

IEEE P802.15 Wireless Personal Area Networks

Project	IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs)	
Title	TG3 SB1 text for various resolution	
Date Submitted	[6 February, 2003]	
Source	[James P. K. Gilb] [Apparent Technologies] [15373 Innovation Drive, #210, San Diego, CA 92129]	Voice: [858-485-6401] Fax: [858-485-6406] E-mail: [gilb@ieee.org]
Re:	[]	
Abstract	[This document is a summary of some of the more complex comment resolutions for SB1.]	
Purpose	[To provide a concise summary of comment resolutions that are too complex to represent in the comment database.]	
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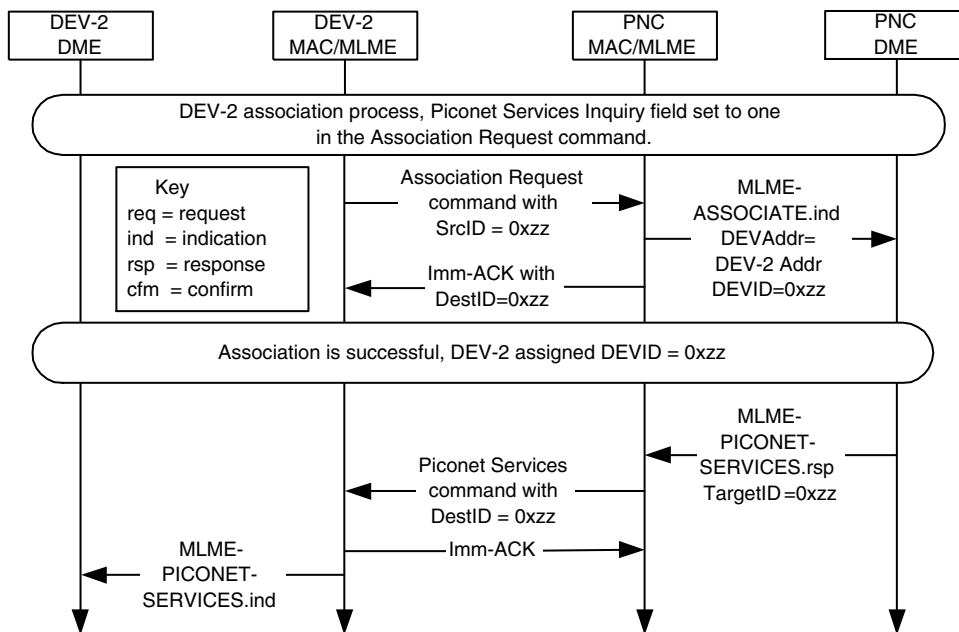
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1 **1. Text for selected resolutions**

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3 This document contains the text for resolutions that were either too length to include in the database or
4 included figures that cannot be placed in the database. The resolutions are copied from document 03/032.
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7 **1.1 CID 299**

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9 Accept in principle “Change to ‘If the DEV sets the piconet services inquiry bit, the PNC shall send the
10 piconet services command, 7.5.4.6, with DestID set to newly assigned DEVID after that PNC has received
11 the second Association Request command from the DEV, {xref }. This process is illustrated in {figure xx},’
12 and add new MSC as shown in 03/032r10.”
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40 **Figure 1—PNC sending the piconet services command to a newly associated DEV in**
41 **response to a request in the association proces.**
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45 **1.2 CID 172**

46 Accept in principle “Add the following MLME-PICONET-SERVICES.indication and .response.

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48 (begin new MLME-PICONET-SERVICES primitives)
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1.2.1 Piconet services

These primitives are used to transfer information regarding the services offered by DEVs in a piconet. The parameters used for these primitives are defined in Table 1

Table 1—MLME-PICONET-SERVICES primitive parameters

Name	Type	Valid range	Description
TargetID	Integer	Any valid DEVID as defined in {xref 7.2.3}	The target of the MLME command.
PiconetServicesIESet	Set of Piconet Services IEs	0 to N Piconet Services IE(s), {xref 7.4.19}.	The set of Piconet Services IEs in the Piconet Services command, {xref 7.5.4.6}

1.2.1.1 MLME-PICONET-SERVICES.response

This primitive is used to send the Piconet Services command, {xref 7.5.4.6}. The semantics of the primitive are:

```
MLME-PICONET-SERVICES.response(
    TargetID
    PiconetServicesIESet
)
```

The primitive parameter is defined in Table 1.

The PNC MLME upon receiving this primitive will send a Piconet Services command to the TargetID.

1.2.1.2 MLME-PICONET-SERVICES.indication

This primitive is used to indicate the reception of the Piconet Services command, {xref 7.5.4.6}. The semantics of the primitive are:

```
MLME-PICONET-SERVICES.indication(
    PiconetServicesIESet
)
```

The primitive parameter is defined in Table 1.

