**IEEE P802.15**

**Wireless Personal Area Networks**

|  |  |
| --- | --- |
| Project | IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs) |
| Title | <Proper PAN ID Field Settings for 802.15.4-2015> |
| Date Submitted | [17 November 2015] |
| Source | [Pat Kinney][Kinney Consulting][address] | Voice: [ ]Fax: [ ]E-mail: [ ] |
| Re: | Practice from IEE Std. 802.15.4-2015 |
| Abstract | [The following text describes the corrected method for setting the PAN ID field in IEEE 802.15.4-2015 frames.] |
| Purpose | [The text in this document shall be used to describe 7.2.1.5] |
| Notice | This document has been prepared to assist the IEEE P802.15. It is offered as a basis for discussion and is not binding on the contributing individual(s) or organization(s). The material in this document is subject to change in form and content after further study. The contributor(s) reserve(s) the right to add, amend or withdraw material contained herein. |
| Release | The contributor acknowledges and accepts that this contribution becomes the property of IEEE and may be made publicly available by P802.15. |

# Introduction

The PAN ID compression field used in IEEE Std. 802.15.4 frames has evolved since the first standard, IEEE Std. 802.15.4-2003, to allow more behaviors appropriate to new frame versions. Unfortunately, this evolution incurs additional complexity that may lead to confusion.

In IEEE Std. 802.15.4e-2012, the PAN ID compression field rules were specified not only in Table 2a but also in normative text in other sections. Table 2a omitted some conditions based on the addressing mode, thus using only Table 2a cannot specify all aspects of how the PAN ID Compression field is to be used. An example of a PAN ID Compression use that is not covered by the Table 2a is shown in the following text from subclause 5.3.11.10 of 802.15.4e-2012:

The PAN ID Compression field of the Frame Control field shall be set to one. In accordance with this value of the PAN ID Compression field, the Destination PAN Identifier field shall contain the value of *macPANId*, while the Source PAN Identifier field shall be omitted. The Destination Address field shall be set to the node address that has requested later. The Source Address field shall contain the value of *macShortAddress*.

In the above case, even though the PAN ID Compression field is set to one, there still is a destination PAN ID due to the existence of a short address, i.e. address mode 2. Just using the Table 2a would indicate that in this case there would be no PAN IDs, so this example clearly shows that Table 2a rules are not complete.

The rules for frame version 0b10 frames when source and destination addresses are present are:

* When both addresses are extended (addressing mode 3), the PAN ID compression is set to one to indicate that no PAN ID is in the frame, while setting the PAN ID Compression to zero indicates the presence of the destination PAN ID in the frame.

Note: the destination PAN ID field may contain the value of the sender (source) PAN ID, for example in the Association Response command. The field name specifies the position in the frame, but is not necessarily descriptive of the content.

* When both addresses are present and either is a short address, PAN ID compression is used as per IEEE Std. 802.15.4-2011.


# IEEE 802.15.4-2015 subclause on the PAN ID compression field

The following text describes the corrected methodology for setting the PAN ID field in IEEE 802.15.4 frames that will be in the IEEE 802.15.4-2015 standard.

**7.2.1.5 PAN ID Compression field**

The PAN ID Compression field is used to indicate the presence of the PAN ID field. When the frame version field value is 0b00 or 0b01, the PAN ID compression field is interpreted as follows:

— If both destination and source addressing information is present, the MAC sublayer shall compare the destination and source PAN identifiers. If the PAN IDs are identical, the PAN ID Compression field shall be set to one, and the Source PAN ID field shall be omitted from the transmitted frame. If the PAN IDs are different, the PAN ID Compression field shall be set to zero, and both Destination PAN ID field and Source PAN ID fields shall be included in the transmitted frame.

— If only either the destination or the source addressing information is present, the PAN ID Compression field shall be set to zero, and the PAN ID field of the single address shall be included in the transmitted frame.

When the frame version field value is 0b10, the PAN ID Compression Field for Beacon frame, Data frame, MAC Command frame and Ack frame shall be set based on the addressing fields present as defined in Table 7-6. Combinations of destination and source address with destination and source PAN ID and PAN Compression not shown in Table 7-6 shall not be generated.

**Table 7-6—PAN ID Compression field value for frame version 0b10**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **De****stination Address** | **Source Address** | **Destination PAN ID** | **Source PAN ID** | **PAN ID Compression** |
| Not Present | Not Present | Not Present | Not Present | 0 |
| Not Present | Not Present | Present | Not Present | 1 |
| Present | Not Present | Present | Not Present | 0 |
| Present | Not Present | Not Present | Not Present | 1 |
| Not Present | Present | Not Present | Present | 0 |
| Not Present | Present | Not Present | Not Present | 1 |
| Extended | Extended | Present | Not Present | 0 |
| Extended | Extended | Not Present | Not Present | 1 |
| Short1 | Short1 | Present | Present | 0 |
| Short1 | Extended | Present | Present | 0 |
| Extended | Short1 | Present | Present | 0 |
| Short1 | Extended | Present | Not Present | 1 |
| Extended | Short1 | Present | Not Present | 1 |
| Short1 | Short1 | Present | Not Present | 1 |

1If both the destination and source addressing information is present and either is a short address, the MAC sublayer shall compare the destination and source PAN IDs and the PAN ID Compression field shall be set to zero if and only if the PAN identifiers are identical.

NOTE 1—In IEEE Std. 802.15.4-2003, i.e., frame version 0b00, the PAN ID Compression field is named Intra-PAN, but it is in the same position and has the same effect as the PAN ID Compression field in 802.15.4-2006.

NOTE 2—The PAN ID Compression field is not present in Multipurpose frames.


# Conclusion

[Draft-ietf-6tisch-minimal-12](https://datatracker.ietf.org/doc/draft-ietf-6tisch-minimal/) correctly indicates that the PAN ID compression field setting must be set to zero for the Data, Acknowledgement and MAC Command frame types when they are using extended addresses for both source and destination address. This setting of zero indicates that the Destination PAN ID field is present.

[Draft-ietf-6tisch-minimal-12](https://datatracker.ietf.org/doc/draft-ietf-6tisch-minimal/) does not specify the PAN ID Compression field setting for the Beacon frames. By stating the PAN ID Compression field MUST be set to indicate that only the Destination PAN ID field is present, it does not specify whether the PAN ID Compression field is set to one or zero. Since the Beacon frames in [Draft-ietf-6tisch-minimal-12](https://datatracker.ietf.org/doc/draft-ietf-6tisch-minimal/) states that the source address is an extended address, i.e. addressing mode 3, and the destination address uses the short address, i.e. addressing mode 2, to properly indicate that for Beacon frames, the PAN ID Compression field should be set to one to indicate that there is only one PAN ID field present.

It is noted that earlier versions of draft-ietf-6tisch-minimal incorrectly specified the PAN ID Compression field value for Beacon frames. Accordingly, it is better to explicitly specify the PAN ID Compression field in the current version of the draft rather than leaving it to implementers to read the 802.15.4e-2012 to decipher the correct value for PAN ID Compression field.