**IEEE P802.15**

**Wireless Specialty Networks**

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| Project | IEEE P802.15 Working Group for Wireless Specialty Networks (WSNs) | |
| Title | Proposed CSMA changes | |
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| Re: | Minor changes to CSMA-CA to support operation in Japan | |
| Abstract | Minimum changes to IEEE 802.15.4 CSMA-CA to support optional suspended CSMA/CA with Active Carrier Sense. | |
| Purpose | Add flexibility requested to support new deployments in Japan | |
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Proposed CSMA changes

For 802.15.4 rev E

# Overview

Proposal to revise IEEE 802.15.4-2020 [1] to support optional Suspendable CSMA/CA to support deployment in Japan and other regions, where backoff suspension is needed. Explanation of need and simulation results for Suspendable CSMA/CA have been discussed in SC WNG and IG Japan Sub-1 GHz from January Meeting and March Meeting, see references [2]-[5].

# Changes

Changes are referenced clause numbering in Rev E draft IEEE P802.15.4me/DF04.

Add to the end of clause 6.2.2.1 CSMA-CA algorithm:

Optional Backoff Suspension can improve performance of IEEE 802.15.4 networks by reducing the probability of CSMA-CA algorithm failure when the network is congested and/or when the network coexists with aggressive interfering networks. The use of Suspendable CSMA/CA is signaled during the association process as described in [10.16.5.1] and [10.4.11.1]. Suspendable CSMA/CA is enabled when macSuspendedCSMA is TRUE. When *macSuspendedCSMA* is TRUE, slotted and unslotted CSMA will proceed as in figure 6-2 with the following additional steps:

* CCA Mode 1, 2 or 3 shall be used;
* Channel will be sensed using the selected CCA mode during the backoff delay period within each unit backoff period. If CCA is busy during the backoff delay period, the backoff timer shall be suspended until sensing the channel indicates that the channel is clear or *macSuspendedCsmaMaxTime* is exceeded. Upon CCA detecting clear, the backoff timer shall resume. If *macSuspendedCsmaMaxTime* is exceeded, the algorithm shall end in “Failure” and terminates with a channel access failure.

In clause 8.4.3 MAC PIB attributes, Insert into MAC PIB attributes Table 8-121:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Attribute | Type | Range | Description | Default |
| *macSuspendedCsma* | Boolean | TRUE, FALSE | Indication that that suspended | FALSE |
| *macSuspendedCsmaMaxTime* | Integer | Implementation dependent | Timeout value for suspending backoff timer | Implementation dependent |

In Clause 10.16.5.1 Association Request command

Change Figure 10-140 as indicated:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Bits:0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Reserved | Device Type | Power Source | Receiver On When Idle | Association Type | Suspendable CSMA/CA | Security Capability | Allocate Address |

**Figure 10-140 —Capability Information field format**

Insert paragraph before The Security Capability field description (paragraph 4):

The Suspendable CSMA/CA bit shall be set to one to indicate that the device will perform backoff suspension as described in clause 6.2.2.1 and shall be set to zero otherwise.

In 10.4.11.1 DSME Association Request command:

Change figure 10-40 as indicated:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Bits:0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Reserved | Device Type | Power Source | Receiver On When Idle | Association Type | Suspendable CSMA/CA | Security Capability | Allocate Address |

Insert the following text after the DSME Association Type subfield:

The Suspendable CSMA/CA bit shall be set to one to indicate that the device will perform backoff suspension as described in clause 6.2.2.1 and shall be set to zero otherwise.

Add entry to Table 10-75:

|  |  |
| --- | --- |
| Association status | Description |
| <ANA> | Suspendable CSMA/CA association successful |

Insert the following text at the end of 10.16.2 Association:

When an association request is received with the Suspendable CSMA/CA field set to 1, and the association is successful, the association status field shall be set to Suspendable CSMA/CA association successful when the responding device will perform backoff suspension as described in clause 6.2.2.1 and shall be set to zero otherwise.

**References**

1. IEEE 802.15.4-2020
2. Philip Orlik, Yukimasa Nagai, Takenori Sumi, Naotaka Sakaguchi and Benjamin Rolfe, “Channel Considerations for Next Generation Japanese Metering Applications,” doc.: 15-23-0064-01, IEEE 802.15.4 SC WNG, January 2023, Baltimore.
3. Philip Orlik, “Japan Sub-1GHz Interest Group Agenda,” doc.: 15-23-0170-01, IEEE 802.15 Working Group, March 2023, Atlanta
4. Takenori Sumi, Philip Orlik, Jianlin Guo, Kieran Parsons, Yukimasa Nagai, Pu Wang, Benjamin Rolfe, “The CSMA Gap Analysis Between IEEE 802.15.4 and Japanese Standard JJ-300.10,” doc.: 15-23-0167-00, IEEE 802.15. Working Group, March 2023, Atlanta.
5. Philip Orlik, “Japan Sub-1GHz Interest Group Closing Report,” doc.: 15-23-0187, IEEE 802.15 IG Japan Sub 1 GHz, March 2023, Atlanta.