IEEE P802.11
Wireless LANs

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| cc50-cid-1429-discussion-on-time-synchronization-in-MAPC-framework |
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Abstract

This submission proposes resolution for CID 1429 received for CC50 in D0.2

**Revision information**

The following is a summary of the important changes that occurred within each revision of this document:

|  |  |
| --- | --- |
| **Revision** | **Major changes** |
| 0 | Initial revision |
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*TGbn editor: The baseline for this document is P802.11bn D0.3 and P802.11REVmeD7.0*

*TGbn Editor: Editing instructions preceded by “TGbn Editor” are instructions to the TGbn editor to modify existing material in the TGbn draft. As a result of adopting the changes, the TGbn editor will execute the instructions rather than copy them to the TGbn Draft.*

# Comments (CIDs) resolved:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Clause** | **Page.line** | **Comment** | **Proposed Change** | **Resolution** |
| 1429 | Akira Kishida | 37.8 | 71.19 | The method of how APs joining MAPC adjust time synchronization should be specified. | As in comment. | **Revised**Agree with the commenter in principle. **TGbn editor, please incorporate changes tagged with #1429 in 11-25/1023r0.** |

## Discussion:

Issue: In the MAPC framework, we need a time synchronization for implementing some MAPC schemes. For example, after accepting a Co-RTWT agreement, the Co-RTWT coordnated AP shall advertise the start time of the R-TWT schedule(s) of a Co-RTWT requesting AP by converting the value of the Target Wake Time field of the Co-RTWT parameter set received from the Co-RTWT requesting AP to the Co-RTWT coordinated AP’s local TSF. Such time info converting requires a synchronization between the Co-RTWT coordnated AP and the Co-RTWT requesting AP. However, we do not have defined an AP-AP sysnchronization mechanism for MAPC framework.

Proposal: A MAPC requesting or responding AP sets up a MAPC synchronization by exchanging the timestamp info (Timestamp field) during the MAPC agreement negotiation procedure. To implement the MAPC synchronization, a MAPC requesting AP (responding AP) transmits a MAPC Negotiation Request (Response) frame including Timestamp field that indicates the TSF value of the MAPC requesting AP (responding AP). After receiving the timestamp info, the MAPC requesting (responding) AP can synchronize with the MAPC responding (requesting) AP by maintain the timing offset value between its own TSF timer and the TSF timer of the MAPC responding (requesting) AP. Such technology is similar with the Neighbor offset synchronization method, as defined in 14.14.2.2.

## Proposed Text starts here

9.4.2.aa3.1 General

The format of the MAPC Control field is defined in Figure 9-aa8 (MAPC Control field).

|  |  |  |  |
| --- | --- | --- | --- |
|  | B0 | B1 | B2 B7 |
|  | AP ID Present | Timestamp Present | Reserved |
| Bits: | 1 | 1 | 6 |

 (#1429)Figure 9-aa8—MAPC Control field format

The AP ID Present field is set to 1 if the AP ID field is present in the MAPC Common Info field, and it is set to 0 otherwise.

**(#1429)** The Timestamp Present field is set to 1 if the Timestamp field is present in the MAPC Common Info field, and it is set to 0 otherwise.

The MAPC Common Info field carries information that is common to all the MAPC schemes. The format of the MAPC Common Info field is defined in Figure 9-aa9 (MAPC Common Info field format).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | MAPC Common Info Length | MAPC Capabilities | MAPC Parameters  | AP ID  | Timestamp |
| Octets: | 1 | 1 | 1 | 0 or 2 | 0 or 8 |

**(#1429)**Figure 9-aa9— MAPC Common Info field format

The MAPC Common Info Length field indicates the number of octets in the MAPC Common Info field including one octet for the MAPC Common Info Length field.The format of the MAPC Capabilities field is defined in Figure 9-aa10 (MAPC Capabilities field format).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | B0 | B1 | B2 | B3 | B4 | B5 B7 |
|  | AP TB PPDU Response Supported | Co-BF Supported | Co-SR Supported | Co-TDMA Supported | Co-RTWT Supported | Reserved |
| Bits: | 1 | 1 | 1 | 1 | 1 | 3 |

Figure 9-X5— MAPC Capabilities field format

The AP TB PPDU Response Supported field is set to 1 if the AP supports transmitting a TB PPDU in response to a Trigger frame. Otherwise, the AP TB PPDU Response Supported field is set to 0 to indicate that the AP does not support transmitting a TB PPDU in response to a Trigger frame.

The Co-BF Supported field is set to 1 if the AP supports Co-BF. Otherwise, the Co-BF Supported field is set to 0.

The Co-SR Supported field is set to 1 if the AP supports Co-SR. Otherwise, the Co-SR Supported field is set to 0.

The Co-TDMA Supported field is set to 1 if the AP supports Co-TDMA. Otherwise, the Co-TDMA Supported field is set to 0.

The Co-RTWT Supported field is set to 1 if the AP supports Co-RTWT. Otherwise, the Co-RTWT Supported field is set to 0.

The format of the MAPC Parameters field is defined in Figure 9-aa11 (MAPC Parameters field).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | B0 | B1 | B2 | B3 | B4 B7 |
|  | Co-BF Agreement Establishment Enabled | Co-SR Agreement Establishment Enabled | Co-TDMA Agreement Establishment Enabled | Co-RTWT Agreement Establishment Enabled | Reserved |
| Bits: | 1 | 1 | 1 | 1 | 4 |

Figure 9-a11— MAPC Parameters field format

The Co-BF Agreement Establishment Enabled field is set to 1 if the AP has enabled MAPC negotiations for establishing new MAPC agreements for Co-BF. Otherwise, the Co-BF Agreement Establishment Enabled field is set to 0.

