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Title	**Radio Resource Reuse in access zone and relay zone**
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Re:	Call for technical proposals regarding IEEE project P802.16j
Abstract	The location information and signal strength information from other stations could be used for radio reuse.
Purpose	This contribution proposes the interference measurement method for radio reuse in both access and relay zone.
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Radio Resource Reuse in access zone and relay zone

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1. Introduction

In this document, we propose interference measurement methods for the purposes of resource reuse. We consider methods for coarse resource allocation and fine resource allocation. The coarse method is based either on the location of the infrastructure stations or the interference measurement as reported by the infrastructure stations. The fine resource allocation can be refined in the access zone by utilizing the scan report messages form the MSs.

2. Coarse Resource Allocation Methods

2.1. Coarse Resource Allocation Based on Location Information

The geographical location can be used for the purposes of resource reuse. Even if the actual interference from other stations could be different from geographical information, the interference from other stations has an intermediate relation with path loss.

2.1.1 Location information report when initial entry.

MR-BS can determine the radio reuse based on this location information when FRS is installed in a certain area in the initial time

2.1.2 Location information update for MRS

MRS moves to the other area during operation. If necessary, MR-BS requests the location information to RS, RS report the present location information to MR_BS.

2.2 Coarse Resource Allocation Based on Interference Measurement

Actual interference measurement results can be used to further refine the radio resource reuse.

2.2.1 Interference measurement in 2-hop case

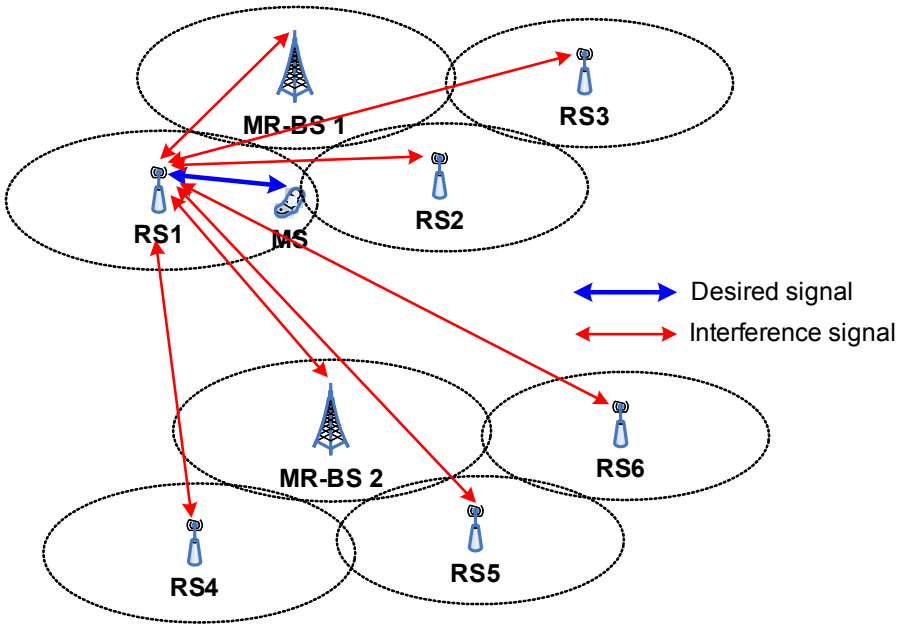

Figure 1. Coarse interference measurement in 2 hop topology

Figure 1 shows the coarse interference measurement in the case of a 2 hop topology. In multi-cell environments, RS needs to measure signals from the neighboring MR-BS and report it. RS can measure the interference from the neighboring MR-BS using DL synchronization symbol within the DL Relay zone as illustrated in Figure 2.

