Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	**Correction to DSD - Remotely Initiated Transaction Holding Down state flow**
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Re:	Supporting document for comment in Letter Ballot #17
Abstract	DSD Remotely Initiated Transaction Holding Down state flow is flawed
Purpose	Correction to be included into P802.16-2004/Cor1-D1
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Correction to DSD - Remotely Initiated Transaction Holding Down state flow

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1- Problem Description

The execution path for "Timeout T10" in the DSD – Remotely Initiated Transaction Holding Down state flow diagram (in Figure 128 in Std IEEE 802.16-2004) is never executed because it is bypassed with the "SF Deleted" event which is always generated by the parent service flow (Figure 99). This prevents the state machine effectively to stay in the holding down condition (i.e. servicing further DSD-REQ if DSD-RSP was lost in transmission).

2- Background

Figure 99 – Dynamic Service Flow state transition diagram.
This figure shows different states a Service Flow (SF) goes through, from "Null" state meaning the service flow does not exist, to "Nominal" state meaning the service flow is created and used, to "Deleting" state, meaning the service flow is about to be deleted.

Figure 105 – DSD-Remotely Initiated Transition state transition diagram.
This figure shows the different states that a SF delete Transaction state machine (SM) is going through. Details of this figure are described in figures 127-128.

Timer T10: Wait for Transaction End timeout. Maximum value = 3 sec
T10 is started by SS upon the transmission of DSD-RSP and is supposed to keep the transaction alive, just in case the response is lost and the BS retries the request.

3- Scenario details

In SS, an SF exists, in "Nominal" state. DSD-REQ msg is received from BS. Here are the steps taken by SS:

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SF state = "Nominal"
DSD-REQ msg received
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From figure 99:
1) Send "SF Delete-Remote" event to all running transaction SMs for this SF (assuming there is no other transaction running, this event has no effect and is ignored in our scenario).
2) Start a new transaction SM of type "DSD-Remote" and passing to it DSD-REQ msg just received.
- SF state = "Deleting"

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Figure 105:
- DSD-REQ msg received
- Send DSD-RSP msg

- Send “DSD Succeeded” event to parent SF (T10 started)
- Trans SM state = “Holding Down”

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Figure 99:
- “DSD Succeeded” event received
- Send “SF Deleted” event to all running transactions SM
- SF state = “Deleted”

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Figure 105:
- “SF Deleted” event received < === This will bypass the timeout
- Send “DSD Ended” event to parent SF condition
- Delete transaction SM

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Figure 99:
- “DSD Ended” event received
- Because no transaction exist for that SF, the SF is deleted

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4- Proposed Solution

Referring to the “Timeout T10” depicted in Figure 128, if T10 timer is started upon transmission of DSD-RSP (see figure 127), it is never considered because the “DSD Succeeded” event generated in Figure 99, causes an immediate transition to “DSD-Remote End” in Figure 128. Thus there exists no way in which the SS can resend the “Saved DSD-RSP” in the event the original DSD-RSP was lost. To correct this situation keep the holding down condition always for T10 through timeout condition which allows further response to DSD-REQ triggered by a missed DSD-RSP (which otherwise would not be possible because the SF and all corresponding state machines would be already terminated).

To correct this situation in P802.16-2004/Cor1/D1 do the following modifications::

6.3.14.9.2 Dynamic Service Flow state transitions

p.31 line 23 insert:

[In Figure 105 below Holding Down bubble modify text according to:]

(Timeout T10 / DSD Ended)
~~(SF Deleted / DSD Ended)~~

p31, line 62 insert

6.3.14.9.5.3 DSD state transition diagrams

[Replace Figure 128 with the following Figure: