**IEEE P802.15**

**Wireless Personal Area Networks**

|  |  |  |
| --- | --- | --- |
| Project | IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs) | |
| Title | **Text for Link-ID assignment and management** | |
| Date Submitted | September 2016 | |
| Source | Billy Verso (Decawave), | billy.verso (at) decawave.com |
| Re: | draft text for inclusion into 802.15.8 | |
| Abstract | This describes the mechanisms for assigning and managing the optional Link-ID that may be used by the 802.15.8 MAC to reduce the number of addressing octets needed in PD-to-PD MAC frames. | |
| Purpose | The purpose of this document is to provide text for link-ID assignment and management with a view to incorporating it into the IEEE 802.15.8 draft | |
| Notice | This document does not represent the agreed views of the IEEE 802.15 Working Group or IEEE 802.15.8 Task Group. It represents only the views of the participants listed in the “Source(s)” field above. 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. | |
| Patent Policy | The contributor is familiar with the IEEE-SA Patent Policy and Procedures:  <http://standards.ieee.org/guides/bylaws/sect6-7.html#6> and  <http://standards.ieee.org/guides/opman/sect6.html#6.3>.  Further information is located at <http://standards.ieee.org/board/pat/pat-material.html> and  <http://standards.ieee.org/board/pat>. | |

**Link-ID assignment and management**

***This document contains text for integration into the 802.15.8 draft.***

*Note to editor****: Please search the existing text for the word link and where the usage is for “Link-ID”, please ensure it is consistently given as “Link” with a capital “L”, a non-breaking hyphen, and capital “ID”, i.e. “Link‑ID”.***

1. MAC protocol
   1. MAC functional description

***Insert the following new clause in an appropriate place in the draft, maybe as the final sub-clause of the MAC functional description….***

* + 1. Link-ID
       1. Introduction

This clause describes assignment and management of Link-IDs. The use of Link-IDs and the provisions of this clause are optional in this standard. The benefit of using the Link-ID is that for directly addressed PD to PD communications the source address may be reduced from a full 48-bit address to an 8-bit Link-ID saving five octets of overhead per frame.

* + - 1. Procedure for assigning Link-ID

Each Link-ID relates to a single direction of frame transfer. The destination PD chooses and assigns the Link‑IDs pertaining to each communications link from selected peers. A destination PD supporting Link‑ID shall maintain a list of Link-IDs, each uniquely cross-referenced to the corresponding source addresses (i.e. the ID) of a PD with which it is peered.

After successful peering, a PD supporting Link-ID, and wishing to afford its remote peer PD the opportunity to employ a Link-ID for its future communication, chooses a unique Link-ID, (typically its lowest free unused Link-ID), and reserves it for the peer PD by creating a record in the *macOwnLinkIdList*. The PD then informs the peer PD of the chosen Link-ID using the Link-ID Assignment IE defined in 5.2.4.3.2. *<Please insert correct hyperlinked cross-reference to the clause titled “Link-ID Assignment IE”>*

A PD that does not wish to support the use of Link-ID may ignore any Link-ID Assignment IEs it receives.

Upon receipt of a Link-ID Assignment IE from a peered PD, the receiving PD supporting Link-ID creates (or updates) a record in its *macTxLinkIdList* as described in 5.2.2. This list is indexed by PD destination address. The records in the *macTxLinkIdList* store the assigned Link-ID for each destination PD. If a Link-ID Assignment IE is received from a peer PD for which there is already a record in the *macTxLinkIdList*, then that record is updated with the new Link-ID assignment.

* + - 1. Procedure for using Link-ID
         1. Transmission of Link-ID

Whenever a PD is sending a frame to a peer PD for which it has an entry in its *macTxLinkIdList*, the sending PD may substitute the shorter, 8-bit or 16-bit, *associatedLinkId* in place of its full 48-bit source address, and set the source addressing mode field in Frame Control field according to the definition in 5.8.2.1.3. *<Please insert correct hyperlinked cross-reference to the clause titled “Source addressing mode (SAM) field”>* Where the Link‑ID is less than 256 the 8-bit format may be used, if the Link-ID is 256 or greater the 16-bit format shall be used.

