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Re:	"IEEE 802.16n-11/0029," in response to Call for Comments on GRIDMAN AWD
Abstract	Local Forwarding on GRIDMAN Amendment Draft Standard
Purpose	To discuss and adopt the proposed text in the draft amendment document on GRIDMAN
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Clarification on Local Forwarding over IEEE 802.16.1a

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1. Introduction

In IEEE 802.16.1a[3], local forwarding for HR-infrastructure station is defined in 6.12.6. Local forwarding needs to be clarified focusing on the operation of HR-RS. According to the relay operation described in IEEE 802.16.1[5], ARS operates in non-transparent mode only. Thus, STID and FID are unique to the domain of an HR-RS, and they are managed by the HR-RS by itself without any control by the HR-BS.

Therefore, the local forwarding shall be described clearly as described in this document.

2. References

[1] IEEE 802.16n-10/0048r3, 802.16n System Requirement Document including SARM annex, November 2011.
[2] IEEE 802.16n-11/0032, P802.16n Draft AWD, November 2011.
[3] IEEE 802.16n-11/0033, P802.16.1a Draft AWD, November 2011.
[4] EEE P802.16Rev3/D3, IEEE Draft Standard for Local and metropolitan area networks; Part 16: Air Interface for Fixed and Mobile Broadband Wireless Access Systems," November 2011.
[5] IEEE P802.16.1^{TM}/D3, IEEE Draft for WirelessMAN-Advanced Air Interface for Broadband Wireless Access Systems, November 2011.

3. Proposed Text on the IEEE 802.16.1a Amendment Draft Standard

[----------Start of Text Proposal----------]

[*Remedy1: Remove the whole section from 6.2.3.65.57 to section 6.2.3.65.62 on 802.16.1a AWD*]

[*Remedy2: Change 6.12.6 Support for local forwarding on 802.16.1a AWD as follows:*]

6.12.6 Support for local forwarding

6.12.6.1 Detection of LF opportunity

When local forwarding opportunity (LF) is determined, an HR-MS may communicate with one or more HR-MSs via an HR-infrastructure station without going through the backhaul. HR-infrastructure station may detect the LF opportunity. Otherwise, LF is detected by upper layer, which is outside of this specification. ~~The capability of LF may be negotiated and may be enabled during HR-RS network entry. HR-RS sends control message AAI-SBC-REQ to HR-BS, indicating that whether it can determine LF opportunity and/or perform LF. HR-BS replies with control message AAI-SBC-RSP to indicate which shall detect LF opportunity and perform LF.~~

6.12.6.2 LF setup and termination

When HR-infrastructure station detects the LF opportunity, it may ~~send control message~~request to ASN to get permission for the LF to be done by HR-infrastructure station. However, how to request and get the permission are outside the scope of this specification.

An infrastructure station capable of providing local forwarding shall (re)assign and manage the uplink FID for the source HR-MS and downlink FID for the destination HR-MS during DSA procedure. Any available FID may be used for the local forwarding (i.e., there are no dedicated FIDs for local forwarding connections). An HR-MS may not be aware of local forwarding but shall follow the same procedure defined in 6.2.

After receiving connection setup control message AAI-DSA-REQ from HR-MS, if LF opportunity is detected and LF is enabled at HR-RS, ~~HR-RS sends a control message, AAI-LFA-REQ, to HR-BS, to setup LF. When HR-BS receives AAI-LFA-REQ, it responds with AAI-LFA-RSP to HR-RS and HR-RS acknowledges with AAI-LFA-ACK. After that~~ the uplink connection of the source HR-MS and the downlink connection of destination HR-MS are established using DSA procedure described in 16.2.12.6 individually. ~~HR-RS sends AAI-DSA-REQ to the destination HR-MS for downlink connection establishment. The handshaking is complete with the response AAI-DSA-RSP and the acknowledgement AAI-DSA-ACK between HR-RS and the destination HR-MS as normal connection setup per 16.2.12.6. The downlink FID is managed by HR-RS.~~

- ~~If the LF is admitted, HR-BS responds to the HR-RS by AAI-LFA-RSP with response code 0b00 and empty downlink FID;~~
- ~~If downlink setup fails, HR-RS sends AAI-LFA-RSP with response code 0b10 and an~~

~~empty downlink FID field;~~

- ~~If LF is not allowed, AAI-LFA-RSP with response code 0b01 to indicate LF cannot be done by the requesting HR-RS,~~

~~The HR-RS replies with AAI-LFA-ACK to HR-BS. HR-RS responds to the source HR-MS with AAI-DSA-RSP, which confirms by AAI-DSA-ACK, following the DSA procedure in 16.2.12.6. HR-BS/HR-RS may use the field of Backup Option in control messages AAI-LFA-REQ/RSP to request or indicate the option, establishing the uplink for the source HR-MS to send data as backup to HR-BS/ASN.~~

