**IEEE P802.15**

**Wireless Personal Area Networks**

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| Project | IEEE P802.15 Wireless Personal Area Networks |
| Title | **Yet another document explaining PAN ID Compression** |
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| Re: | 802.15.4 Revision Preparation  |
| Abstract | Submission to Maintenance standing committee: Proposed revised format and content for the PAN ID compression table and other related things. |
| Purpose | Promote useful work and reduce confusion |
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**Use of PAN ID compression**

# Summary

For frame version 0 or 1, PAN ID Compression is ONLY set to one when both source and destination address are present, and when fewer than both addresses are present PAN ID Compression is always zero.

For frame version 2, means is provided to omit PAN ID completely from frames:

1. Use of PAN ID compression with only one address present is defined: when PAN ID compression is set to one, PAN ID is omitted; when PAN ID compression is set to zero, the PAN ID corresponding to the address is present (same as 2011).
2. When both addresses are present and are extended, PAN ID compression is set to one to indicate that no PAN ID is in the frame. PAN ID Compression is set to zero to indicate presence of a destination PAN ID in the frame.
3. When both addresses are present and either is a short address, PAN ID compression is used as per 2011.

# Details

**Setting PAN ID Compression when frame version equal to 0 or 1 (2011 rules):**

For Beacon, Data and Command Frames:

1. When only one address is present, PAN ID compression is set to ZERO and the PAN ID corresponding the address included is contained in the frame;
	1. Source address present -> one PAN ID field, set to source PAN ID
	2. Destination address present -> one PAN ID field, set to the destination PAN ID
2. When no addresses are included in the frame no PAN IDs are included in the frame; Only valid for Acknowledgment frame
3. When both source and destination address are present,
	1. IF the source and destination PAN IDs are equal, PAN ID compression is set to 1 and the PAN ID field contains the (one) PAN ID (according to figure 35 of 2011, the Source PAN Identifier field is present and the Destination PAN Identifier field is absent)
	2. IF the source and destination IDs are NOT EQUAL, the PAN ID compression field is set to ZERO and BOTH source and destination PAN ID fields are present in the frame.

For Acknowledgement frames: PAN ID Compression is always zero, no addressing is contained in the frame.

PAN ID Compression field is always zero when the frame contains only one address.

Issues from 2006/2011 related to PAN ID:

1. Specifies the broadcast PAN ID be used when PAN ID of destination not known; Address filtering ambiguous when a destination address other than broadcast is included in a frame with the destination PAN ID set to broadcast.

**Setting PAN ID Compression when Frame Version >= 2 (802.15.4e Rules with corrections)**

The use and meaning of the PAN ID compression field is different depending on:

* Frame type
* Frame version
* Addresses present
* Addressing mode

For Beacon, Data, Command and Acknowledgement frames:

1. When the Source Address is present and Destination address is not present
	1. If the frame contains the Source PAN ID field, PAN ID Compression field is set to zero;
	2. If the frame contains no PAN ID, the PAN ID Compression field is set to one;
2. When the Source Address field is not present and the Destination address field is present
	1. If the frame contains the Destination PAN ID field, PAN ID Compression field is set to zero;
	2. If the frame contains no PAN ID field, the PAN ID Compression field is set to one;
3. When Source Address is not present and Destination Address is not present
	1. PAN ID compression set to zero if the frame contains the destination PAN ID.
	2. If the frame contains no PAN ID field, the PAN ID Compression field is set to one
4. When the Source Address field is present and the Destination address field is present and both contain Extended Addresses
	1. When a PAN ID field is present and frame PAN ID compression field is set to zero the Destination PAN ID is present; when the frame type is Beacon, the PAN ID is interpreted as the source PAN ID.
	2. When no PAN ID field is present, PAN ID compression field is set to one;
5. When the Source Address field is present and the Destination address field is present and one or both of source address or destination address fields contain a short address
	1. IF the source and destination PAN IDs are equal, PAN ID compression is set to 1 and the PAN ID field contains the (one) PAN ID (according to figure 35 of 2011, the Source PAN Identifier field is present and the Destination PAN Identifier field is absent)
	2. IF the source and destination IDs are NOT EQUAL, the PAN ID compression field is set to ZERO and BOTH source and destination PAN ID fields are present in the frame.