* + - * 1. Reception of Link-ID

Whenever a PD receives a frame with a Link-ID it validates that the Link-ID is present in the *macOwnLinkIdList* as part of the MAC receive frame filtering defined in 5.3.2. *<Please insert correct hyperlinked cross-reference to the clause titled “Reception and rejection”>*. At the same time, the MAC retrieves the *associatedSourceAddress* from the *macOwnLinkIdList* to report in the MCPS-DATA.indication.

* + - 1. Deleting a Link-ID

Once a Link-ID assignment is made between a pair of peered PDs, this assignment persists for as long as those PDs remain peered. There is no separate mechanism to remove or delete a Link-ID assignment.

When a pair of peered PDs becomes de-peered they delete any corresponding Link‑ID record entries in their *macOwnLinkIdList* and *macTxLinkIdList* if any are present.

***In clause 5.3.2 “Reception and rejection” add the following frame filtering rule between the rule beginning “If a 48-bit destination address is included in the frame…”, and the rule beginning “If a 16-bit multicast group destination address is included in the frame…”:***

* If a 48-bit destination address and the source address is a Link-ID then the Link-ID must match one of the active Link-IDs that the receiving PD has assigned, i.e. it must be present in the *macOwnLinkIdList*.
  1. PAC information base (PIB)

***Add the new PIB attribute and constant definitions below to the appropriate places in Table 73 “PIB attributes” and Table 74 “PAC constants”***

*Ensure the following sentence appears in the paragraph just before the PIB table.*

Attributes marked with a dagger (†) are read-only attributes (i.e. the attribute can only be set by the MAC sublayer).

*Modify “Table 73—PIB attributes” to add the following new attributes:*

Table 7—PIB fields

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Field** | **Type** | **Range** | **Default** | **Description** |
| *macLinkIdSupported*† | Boolean | FALSE, TRUE | - | This attribute tells the upper layer whether or not the MAC includes support Link-ID |
| *macOwnLinkIdList* | See 5.2.1 | See 5.2.1 | Empty | This is the list of active Link-ID cross-reference records as defined in 5.2.1. These are the Link-IDs that the local PD has assigned to its remote peered PD. |
| *macTxLiniIdsList* | See 5.2.2 | See 5.2.2 | Empty | This is the list of cross-reference records, as defined in 5.2.2, for peer assigned Link-IDs. This lists the peer destinations for which the local PD has been assigned a Link-ID by a remote peered PD. |

* + 1. Link-ID assignment cross-reference records

The *macOwnLinkIdList* PIB attribute is a list of Link-ID cross-reference records consisting of the elements defined by Table 7. This is the list of Link-IDs chosen by the local PD as described in 5.1.1.2 (and notified to the remote PD the Link-ID Assignment IE defined in 5.2.4.3.2 *<insert correct hyperlinked cross-reference to the clause titled “Link-ID Assignment IE”>*.

Table 7— Elements of the Link-ID cross-reference record

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Field** | **Type** | **Range** | **Default** | **Description** |
| *assignedLinkId* | integer | 0x0000  to 0xFFFF | - | This element is the assigned Link-ID |
| *associatedSourceAddress* | 48-bit address | 48-bits | empty | This element is the 48-bit address corresponding to the assigned Link-ID |

* + 1. Cross-reference records for peer assigned Link-IDs

The *macTxLinkIdList* PIB attribute is a cross-referenced list recording the peer PD addresses for which the local PD has been assigned a Link-ID. These records consist of the elements defined by Table 7.

Table 7— Elements of the Link-ID cross-reference record

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Field** | **Type** | **Range** | **Default** | **Description** |
| *destinationAddress* | 48-bit address | 48-bits | empty | This is the 48-bit address of a peered device for which the local PD has received a Link-ID assignment IE |
| *associatedLinkId* | integer | 0x0000  to 0xFFFF | - | This element is the Link-ID associated with the destination address. |

**<END>**