**IEEE P802.15**

**Wireless Personal Area Networks**

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| Project | IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs) |
| Title | **Text for Application Control IE** |
| Date Submitted | 14 March 2023 |
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| Re: | Contribution to IEEE 802.15.4ab |
| Abstract | This document provides draft text for Application Control IE |
| Purpose | Support development of technical content for the draft |
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**7.4 IEs**

**7.4.4 Nested IE**

***Insert the new text at the end of 7.4.4.55 as follows***

**7.4.4.X Application Control IE (AC IE)**

The AC IE is used by a controller to send the session configuration information. The session configuration information includes general control parameters used by every application and application-specific control parameters. AC IE may have control parameters for multiple application types to support them in the session. The Content field of the AC IE shall be formatted as shown in Figure 7-X1.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Octets: 2 | 0/4 | 0/1 | 0/1 | 0/2 | 0/1 | 0/TBD | 0/TBD | 0/TBD | 0/TBD |
| Content Control | Session ID | Block Duration | Round Duration | Slot Duration | Contention Slots Info | Ranging Control | Data Comm Control | Sensing Control | TDoA Control |

**Figure 7-X1 – Application Control IE Content field format**

The Content Control field is formatted as per Figure 7-X2, indicating presence or not of other fields in the AC IE.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Bits: 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11–15 |
| SIP | RBDP | RRDP | RSDP | Scheduling Mode | Association Availability | CSIP | RCP | DCP | SCP | TCP | Reserved |

**Figure 7-X2 – Content Control field of the AC IE**

The SIP field when one indicates the presence of the Session ID field, or not present when zero. The SIP field shall be set to one when the Association Availability field is set to one.

The RBDP field when one indicates the presence of the Ranging Block Duration field, or not present when zero.

The RRDP field when one indicates the presence of the Ranging Round Duration field, or not present when zero.

The RSDP field when one indicates the presence of the Ranging Slot Duration field, or not present when zero.

The Scheduling Mode field when one indicates that the scheduling-based mode is used for the session, while the contention-based mode is used when zero.

The Association Availability field when one indicates that the controller is expecting HRP UWB Association Request command from a controlee.

The CSIP field when one indicates the presence of the Contention Slot Information field, or not present when zero. The CSIP field shall be set to zero when the contention-based mode is used.

The RCP field when one indicates the presence of the Ranging Control field, or not present when zero.

The DCP field when one indicates the presence of the Data Comm Control field, or not present when zero.

The SCP field when one indicates the presence of the Sensing Control field, or not present when zero.

The TCP field when one indicates the presence of the TDoA Control field, or not present when zero.

The Session ID field contains a 4-octet session identifier that is unique to a session per controller.

The Block Duration field is an unsigned integer that specifies the duration of a block in units of rounds, that is the number of rounds in the block. When the Block Duration field is not present, the block shall have only one round.

The Round Duration field is an unsigned integer that specifies the duration of the round in units of ranging slots, that is the number of ranging slots in the ranging round. When the Round Duration field is not present, the Round shall have 4 slots.

The Slot Duration field is an unsigned integer that specifies the duration of a ranging slot in RSTU (as defined in 6.9.1.5). When the Slot Duration field is not present, the Slot duration shall be 1200 RSTU.

The Contention Slots Info field is formatted as per Figure 7-X3.

|  |  |
| --- | --- |
| Bits: 0-3 | 4-7 |
| Contention Slots Start | Contention Slots Size |

**Figure 7-X3 – Contention Slot Info field of the AC IE**

The Contention Slots Start field is an unsigned integer that specifies the index of the first slot which can be used without prior scheduling.

The Contention Slots Size field is an unsigned integer that specifies the number of slots, starting from the slot specified by the Contention Slots Start field, that can be utilized without prior scheduling.

The Ranging Control field is formatted as per Figure 7-X4.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Bits: 0 | 1 | 2 | 3-7 | Octet: 0/1 | TBD | Variable |
| Common Ranging Control Present | MMS Ranging Configuration Present | Preamble Code Configuration Presence | Reserved | Common Ranging Control | Preamble Code Configuration | MMS Ranging Configuration |

**Figure 7-X4 – Ranging Control field of the** **AC IE**

When RCP field is set to one, the Ranging Control field of the AC IE is used to configure the parameters for UWB-only MMS based ranging or normal ranging.

The Common Ranging Control Present field when one indicates the presence of the Common Ranging Control field, or not present when zero.

The MMS Ranging Configuration Present field when one indicates the presence of the MMS Ranging Configuration field, or not present when zero.

The Preamble Code Configuration Present field when one indicates the presence of the Preamble Code Configuration field, or not present when zero.

The Common Ranging Control field of the AC IE is formatted as per Figure 7-X5.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Bits: 0–1 | 2–3 | 4–5 | 6 | 7 |
| Multi-node Mode | Ranging Round Usage | STS Packet Config | Deferred Mode | MMRCR |

**Figure 7-X5 – Common Ranging Control field of the AC IE**

The Multi-node Mode field value specifies whether the ranging is to be performed between a single pair of devices or is multi-node ranging involving many devices. The Multi-node Mode field shall have one of the values specified in Table 7-52b.

