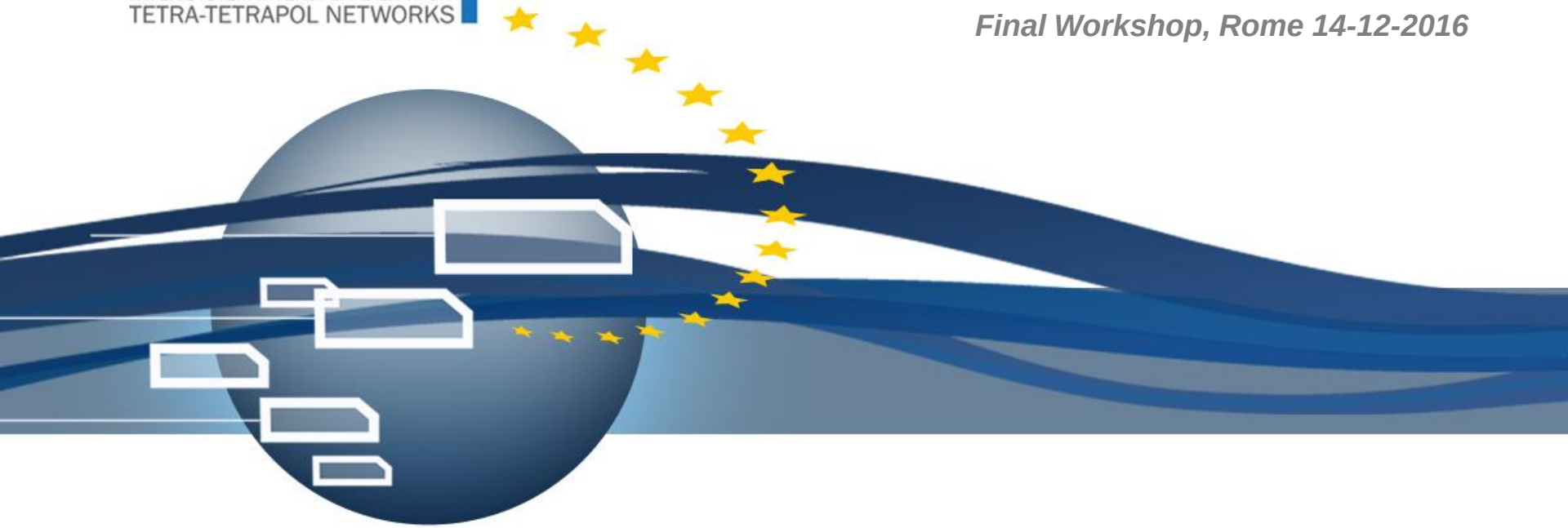

Content

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Current PPDR technology used
Need for interoperability

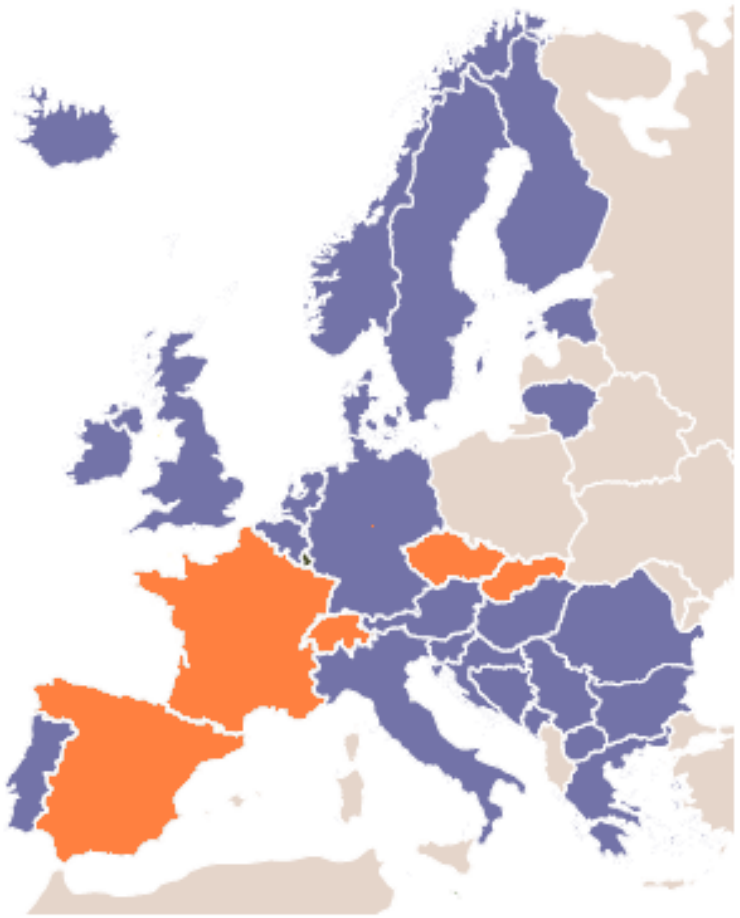
- Each nationwide radio network for Public Safety Services (PPDR) is separated from each other
- 2 technologies:

