ETSI TR 103 263 V1.2.1 (2016-02)

System Reference document (SRdoc);
Cognitive radio techniques for
Satellite Communications operating in Ka band

Reference
RTR/ERM-516

Keywords
radio, satellite, spectral management, SRdoc, system, terrestrial

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Contents

Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (https://ipr.etsi.org/).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Foreword

This Technical Report (TR) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM).

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

Executive summary

As the Internet traffic grows, Broadband satellite systems have to increase their capacity. Beyond space segment performance upgrade, additional spectrum is needed. Ka band is the preferred frequency band for such network. It includes exclusive spectrum allocation to FSS as well as spectrum shared between FSS and other services among which FS or FSS feeder links for BSS.

Until now, the risk associated to the use of these shared bands may have discouraged its full exploitation by satellite systems.

Cognitive radio techniques may help to minimize this risk under appropriate operational and regulatory conditions.

The present document provides an overview of typical Broadband Satellite systems targeting the Ka band shared between FSS and other services, the related market data and spectrum regulation context.

It then analyses the co-existence scenarios of FSS with FS or FSS feeder links for BSS, the enabling Cognitive Radio techniques as well as operational and regulatory conditions for a safer use of the shared spectrum.

Introduction

The present document has been developed to support the co-operation between ETSI and the Electronic Communications Committee (ECC) of the European Conference of Post and Telecommunications Administrations (CEPT).

Flexible spectrum utilization is a surging trend for the optimized exploitation of spectrum resources, and the cognitive approach has already demonstrated its potential for terrestrial systems, but not yet in the SatCom domain. However, SatCom are fundamental to achieve the challenging objectives of fast broadband access for everyone by 2020: their inherent large coverage footprint makes them the most suitable access scheme to reach those areas where deployment of wired and wireless networks is not economically viable.

The Cognitive Radio (CR) paradigm has been identified as a promising solution to conciliate the existing conflicts between spectrum demand growth and spectrum under utilization, and increase the overall efficiency of spectrum exploitation.

It is worth mentioning the 03-September-2012 Communication (2012) 478 [i.8] from the European Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the promotion of the shared use of radio spectrum resources in the internal market. This communication provides clear guidance on the ways the technology research can help the compliance of the policy objectives.

Furthermore, in 2011, the Radio Spectrum Policy Group (European Commission) issued a *Report on Collective Use of Spectrum* that noted the high demand for shared use [i.1]. The RSPG stated that: "*there is a need to progress further on appropriate regulatory mechanisms in regard to sharing of spectrum*". The key challenge for National Radio Authorities is to find appropriate ways to authorize *shared spectrum access* to a band, i.e. to allow two or more users to use the same frequency range under a defined sharing arrangement.

This justifies the relevance of the present document that analyses the potential of CR concepts in satellite networks context, in order to improve coexistence scenarios in selected spectrum allocated to SatCom services. It has been largely drafted with the support of the EU funded project CoRaSat (see [i.51]).

1 Scope

The present document identifies the potential regulatory impacts associated to the operation of SatCom solutions implementing cognitive radio techniques. In particular it addresses different scenarios in Ka band (17,3 GHz - 20,2 GHz for space to earth and 27,5 GHz - 30,0 GHz for earth to space) where the satellite communication service should not create any harmful interference to another incumbent whether terrestrial or satellite service entitled to use the same spectrum on a primary basis. It includes in particular:

- market information;
- technical information (including expected sharing and compatibility issues);
- regulatory issues.

The present document also identifies the existing related ETSI standards enabling this kind of architecture.

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at http://docbox.etsi.org/Reference.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are necessary for the application of the present document.

Not applicable.

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] Point Topic: "BB-MED TN3.1, Expected Broadband demand in 'ESA Study Countries' in 2020", March 2012.

[i.2] COM(2010) 245: "A Digital Agenda for Europe, European Communication", Brussels, 19.05.2010.

[i.3] ETSI EN 302 307 (V1.2.1): "Digital Video Broadcasting (DVB); Second generation framing structure, channel coding and modulation systems for Broadcasting, Interactive Services, News Gathering and other broadband satellite applications (DVB-S2)".

[i.4] ETSI TS 101 545-1 (V1.1.1): "Digital Video Broadcasting (DVB);Second Generation DVB Interactive Satellite System (DVB-RCS2); Part 1: Overview and System Level specification".

[i.5] ETSI EN 301 545-2 (V1.1.1): "Digital Video Broadcasting (DVB); Second Generation DVB Interactive Satellite System (DVB-RCS2); Part 2: Lower Layers for Satellite standard".