This DEV MLME generates this primitive when it receives a Piconet Services command.

(end new MLME-PICONET-SERVICES primitives)

1.2.2 Handover of a dependent PNC.

CID 1, CID 215, CID 352 and CID 139. Accept in principle “Add the ability to handover the dependent PNC as indicated in 03/032r8.”

(begin resolution text)

Add a new field to PNC Handover Response:

octets: 1	2	2
Reason Code	Length(=1)	CommandType

Figure 2—PNC handover response command format

The Reason Code field indicates that the new PNC is either ready to take over as the new PNC or that it will be unable to become the PNC. The valid Reason Code values are:

- 0x00 -> Success, ready for handover
- 0x01-0xEC -> Success, member of parent piconet with DEVID equal to Reason Code value
- 0xED-0xF6 -> Reserved
- 0xF7-0xFC -> Success, associated in parent piconet with NbrID equal to Reason Code value
- 0xFE -> Handover refused, unable to join parent piconet
- 0xFF -> Handover refused, unable to act as PNC for more than one piconet

(end new text for 7.5.3.2)

Add new text to 8.5.1.2,

(begin new text for 8.5.1.2)

A dependent PNC, the originator DEV, may handover control of the dependent piconet's CTA to another DEV, the target DEV, in the parent piconet. The target DEV shall either be a member of the piconet or a DEV that has associated as a neighbor PNC, {xref association}. To handover control of the dependent piconet's CTA, the originator DEV shall send a Channel Time Request command to the parent PNC with the following parameters:

- The Num Targets field set to one.
- The Target ID List field containing the DEVID of the target DEV that is to receive control of the CTA
- The Stream Request ID set to zero.
- The Stream Index of a CTA that has already been allocated to the dependent PNC as a private, pseudo-static CTA.
- All other fields set to the same values as in the last successful Channel Time Request for this Stream Index.

If the target DEV indicated in the Target ID List is either a member of the parent piconet or is a associated neighbor PNC and the Channel Time Request command has the correct entries as indicated above, the parent PNC shall grant the request to change the source and destination for the stream and shall send a Channel Time Response command to the originator with the Reason Code set to 'Success'. The PNC shall continue to place the CTA block for the allocation in the beacon but shall change the SrcID and DestID to be equal to the target's DEVID. Once the PNC has changed the SrcID and DestID in the CTA block, the target DEV will have gained control of the CTA and will be allowed to request modifications or the termination of the allocation.

If the target DEV is not a member of the piconet and it is not an associated neighbor PNC, the parent PNC shall reject the request and shall send a Channel Time Response command to the originator with the Reason Code set to either 'DEV unassociated' or 'DEV unauthenticated' depending on the status of the Target DEV.

If the Channel Time Request command has improper entries, e.g. the Stream Index does not exist or the Stream Index is not associated with a private, pseudo-static CTA, then PNC shall reject the request and shall

send a Channel Time Response command to the originator DEV with the Reason Code set to 'Request denied'.

The MSC for the handover of the control of a private, pseudo-static CTA is illustrated in Figure 3.