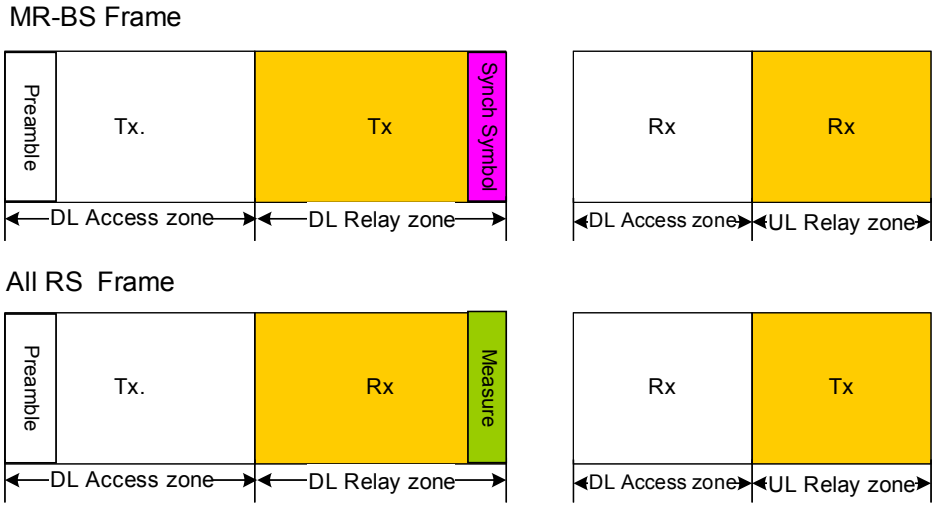

Figure 2. Interference measurement from MR-BS

RS can also measure the interference from the other RSs as shown in Figure 3. When one RS transmit its signature to all other RSs in the DL relay zone, the other RSs can listen and report the results. In this case, RS1 incurs an overhead equal to one R-RTG. The other RSs can receive in the Rx. mode (that they are already in) and therefore do not need any mode transition.

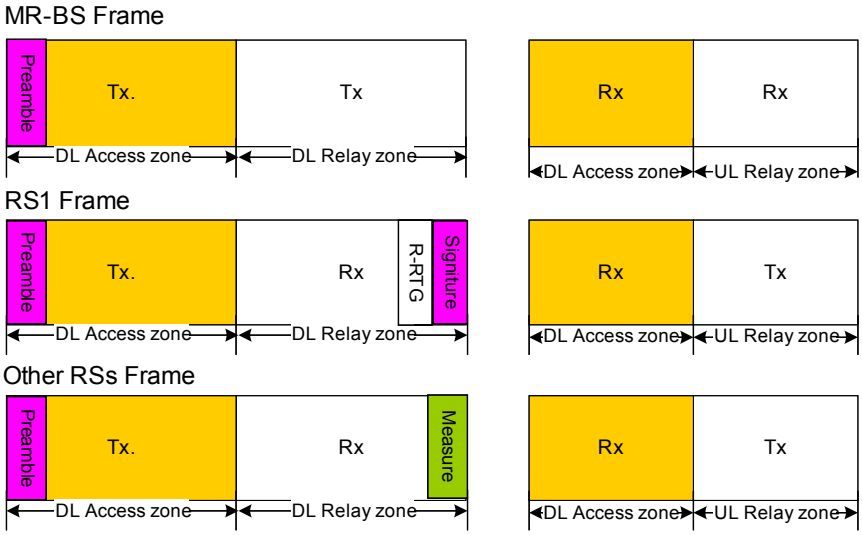

Figure 3. Interference measurement from the other RSs

2.2.2 Interference measurement in multi-hop case

Figure 4 represents a multi-hop topology. In this case, the frame structure can be assumed as shown in Figure 5 which is an in-frame relay frame structure from [1].

