Understanding Dynamic Spectrum Sharing: Field to Lab Methodology and Case Study

Darren McCarthy[1] and David Erisman[2]
(1) Rohde & Schwarz America, Hillsboro, OR 97124, https://www.rohde-schwarz.com
(2) ERISYS LLC, Herndon, VA 20171, https://www.erisys.com

With the demand to fulfill the insatiable appetite for voice, video, and data connectivity anywhere and anytime, the need for more spectrum bandwidth is a never ending challenge. When considering available spectrum, the NTIA and FCC have focused on spectrum that appears viable for coexistence through a measure of dynamic spectrum sharing (DSS). Recent technology and standards enhancement for dynamic access control, frequency selection, and detect and avoid technologies show promise to enable the successful sharing of occupied spectrum.

The traditional methods of measurement of spectrum occupancy can be misleading when you consider the temporal nature of signals in these coexistence bands of interest. Whether your target signals for coexistence are radars, frequency hopping signals, or time division duplex signals (TDD), realtime technologies enable the assessment of time-varying signals and the probability of collision on uncooperative (or uncoordinated) signals of interest.

This paper will discuss the challenge of assessing Dynamic Spectrum Sharing efficiency in the real world and demonstrate an example of a methodology that has been used for assessment of field to lab performance.

The outline of this paper is as follows:

- Overview of areas of dynamic spectrum sharing
- Definition of system requirements for field assessment
    - Realtime architecture overview
    - Realtime tool overviews
- Case Study:
    - Setup and collection of spectrum behavior of commercial uncooperative devices
    - Demonstration of Methods of analysis (collision assessment, reaction latency, etc)
    - Management of large data sets in a lab environment.

Real world examples will be used for the case study using commercially available technologies, however, the applicability of the methodology can be extended to the assessment of non-commercial test requirements and electronic warfare pulse-on-pulse conditions.