Finnish Licensed Shared Access (LSA) trials

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Outline

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- LSA concept
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Introduction

- Mobile traffic is growing at rapid pace leading to increasing spectrum demand.
- New spectrum sharing concepts are being developed for MNOs to access new spectrum bands on a shared basis due to lack of unallocated bands and costly and time-consuming refarming process.
  - Europe: new Licensed Shared Access (LSA) concept is under heavy study.
- Trials are needed to showcase the functioning of the new spectrum sharing concepts with practical systems in realistic situations.
LSA Concept

- LSA concept aims at allowing new licensed users on spectrum bands that already encompass incumbent spectrum users with spectrum sharing that provides a certain quality of service (QoS) for both the entrants and the incumbents.
- The LSA concept could offer a cost-efficient solution for MNOs to access IMT bands currently used by other type of incumbents on a shared basis while protecting the rights of incumbents and offering operational certainty also for the MNO.
Previous work on LSA

**Regulation:**
- EC has given the definition for the LSA concept in Nov. 2013.
- CEPT has developed the LSA framework and a draft decision for the use of LSA for mobile in the 2.3-2.4 GHz band in 2014.

**Standardization:**
- ETSI has developed a system reference document for LSA in the 2.3-2.4 GHz band in July 2013.
- ETSI currently derives system requirements and develops system architecture.

**Research:**
- Research on the concept has started to appear in scientific forums.
- First public live trial of sharing using TD-LTE in the 2.3-2.4 GHz band was shown in Finland in 2013.
Finnish Trial Program (2011-2014)

- Trial Environment for Cognitive Radio and Networks programme (2011-2014) of Tekes – the Finnish Funding Agency for Innovation - offers international partners the opportunity to cooperate with the key players in Finland:
  - 51 projects, 10 companies and 7 research institutes with a total volume of 35 M€.
  - Trial programme has developed trial environments and related cognitive technology and showcased new spectrum sharing concepts, such as the LSA, in close collaboration between industry and research projects and regulation.
  - Finnish Communications Regulatory Authority (FICORA) rewarded Trial program for promoting electronic communications in 2013.

Finnish LSA trial group: CORE+ and WISE2 project consortia

Three public LSA trials: WWRF in Oulu 04/2013, LSA Trial Workshop in Helsinki 09/2013 and IEEE DySPAN in US 04/2014
Finnish LSA trial using live LTE network

Performance evaluation - setup

- Evacuation time from the incumbent’s evacuation request to the
time the LTE base station is offline was measured
  - Starts when the LSA repository delivers an evacuation request to
    the LSA controller.
  - LSA controller sends evacuation commands:
    - to network management system to switch off the base station, and
    - to the end users for forced handovers.
  - Ends when no base station signal is observed over the air
    anymore.
- QoS of end users was also measured.
Performance evaluation - results

- Evacuation time was on the average 26 s.
- Total handover execution took on the average 20 s.
- User connection break during evacuation was on the average only 100 ms.

Results indicate that:
- LSA band can be evacuated in a timely manner
- Evacuation process is almost invisible for end users who continue to be served with other network resources

Other LSA activity

- Technical
  - Live trials and their performance measurements
  - Cellular architecture evolution for LSA
  - LSA architecture consideration from incumbent perspective
- Business
  - LSA work flow and tasks of key stakeholders
  - Business models for MNOs
  - Business scenarios for incumbent spectrum users
  - Business benefits for key stakeholders
- Regulation
  - Contributions to preparation of ECC Report 205
Conclusions

- LSA concept allows MNOs to access new shared bands with guaranteed QoS while protecting the rights of incumbents.
- Finnish consortium has presented live field trials of the LSA concept where a TD-LTE network shares the spectrum in 2.3-2.4 GHz band with cordless camerass (PMSE service).
- Dynamic availability of the LSA band can be handled with existing network equipment and a minimum number of additional components, LSA Repository and LSA Controller.
- Finnish research activity has looked at the LSA concept from technical, business and regulatory sides. Future work will continue to cover more realistic settings.
- See you (and our latest LSA trial) at CrownCom 2014 in Oulu!

References

- Draft ECC Decision. Harmonised technical and regulatory conditions for the use of the band 2300 - 2400 MHz for MFCN. 2014