IEEE P802.19

Wireless Coexistence

TV White Space PAR and 5C				
Date: 2009-9-16				
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Abstract

This document is a work in process draft of a PAR and 5C's for TV White Space Coexistence developed by the co-authors with extensive assistance from other participants in the IEEE 802.19 TV White Space Study Group. It also builds on previous contributions and discussions within the Working Group including "Directions To a TV White Space Coexistence Mechanisms PAR" DCN 56.

This draft is a result of an effort to respond to the NICT contribution (DCN's 61 & 62). It's preparation involved follow-on discussions with the NICT team and detailed and careful consideration of their points.

PAR
Title: Standard for TV White Space Coexistence Mechanisms

5.2   Scope

The standard specifies mechanisms for coexistence amongst networks and devices, which use dissimilar radio technologies and may also be operated independently on common TV White Space Frequency Bands.

5.3   Dependency On Other Standards

None

5.4   Purpose

The purpose of the standard is to enable the family of IEEE 802 Wireless Standards to most effectively use TV White Space by providing standard coexistence mechanisms. This standard addresses coexistence of IEEE 802 networks and devices and will also be useful for non IEEE 802 networks and devices in TV White Space.

5.5   Need

Existing IEEE 802 standards groups are developing standards to comply with the regulatory rules for accessing TV White Space. Mechanisms that allow these standards to coexist are needed. The work proposed here will result in standard overlay mechanisms that allow these different 802 standards to coexist in TV White Space. It will also seek to allow coexistence with other well established non IEEE 802 wireless standards.

7.1   Similar Standards

It appears that there may be related work going on in The TV White Space Data Base Group, 3GPP, OMA, P1900.4.1, P1900.4a, and IEEE 1900.4 - 2009 produced by P1900.4. These will be explored and if there is material that would be valuable for this effort, it will be incorporated.

8.1   Explanatory Notes

The radio technology independent coexistence mechanisms that will be standardized will address the following and related areas:

Discovery is the process of determining that there are two or more dissimilar and independently operated wireless networks or devices desiring to use the same White Space frequency in the same location. This can occur in two ways. The two networks or devices may attempt to enter at the same time or one may be present and a second seek to enter. In the second case, a network operating in White Space, must periodically check for new entrants and a new entrant must check before entering. An etiquette may be helpful in this process.

A **Connection** for Coexistence is necessary for two dissimilar and independently operated wireless networks or devices to exchange information in order to enhance their ability to coexist. There are two prominent ways to provide such a connection. One way is through a back haul facility connecting to the Internet. The US FCC TV White Space Rules require a direct or indirect connection to the Internet for the majority of White Space Device types (radios using the white space spectrum) and this, therefore is a potential physical connection. Using the wireless spectrum is also a potential way of providing a physical connection.

A **Logical Mechanism** for Promoting Coexistence is a mechanism that involves the exchange of information between different dissimilar and independently operated networks or devices and may also involve an algorithm seeking to maximize the quality of service for all participants.

An **Etiquette** is a set of rules for 'polite' behavior by radios. It can involve elements, which facilitate coexistence, such as periodic silence periods and listen before talk algorithms. As such, it can play a role in the above.

These mechanisms will include ways to assure that they are correctly functioning.

The Standards will first address implementations under the USA FCC TV White Space Rules and as a follow on consider if and how modifications need to be made to function under other regulatory regimes.

The term "dissimilar" used in this document refers to the networks and devices, which use different radio technologies adapted for TV White Space Frequency Bands.

The term "independently operated" used in this document refers to the fact that even similar (from radio technology point of view) networks and devices may be operated by independent entities, which do not necessarily have a business relationship for coordinating their use of TV White Space Frequency Bands. For example, this differentiates independently operated from a situation in which a single administrative authority manages the coexistence between dissimilar technologies deployed in a composite network.

TV White Space Coexistence 5C's

1. Broad Market Potential

There is a broad market potential and it is demonstrated by the fact that Microsoft, Google and Dell founded the TV White Space Data Base Group to address this market specifically.   The current 33 members include many other prominent companies. The market potential is further demonstrated by the presentations in the Executive Committee TV White Space Study Group Tutorial and the following contributions in IEEE 802.19 DCN's: 10, 16, 17, 23, 24, 26, 27, 31, 32, 34, 35, 42, 43, 44, 45, 46, 48, 49, 50, 52, 56, 58, 60, 61, 62, 64, 68, 70.

2. Compatibility

The Working Group will coordinate closely with all other working groups within IEEE 802 to insure compatibility within IEEE 802. The Working Group will seek compatibility with external standards groups through a review of their activities.

3. Distinct Identity

Other Working Groups are appropriately developing approaches for how their standards will be modified to meet the FCC's minimum requirements for access to the TV White Space spectrum. The coexistence mechanisms developed by this group will avoid mutual interference.

4. Technical Feasibility

Within the IEEE 802.19 TV White Space Study Group there have been a number of contributions demonstrating a number of technically feasible solutions. These contributions include the following IEEE

802.19 DCN's: 10, 16, 17, 23, 24, 26, 27, 31, 32, 34, 35, 42, 43, 44, 45, 46, 48, 49, 50, 52, 56, 58, 60, 61, 62, 64, 68, 70.

5. Economic Feasibility

Within the IEEE 802.19 TV White Space Study Group there have been a number of contributions demonstrating economically feasible solutions. These contributions include the following IEEE 802.19 DCN's: 10, 16, 17, 23, 24, 26, 27, 31, 32, 34, 35, 42, 43, 44, 45, 46, 48, 49, 50, 52, 56, 58, 60, 61, 62, 64, 68, 70.