

Welcome to the World of Standards



ETSI TC RRS (Reconfigurable Radio Systems)

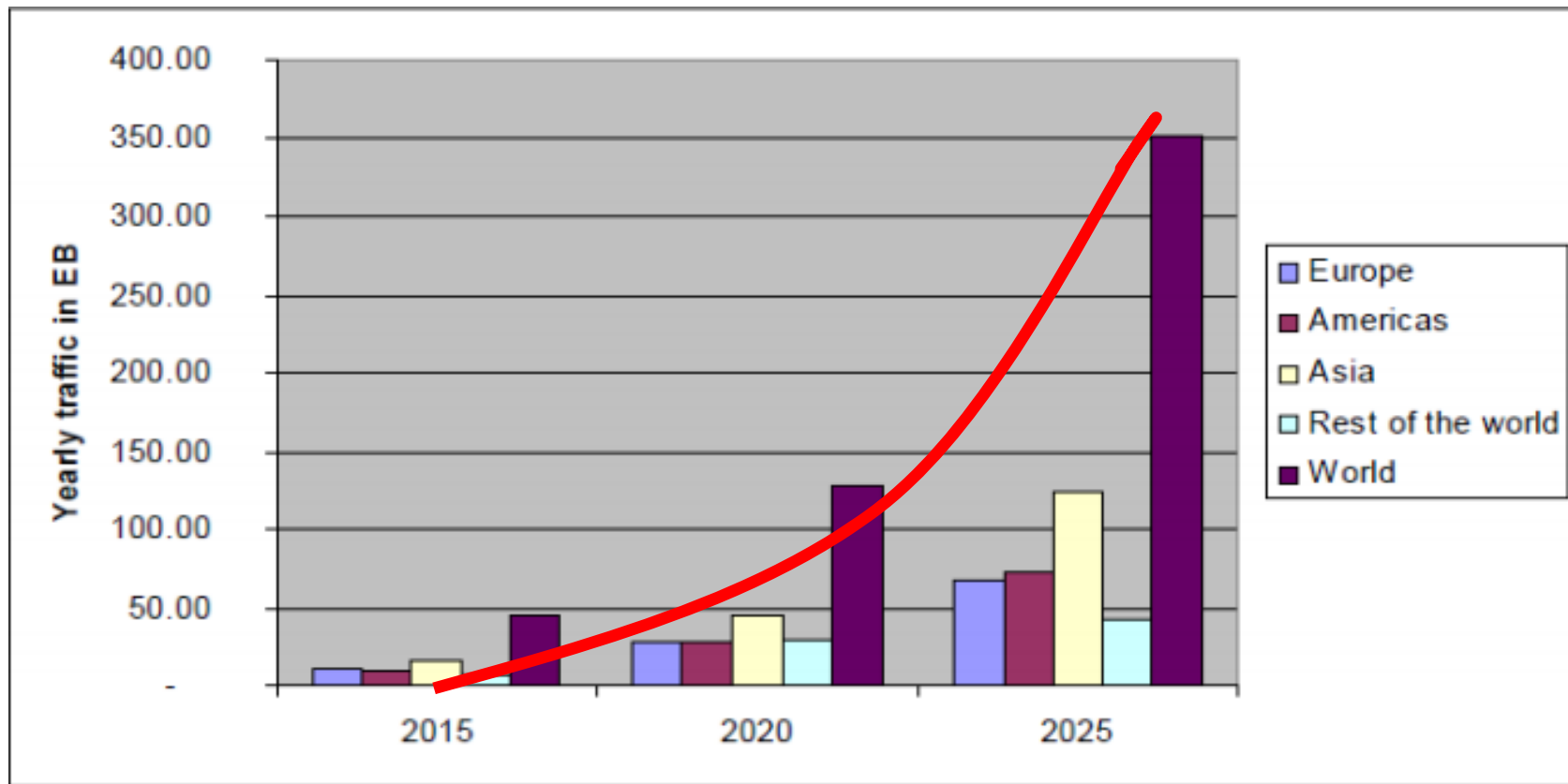
A Vision - Evolution of Wireless Communications

