Models and Simulation: A CEPT example

Jean-Philippe Kermoal (ECO)

International Symposium on Advanced Radio Technologies

May 13, 2015

European regulatory approach to spectrum (Ex-Ante vs Ex-post)

- Ex-Ante, European regulation (CEPT/ECC) is based on compatibility studies that defines technical conditions

- Later, comes the Harmonised Standard (ETSI) which establish the conformity requirement based on the ECPT work for the introduction of the equipment on the European Market (EU)

- Ex-post is more of a national matter to ensure that there is no interference for specific cases (monitoring/market surveillance).

- Therefore from an Ex-Ante perspective, the CEPT is more interested in **generic study**.

Technical study in the CEPT

- CEPT/ECC Project Teams are responsible of the study and decide on the best course of action;

- The Project Teams are opened to Administration (regulators) and Industry players (vendors and operators).

- Any proponent can provide his technical study based on any models;

- Results can be generated using SEAMCAT, matlab models (usually proprietary), excel sheets or commercial softwares. The use of SEAMCAT is not compulsory;

- Proponents may present results on MCL or monte carlo simulation depending on the studies (i.e. service used);

Where can SEAMCAT helps reach agreement?

- Two examples where the use of SEAMCAT by stakeholders, who could not come to agreement due to differing results from competing models, was able to expedite an agreement.

- **ECC Report 207** (Adjacent band co-existence of SRDs in the band 863-870 MHz in light of the LTE usage below 862 MHz) – **SE24**
- **ECC Report 197** (Compatibility studies – MSS terminals transmitting to a satellite in the band 1980-2010 MHz and adjacent channel UMTS services) – **SE40**

http://www.ecodocdb.dk/doks/doccategoryECC.aspx?doccatid=4

- Two fundamentally different mechanisms were identified as sources of possible interference from LTE UE into SRDs

- Measurement and Simulation are used to draw conclusions

- Generic SEAMCAT module used

- Difference of view in the understanding of the results between the LTE and the SRD communities

Table 4: Assumptions for the victim link

Parameter	Non-specific	Metering	Alarms	Audio
dRSS approach 1: user defined dRSS with a mean dRSS 20dB (Gaussian distributed) above sensitivity	-84dBm, std dev 10 dB	-84dBm, std dev 10 dB	-92dBm, std dev 10 dB	-84dBm, std dev 10 dB
dRSS approach 2: real distance simulation, distance up to typical operating distance from Table 1	Mean -77 dBm, std dev 17 dB	Mean -77 dBm, std dev 17 dB	Mean -77 dBm, std dev 17 dB	Mean -62 dBm, std dev 13 dB

Both approaches may be relevant in real life: Approach 1 gives lower maximal dRSS values (up to -50 dBm) and thus may be seen to represent cases with SRD working at higher operational range, whereas approach 2 gives higher maximum dRSS values (up to -20/-30 dBm) and therefore represents operational scenario where SRD path distance may be seen as lower.
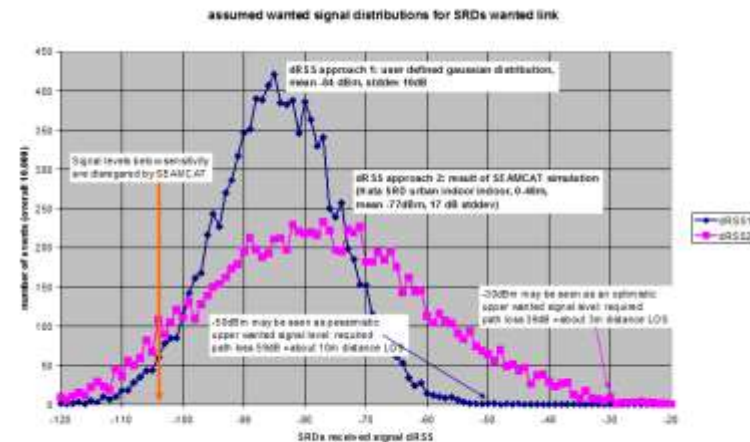

Figure 1: Assumed wanted signal distributions for SRDs (for 200 kHz receivers)

- Deterministic results show that when an MSS UT is near to a victim ECN BS (FDD or TDD BS), in the absence of any mitigation technique, the interference caused is above the recommended protection criterion based on I/N.