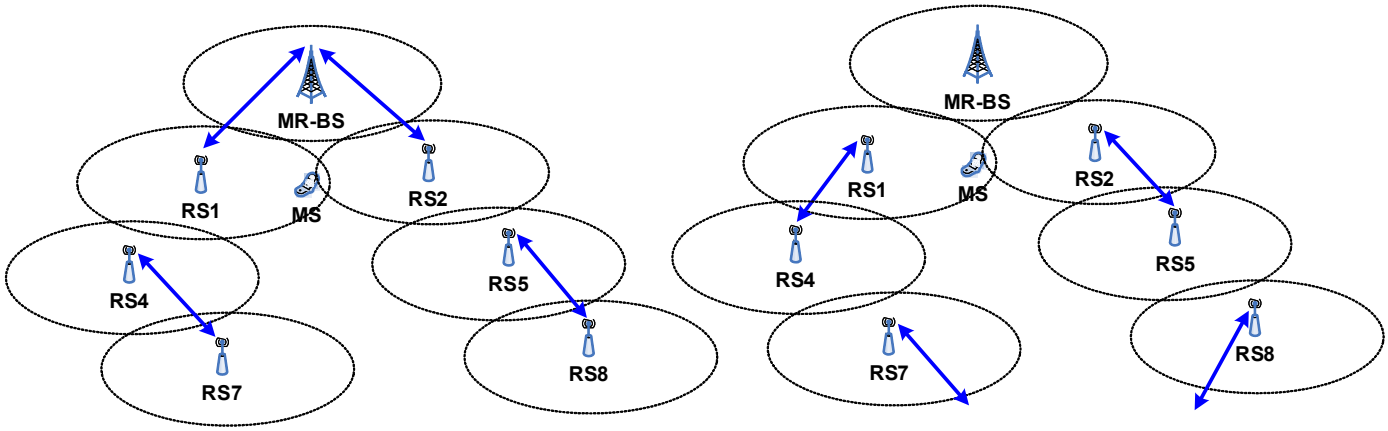

Figure 4. Multi-hop topology environment

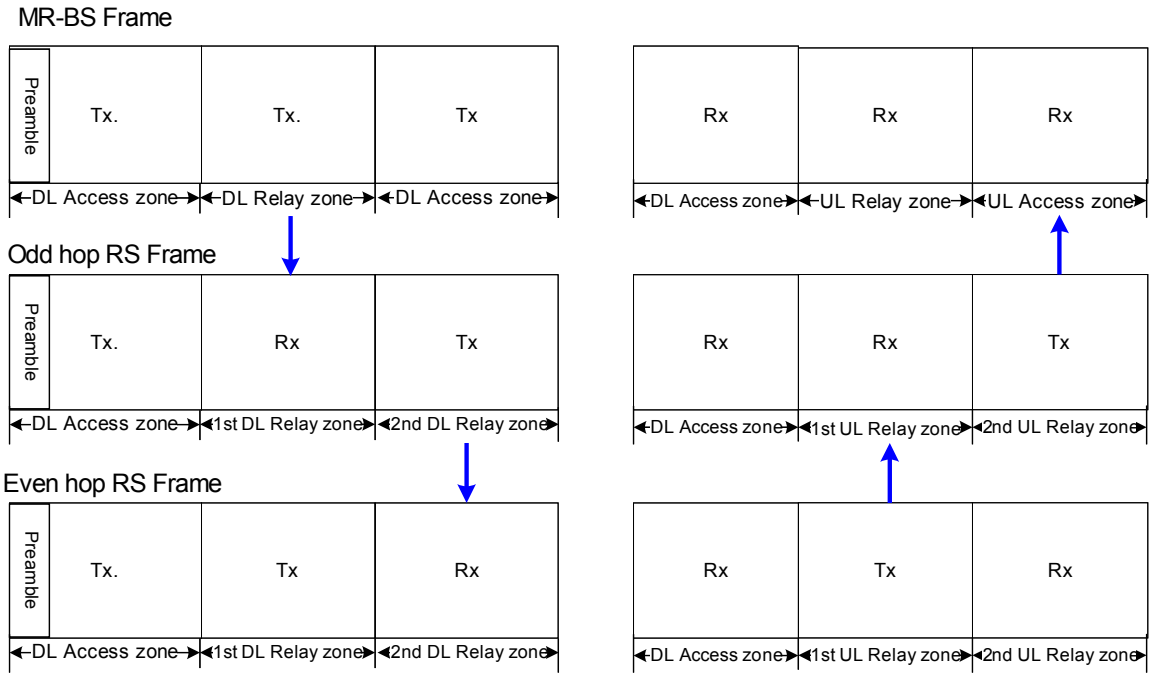

Figure 5. In-frame multi-hop frame structure

Figure 6 shows the coarse interference measurement in the RS. RS1 shall measure the other RSs and report the results to the MR-BS.

