World Class Standards

Software Defined Radio

ETSI

ITU Workshop

Software Defined Radio
or
the answer to life, the universe and everything

- •The ideal SDR will cover all frequencies from 9kHz to 300GHz.
- •It will receive/transmit and modulate/demodulate all modulation modes and bandwidths
- •It will configure itself automatically.

Examples of an SDR definition … the definition used by TCAM

- Proposed definition in **TCAM/TGS** Questionnaire Impact of SDR on the R&TTE Directive
- “SDR”equipment or “Software defined radio equipment”is a radio where essential radio parameters -normally subject to regulation -like frequency range, modulation type, maximum output power etc.can be altered by changing software.
- Note: For the purpose of this assessment “software”is defined as the following: Software is a set of computer instructions and data recorded in a device, and which technically can be modified after placing the equipment on the market.”

Limitations in SDR

- •There are technology limits on achievable RF performances
- •The choice of architecture depends on the available technology e.g ADC performance, semiconductor technology
- •Software reliability (or the lack thereof) may define overall radio reliability, rather than hardware limitations

SDR Reliability

- •There are two areas of reliability to consider:

- Hardware reliability
- •Hardware reliability follows classic patterns
- Software reliability
- •Software reliability (or the lack thereof!) may lead to lower overall reliability, depending on the implementation mechanisms

So …

- •The advent of SDR presents new challenges in design, power consumption, measurement and standards production
- •The current technologies do not provide all the necessary requirements for universal application of the technique
- •There may well be applications where the complexity of SDR will never offer advantages, because of such factors as complexity, price and/or power consumption

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SDR/CR Workshop in ETSI

9th February 2007 - http://portal.etsi.org/sdrworkshop/

- **Why the workshop?**
  - **SDR research is quite advanced**
  - **Military is using SDR already**
  - **First standardization attempts on SDR seen**
  - **The European Commission is funding EU research projects such as E²R**

  -> It is the right time to start standardization!
- **Very successful, more than 100 attendees from:**
  - **Industry**
  - **Research (E2R II project…)**
  - **Military (NATO, European Defence Agency)**
  - **ETSI TBs (ERM, BRAN,…)**

