Interference Detection and Measurement in OFDMA Relay Networks

IEEE 802.16 Presentation Submission Template (Rev. 8.3)

Document Number:

IEEE S802.16j-07/229

Date Submitted:

2007-03-09

Source:

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Venue:

IEEE 802.16 Session #48, Orlando, USA

Base Document:

IEEE C802.16j-07/229 and URL <http://ieee802.org/16/… C80216j-07_229.pdf>.

Purpose:

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

Introduction

- Propose an interference detection and measurement method by sounding signal
  - Reuses 16e sounding pattern
  - Supports both RS to RS/BS and SS to RS/BS measurement
  - Covers both intra-cell and inter-cell measurement
  - Achieves high efficiency of measurement overheads

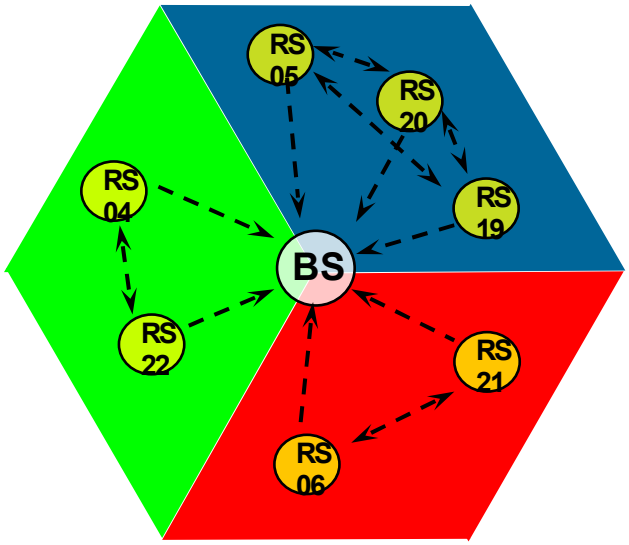
- Use of sounding measurement to achieve:
  - Estimate interference among RSs/BSs
  - Estimate accurate interference at SSs

Channel Estimation by Sounding Signal

- 802.16e-2005 has defined UL sounding as an option for a BS to estimate the channel quality from its MSs
- The proposal extends the usage of sounding to support both RS to RS/BS and SS to RS/BS channel estimation

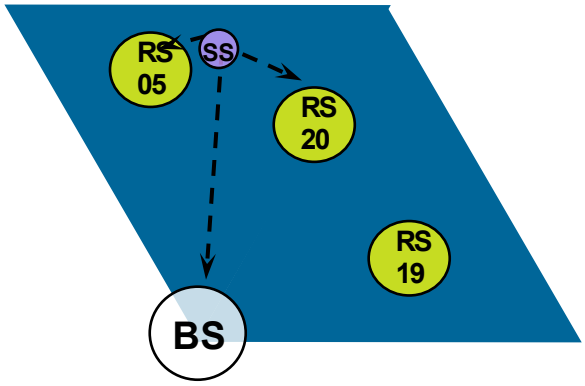
- RS to RS/BS channel estimation

  To identify the resource reuse group



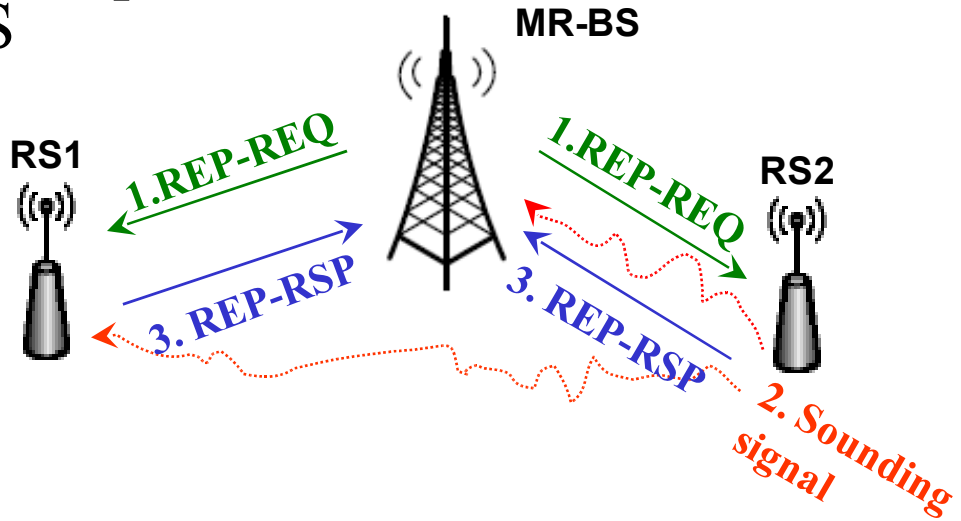
- SS to RS/BS channel estimation

  To measure the interferences at SS caused by RSs and BS
  - Assume symmetric propagation model from SS to RS and from RS to SS
  - Due to high overheads of this measurement, we use RS to BS/RS channel estimation to filter some mappings



Procedures of Interference Measurements by Sounding

- Step 0: MR-BS shall construct a multicast group consisting of the RSs that participate in the interference measurement and use a multicast CID to represent the group
- Step 1: MR-BS sends REP-REQ to RSs in the group
- Step 2: Each RS is instructed by UL_Sounding_Command_IE and PAPR_Safety_and_Sounding_Zone_Allocation_IE to send sounding signal
  - An RS needs to measure sounding signal from other RSs in the group
- Step 3: RSs reports the measurement results in REP-RSP sent to MR-BS