TETRA TETRAPOL

- 3 companies have developed nationwide networks in EU:

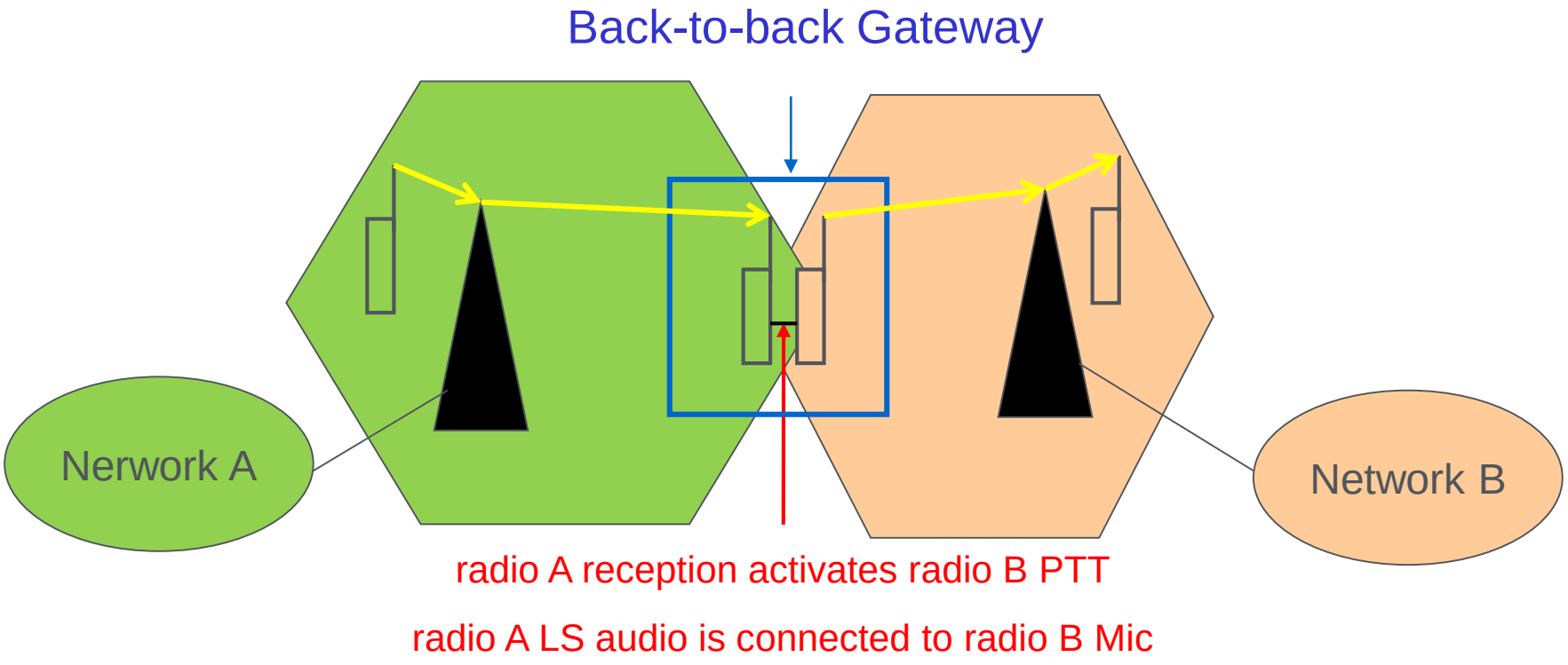
AIRBUS MOTOROLA LEONARDO

- 4 EU nationwide net types
  - Airbus TETRA
  - Airbus TETRAPOL
  - Motorola TETRA
  - Leonardo TETRA
- One exception: Latvia



