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Coexistence challenges of the evolution in the use of the UHF band –
The contribution of standards in the 700MHz band and other possible
measures

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Agenda

- Receiver performances.
- Lessons learnt from LTE800 deployment and comparison with LTE700
- Already achieved DTT receiver immunity Improvements
- Lifecycle and effect of immunity standards on DTT – Work for the “posteriority”?
- Filters as a solution
- Key messages

Receiver performances.

- Receiver performances are the result of several trade offs based on years of field experience.
 - Price
 - Power consumption and size (EC rules on power consumption/standby also flat screen TV sets a few mm thick -> silicon tuners)
 - Sensitivity (to obtain maximum coverage – efficient use of spectrum)
 - Protection ratio for DTT and ATV interference
 - Multiple tuner (DVB-T/DVB-C/DVB-C2/DVB-T2 reception)
 - Multipath (for fixed and portable reception in MFN/SFN)
 - Long echo (for wide SFN thus , one of the EC goals?!)
 - Impulse noise immunity
 - LTE800 robustness (since 2008 in theory and 2010 in practice)
 - LTE700 robustness (today?)
- DVB-T / T2 standards were primarily designed for efficient and intra-system robustness
- Inter-system robustness (DVB / LTE) is “changing the paradigm”
 - New prioritization of immunity is changing the fundamental characteristics of original DTT Receiver designs
 - Some other parameters (e.g. sensitivity, multipath) may need to be relaxed

Lessons learnt from LTE800 deployment and comparison with LTE700

LTE800

- Overall interference issues are not negligible, but have been less severe than anticipated
- Saturation of active aerial distribution (communal aerial) by LTE base stations downlink is the main issue.
- Solved by filters as close as possible to the antenna and before any active element.

LTE700

- LTE700 transmitters are conventional duplex
 - A priori issue is « minor » (as qualified by OFCOM) as low power transmitters but closer (Aerial discrimination + BPL should allow for decoupling)
 - Solved by filters or even improved shielded cables.
 - LTE Uplink is only seen as random issue which does not raise visible customer claim.
 - Has to be further studied
 - Although 9 MHz Guard Band, unknown about PPDR usage?

Still:

- Full focus of the RE-D on DTT Receivers (second order issue) but not on active distribution (first order problem)
- Why not have a harmonised standard for mast head/communal/domestic amplifiers as these are the primary problem?

Already achieved DTT receiver immunity Improvements

CE manufacturers did not wait for RE-D to work on immunity

- Regional organizations (members of broadcast, broadcast network operators and CE manufacturers) used for certification already established LTE800, adjacent channel immunity, impulsive noise immunity.
- E-Book: used as reference in several countries (Spain, France , Italy)
 - Latest version includes T2 spec in IEC process and the parameters as published by DIGITALEUROPE already in 2012 in its White paper on Standardized DVB-T2 RF specifications.
- NorDig: used as reference in Scandinavia, Ireland , and other countries (Commonly used around the world as a reference for national DTT receiver specs)
- D-Book: used as reference in UK

Lifecycle and effect of immunity standards on DTT – Work for the “posteriority”?

- Don't expect that the solution to coexistence lies simply in mandating standards
 - Assuming a standard is approved to cope with the following milestones:
 - June 2016 – RE-D comes into force
 - June 2017 - deadline to comply to RE-D
 - In average, 7 years cycles for TV, less for set top boxes.
 - 2017+7 =2024
 - People should and will not upgrade for immunity to LTE-700 with no upgrade of services (e.g. HD/UHD), there is no motivation for consumers to upgrade
 - France, Sweden, Germany and Finland: LTE-700 expected starting in 2017
 - Current plans (except Germany) do not foresee modernizing the delivery but rather conservation of legacy services: lacking ambition for DTT
- LTE-700 has to protect DTT with existing equipment and deployments have to be done according to legacy equipment
 - Benefits from higher standard robustness could be reaped by 2024 but this is when the future use of UHF will be reassessed according to time-lines outlined in the Lamy report or even before (Plum study)
 - What will be the return on investment for industry for better robustness?
 - EC drives together with member states very ambitious timescales.

External filters as a solution

Which band / Where / When

- 800Mhz, 700Mhz depending on various MS agenda
- Cable reception should be taken into account
 - In some countries, cable is used to distribute DTT
 - Cable continues to use frequencies up to 862 MHz (e.g. French building regulations require communal distribution systems to have the full bandwidth)
 - Demodulator and tuner are generally common to cable and terrestrial
- An external filter to match the individual reception appears to be the most appropriate measures, until all regulatory aspects are stabilized and harmonized in Europe.
- Standards should be stable in time to avoid excessive R&D costs.
- However, filtering is always associated with insertion losses.

Key Messages

- CE Manufacturers will work on improving immunity provided that a stable environment is provided but drastically increasing immunity is unlikely to solve near- to mid-term coexistence issues.
 - ...which are often qualified as minor
 - Two years is the bare minimum time for implementing an approved standard into the market for any change in hardware (more if R&D needed)
 - Given timescales, legacy will have to be taken into account for roll out
 - Complete immunity is unrealistic

→ External Filters are a viable solution in most of the cases
- EC or MS should create added value on DTT for consumers to accelerate the DTT replacement cycle as the end-consumer is motivated by switching to new or improved services (such as HD or UHD), not a new technology.
- There may be drawbacks in increasing the immunity of DTT Receivers:
 - Tightening receiver characteristics on immunity may reduce sensitivity and other characteristics
 - National bodies may have to reconsider some of their performance figures (D-BOOK, E-Book, HD-Book, NorDig)
- EC should take care that transposition of RE-D in national regulation by MS is not creating market fragmentation especially until harmonized norms are available.
- CE faces the challenge to cope with a significant number of independent constraints in different domains without a clear overall perspective in return.