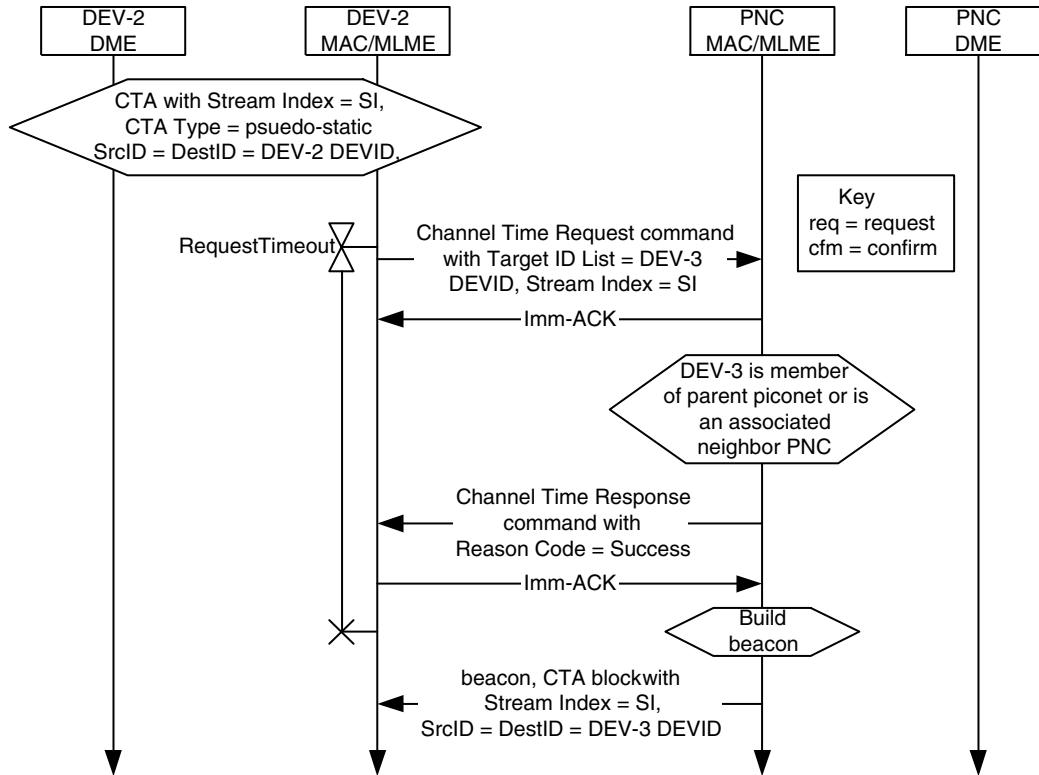


Figure 3—MSC for the handing over control of a private, pseudo-static CTA

(end new text for 8.5.1.2)

Replace pages 164, line 28 last line on the paragraph becomes: 'If the piconet is not a dependent piconet, the DEV shall accept the nomination and be prepared to receive the piconet information records. If the DEV is currently the PNC of a dependent piconet, it may refuse the request by sending PNC Handover Response command to the PNC with the Reason Code field set to 'Handover refused, unable to act as PNC for more than one piconet'. If the piconet is a dependent piconet, then the DEV shall accept the handover request unless it is unable to join the parent piconet as either a regular DEV or as a neighbor PNC. In this case the DEV sends the PNC Handover Response command to the PNC with the Reason Code field set to 'Refused, Handover refused, unable to join parent piconet.'

(begin new text for new subclause, 8.2.4 Depending PNC handover)

8.2.4 Dependent PNC handover

The dependent PNC handover process begins in the same manner as a regular PNC handover, {xref 8.2.3}, with the current PNC sending the PNC Handover Request Command to the target DEV that it has selected to

become the new PNC, as shown in Figure 4. In this and the two subsequent figures, the identities PNC, DEV-2 and DEV-3 are all relative to the dependent piconet and not the parent piconet. If the target DEV is not a member of the parent piconet, then that DEV shall begin the association process to join the parent piconet and, if required, authenticate with the parent PNC. The target DEV may request to associate with the parent piconet as either a neighbor PNC or as a member of the piconet. While target DEV is attempting to join the parent piconet, the current dependent PNC shall send the target DEV the information about all of the DEVs with the PNC Information command, all of the current channel time requests with the PNC Handover Information command and the power save information, if any, using the PS Set Information Response command. The target DEV may also request the transfer of any ACL data at this point using the ACL Information Request command. Note that the transfer of this information will not interfere with the target DEV's association and authentication process because the former occurs only during time reserved for the dependent piconet while the latter only occurs during time reserved for the parent piconet.