Dr. Markus Mueck, Chairman TC RRS

The Challenge

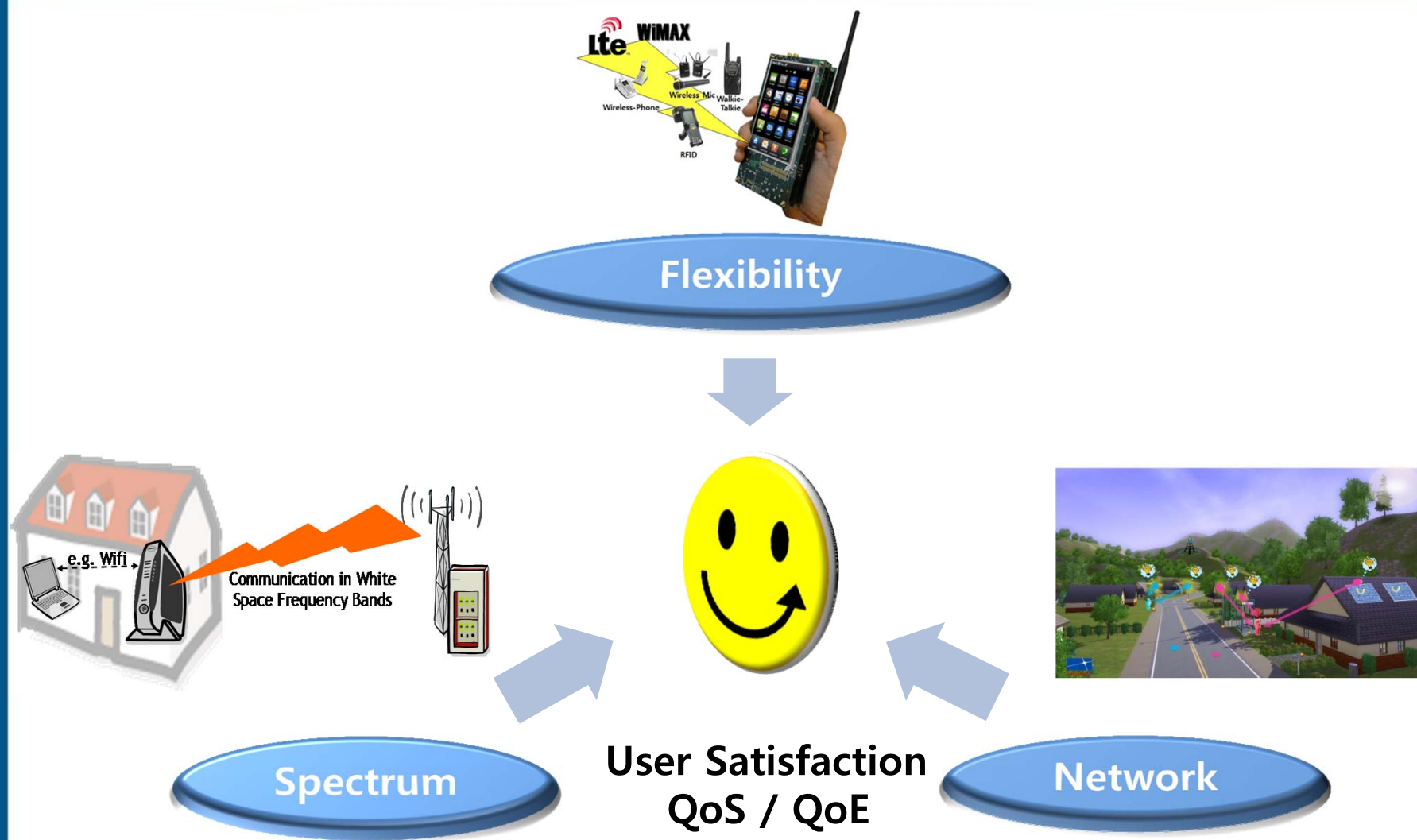


Total mobile traffic (EB per year)



Source: IDATE / UMTS Forum Report 44, Mobile traffic forecasts 2010-2020 report

Major Options



A unique opportunity: EC Mandate M/512 on RRS



- EC Mandate M/512 on RRS is designed to presented Vision:
 - Objective A: In the area of commercial applications, to enable the **deployment and operation of cognitive radio systems (CRS) ...** under **Licenced Shared Access regime**, dependent ... from **geo-location database (GLDB)**.
 - Objective B: In the area of civil security and military applications, to the standardization of suitable SDN architecture(s) (**SCA-based** for the military domain).
 - Objective C: To explore potential areas of **synergy among commercial, civil security and military applications**.