- As a consequence of these deterministic results, a complementary statistical analysis was also performed by using the SEAMCAT tool for studying the interference caused by MSS UT into ECN macro base stations and ECN UT.

- SEAMCAT 4.0.0 was only considering average network noise rise in the CDMA module, hence the algorithm was not able to handle cases were one strong interfer would disrupt a single cell in the whole network.

- Joint work between the UMTS community and the MSS community to agree on an enhancement of the UMTS UL alogorithm in SEAMCAT.

- A SEAMCAT 4.0.1 was therefore released
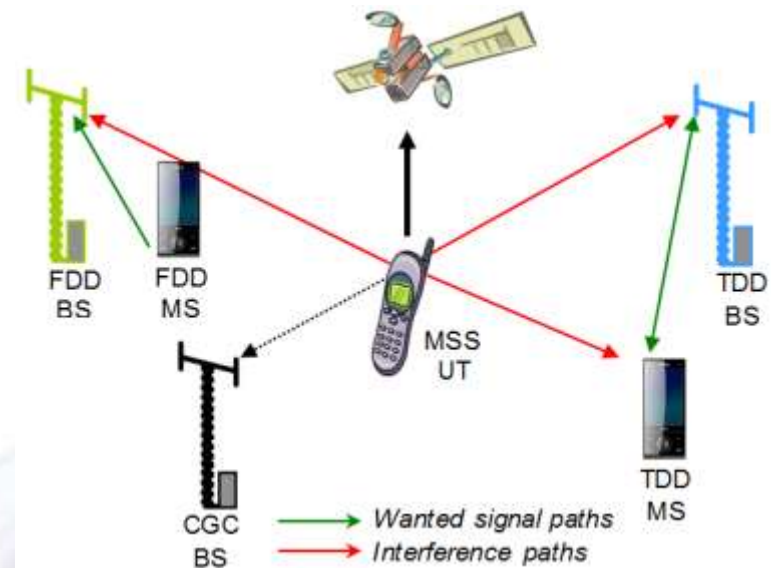
Simulators – Lessons learned

- What are your needs: System simulators vs Generic simulators – What is the use case?

- Black box vs open community – Do people care?

- Sharing and/or standardizing element – Shooting yourself in the foot?

Thank you – Any questions?

