**IEEE P802.15**

**Wireless Personal Area Networks**

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| Project | IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs) | |
| Title | TG 8 MAC Draft Text for Peering and De-peering | |
| Date Submitted | July 14, 2015 | |
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| Re: | Draft text of MAC data request command for 802.15.8 | |
| Abstract | This is the work in progress text of the MAC component for IEEE 802.15.8 group for PAC. | |
| Purpose | This document provides the details of draft text to IEEE 802.15.8 | |
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| 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>. | |

1. MAC protocol
   1. MPDU formats

----------------------------- Beginning of Text ------------------------------------

(Copied from IEEE 802.15.4 2011 release, clause 5.1.3, and then modified for PAC)

**5.1.3 Peering and De-peering**

This subclause specifies the procedures for peering and de-peering.

* + - 1. **Peering**

The next higher layer shall attempt to peer only after having first performed a peer discovery successfully, as defined in [5.1.2.](file:///C:\\Users\\liqx\\Desktop\\!QPAC\\_201503Berline\\802.15.4-2011.docx" \l "_bookmark56) The results of the peer discovery would have then been used to choose a suitable PD. The algorithm for selecting a suitable PD with which to peer from the list of PD descriptors returned from the peer discovery procedure is outside the scope of this standard.

Following the selection of a PD with which to peer, the next higher layers shall request through the MLME-PEER.request primitive, as described in [TBD,](file:///C:\\Users\\liqx\\Desktop\\!QPAC\\_201503Berline\\802.15.4-2011.docx" \l "_bookmark211) that the MLME configures the following PHY and MAC PIB attributes to the values necessary for peering:

* *phyCurrentChannel* shall be set equal to the ChannelNumber parameter of the MLME- PEER.request primitive.
* *phyCurrentPage* shall be set equal to the ChannelPage parameter of the MLME- PEER.request primitive.
* *macPDId (Application Id??)* shall be set equal to the PDId parameter of the MLME-PEER.request primitive.

A PD shall allow peering only if *macPeerPermit* is set to TRUE. Similarly, a first PD should attempt to peer only with a second PD that is currently allowing peering, as indicated in the results of the discovery procedure. If a PD with *macPeerPermit* set to FALSE receives apeering request command from a device, the command shall be ignored.

A first PD that is instructed to peer with a second PD, through the MLME-PEER.request primitive, shall try to peer only with an existing PAC and shall not attempt to start its own PAC.

The MAC sublayer of an un-peered PD(i.e. the first PD) shall initiate the peering procedure by sending apeering request command, as described in [TBD,](file:///C:\\Users\\liqx\\Desktop\\!QPAC\\_201503Berline\\802.15.4-2011.docx" \l "_bookmark163) to the PD of an existing PAC (i.e. the second PD); if the peering request command cannot be sent due to a channel access failure, the MAC sublayer shall notify the next higher layer.

The acknowledgment to apeering request command does not mean that the second PD has peered. The next higher layer of the second PD needs time to determine whether the current resources available on the PAC are sufficient to allow another PD to peer. The next higher layer should make this decision within *macResponseWaitTime*. If the next higher layer of the second PD finds that the first PD was previously peered on its PAC, all previously obtained device-specific information should be replaced. If sufficient resources are available, the next higher layer should allocate a address to the first PD, and the MAC sublayer shall generate apeering response command, as described in [TBD,](file:///C:\\Users\\liqx\\Desktop\\!QPAC\\_201503Berline\\802.15.4-2011.docx" \l "_bookmark171) containing the new address and a status indicating a successful peering. If sufficient resources are not available, the next higher layer of the second PD should inform the MAC sublayer, and the MLME shall generate apeering response command containing a status indicating a failure, as defined in [Table 6](file:///C:\Users\liqx\Desktop\!QPAC\_201503Berline\802.15.4-2011.docx#_bookmark175). The peering response command shall be sent to the first PD requesting peering using indirect transmission; i.e., the peering response command frame shall be added to the list of pending transactions stored on the PD and extracted at the discretion of the PD concerned using the method described in [TBD.](file:///C:\\Users\\liqx\\Desktop\\!QPAC\\_201503Berline\\802.15.4-2011.docx" \l "_bookmark93)

If the Allocate Address field of the Capability Information field, as described in [TBD](file:///C:\\Users\\liqx\\Desktop\\!QPAC\\_201503Berline\\802.15.4-2011.docx" \l "_bookmark168), of the peering request command is set to one, the next higher layer of the second PD shall allocate an address

On receipt of the acknowledgment to the peering request command, the first PD shall wait for at most *macResponseWaitTime* for the PD to make its peering decision; the PIB attribute *macResponseWaitTime* is a network-topology-dependent parameter and may be set to match the specific requirements of the network that a PD is trying to join. The first PD shall attempt to extract the peering response command from the second PD after *macResponseWaitTime*. If the first PD does not extract apeering response command frame from the second PD within *macResponseWaitTime*, the MLME shall issue the MLME-PEER.confirm primitive, as described in [TBD,](file:///C:\\Users\\liqx\\Desktop\\!QPAC\\_201503Berline\\802.15.4-2011.docx" \l "_bookmark219) with a status of NO\_DATA, and the peering attempt shall be deemed a failure.