- Interconnecting countries with gateways (GW) is quite simple

- Principle of a plain “Back-to-back gateway”



Current PPDR technology used
Need for interoperability

- Overview of the current gateways between the European countries

- Making possible to use your own terminal abroad, allowing – if needed – to speak with foreign partners all keeping connected with your home country, i.e. making the networks interoperable, (roaming) is much more complicated and however needed to enable the cooperation between the first responders, hence ISITEP importance

- TETRA, TETRAPOL are voice centric (from 2,5 kb/s to 10 kb/s)
- Data application are limited to:
  - Text messaging
  - Geolocation (sending and receiving positions)
  - Data base requests (text only)
  - Push image (stamp format)

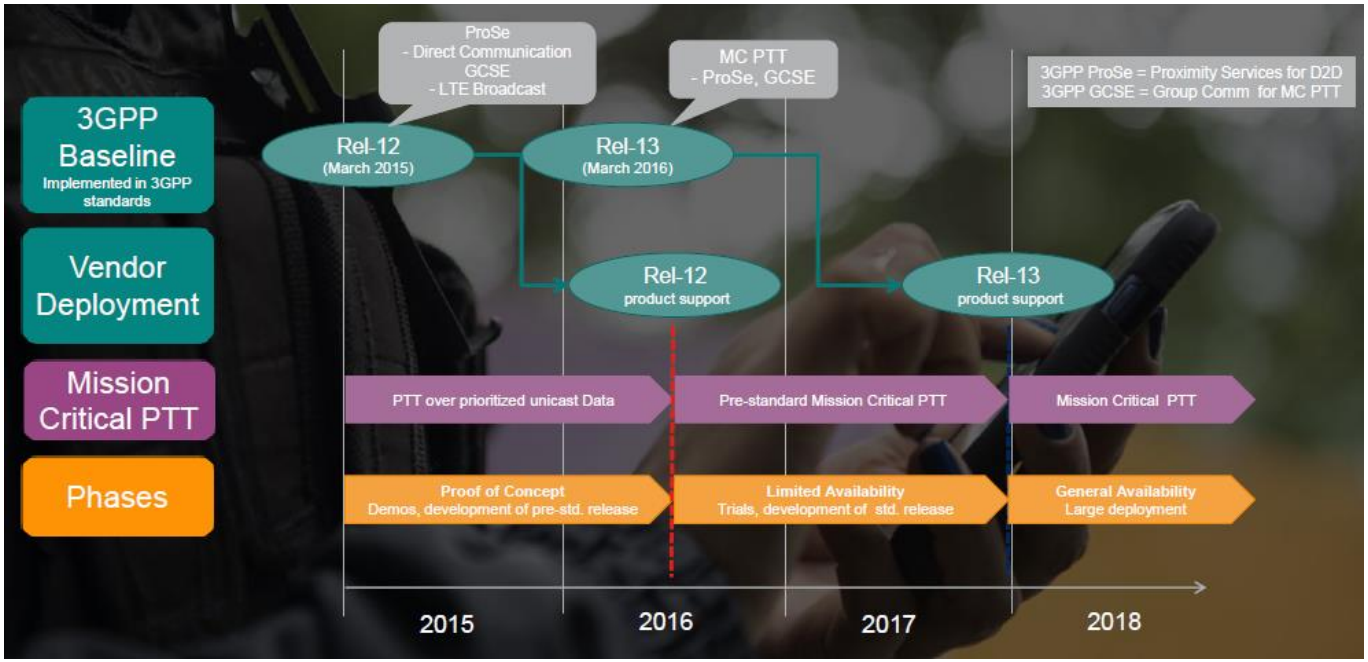
- Seeing the growing need for broadband data application (video, databases consultation, situational awareness, professional applications and office environment via mobile access, ANPR…), PPDR services are using commercial 2G/3G/LTE networks (MNO) in parallel with TETRA and TETRAPOL
- MNO's however do not deliver a "mission critical" service
  - Security
  - Resiliency/Redundancy/availability
  - Priority
  - Group call (true multicast, also for video streaming)
  - Seamless interoperability/roaming

- TETRA and TETRAPOL have a future at least until 2030 (live cycle of a national radio network ~ 15 years)
  - Several countries have new TETRA networks: No, De, Lu
  - Several countries are totally renewing their network starting a new live cycle: Fr, Be, Es, Dk
  - A country, Nl, is swapping its network from the TETRA supplier Motorola to the TETRA supplier Hytera (2017)
- Investing now to make the European voice centric networks interoperable is grounded (ISITEP 2.0)