I. The role of RRS

II. Direction 1 - Spectrum

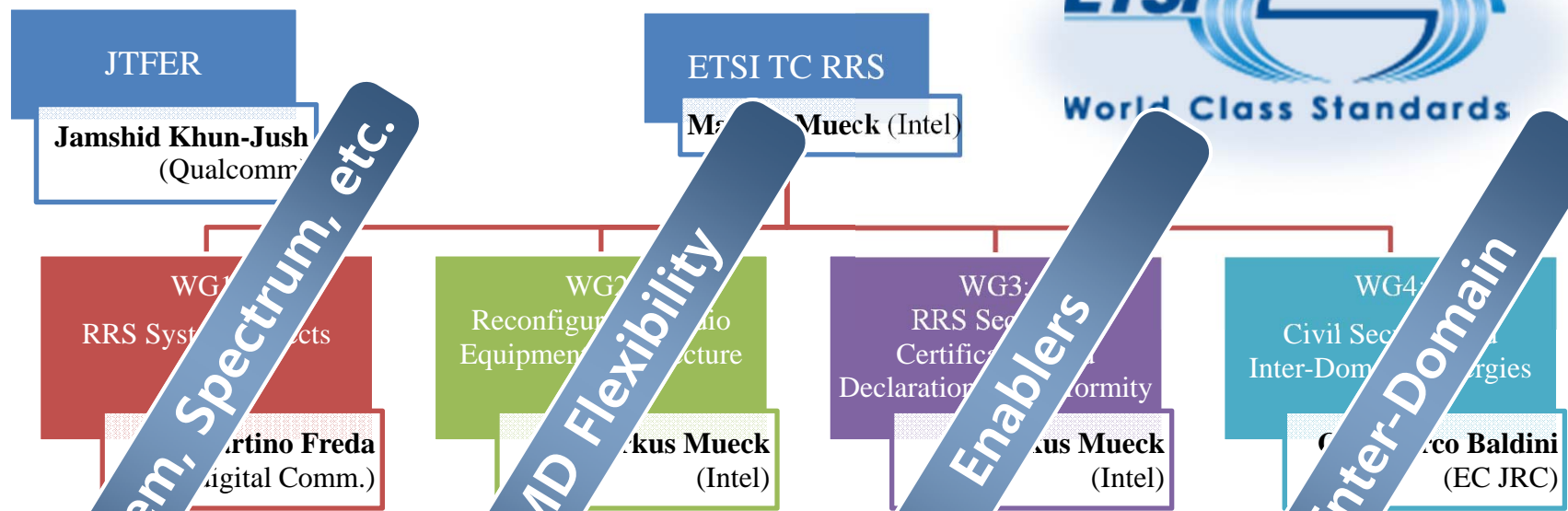
III. Direction 2 - Flexibility

IV. Direction 3 - Area

V. Conclusion

I. ETSI RRS

Introduction of ETSI RRS



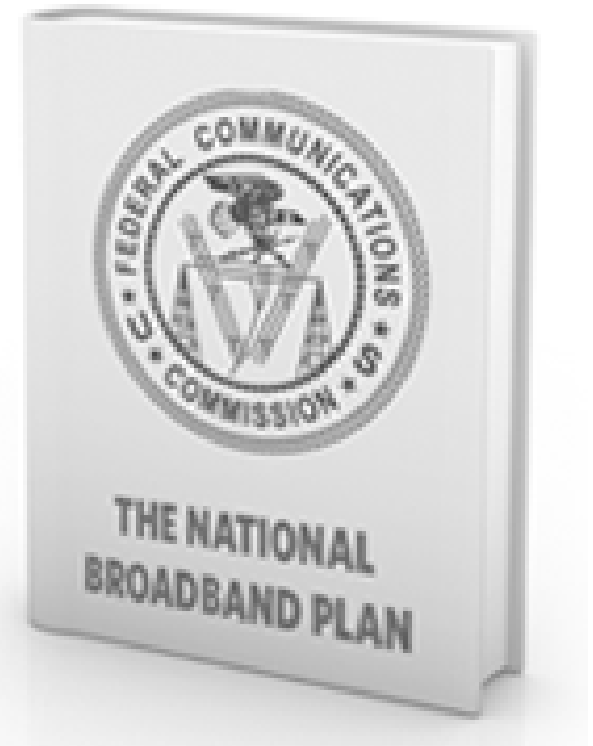
- The committee has focused on the RRS encompassing both SDR and CR
- The committee's activities include studies on the feasibility of RRS standardization, collecting and defining RRS requirements, identifying gaps where existing standards do not fulfill those requirements and proposing solutions to fill those gaps.
- On average, 35 ETSI members attend the RRS meeting (Plenaries and/or WG meetings)

II. Spectrum

Strategies on a World-Wide-Level



- **Example: The US National Broadband Plan** (<http://www.broadband.gov/plan/>)
- **“GOAL No. 2: The United States should lead the world in mobile innovation, with the fastest and most extensive wireless networks of any nation.”**
 - “the plan recommends making **500 MHz of spectrum newly available** for broadband **by 2020**, with a benchmark of making 300 MHz available by 2015. In addition, we should ensure greater transparency in spectrum allocation and utilization, reserve spectrum for unlicensed use and **make more spectrum available for opportunistic and secondary uses.** ”



➤ **What is the situation in Europe ?**

What happens in Europe ?



➤ New Spectrum Access options are studied: Shared Spectrum Access

➤ SCF Associates for the European Commission, February 2012:

