Modification for enabling RS operations

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Modification for enabling RS operations

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Purpose and Scenario

- Propose the MAC modifications in the two-hop relay scenario
  (System broadcast information is sent to SSs directly)
Motivation

- Throughput enhancement (from SS’ perspective)
  - With the helps of RSs, the goal can be achieved
RS Operations

- What can RSs help?
  - Network entry
    - Ranging
    - …
  - Normal operation
    - Data transmission
  - Handover
  - …
Ranging Process Modification

- **Criteria**
  - Network entry process is administrated by BS
    - Security / Performance / Complexity issues
  - BS treats RS as a specific “SS”
    - Compatibility
  - RS may or may not be transparent for SS
    - Considering the impact of SS

- **RS to BS**
  - Legacy SS ranging process

- **SS to RS/BS**
  - BS controls the ranging process and advise the suitable parameters to SS by the help of the information from RSs
Initial Ranging

SS is near BS

- RS 1
- RS 2
- SS

UL-MAP
- RNG code
- RS-RNG report
- RNG RSP (continue)
- RS-RNG report
- RNG RSP
- RNG RSP (success)
- UL-MAP
- RNG REQ
- RNG RSP

Normal operation

- standard
- modified
- new
Initial Ranging – Multi SSs

- RS collects the ranging info. within its coverage and reports to BS
  - Sending RS-RNG report periodically
- BS administrates overall ranging processes of SSs
  - Select the suitable RS for further operations
  - Adjust parameters between SS and RS/BS
**RS-RNG Report**

- **Purpose**
  - Report the signal and info. of ranging SSs

- **Operation**
  - Aggregate the IEs for measurements and send to BS

- **Benefits**
  - Assist adjusting the parameters between BS/RS/SS
  - BS can arrange the RS to SSs based on the info.
    - The algorithm for choosing BS/RS can consider the measurement result or some others
      - Traffic load, QoS, …
RS Identification Modification

- For sending the RS-RNG report message, RS identification is needed
  - BS can treat the RS as a “specific” SS and give a RS CID for management and transmission

- Benefits
  - limited overheads for standard
  - High compatibility with legacy system
  - Easy for management
Modified CID field
(ref. 16-2004/16e)

Table 345—CIDs

<table>
<thead>
<tr>
<th>CID</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial ranging</td>
<td>0x0000</td>
<td>Used by SS and BS during initial ranging process.</td>
</tr>
<tr>
<td>Basic CID</td>
<td>0x0001–m</td>
<td>The same value is assigned to both the DL and UL connection.</td>
</tr>
<tr>
<td>Primary management</td>
<td>m+1 – 2m</td>
<td>The same value is assigned to both the DL and UL connection.</td>
</tr>
<tr>
<td>Transport CIDs and</td>
<td>3m + 1−0xFEFE</td>
<td>For the secondary management connection, the same value is assigned to both</td>
</tr>
<tr>
<td>secondary Mgr CIDs</td>
<td></td>
<td>the DL and UL connection.</td>
</tr>
<tr>
<td>AAS initial ranging CID</td>
<td>0xFEFF</td>
<td>A BS supporting AAS shall use this CID when allocating a</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Initial ranging period for AAS devices.</td>
</tr>
<tr>
<td>Multicast polling CIDs</td>
<td>0xFF00–0xFFFFD</td>
<td>An SS may be included in one or more multicast polling groups for the</td>
</tr>
<tr>
<td></td>
<td></td>
<td>purposes of obtaining bandwidth via polling. These connections have no</td>
</tr>
<tr>
<td></td>
<td></td>
<td>associated service flow.</td>
</tr>
<tr>
<td>Padding CID</td>
<td>0xFFFF</td>
<td>Used for transmission of padding information by SS and BS.</td>
</tr>
<tr>
<td>Broadcast CID</td>
<td>0xFFFFF</td>
<td>Used for broadcast information that is transmitted on a</td>
</tr>
<tr>
<td></td>
<td></td>
<td>downlink to all SS.</td>
</tr>
<tr>
<td>RS CID</td>
<td>2m+1 – 3m</td>
<td>For RS connection, the same value is assigned to both the DL and UL</td>
</tr>
<tr>
<td></td>
<td></td>
<td>connection.</td>
</tr>
</tbody>
</table>
MMR Activities

- MMR relay for fixed/mobile terminal including PHY/MAC modification
- Impact of PHY and backward compatible with 802.16e PMP mode
- MAC protocols to be newly added for relay networking
  - Spectral scenario including frequency reuse and interference
- Security between BS and MS via RS
Summary

- This contribution proposes modifications for RS in the standard
  - Raging process
  - RS identification
- With slight modifications, the RS operations can be enabled and compatible with the standard
- By the help of the modification, RS can also facilitate other processes
  - Normal operation
  - Handover
  - Load balance
  - …