ITU Global Symposium for Regulators 2014
Manama, Bahrain, 2 – 5 June 2014

ITU activities related to Dynamic Spectrum Access

Radiocommunication Bureau
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ITU and radiocommunications

- ITU provides a forum where 193 Member States, 700 Sector Members and Associates and 40 Academia can cooperate for improvement and efficient use of telecommunications worldwide

1865 → **2014**

- Wireless world is taken care by ITU-R Sector. Its activities are aimed at providing an enabling environment for the sustainable development of radiocommunications:
  - Interference-free operation of radio applications
  - Harmonization of frequency usage
  - Promoting new technologies while protecting incumbent users
  - Efficient spectrum utilization
  - Quality and reliability of services provided to customers

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ITU focuses on new technologies/applications

- ITU accommodates and promotes new technologies through:
  - Setting up a regulatory framework at world and regional radio communication conferences-> Radio Regulations, Regional Agreements
  - Studying technical and spectrum management aspects in ITU-R Study Groups -> Reports, Handbooks, Recommendations
  - Collecting and disseminating best practices of spectrum usage-> reports, materials of workshops, seminars, forums (e.g. GSR)
- Dynamic spectrum access and white space applications need to follow the same path (e.g. studies, best practices, collection of views of different radio communities)

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Some terminology to start discussions

- Dynamic Spectrum Access (DSA):
  real-time adjustment of spectrum use in response to changing circumstances and objectives. DSA can be implemented via radio with some intelligence e.g. Cognitive Radio, Software Defined Radio, Database Radio, etc.
- TV White Space (TVWS):
  a portion of spectrum in a band allocated to the broadcasting service and used for television broadcasting that is identified by an administration as available for wireless communication at a given time in a given geographical area on a non-interfering and non-protected basis with regard to other services with a higher priority on a national basis. Source: ***Report ITU-R M.2225 (2011) "Introduction to cognitive radio systems in the land mobile service"***

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World radiocommunication conferences and DSA

- Previous WRCs already considered some DSA techniques
- WRC-97: use of frequency Adaptive Systems in MF and HF bands
  - Dynamic change of frequency/power depending on channel quality
  - Resolution **729**: Adaptive Systems have to evaluate channel occupancy before transmission, limit frequency use to minimum necessary, protect safety and passive services…
- WRC-03: use of Dynamic Frequency Selection (DFS) for RLANs
  - Resolution **229**: RLANs shall use DFS to protect radars in 5 GHz
- WRC-12: regulations for Cognitive Radio Systems. Conclusions:
  - No need to change Radio Regulations. RR have enough flexibility to use CRS in some services according to RR & national regulations
  - Recommendation **76** (WRC-12) recognizes that CRS need to: (a) operate according to RR; b) protect stations operating iaccording to RR. Invites administrations to participate in studies of CRS

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Radio Regulations and DSA

- RR - single set of international regulations on spectrum/orbit use
- RR established at WRC. Treaty nature->mandatory for application
- Some RR provisions may have impact on DSA, e.g. TVWS devices:
- ***4.4*** *Administrations shall not assign …any frequency in derogation of either the Table of Frequency Allocations …, except on the condition that using such assignment shall not cause harmful interference to, and shall not claim protection from a station operating in accordance with …these Regulations.*

  RR4.4 usage is not stable (reliable) : if there are no free channels for TVWS device, it has to switch-off, stopping service to customers
- ***18.1*** *No transmitting station may be established or operated … without a licence issued in … conformity with the provisions of these Regulations by or on behalf of the government of the country to which the station is subject*

  All radios shall operate under a license (individual or general) and follow established national rules

RR-12 are available free of charge at:
http://www.itu.int/pub/R-REG-RR-2012

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ITU-R studies on DSA and TVWS

- In ITU-R Study Groups 1, 5, 6. Framework Res. ITU-R 58 (RA-12)
- Working Party 1B - Spectrum management issues. Outputs:
  - Report ITU-R SM.2152: Definition of Software Defined Radio (SDR) and Cognitive Radio System (CRS)

"CRS - radio system employing technology that allows the system to obtain knowledge of its operational and geographical environment, established policies and its internal state; to dynamically and autonomously adjust its operational parameters and protocols according to its obtained knowledge in order to achieve predefined objectives and to learn from the results obtained"

  - Working document towards a PDN Report ITU-R SM.[WHITE-SPACE] on principles and spectrum engineering techniques for WS by radio systems employing cognitive capabilities

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ITU-R studies on DSA and TVWS (2)

- WP 1C: Spectrum Monitoring (CRS impact on monitoring)
  - New Recommendation ITU-R SM.2039
  - Working Doc. towards a PDN Report M.[SPEC_MON_EVOLUTION]
- WP 5A: Land mobile service, except IMT
  - Report M.2225 - " Introduction to cognitive radio systems in the land mobile service" - capabilities, challenges, deployment types
  - Preliminary DNR Report M. [LMS.CR2] on CRS in the land mobile services – characteristics, performances and CRS benefits
  - WP5A Seminar on CRS and White Spaces on 18 November 2013
- WP 5C: Fixed Service
  - Working towards a Report F. [FS-SDR] on the impact of SDR and CRS on the fixed service

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ITU-R studies on DSA and TVWS (3)

- WP 5D: IMT Systems
  - Report ITU-R M.2242: CRS specific for IMT systems
  - Additional studies on CRS implementation in IMT
- WP 6A: Terrestrial broadcasting service
  - PDN Report BT.[ASSESSDTTBCRS] on interference into broadcasting from CRS devices in 470 – 790 MHz
- Other WPs, ICAO: Liaisons with concern of aeronautical, space science, radionavigation-satellite communities on WS use
- Possible new issues for ITU-R studies :
  - Geo-location databases for use by White Space devices
  - White Space authorization/licensing regime
  - Coordination of White Space devices in border areas
  - Results of trials, best practices
  - Innovative regulatory tools, e.g. Licenced Shared Access

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Some references

- Resolution ITU-R 58 “Studies on the implementation and use of cognitive radio systems”
- Recommendation 76 (WRC-12) “Deployment and use of cognitive radio systems”
- Question ITU-R 230-3/5 “Software defined radios”
- Question ITU-R 241-2/5 “Cognitive radio systems in the mobile service”
- Question ITU-R 235/1 “Spectrum monitoring evolution”
- Report ITU-R SM.2152 “Definitions of Software Defined Radio (SDR) and Cognitive Radio System (CRS)”
- Report ITU-R M.2225 “Introduction to CRS in LMS”
- Report ITU-R M.2242 “CRS specific for IMT systems”
- PDN Report ITU-R [LMS.CRS2]” CRS in land mobile service
- ITU-R WP 5A Seminar: Seminar on Cognitive Radio Systems and the use of White Spaces (Geneva, 18 November 2013)
- ITU-R WP 1B Workshop: Spectrum Management issues on the use of White Spaces by Cognitive Radio Systems (Geneva, 20 January 2014)

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Conclusions

International Regulations (RR)

Providing place for discussions by all stakeholders

Studies of technical and spectrum management aspects

Gathering and disseminating best practices

- Experience in new technologies needs to be shared for benefit of all
- ITU-R studies are contribution-driven -> your participation in ITU-R activities is critically important for all stakeholders

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Thank you for your attention!

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