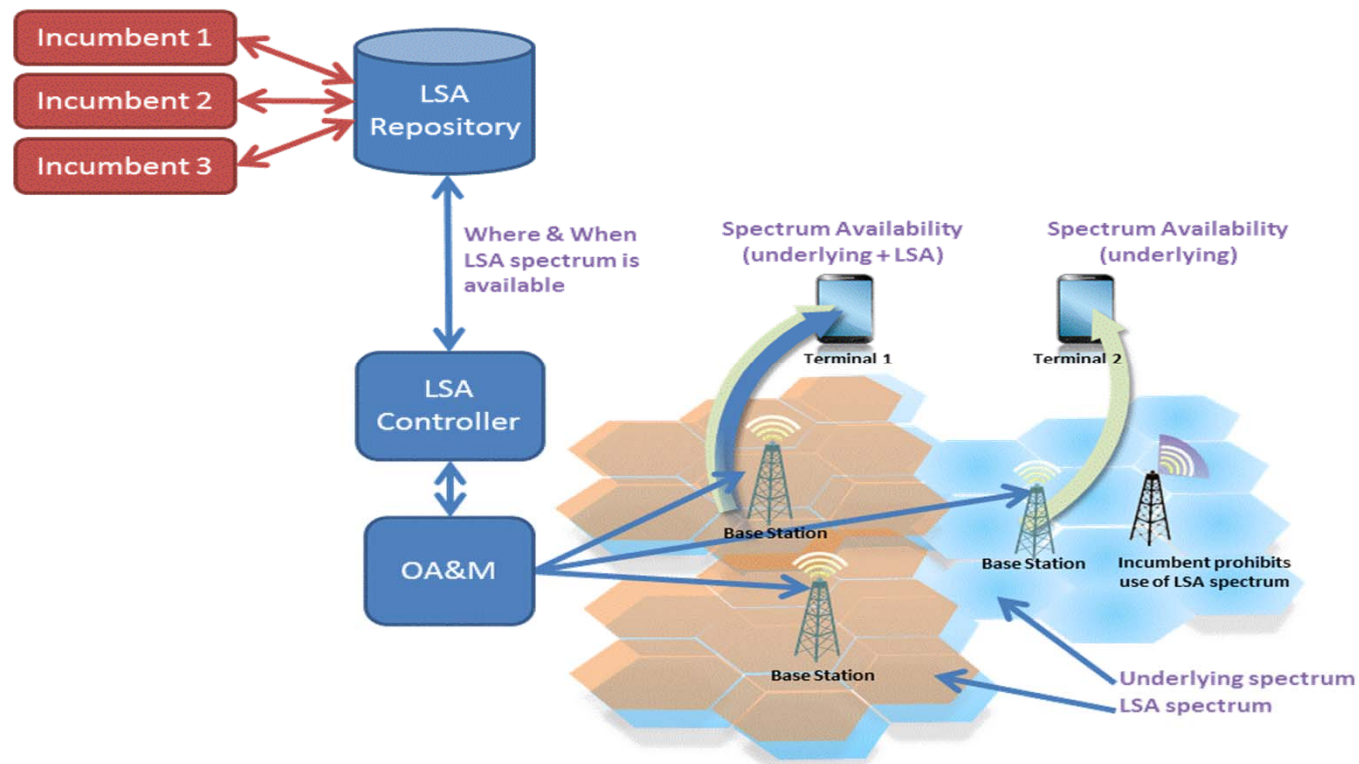
“Perspectives on the value of shared spectrum access - Final Report for the European Commission”

Type of sharing	Band position	Spectrum width, MHz	Value
Existing Wi-Fi bands 2.4 and 5 GHz licence exempt, ASA sharing, bands allocated today for ISM			
As for Scenario 2 - But with variations in width of broadcasting, military and other public services and MNO bands shared under AIP			
Unlicensed bands allocated today	Existing ISM bands	Existing allocations - no new spectrum	Low
Broadcast sharing		Total 111 MHz	Very high/high
MNO sharing		Total 80 MHz	High/medium
Licence-exempt new bands in Digital Dividend	535-585 MHz	50 MHz	Very High
Licence-exempt new bands in upper UHF	1442-1492 MHz	50 MHz	High
Military and other public services		Total 109 MHz	Low except for RFID or white space
New shared bands, total MHz		400 MHz	Averaged: medium/high

Licensed Shared Access



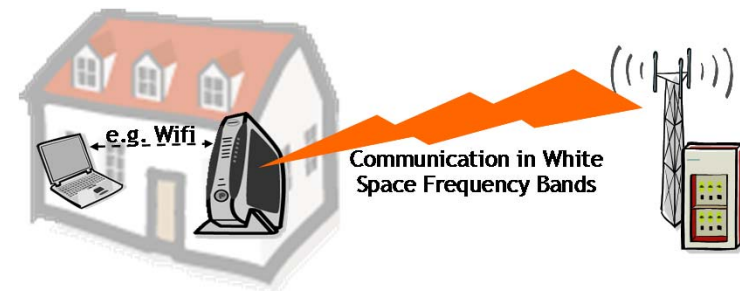
- Based on EC Mandate M/512, ETSI ERM/RRS have developed a Shared Spectrum related System Reference Document (SRdoc): TR 103 113
 - Mobile broadband services in the 2 300 MHz – 2 400 MHz frequency band under Licensed Shared Access regime, the following example architecture was presented:



➤ Use Cases for TVWS Usage

- Mid-/long range wireless access over white space frequency bands: Internet access is provided from a base station to the end users by utilizing white space frequency bands over ranges similar to today's cellular systems, e.g. in the range of 0 – 10 km

