450MHz Networks for critical M2M Applications

CEPT ECC M2M Workshop

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Regulatory Working Group

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promoting the advancement of 450 MHz worldwide.

450 MHz Alliance Mission

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Promote Allocation Of The 450 MHz Spectrum Worldwide,

Grow and Facilitate Coordination of the 450 MHz Ecosystem to maximize commercial benefits to stakeholders

450 MHz Alliance Major Functions Overview

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Representation in industry and regulatory bodies

Marketing, Promotion and Growth of the 450 MHz band and its ecosystem

Facilitating Coordination in demand/supply of 450MHz equipment/terminals

Driving the economies of scale

Support development of and advocate new business models

Services

Specific goal-oriented

Working Groups

Guidelines, Processes

Setting industry standards

Taking regulatory positions

450 MHz Alliance Services

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Working groups (WG) based on members' various interests is a cornerstone of the 450A's functionality and value of the organization

Working Group Program

- A WG sets up its own program
- Each WG's objective is to solve a certain issue(s), which otherwise could not have been likely solved if done separately

WGs are virtual center of excellence for knowledge

450MHz: a spectrum that has a history to drive new applications

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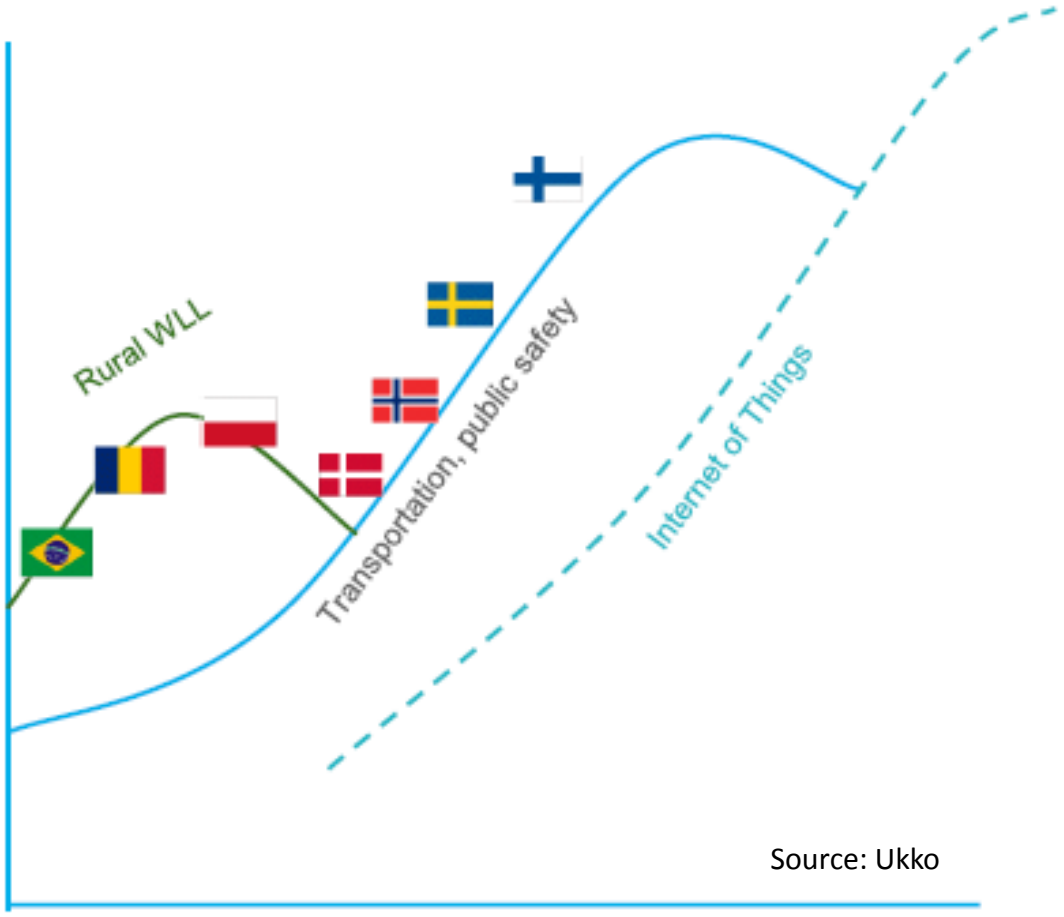