- One exception so far: Great Britain national TETRA network “Airwave” shuts down between Oct 2017 and 31 Dec 2019
  - Airwave was too expensive
  - Authorities preferred to pay directly for a new broadband network “Emergency Service Network” either than starting a new TETRA live cycle
  - “ESN” relies on a commercial LTE network (EE) with a “User services layer” on top (Motorola), which will evolve following the “Mission Critical LTE standard” definition and implementation

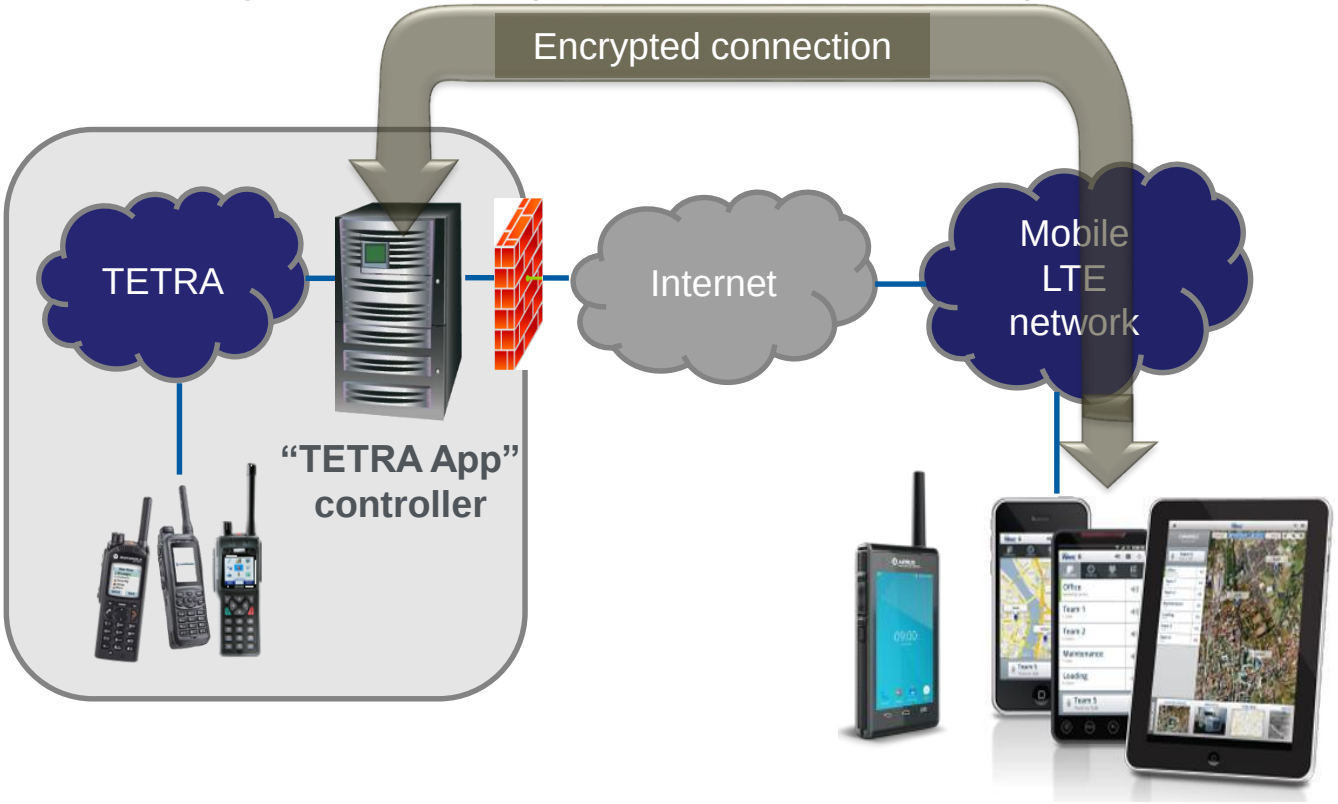
Current evolution plan
Getting acquainted with mission critical LTE

- European countries (excepted GB) prefer to keep their TETRA and TETRAPOL networks because it will be a long time before LTE fulfils the same voice functionalities