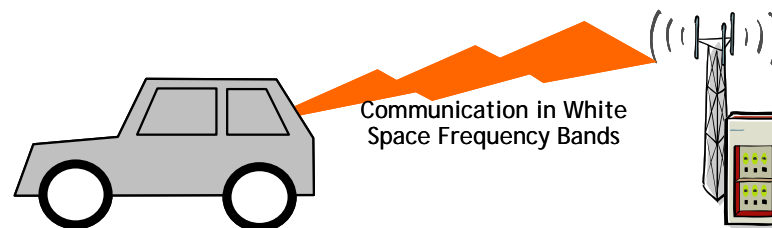
- No mobility



- Low mobility

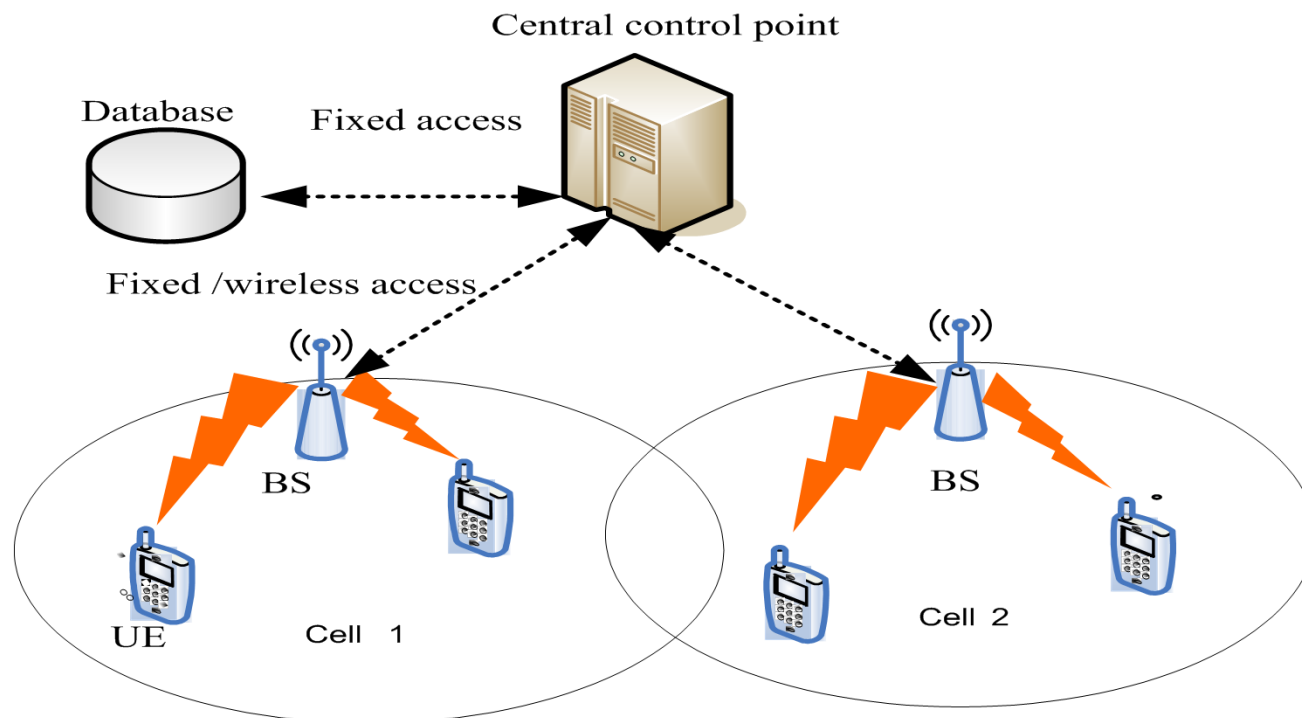


- High mobility



➤ Use Cases for TVWS Usage

- Access to UHF TV band White Spaces using a centralized mode: a central control point (logical node) is deployed to manage the access of the macro radio system (e.g. TD-LTE) to the UHF TV band White Spaces.



II. Flexibility

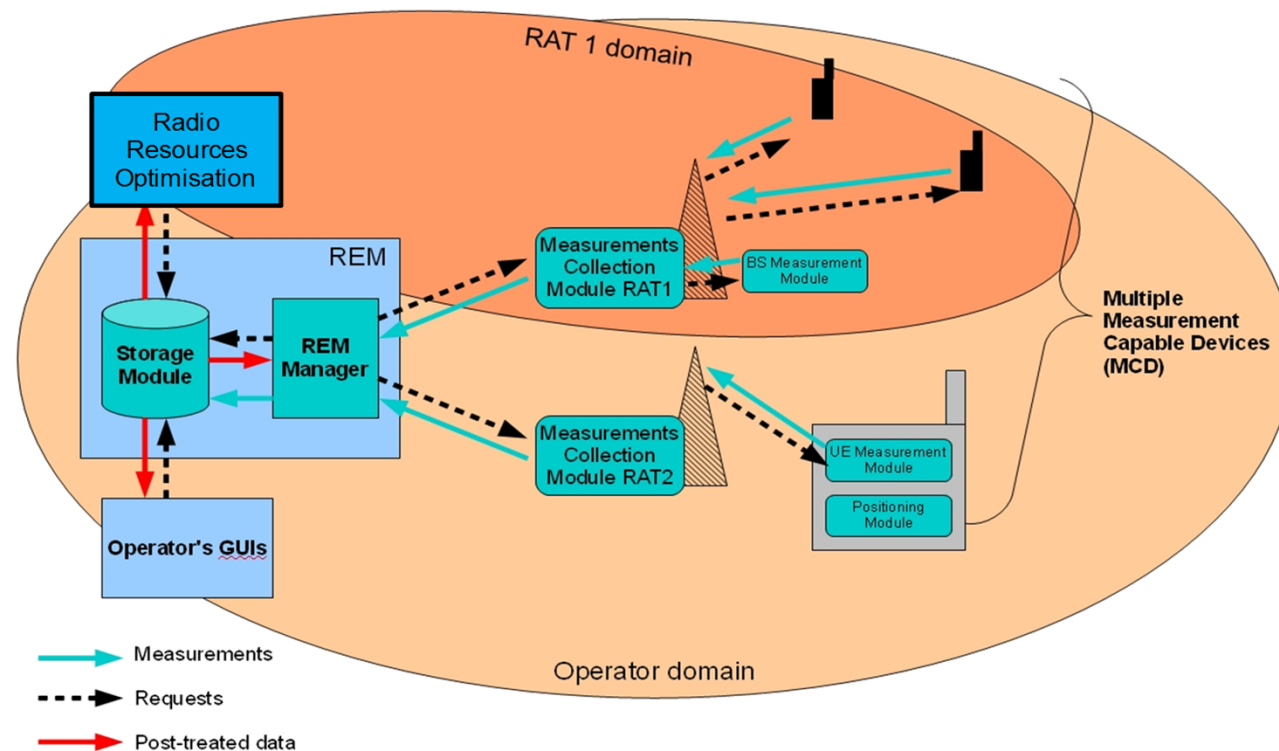
Flexibility on a NW level (intra-operator): Radio Environment Map