~~If HR-BS/ASN rather than HR-RS detects the LF opportunity that can be done through HR-RS, once LF opportunity is detected and determined by HR-BS/ASN, data path setup shall be deferred for the uplink flow from the source HR-MS.~~

- ~~If the LF is impossible, HR-RS shall communicate with ASN entities to complete data path setup, and the uplink setup is complete after HR-RS sends control message AAI-DSA-RSP and the source HR-MS confirms by AAI-DSA-ACK.~~
- ~~If the LF is determined, HR-RS sends AAI-LFA-REQ to the HR-BS, requesting to perform LF. When the HR-BS receives this control message and acknowledges the HR-RS with AAI-LFA-RSP that LF will be done by itself, HR-RS confirms by control message AAI-LFA-ACK. HR-RS shall continue the downlink setup through control messages AAI-DSA-REQ/ RSP/ACK. If all these procedures are successful, the uplink setup is complete after HR-RS sends AAI-DSA-RSP and HR-MS confirms by AAI-DSA-ACK. In this case, if the field of Backup Option is set in LFA procedure (AAI-LFA-REQ/ RSP/ACK), the data path for the uplink flow may be setup. Otherwise, data path may be setup without data transferring or not setup at all.~~

Alternatively, if the LF detection is performed after connection establishment, HR infrastructure station ~~can~~may initiate the LF establishment procedure to set up the LF.
~~When HR-BS initiates the handshaking with HR-RS for LF, it sends AAI-LFA-REQ to HR-RS. After receiving AAI-LFA-REQ, HR-RS shall response with AAI-LFA-RSP and perform the LF as described in 6.12.6.3.~~ HR infrastructure station performs LF as described in 6.12.6.3. HR-BS may communicate with ASN entities to remove data path between the HR-BS and the ASN for the corresponding uplink flow from the source HR-MS and the corresponding downlink flow to the destination HR-MS.

~~When HR-RS initiates the handshaking with HR-BS for LF, it sends AAI-LFA-REQ to the HR-BS. HR-BS shall response with AAI-LFA-RSP for the received AAI-LFA-REQ and performs the LF as described in 6.12.6.3.~~

~~Either HR-BS or HR-RS may communicate with ASN entities to remove data path established for the flow that adopts local forwarding. Besides these messages, after receiving AAI-LFA-REQ,~~

~~HR-RS may send DSA or DSC messages to HR-BS to reflect the changed QoS requirement on the relay link.~~

When DSD procedure is performed, LF is terminated. If the destination HR-MS terminates the downlink service flow, HR-infrastructure station may ~~setup~~release a data path for the flow from the source HR-MS.

~~When HR-RS initiates the termination procedure after receiving AAI-DSD-REQ, HR-RS sends AAI-LFD-REQ to its HR-BS, which responds with AAI-LFD-RSP. HR-RS will acknowledge with AAI-LFD-ACK. HR-BS shall also send AAI-DSD-REQ to the other HR-MS to terminate the connection.~~

~~When HR infrastructure station terminates the LF adopted for a service flow, it shall proceed with the handshaking using AAI-LFD-REQ/RSP/ACK without terminating the current connection for the service flows. If the destination HR-MS terminates the downlink service flow, HR-infrastructure station may reestablish the data path for the affected flow from source HR-MS through ASN entities.~~

6.12.6.3 Data traffic forwarding

When LF is adopted and the FIDs for uplink flow from the source to its serving infrastructure station and downlink flow from the serving infrastructure station to the destination HR-MS have been assigned, HR-infrastructure station shall forward the received data traffic from the source HR-MS to the destination HR-MS based on STIDs of the source HR-MS and the destination HR-MS, uplink FID of the source HR-MS and downlink FID of the destination HR-MS.

- ~~When the field of Backup Option is set as 0b1 during LFA procedure (AAI-LFA-REQ/RSP/ACK), the data flow for the uplink shall be forwarded by HR infrastructure station accordingly.~~
- ~~When the field of Backup Option is set as 0b1 during LFA procedure (AAI-LFA-REQ/RSP/ACK),~~
    - ~~if HR-RS performs the LF, the data traffic shall be forward by HR-RS without going through HR-BS;~~
    - ~~if HR-BS performs the LF, the data traffic shall be forward by HR-BS without going through backhaul.~~
    - ~~o~~

~~When the LF opportunity is determined during data traffic forwarding after connection establishment and LF can be done through HR-RS, its serving HR-BS shall continue to deliver the data to maintain the connectivity to the destination HR-MS. Once the LF is setup, the HR-RS shall start to forward the data locally to the destination HR-MS.~~

The data traffic locally forwarded by HR-RS shall follow MAC PDU formats in 16.2.2. Construction and transmission of MPDUS shall follow 16.2.3. The data traffic locally forwarded by HR-BS shall follow MAC PDU formats in 6.2.2. The construction and transmission of MPDUS shall follow 6.2.3.

[----------End of Text Proposal----------]