The Ranging Round Usage field specifies the use of the current ranging round. The Ranging Round Usage field shall have one of the values defined in Table 7-52c.

The STS Packet Config field specifies the STS packet format to be used in the current ranging round. The STS Packet Config field shall have one of the values defined in Table 7-52d. For devices that are not HRP-ERDEV this field shall be set to zero.

The Deferred Mode field specifies whether or not the deferred frame is allowed for the measurement report. If the field value is one, it indicates that ranging slots are scheduled for the exchange of deferred data frame(s) after the ranging cycle, which should typically be used to report certain measurement information, for example TOF, reply time, and AOA. If the field value is zero, it indicates that ranging slots are not scheduled for data frames for exchange of requested information and the requested information should be embedded in the RFRAME, for example RRTI IE as described in 7.4.4.35.

The Multiple Message Receipt Confirmation Request (MMRCR) field indicates whether multiple message receipt confirmation is requested or not: if the MMRCR field value is one, it is requested, otherwise it is not. The Multiple Message Receipt Confirmation procedure is described in 6.9.11.

The Preamble Code Configuration field if present specifies the preamble code that will be used in the forthcoming ranging exchange.

The MMS Ranging Configuration field if present specifies the parameters for UWB-only MMS based ranging.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Bits: 0 | 1 | 2 | 3 | 4 | 5 | 6-7 | Octets: 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/2 | 0/2 |
| Number of RSF Present | Number of RIF Present | TX MMRS Gap Size Present | RX MMRS Gap Size Present | TX MSR For MMRS Present | RX MSR For MMRS Present | Reserved | Number of RSF | Number of RIF | TX MMRS Code | RX MMRS Code | TX MMRS Gap Size | RX MMRS Gap Size | TX MSR For MMRS | RX MSR For MMRS |

**Figure 7-XX – MMS Ranging Configuration field of the AC IE**

The Number of Ranging Sequence Fragment (RSF) Present field when one indicates the presence of the Number of RSF field, or not present when zero.

The Number of Ranging Integrity Fragment (RIF) Present field when one indicates the presence of the Number of RIF field, or not present when zero.

The TX MMRS Gap Size Present field when one indicates the presence of the TX MMRS Gap Size field, or not present when zero.

The RX MMRS Gap Size Present field when one indicates the presence of the RX MMRS Gap Size field, or not present when zero.

The TX MMRS Symbol Repetitions (MSR) Present field when one indicates the presence of the TX MSR field, or not present when zero.

The RX MMRS Symbol Repetitions (MSR) Present field when one indicates the presence of the RX MSR field, or not present when zero.

The Number of RSF field specifies the number of RSF that will be used in the forthcoming ranging exchange.

The Number of RIF field specifies the number of RIF that will be used in the forthcoming ranging exchange.

The TX MMRS code field indicates the MMRS code index that will be used by the AC IE sender for transmission in the forthcoming ranging exchange.

The RX MMRS code field indicates the MMRS code index that will be used by the AC IE sender for reception in the forthcoming ranging exchange.

The TX MMRS Gap Size field indicates the MMRS gap size that will be used by the AC IE sender for transmission in the forthcoming ranging exchange.

The RX MMRS Gap Size field indicates the MMRS gap size that will be used by the AC IE sender for reception in the forthcoming ranging exchange.

The TX MSR for MMRS field indicates the MSR that will be used by the AC IE sender for transmission in the forthcoming ranging exchange.

The RX MSR for MMRS field indicates the MSR that will be used by the AC IE sender for reception in the forthcoming ranging exchange.

One or more fields defined in the AC IE, may not be present in the AC IE of the current ranging round, if the parameters specified in these fields follow the same configuration as before.

If the AC IE defined in 7.4.4.X and the ARC IE defined in 7.4.4.36 are both present in the same RCM, then the ranging parameters for ERDEV(s) in enhanced HPRF mode are jointly configurated by the AC IE and the ARC IE. And the ranging parameters for ERDEV(s) in HPRF mode are configurated by the ARC IE defined in 7.4.4.36. Particularly, the Common Ranging Control Present field is set to zero to indicate that the Common Ranging Control field is not present.

The Data Comm Control field is formatted as per Figure 7-X6

|  |  |
| --- | --- |
| Bits: 0 | 1–7 |
| MMRA | Reserved |

**Figure 7-X6 – Data Comm Control field of the AC IE**

The MMRA field when zero indicates that a receiver shall send an Imm-Ack frame following AIFS after the data frame with the AR field set to one. The MMRA field when one indicates that the RMMRC IE shall be utilized for confirming the receipt of data frames with AR fields set to one.

The Sensing Control field is formatted as per Figure 7-X7

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| TBD | TBD | TBD | TBD | TBD | TBD |
| TBD | TBD | TBD | TBD | TBD | TBD |

**Figure 7-X7 – Sensing Control field of the AC IE**

The TDoA Control field is formatted as per Figure 7-X8

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| TBD | TBD | TBD | TBD | TBD | TBD |
| TBD | TBD | TBD | TBD | TBD | TBD |

**Figure 7-X8 – TDoA Control field of the AC IE**