Source: Ukko

- First public cellular networks worldwide due to very good propagation substituted by 2G/3G networks with higher capacity
- Continued use for nationwide voice coverage until replaced by 2G/3G networks
- Often first rural broadband services until fixed & 3G/4G wireless networks were rolled-out
- Use for dedicated networks for transportation, public safety but again capacity limited, in particular for broadband/video applications
- Reinvented for M2M / IoT applications making best use of 450MHz benefits without running into capacity restrictions

450 MHz best positioned for critical connectivity (M2M & IoT & fallback)

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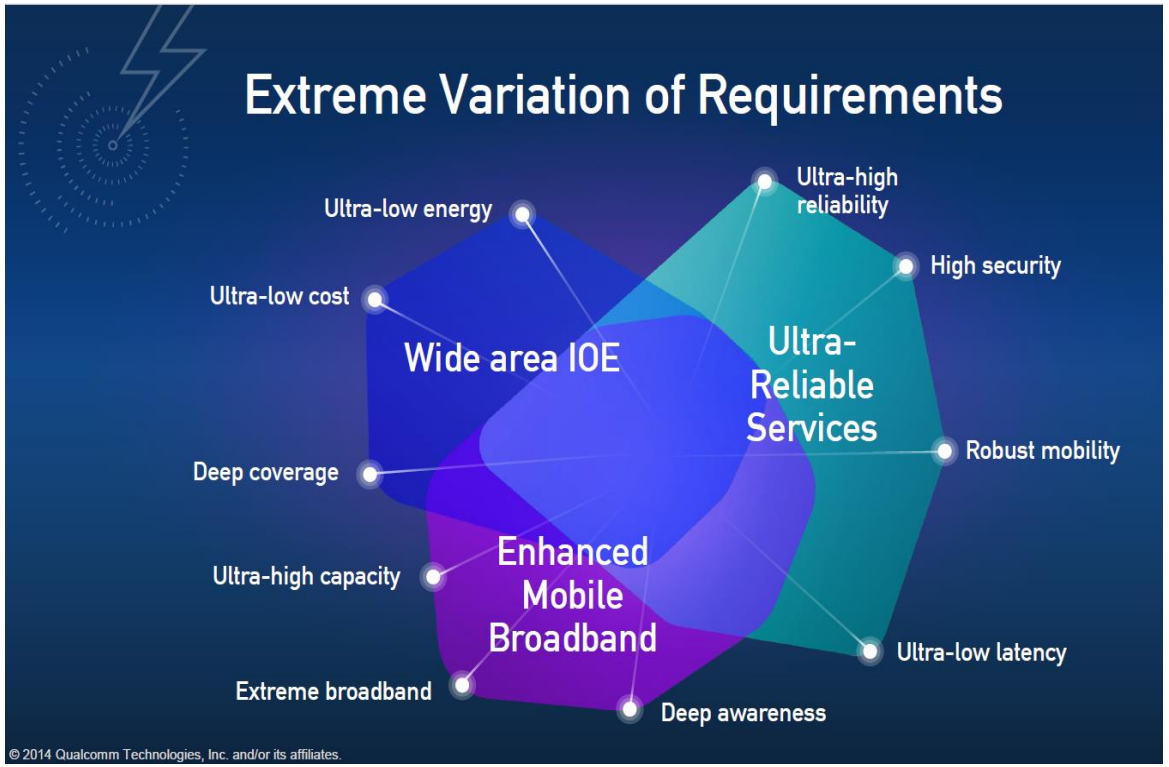

- 450MHz spectrum
  - Exclusive
  - Cost effective coverage
  - Deep indoor coverage
- CDMA/LTE technology
  - Low latency & robust mobility
  - High capacity for M2M/IoT
- Dedicated Network
  - Control
  - Ultra high reliability
  - High security

Unique proposition through combination of
450MHz spectrum, CDMA/LTE technology and dedicated, “private” network