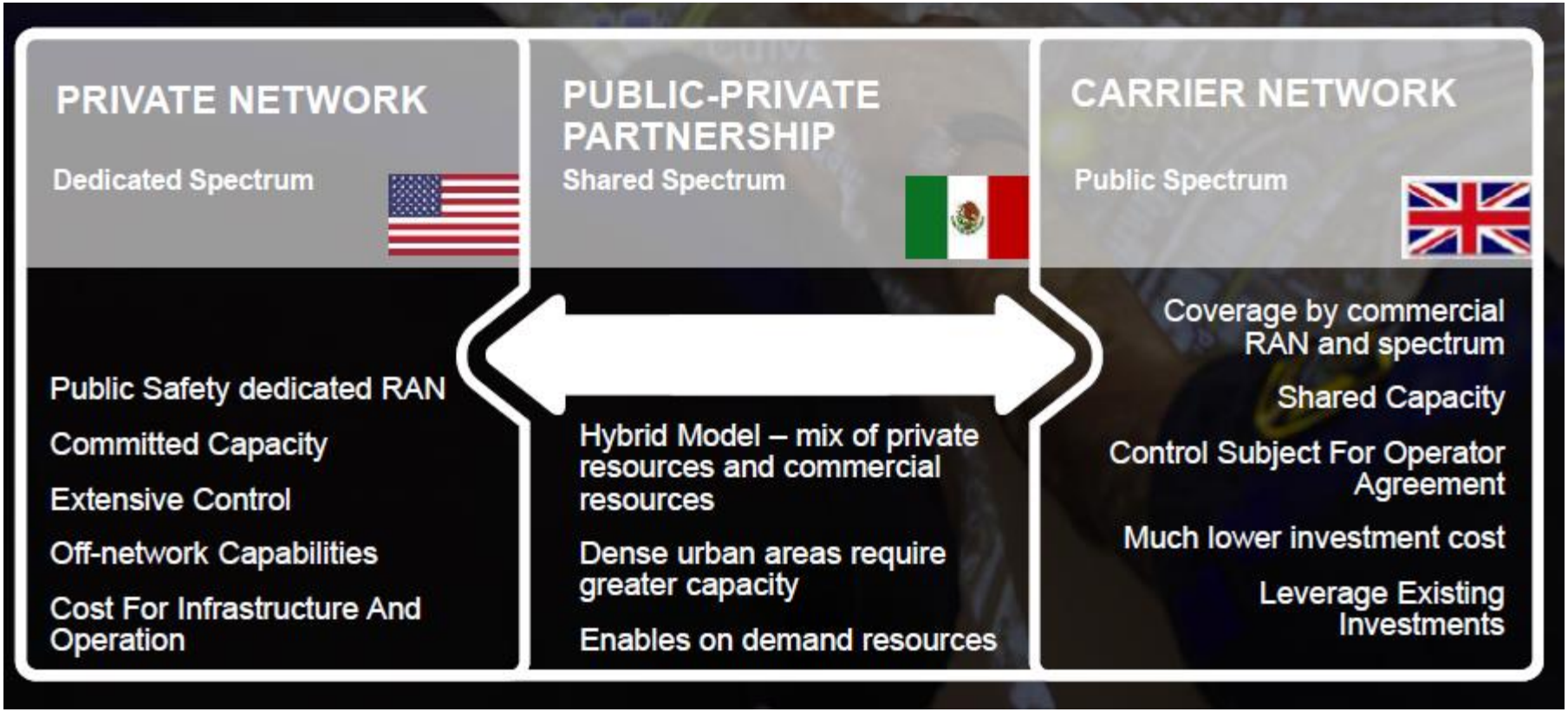
- However, they start to get acquainted with LTE, e.g. by becoming a MVNO (like A.S.T.R.I.D. in Belgium), and they are envisaging different scenarios for a secure and smooth transition from TETRA or TETRAPOL to the Mission Critical LTE

- First integration step between TETRA and LTE (2017): downloading a “TETRA App” in a smartphone allowing it to integrate a TETRA talkgroup
  - Switching is done by the TETRA network
  - Provisioning is operated by the TETRA network: each “TETRA App” in the smartphone having its own ITSI (TETRA radio ID number)



Future: Broad Band and interoperable radio systems
Mature Mission Critical LTE

- Three PPDR models are possible for the future:



- Seeing the difficulty to obtain spectrum and the costs of a Broad Band Radio Access Network (RAN), full dedicated PPDR radio networks will probably disappear