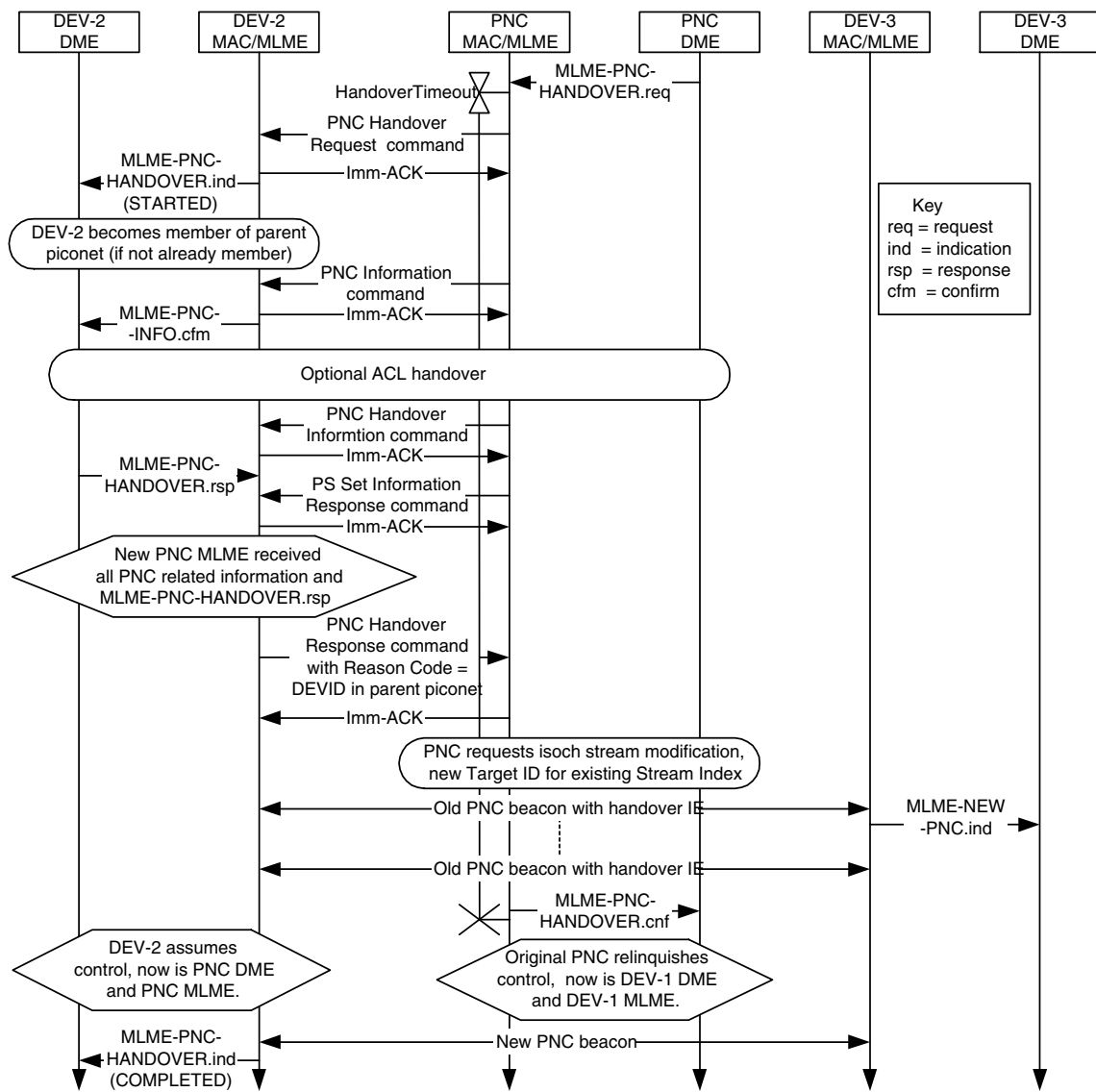


Figure 4—Successful PNC handover in a dependent piconet.

Once the transfer of the information is complete and target DEV has joined the parent piconet, the target DEV shall send a PNC Handover Response command to the dependent PNC with a Result Code set to the DEVID that was assigned to it by the parent PNC. This lets the dependent PNC know that the target DEV is ready take over control of the piconet. At this point, the dependent PNC shall send a Channel Time Request command to the parent PNC to handover the control of the dependent piconet CTA to the new dependent PNC, {xref 8.5.1.2 stream modification}. Once the parent PNC changes the SrcID and DestID of the dependent piconet CTA, the current dependent PNC shall either complete the handover process to the new PNC or it shall shutdown the dependent piconet because it will not be able to regain control of the CTA.

After the dependent PNC receives a beacon from the parent PNC with the change in the SrcID of the dependent piconet CTA, the current dependent PNC shall begin placing the Handover IE in its beacon with a countdown to indicate the last superframe that it will be the PNC using the procedure indicated in {xref 8.2.3}. The last superframe controlled by the current dependent PNC will be the one in which the Handover Countdown field is zero. The following superframe will begin when the target DEV, now the new dependent PNC, sends its first beacon.

There are multiple points in the handover process where it can fail. The current dependent PNC may cancel the handover process up until the time that it requests that the parent PNC handover control of the dependent piconet CTA to the new dependent PNC. The dependent PNC cancels the process by sending PNC Handover Request command to the target DEV with the Handover Status field set to 1 to indicate that the process has been cancelled.

The handover process will also fail if the target DEV fails to join the parent piconet. If the target DEV attempts to join as a neighbor PNC and the parent PNC does not support neighbor PNCs or does not wish to allow any more neighbor PNCs, then the association request by the new dependent PNC will be rejected. In that case, the DEV may also try to join as a regular DEV, in which case the dependent piconet would become a child piconet after the handover process.

If the target DEV fails to join the parent piconet as either a regular DEV or as a neighbor PNC, it shall send the PNC Handover Response command to the dependent PNC with the Reason Code set to 'Handover

refused, unable to join parent piconet' as illustrated in Figure 5. The target DEV may refuse the handover at any time while the dependent PNC is sending over the information about the piconet.