➤ Objective: Efficient Cross-Technology Optimization through distributed

Knowledge acquisition: The Radio Environment Map

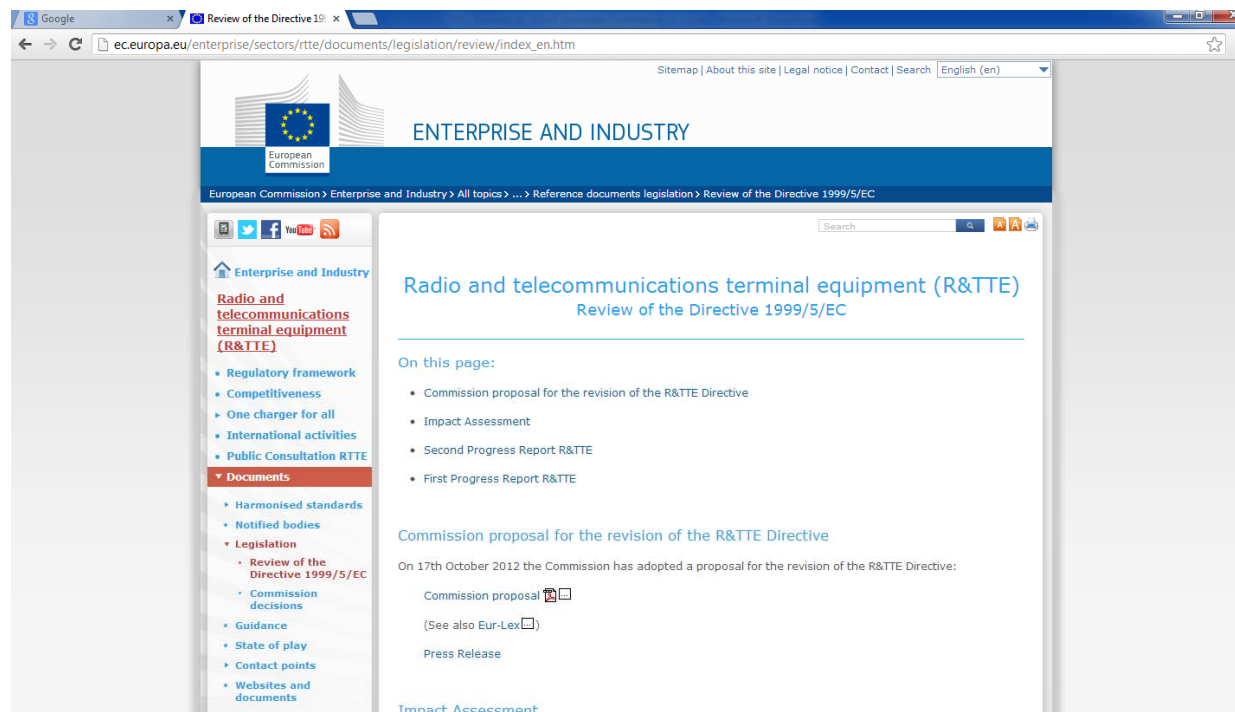
- The Radio Environment Map (REM) defines a set of network entities and associated protocols that trigger, perform, store and process geolocated radio measurements and network performance indicators.



Key opportunity for MD flexibility: R&TTED Revision



- For the first time since 1999, the basic regulation framework in Europe (the Radio and telecommunications terminal equipment (R&TTE) Directive) is revised.
- The revised Directive specifically allows for reconfigurable radio features:



The revised R&TTE Directive



Draft Revised R&TTE Directive - Article 3(3)g and Article 4

Article 3(3) (g) makes it possible to require software-defined radio equipment to ensure that only compliant combinations of software and hardware come together. Article 4 makes it possible to adopt measures to avoid that this regulatory requirement creates barriers to competition in the market for third-party software

Article 3(3)(g):

