Enhanced Non-Optimized CDMA-LTE Interworking Solution

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Key Areas for LTE/eHRPD IWK

- Low cost terminal
- Power consumption
- RAN(LTE/eHRPD)
- Performance
- Low HO latency
- Data lossless
- Minimum RAN impact
- Inter-operability
UE controlled non-optimized HO

- **Terminal**
  - Support Dual Rx/Single Tx
  - High cost of terminal
- **eNB**
  - No impact on eNB
- **Performance**
  - No LTE data interruption
  - Good HO latency
UE controlled non-optimized HO

- **Terminal**
  - Support Dual Rx/Single Tx
  - High cost of terminal

- **eNB**
  - No impact on eNB

- **Performance**
  - No LTE data interruption
  - Good HO latency

Standard option 1
Network assisted non-optimized HO

- **Terminal**
  - Support single Rx/Tx, low cost
- **eNB**
  - eNB provides cdma RAN level info
- **Performance**
  - LTE data interruption occurs during compressed mode period
  - Longer HO latency

![Diagram showing timeline and data transmission over eHRPD and LTE]
Network assisted non-optimized HO

- **Terminal**
  - Support single Rx/Tx, low cost

- **eNB**
  - eNB provides cdma RAN level info

- **Performance**
  - LTE data interruption occurs during compressed mode period
  - Longer HO latency

**Standard option 2**

- **Terminal cost**
- **eNB complexity**
- **Good performance**
Enhanced non-optimized HO

- **Terminal**
  - Support single Rx/Tx, low cost

- **eNB**
  - Minor or no impact on eNB

- **Performance**
  - Good HO latency
  - Performance loss?
Enhanced non-optimized HO

- **Terminal**
  - Support single Rx/Tx, low cost

- **eNB**
  - Minor or no impact on eNB

- **Performance**
  - Good HO latency
  - Performance loss?
## Performance analysis

<table>
<thead>
<tr>
<th>Channel</th>
<th>SFBC</th>
<th>2Rx (unbalanced)</th>
<th>1Rx</th>
</tr>
</thead>
<tbody>
<tr>
<td>ETU60</td>
<td>Y</td>
<td>Ref</td>
<td>-3.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0dB</td>
<td>3dB</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-1.2</td>
<td>-2.2</td>
</tr>
</tbody>
</table>

- **Assumption**
  - Data card: 2nd ANT 3dB loss VS primary ANT
  - Handset: 2nd ANT 6dB loss VS primary ANT

Call can be kept with lower data rate
Network can enhance to address this issue

Minimum gain loss is 1.6 dB only. The maximum gain loss is 3.8 dB
## Coverage analysis

<table>
<thead>
<tr>
<th>Coverage (km)</th>
<th></th>
</tr>
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<tbody>
<tr>
<td>UL</td>
<td>DL</td>
</tr>
<tr>
<td>2Rx</td>
<td>2Rx</td>
</tr>
<tr>
<td>11.78</td>
<td>16.31</td>
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</tbody>
</table>

• **Link budget assumption**
  - Edge data rate: 64kbps for DL and UL; UE speed: 60 km/h
  - Morphology: Suburban
  - Environment: Outdoor
  - Sectorization: 3 sector
  - Antenna configuration: 2x2 OL-SFBC
  - Propagation Model: Okumuru- Hata Model

Antenna reduction decreases DL coverage. However, the coverage is UL limited.
Summary

- **Enhanced non-optimized HO solution**
  - Significant reduction of HO latency VS standard option
  - Lower UE cost
  - Lower power consumption of UE
  - No impact on coverage
  - Performance down-gradation can be improved by network enhanced method
  - No/less standard impact
  - No impact on both LTE RAN and CDMA RAN.
  - Apply to other technology interworking
  - Add some complexity to UE implementation
Thank you

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