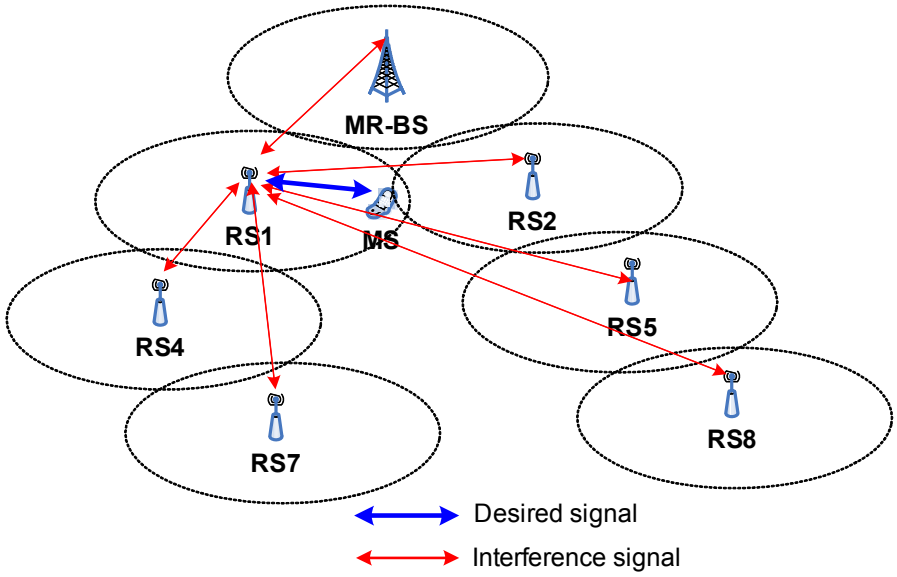

Figure 6. The coarse interference measurement

For this operation, RS1 can measure MR-BS and the interference from the other RSs as shown in Figure 7. When RS1 measures all the other stations, RS1 can measure MR-BS as well as even-hop RSs using synchronization symbol within the 1st DL relay zone. If the MR-BS or the even-hop RS does not transmit synchronization symbol, then RS1 can transmit its own signature to the other odd-hop RSs. The even hop RSs such as RS 4, RS5 also can detect the interference from the odd hop RS using synchronization symbol, and can also measure the signal strength of MR-BS and even hop RS within the 2nd DL relay zone.