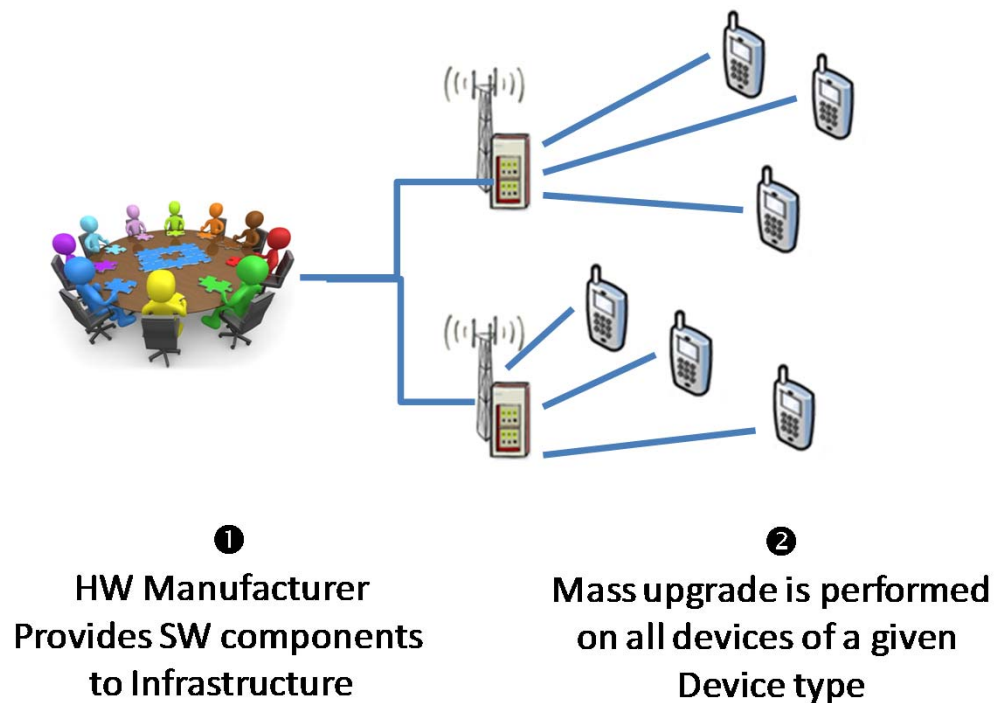
*radio equipment supports certain features in order to ensure that **software can only be loaded into the radio equipment** where the **compliance** of the combination of software and the radio equipment has been demonstrated.*

Article 4: Provision of information on the compliance of combinations of software and radio equipment

***Manufacturers of radio equipment and of software** allowing radio equipment to be **used as intended** shall provide the Member States and the Commission with **information on the compliance of intended combinations of radio equipment and software** with the essential requirements set out in Article 3.*

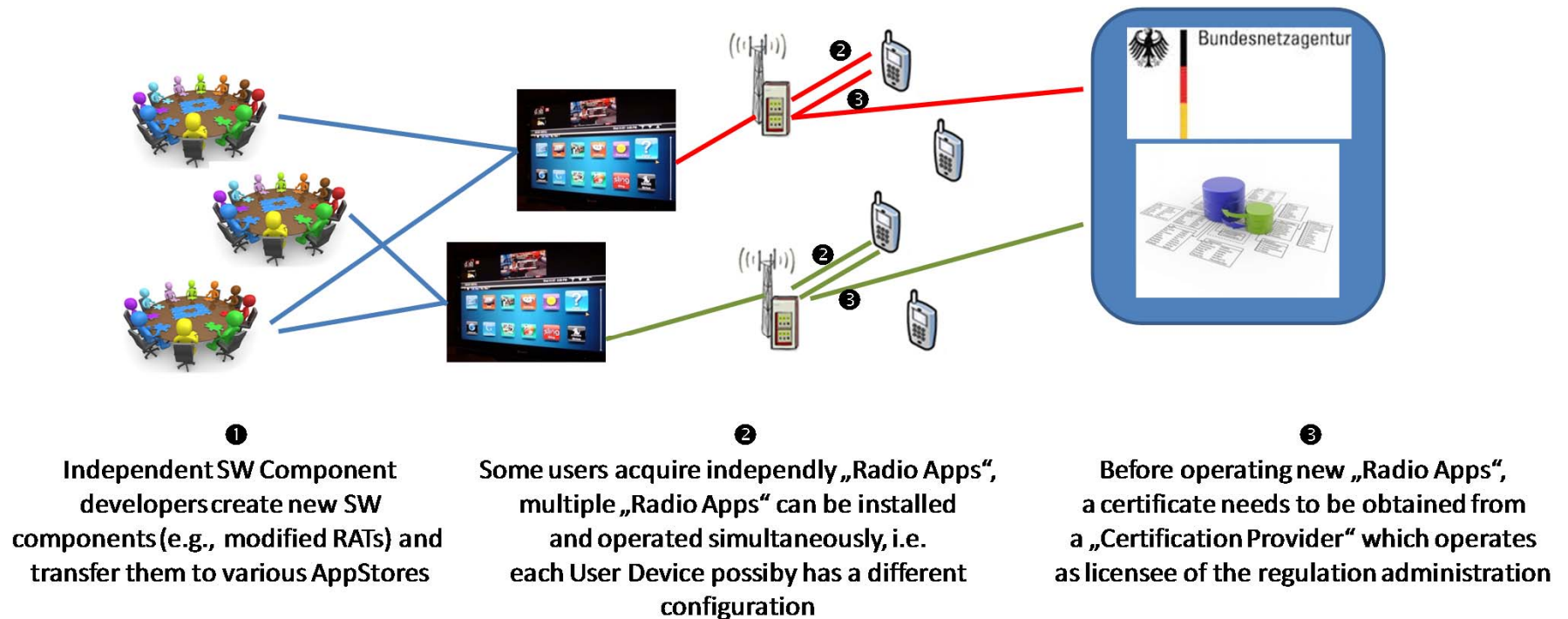
The Commission shall be empowered to adopt delegated acts in accordance with Article 45 specifying which categories or classes of radio equipment are concerned by the requirement in the paragraph 1, the required information and the operational rules for making the information on compliance available.