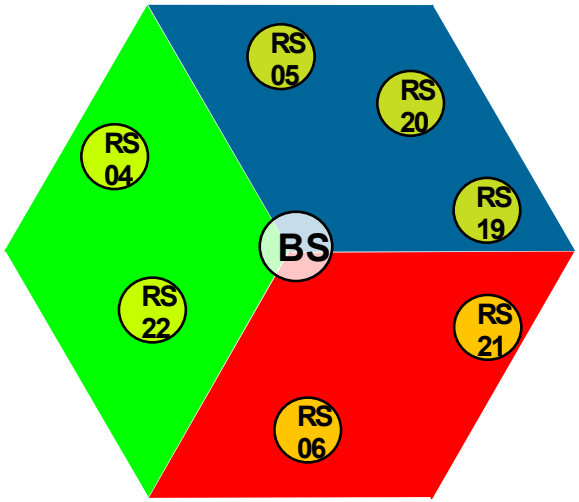


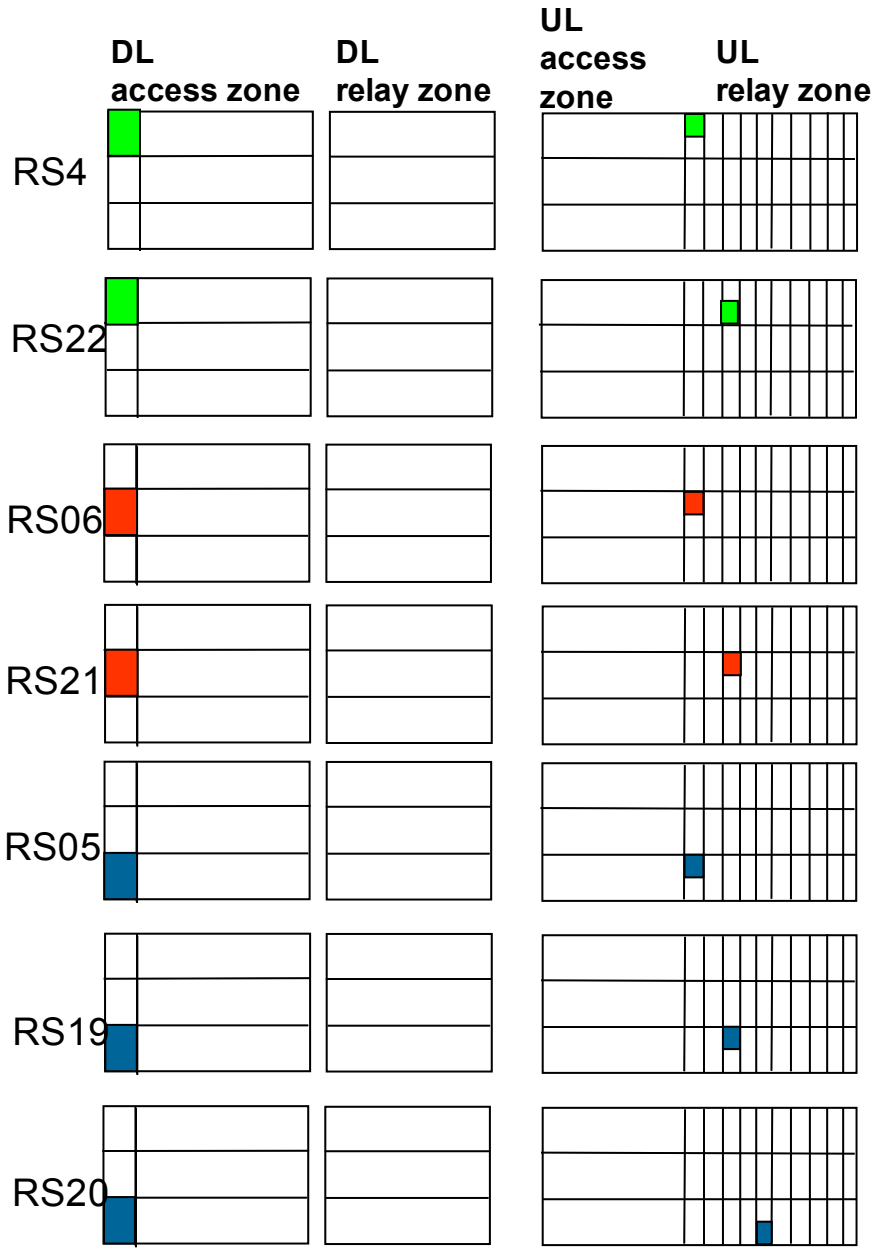
Overhead Efficiency of Sounding Measurement

- Assume UL relay zone is 12 symbol long and R-RTG and R-TTG are one symbol long
- A sounding band consists of 18 consecutive subcarriers

	512 FFT		1024FFT		2048FFT	
	# RS per symbols	# RS per frame	# RS per symbols	# RS per frame	# RS per symbols	# RS per frame
PUSC	7	42	15	90	32	192

It is possible to complete the interference mapping in a BS cell within a frame.





Tier-1 and Tier-2 Inter-cell Interference Measurement

Use 7 frames to complete the interference measurement in a 19-cell cluster.