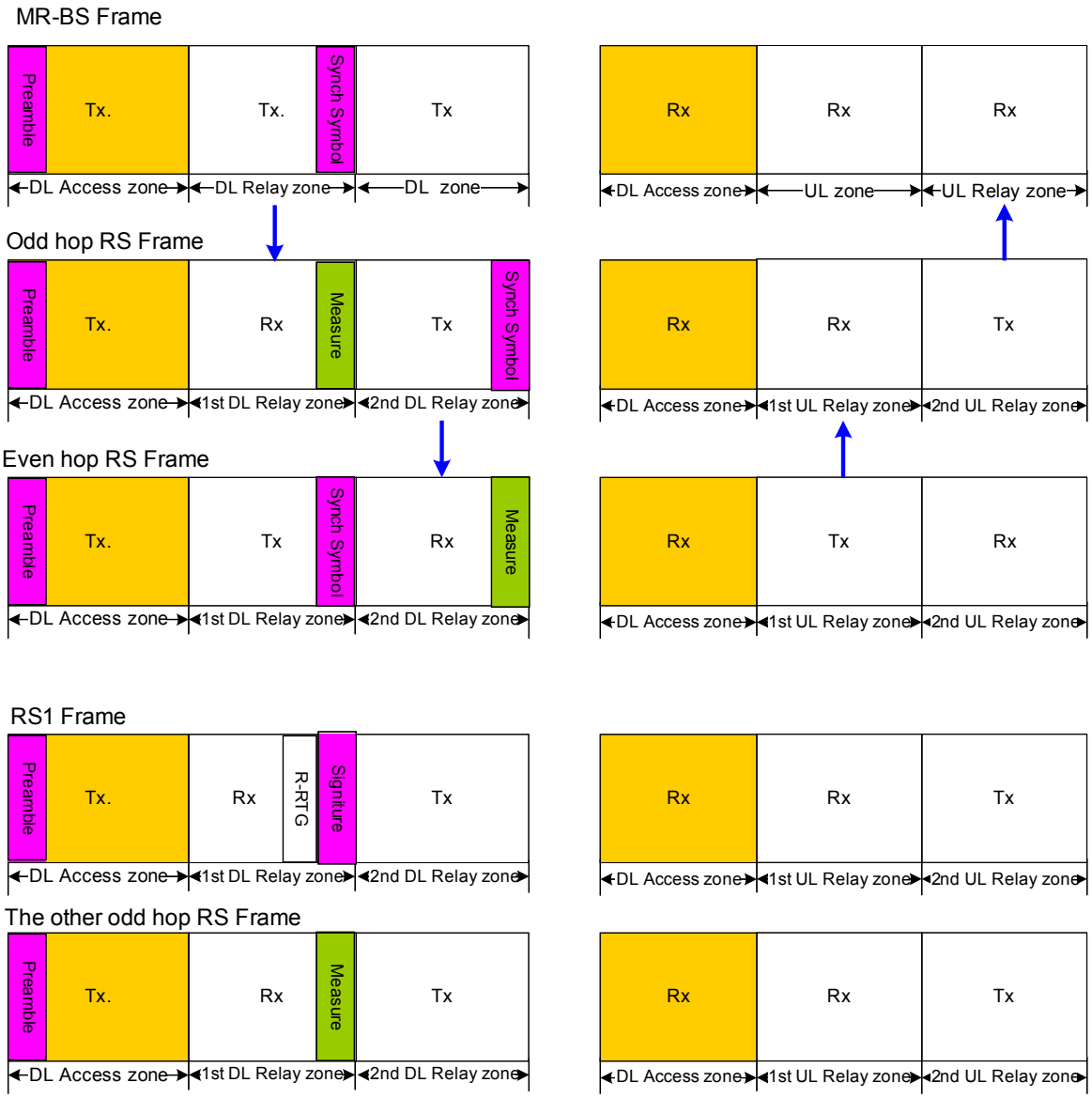

Figure 7. Coarse interference measurement method in RS

3. Refining the Resource Alloocation in the Access Zone

In access zone, the exact interference measurement is at the MS not RS. Figure 5 represents this situation.

For fine interference management, MS needs to measure the interference from the other RSs and MR-BS and report to them.

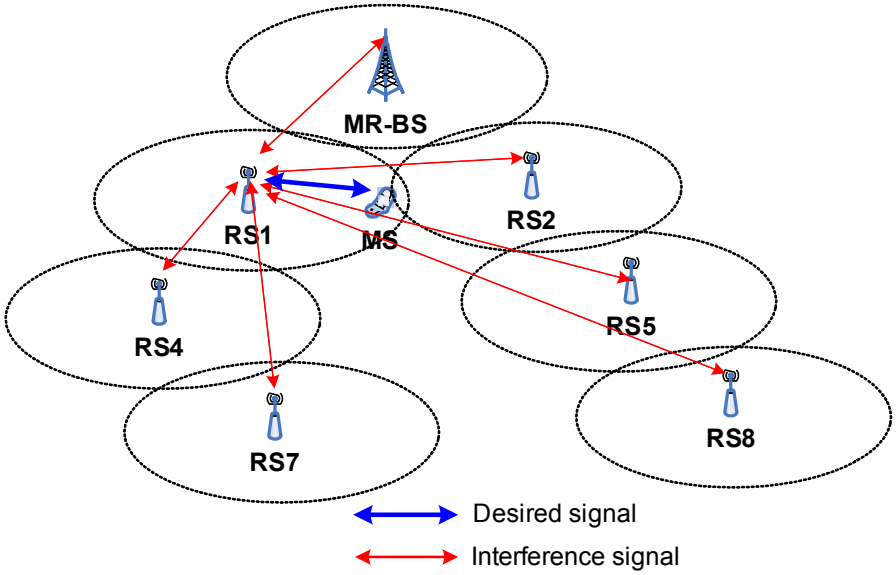

Figure 5. Interference measurement using scanning report of MSs

MS scanning operation of neighbor BSs is already exist to support handover in current specification at 6.3.22.1.2 in [2]. Using this information, MR-BS can get easily the actual interference feeling from MSs without message overhead.

For handover, RS may allocate time for MS to scanning neighbor stations (i.e. MR-BS and RSs), and collect and update from all serving MSs. When MR-BS controls whole handover procedure, MR-BS may received this scanning information from RSs.

4. Proposed Text Change

[Insert the proposed text at the end of section 6.3.27]

In multi-cell environments, RS needs to measure signals from the neighboring MR-BS and report it. RS can measure the interference from the neighboring MR-BS using DL synchronization symbol within the DL Relay zone.

References

[1] C80216j-07/136, “On the use of postamble for the relay link, January, 2007.

[2] 802.16e-2005, “Amendment 2: Physical and Medium Access Control Layers for Combined Fixed and Mobile Operation in Licensed Bands and Corrigendum 1”, *IEEE Computer Society and the IEEE Microwave Theory and Techniques Society,* 28 Feb. 2006.