Jean-Philippe Kermoal

European Communications Office

Nyropsgade 37, 4

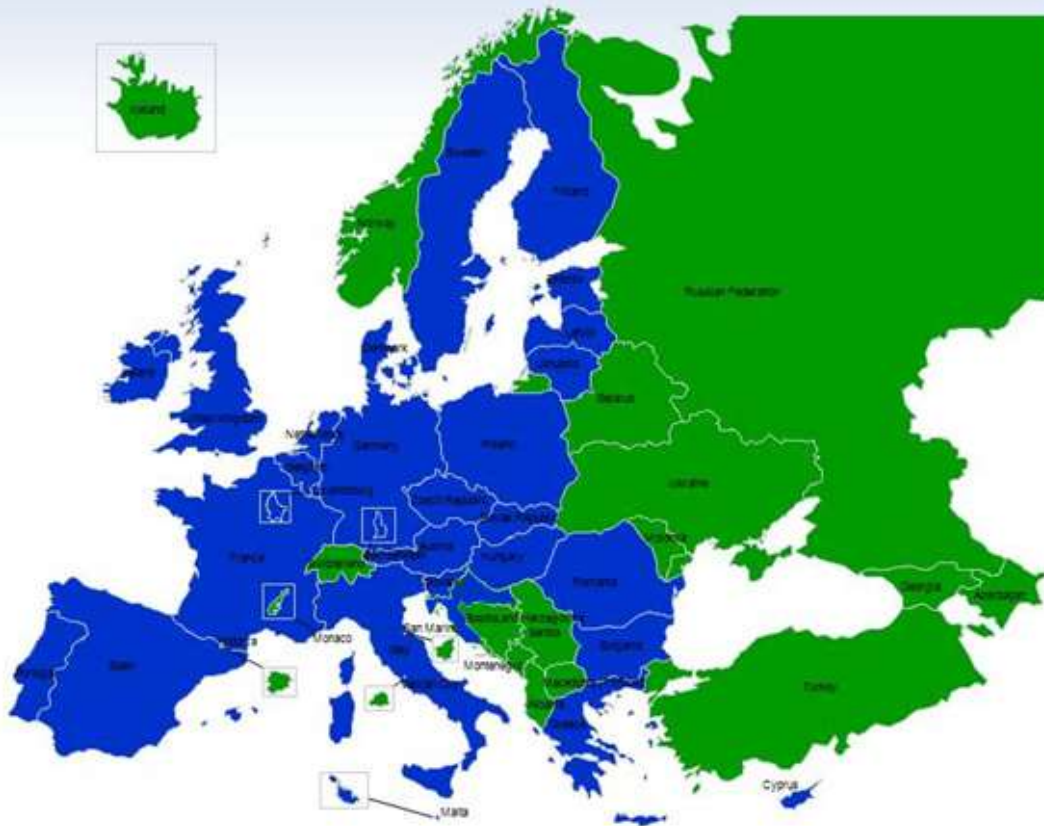1602 Copenhagen

Denmark

T: +45 33 89 63 07

F: +45 33 89 63 30

Jean-philippe.kermoal@eco.cept.org

Extra material on European Regulatory Framework

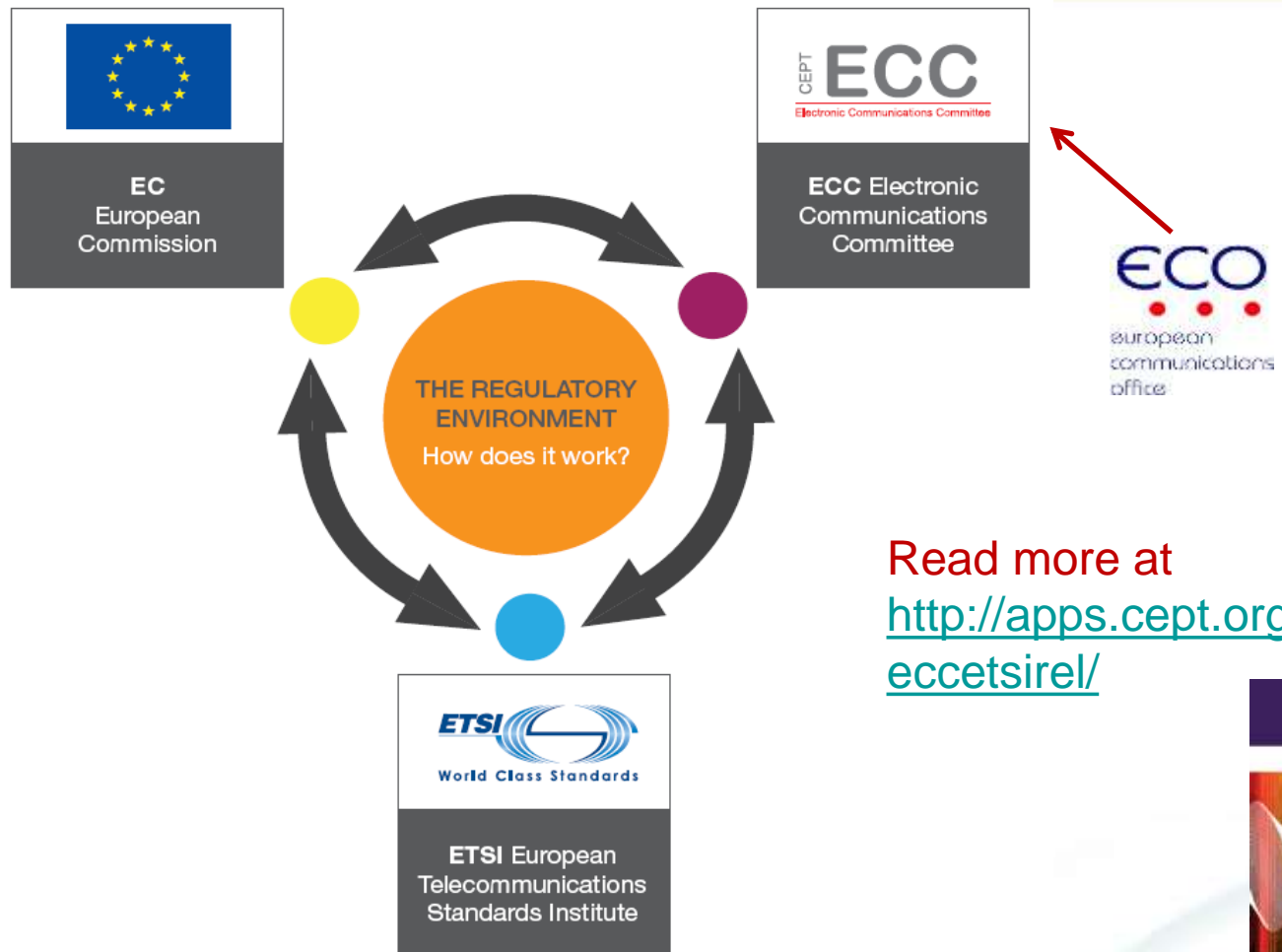# CEPT framework - 48 countries

Established in 1959

CEPT: all EU states (blue) and rest of Europe

Framework: Arrangement and Rules of Procedure (2009)

CEPT: European Conference of Postal and Telecommunications Administrations

# European regulatory framework for radio spectrum and equipment

Read more at
http://apps.cept.org/eccetsirel/

CEPT – Organisation – ECC and ECO

- **ECC**: Electronic Communications Committee
  - Work towards common regulatory policies in Europe
  - Harmonise efficient use of the radio spectrum, satellite orbits and numbering resources

