Activities in the WG FM SRD/MG related to Cognitive Radio Techniques

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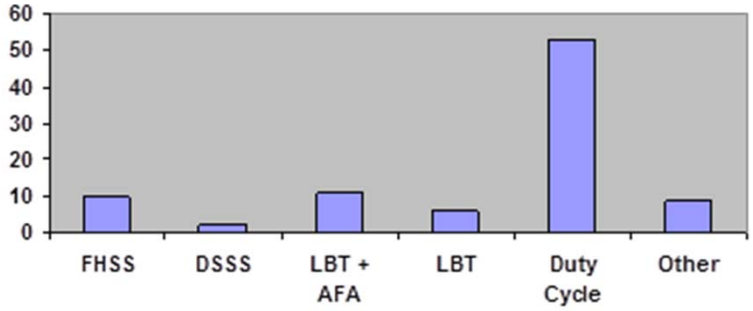
SRDs – only a minority is using the cognitive techniques

- The traditional way of sharing frequencies for SRDs is:



Source: ECO – Survey 863-870 MHz 2011, basis: > 50 million units placed on the market annually in 863-870 MHz

- Result of a combination of cost, size, and power consumption considerations.
- Duty Cycle mitigation dominates
- Three aspects (cost, size, power) have to be judged against predictability, latency, and data speed requirements of a particular application.
- Professional applications: Cognitive techniques should not be in contradiction to the application (Remember: UHF RFID LBT case)

SRD Principles - how it could apply to Cognitive techniques

- Technology Neutrality and Application Neutrality
  - This is the concept on non- specific SRD applications with common spectrum access rules;
  - It avoids unnecessary spectrum fragmentation and hence, increases efficient spectrum use;
- However,
  - there are a lot of specific SRD applications which need a more predictable sharing environment;
  - Without specific assumptions, many frequency opportunities for specific SRD applications would not have materialised (no positive co-existence conclusions)

- It is not easy to find out the right balance (non-specific approach could lead to prohibitive spectrum access parameters, a too specific approach to fragmentation and perhaps also not innovation friendly). There may also be the need to find the right balance for CR approaches.

How to improve spectrum sharing?

- ECC has received requests in a total of 5 ETSI System Reference Documents for future spectrum for a variety of application in the UHF band for other frequency
  - UHF Roadmap in WGFM SRD/MG focusing (not exclusively) on 863-870 MHz, 870-876 MHz, 915-921 MHz;
  - Industry does not trust the TVWS / CR opportunities;
  - Applications involved: non-specific SRD, Automotive, Smart Metering/sub-metering, Smart Grids, RFID, Alarms, Home Automation, hearing aids etc).

- Geo-location has been discussed but no proposals received from ETSI yet;
- The Duty Cycle concept is proposed to be improved (Low Duty Cycles) as well as DAA (Detect-And-Avoid, e.g. for RFID);
- For some professional (non-consumer) SRD applications, cognitive techniques may facilitate coexistence with existing services and applications

Example 1: Assistive Listening Devices (ALD)

- Many administrations already allow the operation of ALD in all or parts of the 174-216 MHz under license-exempt conditions. 174-216 MHz is already included in ERC REC 70-03 Annex 10;

- The studies in WGSE should provide guidance to administrations under which conditions, adaptive ALD may operate in spectrum not used by the primary services;

- The technical characteristics of ALD transmitters for these studies are understood to be the same as for ALD equipment operating in the 169 MHz band and the equipment can operate over a tuning range covering the 169.4 MHz to 169.8125 MHz as well as 174-216 MHz range;

- This is a specific case of a professional application in VHF applying the “cognitive technology approach”. This action follows work in the ECC under the 169 MHz mandate from the EC.

Example 2: Medical Body Area Network Systems (MBANS)

- New MBANS regulations are discussed in the ECC and also the FCC;
- Frequencies under study are in 2360-2500 MHz in the WGSE;
- The FCC will limit operations to medical professionals in hospitals and a notification and coordination duty is to be followed. This is an automatic process and includes that all MBANS master equipment will be requested to notify themselves in a national database. MBANS masters again will provide electronic keys to all MBANS client equipment within the operating distance (thus ensuring the location and radius of operation).
- This is another specific case of an “high-end” SRD application applying a “geo-location database concept” including the possibility to quickly react in case of interference at a given location.

Example 3: UHF RFID (DAA as a cognitive techniques)

- Study UHF RFID readers to use Detect-And-Avoid (DAA) for the protection of E-GSM-R (Work Item in WGSE PT SE24);
- ETSI STF 397 (ERM / ERM TG34) is developing and creating standards for UHF RFID DAA;
- The approach could be widened to develop a more generic approach to protect a variety of digital cellular/wireless access implementations provided that: the technology to protect is known (basis in 915-921 is PMR/PAMR or even service neutral licensing in some countries)!

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