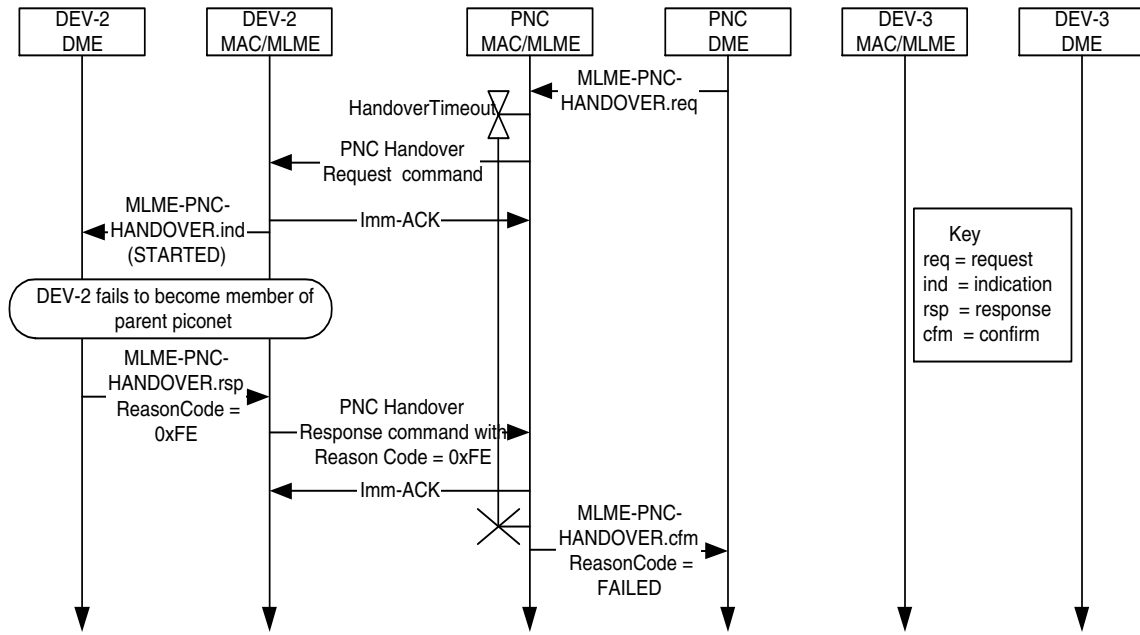


Figure 5—Failed dependent PNC handover when target DEV fails to join parent piconet.

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If the parent PNC rejects the request to handover control of the CTA to the new dependent PNC, the dependent PNC shall send a PNC Handover Request command to the target DEV with the Handover Status field set to 1 to indicate that the handover process is being cancelled, as illustrated in Figure 6.