- **ECO**: European Communications Office
  - Permanent office of the CEPT;
  - Provide a centre of expertise in electronic communications;
  - Advice and support to the ECC;
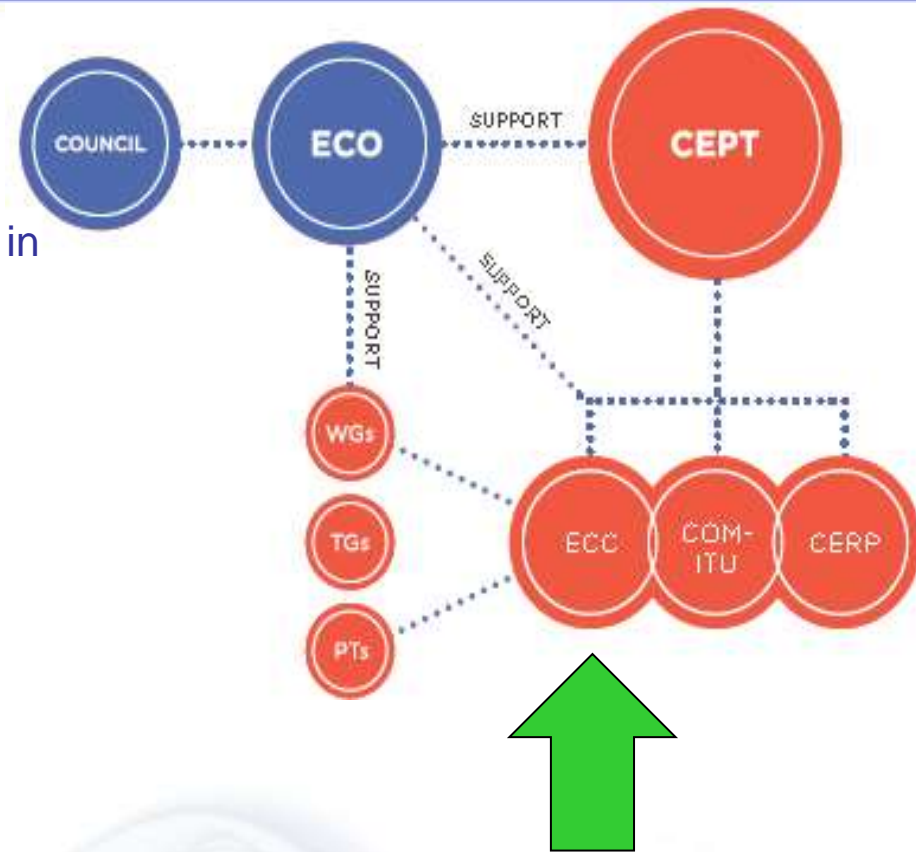
Roles of the three European regulatory organizations

European Commission:
Single market issues
Binding regulations based on the technical expertise of CEPT/ECC and harmonised standards of ETSI
(28 Member States)

CEPT/ECC:
Consensus and **voluntary** character Spectrum designation to systems/applications and technical conditions for its use
(48 member countries)

ETSI:
European Harmonised standards (EN) for radio equipment
'System Reference Documents' (SRDoc) which inform and trigger much of the CEPT/ECC work
(over 700 industry members &
and European naitonal regulators)