# Parsing the incoming frame (for explanation purposes only):

PAN ID Compression for Beacon, Data, Acknowledgement, Command frames

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Frame Version | Src Addr Present | Dest Addr Present | Addr Mode | PAN ID Comp | Frame Type and notes | Src PAN ID | Dest PAN ID |
| Src | Dest |
| 0 or 1 | 0 | 0 | X | X | 0 | Only valid for AcknowledgeNo addressing included | NO | NO |
| 0 or 1 | 0 | 0 | X | X | 1 | Not valid for any frame type: cannot be generated  | NA | NA |
| 0 or 1 | 0 | 1 | X | X | 0 | Frame type == {B|D|C} (Note 1) | NO | YES |
| 0 or 1 | 0 | 1 | X | X | 1 | Not valid for any frame type | YES | YES |
| 0 or 1 | 1 | 0 | X | X | 0 | Frame type == {B|D|C} (Note 1) | YES | NO |
| 0 or 1 | 1 | 0 | X | X | 1 | Not valid for any frame (Note 2) | NA | NA |
| 0 or 1 | 1 | 1 | X | X | 0 | Frame type == {B|D|C} Indicates both PAN IDs are present and not equal;  | YES | YES |
| 0 or 1 | 1 | 1 | X | X | 1 | Frame type == {B|D|C} indicates that source and destination PAN ID are equal (Note 3) | YES | NO |
| >= 2 | 0 | 0 | X | X | 0 | Frame type == {B|D|A|C} (note 4) | NO | NO |
| >= 2 | 0 | 0 | X | X | 1 | Frame type == {B|D|A|C} (note 4) | NO | YES |
| >= 2 | 0 | 1 | X | X | 0 | Frame type == {B|D|A|C}  | NO | YES |
| >= 2 | 0 | 1 | X | X | 1 | Frame type == {B|D|A|C}  | NO | NO |
| >= 2 | 1 | 0 | X | X | 0 | Frame type == {B|D|A|C}  | YES | NO |
| >= 2 | 1 | 0 | X | X | 1 | Frame type == {B|D|A|C}  | NO | NO |
| >= 2 | 1 | 1 | E | E | 0 | Frame type == {B|D|A|C}  | NO | YES |
| >= 2 | 1 | 1 | E | E | 1 | Frame type == {B|D|A|C}  | NO | NO |
| >= 2 | 1 | 1 | S | S | 0 | Frame type == {B|D|A|C} (note 5) | YES | YES |
| >= 2 | 1 | 1 | E | S | 0 | YES | YES |
| >= 2 | 1 | 1 | S | E | 0 | YES | YES |
| >= 2 | 1 | 1 | E | S | 1 | Frame type == {B|D|A|C} indicates that source and destination PAN ID are equal(note 3) and (note 5) | YES | NO |
| >= 2 | 1 | 1 | S | E | 1 | YES | NO |
| >= 2 | 1 | 1 | S | S | 1 | YES | NO |
|  |  |  |  |  |  |  |  |  |
| Pulled from 802.15.4-2011.  |
| Extracted from 802.15.4e with corrections/additions. |
| Notes:1. When only ONE address is present PAN ID compassion must be zero and the PAN ID corresponding to the address is included
2. Can’t set PAN ID compression when there is only one address.
3. According to figure 35 of 2011, the Source PAN Identifier field is present and the Destination PAN Identifier field is absent, but in fact the sole PAN ID present is both.
4. This seems backwards but as done because the first case is consistent with 2011, and the second (PAN ID Compression set with no addresses) is the new case;
5. These cases were not specified explicitly in Table 2a of 802.15.4e; the behavior when short addressing is used should be the same as 802.15.4-2011.
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