➤ Today's Mobile Device reconfiguration framework:



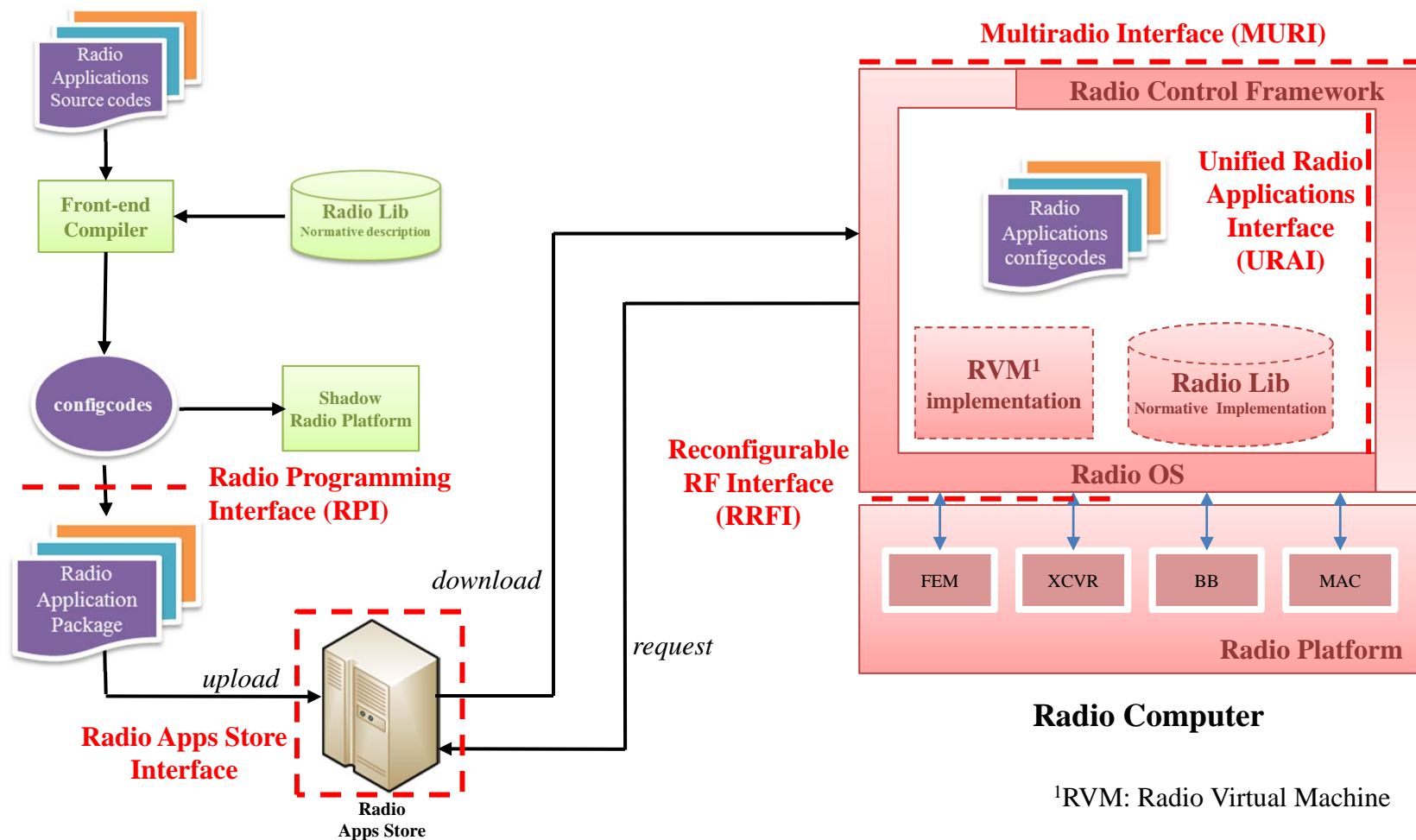
Related System Vision

- A possible Vision on tomorrow's Mobile Device reconfiguration Framework building on „RadioApps“ enabled by the revised R&TTE Directive – see work ongoing in ETSI RRS: Draft „TR 102 967 - Use Cases for Dynamic Declaration of Conformity“



What is being standardized?

- Standard Software Architecture for Radio Computer (ETSI TS 103 095)
- Standard Interfaces for Radio Computer (ETSI TS 103 146)



IV. Area

A current key technology trend: Small Cells

- Out of Scope for ETSI RRS but important for the full picture -



V. Conclusion

- The key problem to be addressed by any new technology in the Mobile Communications space: How to cope with exponential Mobile Traffic Growth ?
- Key Requirement: Solution must provide guaranteed QoS/QoE to Users!
- Key Strategies for addressing Mobile Traffic Growth:
 - New Spectrum
 - More Flexibility
 - Intelligent Management of Cell Areas

The good news:
**Those Technologies
are complementary and
quasi-orthogonal**



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