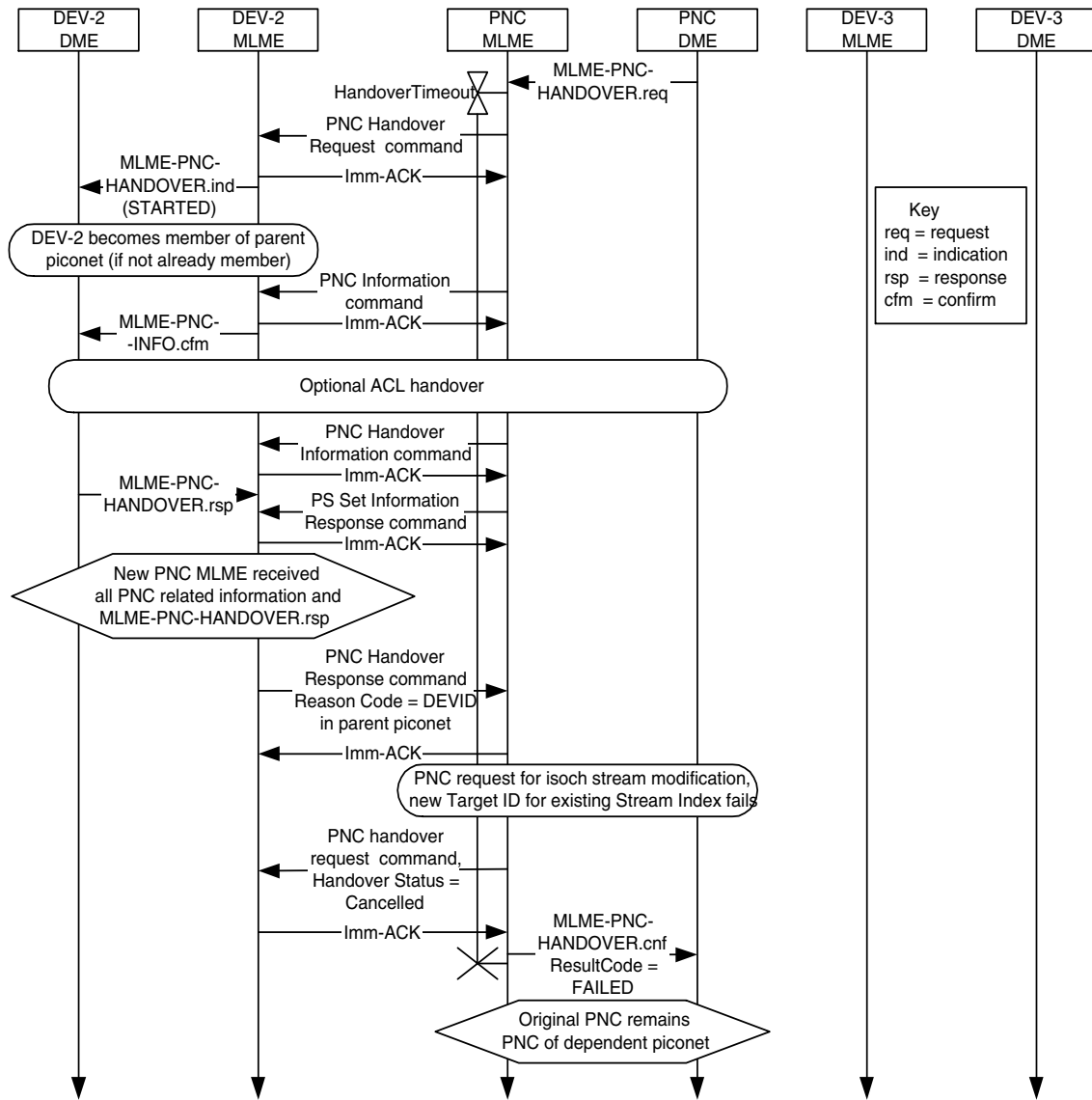


Figure 6—Failed dependent PNC handover when control for the dependent piconet CTA is handed over in the parent piconet.

If the dependent PNC cancels the handover process, the target DEV may disassociate from the parent piconet. If DEV-2 joined the parent piconet as a neighbor PNC, it should disassociate from the parent piconet if the handover process is cancelled to free up that resource for other DEVs that may want to form a neighbor piconet.

(end of new text for new subclause 8.2.4)

1.3 CID 682

Accept in principle: “The inclusion of MIFS changed the CTR calculations, but the changes were not reflected in 8.4.4.6. 1)Change b3 in Figure 79 from “stream termination” to “MIFS CTRq TU”. 2)Replace page 152, line 12 with:

‘The MIFS CTRq TU bit indicates that the CTRq TU includes MIFS, not SIFS as described in 8.4.4.6. When the MIFS CTRq TU bit is set to one the PNC shall allocate SIFS-MIFS additional time to the CTA so that there is at least a SIFS duration between the last transmission in one CTA and the first transmission in the next. Otherwise, the SIFS is included in the CTRq TU.’

3)Move 8.4.4.6 after 8.4.4.7 since 8.4.4.6 refers to guard time. 4)Modify 8.4.4.6 as follows:

1.3.0.1 Calculating channel time requests

Each DEV sends channel time requests to the PNC to indicate the amount of channel time required for transmission.

The requesting DEV shall include the frame transmission time, if known *a priori*, and the ACK transmission time, if used, and MIFS or SIFS time as appropriate per frame or ACK when calculating channel time requests. Figure 7 (was #108) shows an example of channel time being requested for a CTA where Imm-ACKs are used.

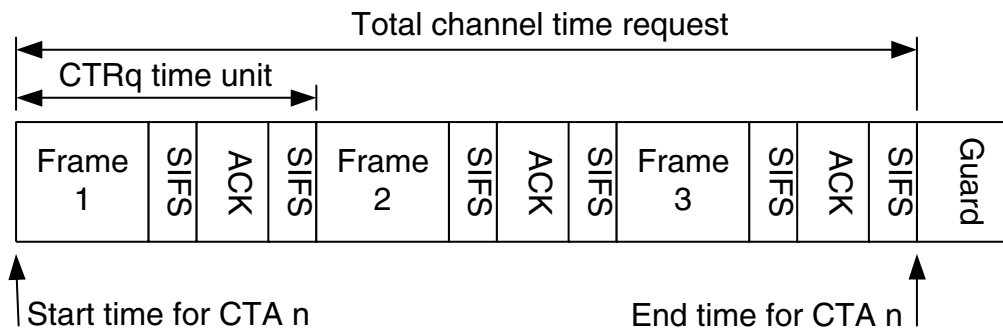


Figure 7—Channel time request for frames with immediate ACKs

When No-ACK is used, the channel time request is calculated differently because there is a MIFS in between each frame in the CTA instead of a SIFS. A channel time request that uses a CTRq TU with MIFS instead of SIFS shall set the CTRq TU MIFS bit to one to inform the PNC that it must add a time equal to SIFS-MIFS to the end of the CTA. This ensures that there is a SIFS between the end of transmission in one CTA and the

start of the next. Figure 8 shows an example of a channel time request when no-ACK is used and the MIFS bit is set in the Channel Time Request command.