450MHz spectrum characteristics

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- Physical propagation properties of 450MHz allow building and operation of wireless networks for critical M2M applications with low investment and operational costs
  - **Lower frequency => larger radio cells**.
    - Network costs largely depend on the number of radio sites required for coverage
    - Cost for network resilience is related to the number of required radio sites
  - **Lower frequency => better in-building penetration**
    - Good radio coverage in buildings and other types of premises where M2M devices are located
    - No need for additional access technology (wireless or wireline) – direct connection to device
- Limited spectrum in 450MHz band, but exclusive spectrum
  - Typical exclusive spectrum assignments per operator are 2 x 1.25, 2x 2,5 and 2 x 5MHz
  - Not sufficient for broadband applications but enough for most M2M applications
  - Allows building of a dedicated network platform for critical M2M applications independent of mass market (neither mobile users nor shared spectrum users)

3G/4G technologies for 450MHz

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- 450-470MHz is identified as IMT band for all three ITU regions
  - Various standard mobile technologies are available or under development
  - Technologies in 450 profit from continuing developments in other mobile bands (LTE, NB IoT)
  - Limited spectrum amount in this band allows developers to focus on M2M applications

- Technology roadmap for 450MHz
  - CDMA2000 – 1.25MHz system bandwidth – mature and wide spread technology
    - CDMA EVDO – optimised for data services with short latency, large M2M capacity and support of QoS
  - LTE in Band 31 – new technology with 1.4, 3 and 5MHz bandwidth – under studies within CEPT
    - Ongoing optimization for M2M with LTE-M reducing cost and power consumption (Release 13)
  - NB IoT – future variant of LTE with 200kHz bandwidth under standardisation for IoT
    - Larger radio cells, better in-door coverage, longer battery life and lower cost devices

Dedicated Networks in 450MHz

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- Dedicated coverage, e.g.
  - Coverage customised to critical communication use cases
  - Deep-indoor coverage for smart metering
  - Coverage of infrastructure (power grid) in sparsely inhabited areas and for emergency communication
- High system resilience and service availability, e.g.
  - Redundant system design (no single point of failure)
  - Network planning with high service availability
  - Overlapping coverage for critical applications (like smart grid, or emergency communication)
  - Redundant base station backhaul
  - Emergency power provision (battery back-ups, fuel power generators) at all/key radio sites
- High-level security, e.g.
  - Control over network deployment and parameters
  - Implementation of available security mechanisms of standard mobile technologies
  - Private network without public access (e.g. private backhaul, tunnelling technologies)

Innovative M2M uses of 450MHz

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Utility Connect (Netherlands)

- Nationwide M2M platform for critical infrastructure
- CDMA450 rolled out for smart grid & metering in 2/3 of Netherlands

AINMT (Scandinavia, Asia)

- Leveraging best coverage to address multiple segments (rural, M2M, public service)
- Migrating to LTE450 in Scandinavia and acquiring 450MHz operators in Asia

Inquam (Germany)

- Targeting nationwide platform for M2M/critical connectivity
- CDMA450 pilots with all large utilities & first commercial network for city utility in rollout

Argonet (Austria)

- Targeting nationwide platform for M2M/critical communication
- Rolling out two regional CDMA450 networks for utilities

Ukko (Finland)

- Leveraging best coverage to address multiple segments (transport, public service, IoT)
- Newly deployed LTE450 networks

MVM (Hungary)

- Nationwide network initially for utility data communication needs
- LTE450 newly deployed

Conclusion

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- 450MHz drives innovation in wireless use cases
- 450MHz extremely well positioned for critical connectivity for M2M/IoT
  - Exclusive spectrum with best coverage characteristics
  - Availability of CDMA and LTE standardised technology
  - Ability to deploy dedicated networks with high resilience and security
- Use cases demonstrate strong innovative forces to develop new business models for 450MHz leveraging of CDMA and LTE technology with increasing focus on M2M/IoT
- “National approach” allows 450MHz to act as innovation lab for new wireless business models (i.e. not one size fits all)
- Important process at CEPT to open 450MHz band for LTE450
- 450MHz Alliance ensures information exchange among all ecosystem players to drive innovation and global use of 450MHz

450MHz Alliance contacts

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