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| **Radiocommunication Study Groups** |  |
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| **10 December 2013** |
| **English only** |
| Annex 14 to Working Party 6A Chairman's Report |
| Working Document towards a preliminary draft new report ITU-R BT.[CRS\_BS\_BANDS] |
| Compatibility issues and national approaches related to introduction of Cognitive Radio Systems within frequency bands used by terrestrial broadcasting services |

# 1 Introduction

A number of countries have recently introduced or considering the introduction of Cognitive Radio Systems (CRS) within frequency bands, allocated to Broadcasting Service.

Devices applying cognitive radio techniques are seeking to use currently available spectrum using either sensing of its environment or via device management within specifications of a national database. CRS are techniques that can be applied to many applications and radio systems and do not have or require the definition of a service in the Radio Regulations.

The definitions of Cognitive radio system and Software-defined radio given in Report
ITU-R [SM.2152](http://www.itu.int/pub/publications.aspx?lang=en&parent=R-REP-SM.2152-2009).

“*Cognitive radio system (CRS)*: A 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.”

Practical application of cognitive technique requires that implementing radio system could have at least some capabilities of software-defined radio.

“*Software-defined radio (SDR)*: A radio transmitter and/or receiver employing a technology that allows the RF operating parameters including, but not limited to, frequency range, modulation type, or output power to be set or altered by software, excluding changes to operating parameters which occur during the normal pre-installed and predetermined operation of a radio according to a system specification or standard.”

Working Party 6A is concerned with the protection of the broadcasting service from interference, particularly from unlicensed users of the broadcasting spectrum. Applications, which do not have a defined frequency allocation in the RRs, must not cause any interference or claim protection from the services which are in the same band or adjacent bands.

CRS may operate using a part of the spectrum, which is currently available for it application (service, system) at a given time in a given geographical area on a non-interfering / non protected basis with regard to primary services and other services with a higher priority on a national basis. Therefore, extent of cognitive systems implementation will be determined by the presence of available frequency spectrum and will depend from the technical parameters necessary for such cognitive systems to operate.

The potential impact of:

– CRS cross-border emissions affecting national frequency assignments;

– CRS to become ubiquitous or have a global roaming;

should also be considered.

# 2 Bands, allocated to the broadcasting service

The broadcasting service has been allocated on a common Primary basis by Region as well as on a Primary / secondary basis by Region.

Frequency allocations made to the broadcasting service have also been allocated in many administrations as the primary delivery method of news to the general public. In addition, bands allocated to the broadcasting service have been applied to program making e.g. wireless microphones e.g. No 5.296.

Bands allocated to the broadcasting service may be found in Article **5** of the 2012 edition of Radio Regulations. ITU-R Study Group 6 has developed a report, what lists these frequency bands. Please refer to Document [6A/229](http://www.itu.int/md/R12-WP6A-C-0229/en).

It should be noted that in some parts of the world bands are also shared with other services. For example, the frequency band 790-800 MHz band is co-primary allocated with Mobile Service, except Aeronautical mobile service in all RR Regions starting from WRC-2012.

# 3 ITU-R parameters for the protection of the broadcasting service

In frequency bands where the broadcasting service has been allocated on a long-term basis, ITU-R has developed a series of Recommendations for the planning, implementation and protection of broadcasting services. These include the following ITU-R Recommendations:

– BS./BT.1895 Protection criteria for terrestrial broadcasting systems.

– BT.1368 Planning criteria, including protection ratios, for digital terrestrial television services in the VHF/UHF bands.

– BT.2033 Planning criteria, including protection ratios, for second generation of digital terrestrial television broadcasting systems in the VHF/UHF bands.

– P.1546 Method for point-to-area predictions for terrestrial services in the frequency range 30 MHz to 3 000 MHz where applied for planning and for interference assessment.

Where assessment for continuous interference has been a consideration, ITU-R has applied a method of applying a 3 dB increase to the interference allowance for environmental variations e.g. reflections, in the planning process. [*Editorial Note:* Reference to be placed.]

# 4 Technical parameters for the SDR/CRS systems

[*Editorial Note:* This is a place holder for references to ITU-R Reports and Recommendations containing the technical parameters of Cognitive radio systems and Software-defined radio.]

# 5 SAB/SAP issues

[*Editorial Note:* This is a place holder for material related to SAB/SAP issues with respect to:]

## 5.1 Cognitive technique implementation for SAB/SAP

## 5.2 Future coexistence with CRS operating in frequency bands, allocated to broadcasting

Current state, identified compatibility issues and national approaches for Cognitive Radio Systems implementation

The annexes in this report provide a compilation of current state of CRS and their development, identified compatibility issues, national approaches / best practices and respective experiences in the protection of TV Services in conjunction with the introduction of CRS.

[*Editorial Note:* At the next meeting of WP 6A, some input material for Annexes to be taken from the preliminary draft new Report ITU-R BT.[ASSESSDTTBCRS] - Assessment of interference into the broadcasting service from cognitive devices in the frequency band 470‑790 MHz. [Annex 9 to Document 6A/264](https://www.itu.int/md/choice_md.asp?id=R12-WP6A-C-0264!N09!MSW-E&lang=en&type=sitems).]

Working Party 6A seeks contributions from administrations, including:

– statements how it will be / has been implemented on a national basis;

– working examples on a national basis;

– common / typical characteristics of these systems;

– compatibility / implementation issues identified;

– protection requirements of the broadcasting service on an international regulatory basis;

– technical and regulatory approaches;

– management of CRS over locations/time;

in the form relevant to be a separate annex to this report. Authors of input Documents [6A/308](http://www.itu.int/md/R12-WP6A-C-0308/en), [6A/311](http://www.itu.int/md/R12-WP6A-C-0311/en), [6A/323](http://www.itu.int/md/R12-WP6A-C-0323/en), [6A/343](http://www.itu.int/md/R12-WP6A-C-0343/en) invited to update their material in the form relevant to be a separate Annex to this report and submit a new contribution]

[ANNEX 1 State of implementation, issues identified and national approaches form country XXX]

[ANNEX 2 State of implementation, issues identified and national approaches form country YYY]

[ANNEX 3 State of implementation, issues identified and national approaches form country ZZZ]