Estimation of Initial Interference Matrix

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For discussion and approval of inclusion of the proposed text into the P802.16j baseline document.

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Introduction

• Goal: Take advantage of resource reuse while mitigating interference
  – Resource reuse enhances system capacity, but causes potential interference
  – Resource reuse group could include combinations of access links and relay links

• Definition of “resource”: one region in time-frequency 2D domain
Interference Measurements between RSs

• Proposal: use UL Sounding sent by RSs to estimate interference between RS ⇔ RS and RS⇔MR-BS

• Step 1: MR-BS sends REP-REQ to RSs
• Step 2: Each RS sends Sounding signal sequentially
• Step 3: RSs send REP-RSP to MR-BS
**Step 1: MR-BS Sends REP-REQ to RSs**

- MR-BS sends a REP-REQ message to all RSs inside the same MR-cell
- When an RS receives REP-REQ, it expects to hear the Sounding zone allocation IE in the subsequent frames

### REP-REQ RS sounding TLVs

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Len</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>RS sounding #</td>
<td>1.9.1</td>
<td>1</td>
<td>RSs #, N_{RS}, participating in RS sounding measurement</td>
</tr>
<tr>
<td>RS CID</td>
<td>1.9.2</td>
<td>N_{RS}*2</td>
<td>RS(1) … RS(N_{RS}) basic CID</td>
</tr>
<tr>
<td>Report period</td>
<td>1.9.3</td>
<td>1</td>
<td>RS sends REP-RSP after the number of frames since receiving the REP-REQ</td>
</tr>
<tr>
<td>CINR request</td>
<td>1.10</td>
<td>1</td>
<td>Bits #0-3: in multiples of 1/16 (range is [1/16,16/16])</td>
</tr>
<tr>
<td>RSSI request</td>
<td>1.11</td>
<td>1</td>
<td>Bit #0: RS reports RSSI on either all or partial subcarriers Bits #1-4: in multiples of 1/16 (range is [1/16,16/16])</td>
</tr>
</tbody>
</table>
Step 2: RSs Send RS Sounding Signal

- MR-BS allocates a Sounding zone allocation IE (an exclusive transmission period) for an RS to send an RS sounding signal
- If the last bit (RS Sounding zone) in the Sounding zone allocation IE is enabled, one RS (indicated by its basic CID) transmits a sounding signal. All other RSs listen to the signal.
- MR-BS uses UL_Sounding_Command_IE to instruct RS how to compose RS sounding signal
Step 3: RSs send REP-RSP to MR-BS

- RSs send measurement results in REP-RSP to MR-BS after the report period (indicated in REP-REQ)
- Measurements may include CINR and/or RSSI

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Len</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>RS Sounding CINR Report</td>
<td>2.6</td>
<td>$N_{RS}$</td>
<td>CINR for each RS</td>
</tr>
<tr>
<td>RS Sounding RSSI Report</td>
<td>2.7</td>
<td>$N_{RS}$</td>
<td>RSSI ranging from $-40$ dBm (encoded 0x53) to $-123$ dBm (encoded 0x00)</td>
</tr>
</tbody>
</table>