IEEE P802.19
Wireless Coexistence

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| Proposed Coexistence Discovery Algorithm |
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Abstract

This document is a submission to IEEE 802.19 TG1 proposing a coexistence discovery algorithm.

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# Proposed update

*It is proposed to create an informative annex Algorithms and a Coexistence Discovery Algorithm using the text below.*

# Annex A: Coexistence discovery algorithm

The CDIS shall maintain the following output parameters up to date:

OutputParameters ::= SEQUENCE OF SEQUENCE {

 --CM ID

 cmID CxID,

 --List of CEs

 listOfCEs SEQUENCE OF SEQUENCE {

 --CE ID

 ceID CxID,

 --List of WSOs

 listOfWSOs SEQUENCE OF SEQUENCE {

 --WSO ID

 wsoID OCTET STRING,

 listOfAvailableFrequencies SEQUENCE OF SEQUENCE {

 --Frequency range

 frequencyRange FrequencyRange,

 --List of neighbor CMs

 listOfNeighborCMs SEQUENCE OF SEQUENCE {

 --Neighbor CM ID

 neiCMID CxID,

 --List of neighbor CEs

 listOfNeighborCEs SEQUENCE OF SEQUENCE {

 --Neighbor CE ID

 neiCEID CxID,

 --List of neighbor WSOs

 listOfNeighborWSOs SEQUENCE OF SEQUENCE {

 --Neighbor WSO ID

 neiWSOID OCTET STRING,

 --Neighbor WSO network technology

 neiNetworkTechnology NetworkTechnology,

 --Interference direction among subject WSO and neighbor WSO

 interferenceDirection InterferenceDirection,

 --Normalized distance between subject WSO and neighbor WSO

 distance REAL

 }

 }

 }

 }

 }

 }

}

The coexistence discovery algorithm is as follows.

First, all WSOs are sorted according to frequency groups. One frequency group includes WSOs having the same available frequency. Two WSOs have same available frequency if they have same or overlapping values of the ***frequencyRange*** parameters in the ***MaintainedInformation***. Each frequency group is processed independently.

In each frequency group all possible pairs of WSOs are processed as follows.

For a pair of WSOs  and  real distance  is calculated as the geographical distance between them using the values of the ***geolocation*** parameters of these WSOs in the ***MaintainedInformation***.

Then, normalized distance  on the available frequency  is calculated as follows:



Where  and  are the values of the ***radius*** parameters of the WSOs  and  on the available frequency  in the ***MaintainedInformation***.

The normalized distance  is compared to the coexistence discovery thresholds corresponding to the network technologies of the WSOs  and  as follows.

We use the following notations:

*  is the value of the ***networkTechnology*** parameter of the WSOs  in the ***MaintainedInformation***
*  is the value of the ***networkTechnology*** parameter of the WSOs  in the ***MaintainedInformation***
*  is the value of the coexistence discovery threshold for network technologies  and  in the ***CoexistenceDiscoveryThresholds***
*  is the value of the coexistence discovery threshold for network technologies  and  in the ***CoexistenceDiscoveryThresholds***.

If  or , then WSOs  and  are neighbors.

The CDIS shall include WSO  in the ***OutputParameters*** under the WSO  element of the ***listOfWSOs*** parameter under the available frequency  element of the ***listOfAvailableFrequencies*** parameter. The value of the ***neiCMID*** parameter in the ***OutputParameters*** shall be set to the value of the ***cmID*** parameter of the WSO  in the ***MaintainedInformation***, the value of the ***neiCEID*** parameter in the ***OutputParameters*** shall be set to the value of the ***ceID*** parameter of the WSO  in the ***MaintainedInformation***, the value of the ***neiWSOID*** parameter in the ***OutputParameters*** shall be set to the value of the ***wsoID*** parameter of the WSO  in the ***MaintainedInformation***, the value of the ***neiNetworkTechnology*** parameter in the ***OutputParameters*** shall be set to the value of the ***networkTechnology*** parameter of the WSO  in the ***MaintainedInformation***, and the value of the ***neiNetworkTechnology*** parameter in the ***OutputParameters*** shall be set to the value of the calculated normalized distance .

The CDIS shall include WSO  in the ***OutputParameters*** under the WSO  element of the ***listOfWSOs*** parameter under the available frequency  element of the ***listOfAvailableFrequencies*** parameter. The value of the ***neiCMID*** parameter in the ***OutputParameters*** shall be set to the value of the ***cmID*** parameter of the WSO  in the ***MaintainedInformation***, the value of the ***neiCEID*** parameter in the ***OutputParameters*** shall be set to the value of the ***ceID*** parameter of the WSO  in the ***MaintainedInformation***, the value of the ***neiWSOID*** parameter in the ***OutputParameters*** shall be set to the value of the ***wsoID*** parameter of the WSO  in the ***MaintainedInformation***, the value of the ***neiNetworkTechnology*** parameter in the ***OutputParameters*** shall be set to the value of the ***networkTechnology*** parameter of the WSO  in the ***MaintainedInformation***, and the value of the ***neiNetworkTechnology*** parameter in the ***OutputParameters*** shall be set to the value of the calculated normalized distance .

If  and , then the CDIS shall set the value of the ***interferenceDirection*** parameter in the ***OutputParameters*** for the subject WSO  and neighbor WSO  under the available frequency  to ***victim*** and shall set the value of the ***interferenceDirection*** parameter in the ***OutputParameters*** for the subject WSO  and neighbor WSO  under the available frequency  to ***source***.

If  and , then the CDIS shall set the value of the ***interferenceDirection*** parameter in the ***OutputParameters*** for the subject WSO  and neighbor WSO  under the available frequency  to ***source*** and shall set the value of the ***interferenceDirection*** parameter in the ***OutputParameters*** for the subject WSO  and neighbor WSO  under the available frequency  to ***victim***.

If  and , then the CDIS shall set the value of the ***interferenceDirection*** parameter in the ***OutputParameters*** for the subject WSO  and neighbor WSO  under the available frequency  to ***mutual*** and shall set the value of the ***interferenceDirection*** parameter in the ***OutputParameters*** for the subject WSO  and neighbor WSO  under the available frequency  to ***mutual***.

After all frequency groups are processed, the updated ***OutputParameters*** are compared to previous ***OutputParameters***. If any of the parameters of the WSO  in the ***listOfWSOs*** parameter in the ***OutputParameters*** have been changed, the CDIS shall generate and send ***CoexistenceSetInformationAnnouncement*** message to the CM serving WSO . If coexistence set information has been changed for several WSOs served by the same CM, the CDIS shall combine the updated coexistence set information in one ***CoexistenceSetInformationAnnouncement*** message to reduce the number of messages to be exchanged between the CDIS and the CM.

The elements in the ***listOfSubjectCEs*** parameter in the ***CoexistenceSetInformationAnnouncement*** message correspond to the elements of the ***listOfCEs*** parameter in the ***OutputParameters*** for the CM for the WSOs coexistence set information has been changed.

The ***cmID***, ***ipAddress***, and ***portNumber*** parameters in the ***listOfNeighborCMsTransport*** parameter in the ***CoexistenceSetInformationAnnouncement*** message correspond to the ***cmID***, ***ipAddress***, and ***portNumber*** parameters in the ***listOfCMs*** parameter in the ***MaintainedInformation*** for the CMs mentioned in the ***listOfNeighborCM*** parameters in the ***CoexistenceSetInformationAnnouncement*** message.