IEEE P802.19
Wireless Coexistence

Logical System Overview Section

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Abstract

This is a contribution to IEEE 802.19 TG1 about system description section and the proposal is to have a new sub-section to give an overview of the coexistence system. The document is intended to be updated frequently based upon comments received from the TG and thus the current version is an intermediate version that is targeted to be adopted at the end to the 802.19.1 draft.

The contribution has two main sections from which the first one (Background information) discusses the reasons behind the proposal. The second section (Text proposal for the candidate draft) contains text that is being proposed to be incorporated into the latest candidate draft. The section contains some instructions to the technical editor to facilitate the editing work.

1 Background information

We believe the IEEE 802.19.1 candidate draft misses an overview sub-section in the system description section (section 3) that would serve as an introduction to a reader to the specification. Currently we have just short introductions to the system architecture and its logical elements and interfaces but there is nothing how those elements and the interfaces form a coexistence system and what are the elements' responsibilities and functionality to keep the system working. We believe such description is needed early on in the draft and this submission contains in the next section initial text that is proposed to be adopted as a framework for further revisions of the draft.

2 Text proposal for the candidate draft

Editorial instruction: Have the following new section with a set of sub-sections added to the candidate draft after the section 3.5 Coexistence services and update the subsequent section numbering accordingly.

3.6 Logical coexistence system overview

Core of the IEEE 802.19.1 coexistence system is comprised of interconnected coexistence managers (CMs) and a set of interconnected coexistence discovery and information servers (CDIS) to which all the CMs are connected. On the edge of the coexistenc system there are coexistence enablers (CEs) that are interface elements through which white space objects (WSO) can consume services of the coexistence system. Each WSO is represented by a CE and there is one-to-one mapping between a WSO and a CE.

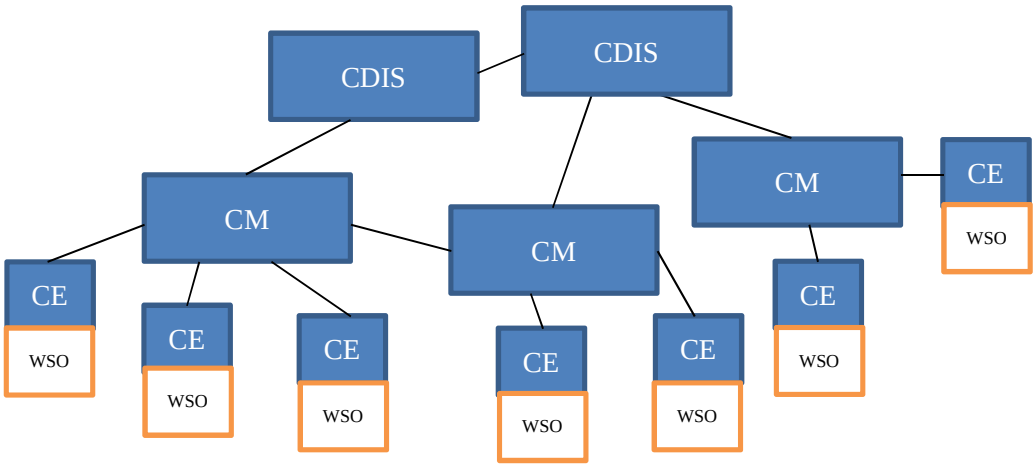

Figure 1: Logical coexistence system overview

3.6.1 CE view of the coexistence system

In order for a WSO to use the coexistence system and its services it needs to be connected to a CE. The CE authenticates to the coexistence system, subscribes to the coexistence system services available for WSOs and registers to the system. The CE does all this on behalf of the WSO connected to it. Thus the WSO is not visible to the coexistence system but the CE represents the WSO connected to it. The WSO is either a TVWS device or a network of TVWS devices. When a WSO is a network of TVWS devices, the WSO represents a number of wireless devices that have a wireless receiver or transmitter or both capable of operating at the TVWS band. Then the WSO has means to control operations of the number of TVWS

devices that it represents to the direction of the coexistence system. When a WSO is a TVWS device, the WSO represents just itself.

3.6.1.2 CE authentication

First step a CE needs to take in order to become a part of the coexistence system is authentication. A CE authenticates with a CM and it is valid only with the CM with which the authentication has been done. So, the specification doesn't provide coexistence system level authentication but the authentication is always between a CE and a CM.

3.6.1.3 Service subscription

Once a CE has successfully authenticated to a CM it may subscribe to any of the coexistence system services that are available. The CE may change service subscription at any time while it is authenticated to the CM.

3.6.1.4 CE registration

Once a CE has subscribed successfully to at least one of the coexistence services that are available the CE uses the CE registration to provide information about the WSO to the coexistence system. The CE registration is used also to indicate updates in the WSO information and keep the coexistence system aware of changes in the information.

3.6.2 Coexistence discovery and information servers

Coexistence discovery and information servers are connected to each other to share information about WSOs that they need to consider in coexistence discovery procedures they run. The interconnected CDISs provide means for the coexistence managers to find out those WSOs that need to coexist and the CMs that serve those WSOs. The interconnected CDISs are structured so that a CM may connect to any coexistence discovery and information server and become served in terms of coexistence discovery.

3.6.3 Coexistence managers

Coexistence managers are coexistence decision makers that interconnect with each other to exchange information about CEs they serve in case the CEs are connected to WSOs that need to coexist with each other. Coexistence managers are connected to the coexistence discovery and information servers for coexistence discovery pruposes. With help from the CDIS the CM determines for each CE it serves those WSOs with which the WSO connected to its own CE need to coexist. As the result the CM has a coexistence set for each of the CEs it serves. If the coexistence set has CEs that are served by other CMs the CM gets connected to those other CMs. The CM keeps connected to the other CM as long as it has in one of its coexistence sets at least one CE served by the other CM. The CMs use the connections to exchange information about the WSO capabilities, requirements, operating parameters and coexistence environment.

The CMs exchange also information about the coexistence decision approach and the coexistence decision topology applied in the coexistence decisions related to the WSOs. Both these have effect on use of the interconnections between CMs.

The specification provides means for a CM to apply centralized, autonomous and distributed decision topology. When a CM applies either the autonomous or distributed decision topology, the CM gets connected to other CMs as per the rules stated above and the CMs interact whenever they serve CEs that are connected to WSOs that need to coexist. The only exceptions in this respect are the CMs that apply the centralized decision topology. A CM that applies the centralized decision topology operates in either the master mode or the slave mode. A CM that operates in the slave mode has a master CM and the slave CM is connected only to the master CM. A CM that operates in the master mode represents also those CEs that are connected to the slave CMs that operate under control of the master CM to the direction of other CMs. Thus a master CM is connected to other master CMs and CMs that apply the autonomous or

distributed decision topology when the CMs or their slave CMs serve CEs connected to WSOs that need to coexist.

When the interconnected CMs apply the same coexistence decision topology and the same coexistence decision approach the CMs may interact also on the coexistence decision level. The CMs may then apply joint decision making that requires message exchanges between them as part of coexistence decisions.