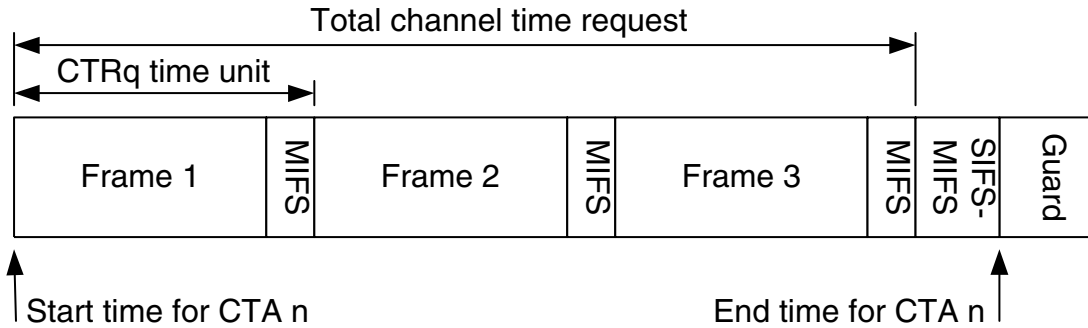


Figure 8—Channel time request with no ACKs

A CTRq TU in the CTA may cover more than one frame as shown in Figure 9. If the requesting DEV included SIFS-MIFS following the last MIFS as shown in Figure 9 it shall set the CTRq TU MIFS in the Channel Time Request to “0.” IF SIFS-MIFS is not included in the CTRq TU, the CTRq TU MIFS bit shall be set to “1” and the PNC shall add SIFS-MIFS to the CTRq TU to calculate the duration of the CTA. Figure 9 shows a multi-frame CTRq with the CTRq TU MIFS field set to 0.

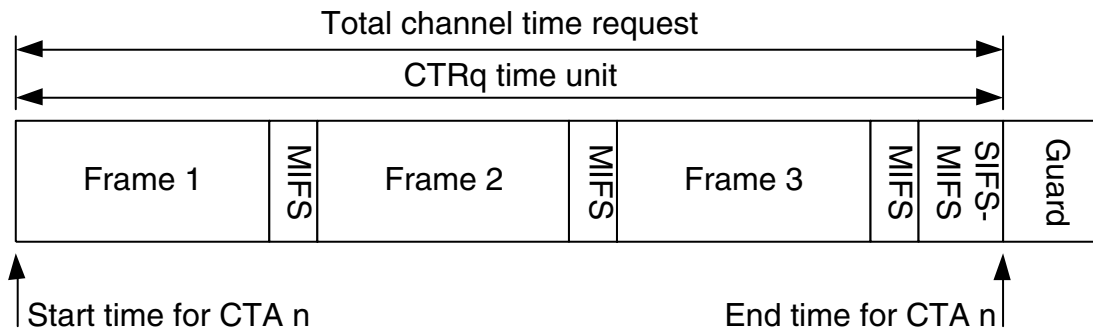


Figure 9—CTRq time unit covering multiple frames with CTRq TU MIFS = 0

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Figure 10 shows a multi-frame CTRq with the CTRq TU MIFS field set to 1.

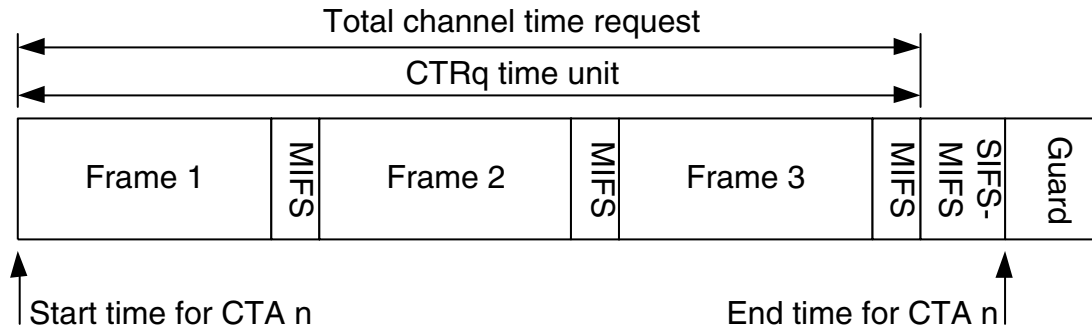


Figure 10—CTRq time unit covering multiple frames with CTRq TU MIFS = 1

(end new text for CID 682)

1.4 Removal of security suites.

What is required in the MAC?

