**IEEE P802.15**

**Wireless Personal Area Networks**

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| Project | IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs) |
| Title | **Proposed comment resolution for CID #177, 188, 215, R77, R78, R188, R191, R197, 385, R198 of LB104** |
| Date Submitted | 2 June 2015 |
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| Re: | 802.15.10 Consolidated Comment Entry Form, CID #177, 188, 215, R77, R78, R188, R191, R197, 385, R198 |
| Abstract | Provides a proposed resolution to CID #177, 188, 215, R77, R78, R188, R191, R197, 385, R198 |
| Purpose | To be used by the technical editor to apply the necessary changes to the draft to resolve CID #177, 188, 215, R77, R78, R188, R191, R197, 385, R198 |
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1. **Comments CID 177, 188, 215, R77, R78, R188, R191, R197, 385, R198**

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| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Page** | **Clause** | **Line** | **Comment** | **Proposed change** |
| 177 | Noriyuki Sato | 22 | 5.2.1 | 39 | The detail of definition of 'Priority' seen in Table 2 on p.22, Table 4 on p.24, Figure 38 on p.58 is not defined. Is it treat as bit-wise, or byte-wise? Is the less value means high prior or low prior? | Add the definition of priority so that a device can manage it. |
| 188 | Don Sturek | 23 | 5.2.1 | 34 | See also p. 25 lines 33 and 39. While multiple metrics can be used in a single network, routing HAS to consider only a single consistent metric between all devices in the routing path. It does not make sense to have different metrics between routing devices and then attempt to choose an optimal path since the routing weight between the devices would differ. Either section 5.2.2 is not writen cleearly (and the use of single metric at a time is what is being done) or else A LOT more explanation is needed on how different metrics can used between differnet devices in the network and then somehow optimized into a single route. | Either an explanation is needed or else this is some sort of breakthrough in mesh routing that needs a lot of explanatory text. |
| 215 | Verotiana Rabarijaona | 25 | 5.2.2 | 35 | Explain the use of the Priority field if more than 1 metric is used | See comment |
| R77 | Charlie Perkins | 23 | 5.2.1 | 34 | "Number of metrics in use in the L2R mesh tree" | How does this work? (xref needed) |
| R78 | Charlie Perkins | 23 | 5.2.1 | 34 | "Number of metrics in use in the L2R mesh tree" | Is zero allowed? If not, valid range is 0x01 - 0x07 |
| R188 | Charlie Perkins | 58 | 6.2.2.10 | 3 | Zero seems to be allowable as Number PQMs | Insert text to disallow |
| R191 | Charlie Perkins | 58 | 6.2.2.10 | 26 | Are all routes in mesh constrained to use the same metric? | Insert clarifying text |
| R197 | Charlie Perkins | 58 | 6.2.2.10 | 54 | Is the priority field associated with the message or the metric? | Reword "the Priority field is ignored" if with the metric. |
| 385 | Verotiana Rabarijaona | 59 | 6.2.2.10 | 4 | The Value field might be omitted for metric that are only measured but not exchanged (ex: SINR, RSSI…), the threshold might also be omitted if Brother routing is not used. Therefore the Length of the value and that of the Threshold might not always be the same | Use 2 "Length" fields or use another flag for "value present"  |
| R198 | Charlie Perkins | 59 | 6.2.2.10 | 6 | The Threshold field size is not clear. | Explain (is it metric-dependent?) |

**Resolution: AiP**

* ***Delete the “Number of metrics N” row in Table 1***
* ***Replace the last row of Table 1 with:***

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Valid range** | **Description** |
| PQM ID | Integer | 0x00-0xff | Identifies the metric in use in the mesh tree. The metric identifier values are listed in Table 11. |
| PQM Value length | Integer | 0x00-0xff | Indicates the length of the metric in octets |
| PQM threshold length | Integer | 0x00-0xff | Indicates the length of the threshold in octets |
| Link quality threshold | \_ | Depends on the metric ID | Indicates the threshold of the metric that a link shared with an ancestor should satisfy. |
| PQM Value | \_ | Depends on the metric ID | Value of the metric of the current device |

* ***Delete Table 2***
* ***Delete the “Number of metrics N” row in Table 3***
* ***Replace the “Set of N NT PQM Entries” row in Table 3 with:***

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Valid range** | **Description** |
| PQM Value | \_ | Depends on the metric ID | Value of the PQM provided by the current neighbor. |
| Incoming metric | \_ | Depends on the metric ID | Value of the single hop metric from the neighbor to the current device. |
| Outgoing metric | \_ | Depends on the metric ID | Value of the single hop metric from the current device to the neighbor retrieved in NLM IEs when applicable. |
| Mutual link | \_ | Depends on the metric ID | Value of the single hop mutual link between the neighbor and the current device. Present only if NLM IEs are used. |

* ***Delete Table 4***
* ***Modify the paragraph before Table 4 as follows:***

If the best PQM value in the NT is provided by several neighbors, the depth of the receiving device is set to one depth higher than the neighbor with the lowest depth. The definition of “best” PQM depends on the PQM in use and can be found in Table 11.

