

SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)
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COGNITIVE RADIO FOR SATCOM APPLICATIONS: THE SCREEN PROJECT

Abstract

Spectrum allocation for current wireless communication systems is performed by the regulatory and licensing bodies, who allocate spectrum bands for given applications. This strict allocation severely limits the effectiveness and flexibility of the spectrum use. Cognitive radio (CR) has been demonstrated as a key emerging technology to provide flexible and efficient use of the available spectrum by allocating frequency bands dynamically, and to improve the performance of radio systems in congested or jammed environments. Frequencies that are reserved or usually occupied can be exploited if the cognitive radio system identifies them as being free. Such a system is also able to monitor and deal with degrading communication performance or regulatory constraints. It automatically adjusts radio settings to use the best wireless channels in its environment, ensuring appropriate quality of service, efficiency and versatility.

The SCREEN project proposes to extend the concept of cognitive radio to space and particularly to Satcom applications. This is an on-going project funded by the Horizon 2020 European Union programme.

CR has never been used or tested in space, since previous research has been focused in terrestrial technologies. By addressing this topic and demonstrating its capabilities and benefits for space applications, SCREEN will contribute to a better management of this scarce resource that is bandwidth. While it has already been demonstrated that CR technology radically improves the performance for terrestrial

applications at many different levels, the same benefits also apply in Space and especially in the Satcom segment, where the services provided need to ensure quality to the clients, for market competitiveness. CR has the potential to enable different approaches for managing the growing satellite communication demands and provides flexibility to explore new types of hybrid networks. Satcom operators will benefit from having the flexibility to allocate frequency slots dynamically, according to the instantaneous traffic patterns, instead of reserving fixed bands within regulatory constraints. Additionally, by optimising the spectrum management, Satcom operators can accommodate more users at the same time, without sacrificing the network performance.

In this paper we will describe the overall concept behind the SCREEN project and present the results of a complete framework analysis, consisting of technical conclusions, market and impact analyses, regulatory considerations/constraints and requirements. Based on this analysis we further present functional, performance and test requirements for the project, which will show the project direction and outcome, together with the expected benefits that this technology will bring to Space applications.