The Co-SR Agreement Establishment Enabled field is set to 1 if the AP has enabled MAPC negotiations for establishing new MAPC agreements for Co-SR. Otherwise, the Co-SR Agreement Establishment Enabled field is set to 0.

The Co-TDMA Agreement Establishment Enabled field is set to 1 if the AP has enabled MAPC negotiations for establishing new MAPC agreements for Co-TDMA. Otherwise, the Co-TDMA Agreement Establishment Enabled field is set to 0.

The Co-RTWT Agreement Establishment Enabled field is set to 1 if the AP has enabled MAPC negotiations for establishing new MAPC agreements for Co-RTWT. Otherwise, the Co-RTWT Agreement Establishment Enabled field is set to 0.

The AP ID field is used to assign an AP ID to another AP. The AP ID field is optionally included in the MAPC Common Info field of a MAPC element (see Table 9-aa9) as defined in 37.8.1.3.2 (AP ID assignment).

(#1429)The Timestamp field represents the timing synchronization function (TSF) timer of the frame’s source, as defined in 9.4.1.10. The Timestamp field is optionally present in the MAPC Common Info field of a MAPC element (see Table 9-aa9) as defined in 37.138.1.3.3 (MAPC synchronization framwork).

(#1429) 37.13.1.3.3 MAPC synchronization framework

**37.13.1.3.3.1 General**

This subclause introduces an MAPC synchronization framework to enable the implementation of MAPC synchronizations for MAPC responding APs and MAPC requesting APs in the MAPC framework. Within the MAPC synchronization framework, the MAPC offset synchronization method is defined as the default synchronization method in order to implement the MAPC schemes and interoperability between MAPC requesting and responding APs. MAPC synchronization framework allows the integration of other synchronization methods into the MAPC framework. A vendor may implement MAPC synchronization via other means out of the scope of this standard.

A MAPC responding AP that receives an individually addressed MAPC Negotiation Request frame from a MAPC requesting AP that includes a Timestamp field in the MAPC element may start the MAPC synchronization with the MAPC requesting AP by the MAPC offset synchronization method defined in 37.13.1.3.3.2.

A MAPC requesting AP that receives an individually addressed MAPC Negotiation Response frame from a MAPC responding AP that includes a Timestamp field in the MAPC element may start the MAPC synchronization with the MAPC responding AP by the MAPC offset synchronization method defined in 37.13.1.3.3.2.

If a MAPC requesting AP initiates a MAPC negotiation for a Co-RTWT scheme by sending an individually addressed MAPC Negotiation Request frame, the MAPC Negotiation Request frame shall include a MAPC element including Timestamp field.

If a MAPC responding AP receives an individually addressed MAPC Negotiation Request frame with including a Timestamp field and intends to accept a MAPC agreement for one Co-RTWT scheme at least from the MAPC requesting AP, the MAPC responding AP shall start the MAPC synchronization using the MAPC offset synchronization method defined in 37.13.1.3.3.2 with the MAPC requesting AP.

If all the MAPC agreements have been torndown in a MAPC agreement teardown procedure (see 37.13.1.3.4 (MAPC agreement teardown)), the MAPC responding and requesting AP shall stop the MAPC synchronization between the MAPC responding and requesting AP.

**37.13.1.3.3.2 MAPC offset synchronization method**

**37.13.1.3.3.2.1 General**

A MAPC responding (requesting) AP that utilizes the MAPC offset synchronization method to synchronize with the MAPC requesting (responding) AP, the MAPC responding (requesting) AP shall calculate the timing offset value with respect to the MAPC requesting (responding) AP with which it maintains synchronization, as described in 37.13.1.3.3.2.2 (Timing offset calculation).

NOTE —A MAPC responding (requesting) AP that utilizes the MAPC offset synchronization method may start its TSF timer independently of other responding (requesting) APs.

A MAPC responding (requesting) AP that has started a MAPC synchronization with a MAPC requesting (responding) AP with utilizing the MAPC offset synchronization method shall maintain the timing offset value between its own TSF timer and the TSF timer of the MAPC requesting (responding) AP.

**37.13.1.3.3.2.2 Timing offset calculation**

This subclause defines methods for a MAPC responding (requesting) AP to calculate the timing offset value respect to the MAPC requesting (responding) AP with which it maintains synchronization. The calculation of the timing offset value is based on the timestamp from the received MAPC Negotiation Request frame or MAPC Negotiation Response frame as follows:

where

 is the timing offset value

 is the value in the Timestamp field in the received frame

 is the frame reception time measured in the TSF timer of the receving AP

The offset value is represented as a signed integer. The unit of the offset value is μs. The MAPC responding (requesting) AP shall keep the value calculated from the latest MAPC Negotiation Request frame (MAPC Negotiation Response frame) received from each peer MAPC requesting (responding) AP with which it maintains synchronization.

If a MAPC responding (requesting) AP has synchronized with a MAPC requesting (responding) AP with using MAPC offset synchronization method, the MAPC responding (requesting) AP may convert the TSF value of the MAPC requesting (responding) AP into its own TSF value based of .

NOTE —A Co-RTWT coordinated AP might convert the TSF value of the Target Wake Time field of the Co-RTWT parameter set received from the Co-RTWT requesting AP to its own based on the timing offset value described in this subclause.

## Proposed Text ends here

# SP

Do you support resolution to the CID 1429 and incorporate the corresponding text changes in 11-25/1023r0 into the latest TGbn draft?

Y/N/A

**References:**