If the Peering Status field of the peering response command indicates that the peering was successful, the first PD shall store the address contained in the Address field of the command in *macAddress*; communication on the PAC uses this address*.*



If the value of the Peering Status field of the command is not “Peering successful,” if there were a communication failure during the peering process due to a missed acknowledgment, or if the peering response command frame were not received, the first PD shall set *macPDId* to the default value (0xffff).

A message sequence chart for peering is illustrated in [Figure TBD](file:///C:\\Users\\liqx\\Desktop\\!QPAC\\_201503Berline\\802.15.4-2011.docx" \l "_bookmark78).

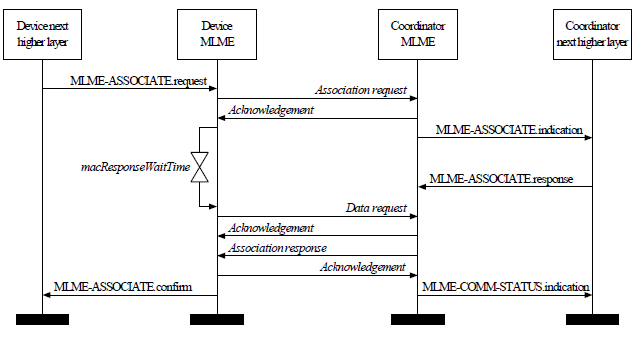
[Figure TBD](file:///C:\\Users\\liqx\\Desktop\\!QPAC\\_201503Berline\\802.15.4-2011.docx" \l "_bookmark79) illustrates a sequence of messages that may be used by a first PD to successfully peer with a second PD.

**Figure TBD—Peering message sequence chart**

* + - 1. **de-peering**

The de-peering procedure is initiated by the next higher layer by issuing the MLME- DEPEER.request primitive, as described in TBD, to the MLME.

When a first PD wants one of its peered PDs to leave the peered connection, the MLME of the first PD shall send the de-peering notification command in the manner specified by the TxIndirect parameter of the MLME-DEPEER.request primitive previously sent by the next higher layer. If TxIndirect is TRUE, the MLME of the first PD shall send the de-peering notification command to the second PD using indirect transmission; i.e., the de-peering notification command frame shall be added to the list of pending transactions stored on the first PD and extracted at the discretion of the second PD concerned using



**Figure 18—Message sequence chart for peering**

the method described in [TBD.](file:///C:\\Users\\liqx\\Desktop\\!QPAC\\_201503Berline\\802.15.4-2011.docx" \l "_bookmark93) If the command frame is not successfully extracted by the second PD, the first PD should consider the second PD depeered. Otherwise, the MLME shall send the de-peering

notification command to the first PD directly. In this case, if the depeering notification command cannot be sent due to a channel access failure, the MAC sublayer shall notify the next higher layer.

If the direct or indirect transmission fails, the first PD should consider the second PD de-peered.

If a first PD wants to leave the peered connection, the MLME of the first PD shall send a de-peering notification command to its peered PD (i.e. the second PD). If the de-peering notification command cannot be sent due to a channel access failure, the MAC sublayer shall notify the next higher layer. If the acknowledgment to de-peering request is not received, the first PD should consider itself disassociated.

The second PD receiving the depeering notification command shall verify that the source address corresponds to one of its peered PDs; if so, the second PD should consider the first PD de-peered. If this condition is not satisfied, the de-peering notification command shall be ignored.

A peered PD shall de-peer itself by removing all references to the PAC; the MLME shall set *macPANId*, *macShortAddress*, *macAssociatedPANCoord*, *macCoordShortAddress*, and *macCoordEx- tended-Address* to the default values. The next higher layer of a first PD should de-peer a second PD by removing all references to that PD.

The next higher layer of the requesting PD shall be notified of the result of the de-peering procedure through the MLME-DEPEER.confirm primitive, as described in [TBD.](file:///C:\\Users\\liqx\\Desktop\\!QPAC\\_201503Berline\\802.15.4-2011.docx" \l "_bookmark229)

[Figure TBD](file:///C:\\Users\\liqx\\Desktop\\!QPAC\\_201503Berline\\802.15.4-2011.docx" \l "_bookmark80) illustrates the sequence of messages for a first PD to de-peer itself from a second PD.

1st PD

MLME

1st PD

high layer

Device next higher layer

Device MLME

Coordinator MLME

MLME-DISASSOCIATE.request

*de-peering notification*

*Acknowledgment*

MLME-DISASSOCIATE.confirm

(SUCCESS)

MLME-DEPEER.indication

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| 2nd PD next higher layer | |
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**Figure TBD—Message sequence chart for de-peering initiated by a PD**