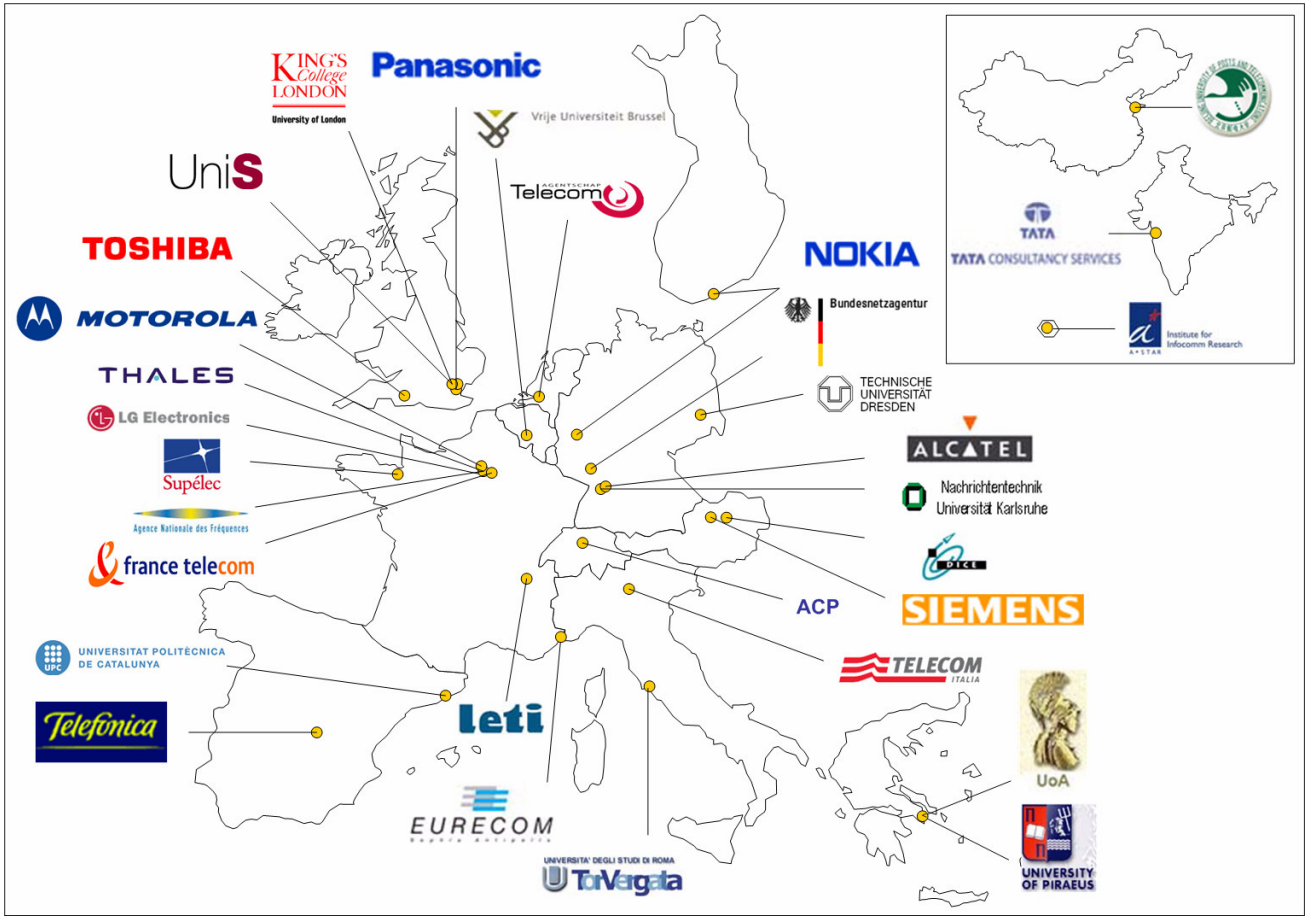
The main objectives of the workshop

- present the results of the E2R project
- present the status/view of SDR technologies from Members
- discuss and identify possible future work areas to be addressed
- assess the opportunity for SDR/CR standardization to be started

Organized in collaboration with E²R II

E²R II Highlights

- ✓ **Phase 2 Duration**
  - Jan. 06 – Dec. 07
- ✓ **Consortium**
  - 32 Organizations
  - 14 Countries
- ✓ **Budget**
  - 19.0 MEuros
- ✓ **EU Budget**
  - 11.6 MEuros
- ✓ **Resources**
  - Around 67 PY/Y



- ✓ **Contractual Outcomes: 38 Deliverables and 45 Milestones**

SDR flavours

- Terminals using one HW for different radio standards.
- Cost saving in semiconductors.
- Joint radio resource management.
- Reconfigurability and SW-download.
- Security and approval issues.
- Dynamic spectrum allocation.
- Spectrum band sharing.
- Spectrum trading.

Aspects analysed

- Results of a number of related research projects.
- Analysis of architectures and reliability.
- Possibilities and limitations of SDR system design.
- Political needs for harmonization in Military equipment procurement.
- Current military procurement model and its possible application to the civil domain.
- Overview of current regulatory requirements, and activities within the R&TTE Directive TCAM committee.

ETSI Board ad hoc group

- **A Board ad hoc group was created on Software Defined Radio (SDR) & Cognitive Radio (SDR) within ETSI.**
- **proposed ETSI standardisation work into 3 segments:**
  - **SDR (Modules and Interfaces, terminal aspects)**
  - **Cognitive Radio - impacts on spectrum management**
  - **Cognitive Radio Systems**

Several concrete proposals for standardization

- System Reference document (SRdoc)
- Harmonised Standards
- New Interfaces
- Test and interoperability
- Measurement techniques

ETSI to avoid duplication of work already in progress elsewhere

Next steps

- **Next meeting date of the** ad-hoc group **6th September 2007**
- **ETSI Board decisions expected at the Board #64 meeting, 10-11 October.**