- Symmetric key processing for payload protection
- Ability to ask the DME which DEVs are acceptable peers and members of a piconet.
- Ability to obtain and update symmetric keys.
- Provide security events to upper layer security manager.
- Processing of security events required to update how the MAC operates in a secure mode.
- Selective processing of commands and acceptance of frames based on security mode and state (which DEVs are authenticated).
- Definition of parameters used within the MAC that depend on a particular authentication security suite specification.
- Security command frames with undefined TLVs, auth, chal, dist key, req key.
- Add justification for why security related command frames are required in the MAC, e.g. request/distribute keys.
- Change ACL handover to be Security Information Handover.

What is not required in the MAC?

- ACL – The MAC should not maintain a separate list of authenticatable DEVs as this will be done in a higher layer.
- Any informative annex on possible security suites.
- Any protocol for authenticating peer or membership relationships.
- Any references to specific security suites.
- Any definition of 802.15.3 security suite ARC
- Define or modify authentication protocols.
- Specify parameters for a public key security suite used for authentication.
- Public key IE.

1.5 Waking up SPS and HIBERNATE (now APS) mode DEVs

Allow DEV to request CTAs with HIBERNATE DEV. PNC allows or rejects and responds with the channel time response command but doesn't allocate until the HIBERNATE DEV changes mode to ACTIVE. If it accepted, use Reason Code "Success, target DEV in HIBERNATE mode" When the DEV wakes up, begin allocating the CTAs as normal with a CTA status IE to notify people.

CID 262, CID 98, CID 384, CID 224, CID 234, CID 320, CID 161, CID 99, CID 235, CID 385, CID 321, CID 225, CID 162, CID 263, CID 255, CID 260, CID 382, CID 318, CID 96, CID 222, CID 232, CID 159, CID 97, CID 319, CID 261, CID 160, CID 233, CID 223, CID 383, CID 100, CID 386, CID 322, CID 163, CID 236, CID 226

Allow DEV to request CTAs with HIBERNATE DEV. PNC allows or rejects and responds with the channel time response command but doesn't allocate until the HIBERNATE DEV changes mode to ACTIVE. If it accepted, use Reason Code "Success, target DEV in HIBERNATE mode" When the DEV wakes up, begin allocating the CTAs as normal with a CTA status IE to notify people.

In section 8.5.1.1, add the following new text.

(new text)

If the target DEV is in either SPS or HIBERNATE mode and the PNC grants the channel time request, the PNC shall set the Reason Code in the Channel Time Response command to "Success, DEV in PS mode." The PNC shall place the PCTM IE in the beacon with a bit set for the target DEV, 7.4.8.

When the Target DEV in HIBERNATE or SPS mode receives a beacon with its bit set in the PCTM IE, it shall send a PS mode change command to the PNC. If the DEV wants to remain in a power save mode it shall set the PS mode field in the PS mode change command to the appropriate value, either 'PS' or 'HIBERNATE'. The PNC shall then terminate the stream, 8.5.1.3.

If the power save DEV wishes to listen to the new allocation, it shall set the PS mode field in the PS mode change command to 'ACTIVE'. The PNC shall then begin allocating the channel time in the beacon for the stream. The PNC shall no longer set the bits for the DEV in the PS status IEs.

If the PNC does not receive the PS change command from the power save DEV within a timeout determined by the PNC, the PNC shall terminate the channel time request, 8.5.1.3, and unset the power save DEV's bit in the PCTM IE.

If the Target DEV is SPS mode, after the PNC sets the SPS DEV's bit in the PCTM IE the PNC shall provide in the SPS DEV's next wake superframe a CTA with the SPS DEV as the source and the PNC as the destination that is long enough to handle a PS change command and a channel time request command with 4 isochronous CTRBs. This allows the SPS DEV to request a change to one of the current channel time allocations, to request new channel time or to request that a channel time allocation be terminated.

8.5.2.1

Same as above, but only for HIBERNATE DEV since async slots are aligned to the SPS wake beacons.

(new text)

If the target DEV is in either HIBERNATE mode and the PNC grants the channel time request, the PNC shall set the Reason Code in the Channel Time Response command to "Success, DEV in PS mode." The PNC shall place the PCTM IE in the beacon with a bit set for the target DEV, 7.4.8.

When the Target DEV in HIBERNATE mode receives a beacon with its bit set in the PCTM IE, it shall send a PS mode change command to the PNC. If the DEV wants to remain in HIBERNATE mode it shall set the PS mode field in the PS mode change command to 'HIBERNATE'. The PNC shall then terminate the stream, 8.5.1.3.

If the power save DEV wishes to listen to the new allocation, it shall set the PS mode field in the PS mode change command to 'ACTIVE'. The PNC shall then begin allocating the channel time in the beacon for the stream. The PNC shall no longer set the bits for the DEV in the PS status IEs.

If the PNC does not receive the PS change command from the HIBERNATE DEV within a timeout determined by the PNC, the PNC shall terminate the channel time request, 8.5.1.3, and unset the DEV's bit in the PCTM IE.

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