* ***Modify Table 11 as follows:***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Value** | **Name** | **Description** | **Type** | **Length in octets** | **“Best” definition** |
| 0 | Hop count | Number of hops between a device and the mesh root | Integer | 1 | Lowest |
| 1 | Power related metric (WiP) |  |  |  | Highest |
| 2 | ETX | Expected transmission count | Integer | 2 | Lowest |
| 3 | ETT | Expected transmission time in milliseconds | Float | 4 | Lowest |
| 4 | Inactive time aware airtime link metric | See 5.2.2.1 | Float | 4 | Lowest |
| 5 | Vendor specific | \_ | \_ | \_ | \_ |
| 6-15 | Reserved | \_ | \_ | \_ | \_ |

* ***Modify clause 5.2.2 as follows:***

A routing metric is used to find an optimal routing path from a device to the mesh root. The metric in use is determined by the mesh root and is propagated to the other devices through TC IEs. The PQM field in a TC IE indicates the PQM currently used. When a device receives a TC IE, it retrieves the PQM therein. It measures or calculates the corresponding metric between itself and the source of the TC IE and records the value as the incoming link metric of the neighbor. This value is added to the PQM from the TC IE and recorded as the PQM of the neighbor in the NT. Before transmitting its own TC IE, a device browses its NT and finds the best PQM value. This value becomes the device's own PQM and is included in the TC IE to be transmitted.

NLM IEs may be used to exchange the incoming link metrics of each neighbor found in the NT. NLM IEs are used to determine the mutual link between two neighbors based on the incoming metric (measured or calculated by the device) and outgoing metrics (retrieved from the NLM IE from a neighbor) when symmetric links cannot be assumed in the L2R mesh tree. The mutual link metric may be the arithmetic average or the geometric average of the incoming and the outgoing link metric and its calculation is out of the scope of this document. If NLM IEs are used, the PQM of the corresponding metric is calculated based on the mutual link metric. When a device receives a TC IE or a NLM IE, it updates the PQM, the incoming link metric from and the outgoing link metric to the corresponding neighbor if needed. Table 11 provides the metric identifier values defined by this recommended practice used in the TC IEs and NLM IEs.

* ***Modify the first sentence of clause 5.2.3.1 as follows:***

When hop-by-hop routing is used, each device selects the next hop from its NT based on the PQM without the knowledge of the entire path to the mesh root.

* ***Modify Figure 32 as follows:***

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Bits:0-7** | **8-14** | **15** | **Octets: 0/1/2** | **0/2/8** | **0/Variable** | **0/1** | **0/1** | **0/1** | **0/10** | **0/1** | **0/1** | **0/Variable** | **0/Variable** |
| Length | Sub-ID | Type = 0 | Descriptor | Mesh Root Address | Entity ID List | Depth | Sequence Number | TC IE Interval | MCO Descriptor | DAgg Buffering Time | Security Level | PQM | Path to Root |

* ***Modify clause 6.2.2.10 as follows:***

**6.2.2.10 PQM field**

The PQM field is formatted as illustrated in Figure 38.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
|  |  |  |  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Bits: 0-3** |  |  | **4** | **5-7** | **Octets: Variable** | **0/Variable** |
| PQM ID |  |  | Threshold Present | Reserved | Value | Threshold  |

Figure 38—Format of the PQM field

The PQM ID field identifies the metric in use in the L2R mesh tree. This field is set to one of the values listed in Table 11. An implementer may use the vendor specific value for a metric that is not defined in this recommended practice.

Table 11

When the Threshold Present field is set to 1, the Threshold field is present. Otherwise, it is omitted.

The Value field indicates the value of the metric of the path between the mesh root and the transmitter of the TC IE. The length of the Value field depends on the type of the PQM.

The Threshold field, when present, indicates the threshold of the metric that a link with an ancestor should satisfy to be selected as a next hop. The threshold is set by the mesh root and propagated by the devices in the L2R mesh tree. The length of the Threshold field depends on the type of the PQM.

* ***Modify Figure 44 as follows:***

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **1** | **2-7** | **Octets: 2/8** | **Variable** |  |  |
|  | Address Mode | Reserved | Neighbor Address | Link Metric  |  |  |

* ***Delete the second paragraph of clause 6.2.5.4***
* ***Replace “metric(s)” with “metric” throughout the document***