AAS Direct Signaling Methodologies to Support High Capacity MR-BS to RS Links

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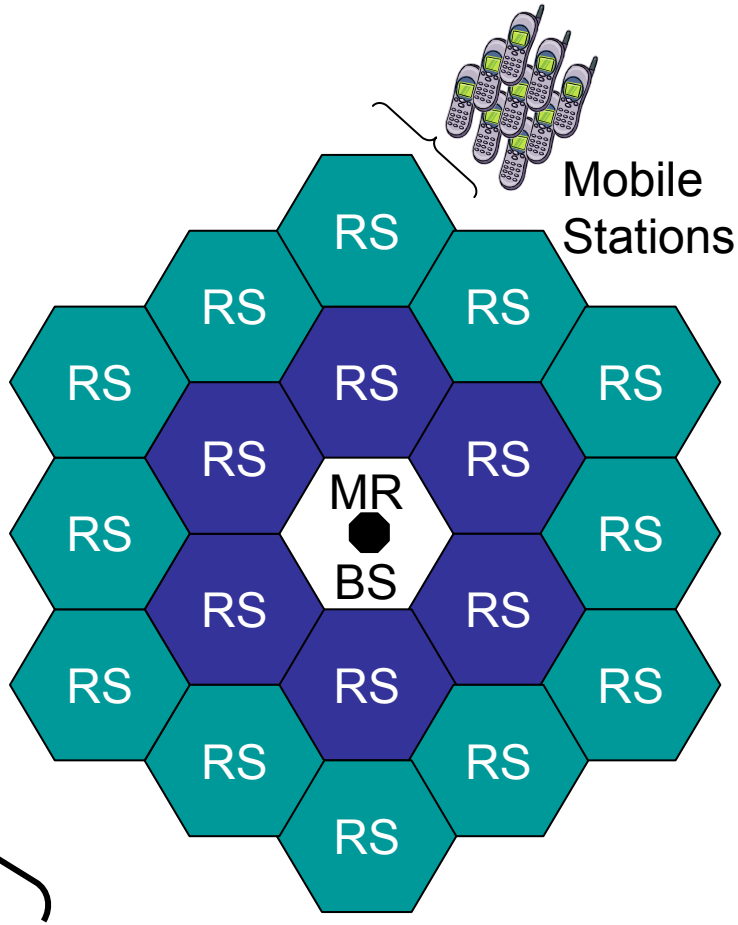
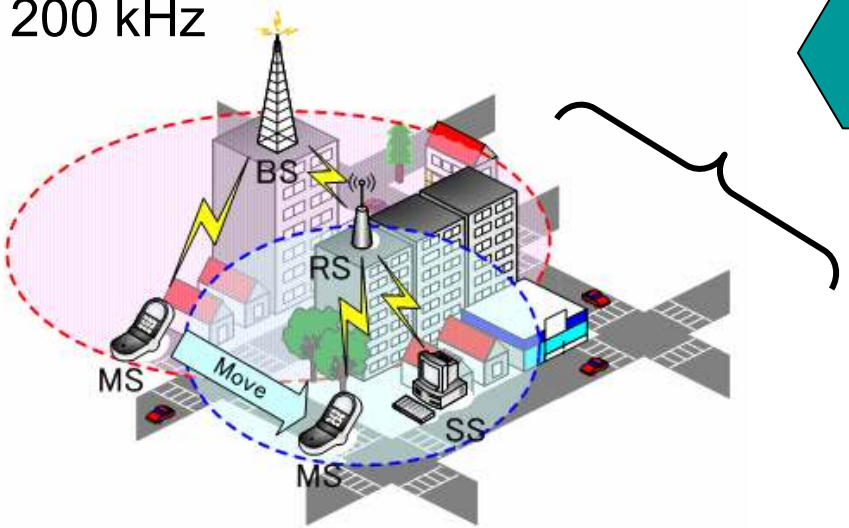
Purpose:

This document provides a Technical Proposal for an AAS Signaling Methodology for consideration by the 802.16j Multi-hop Relay Task Group.

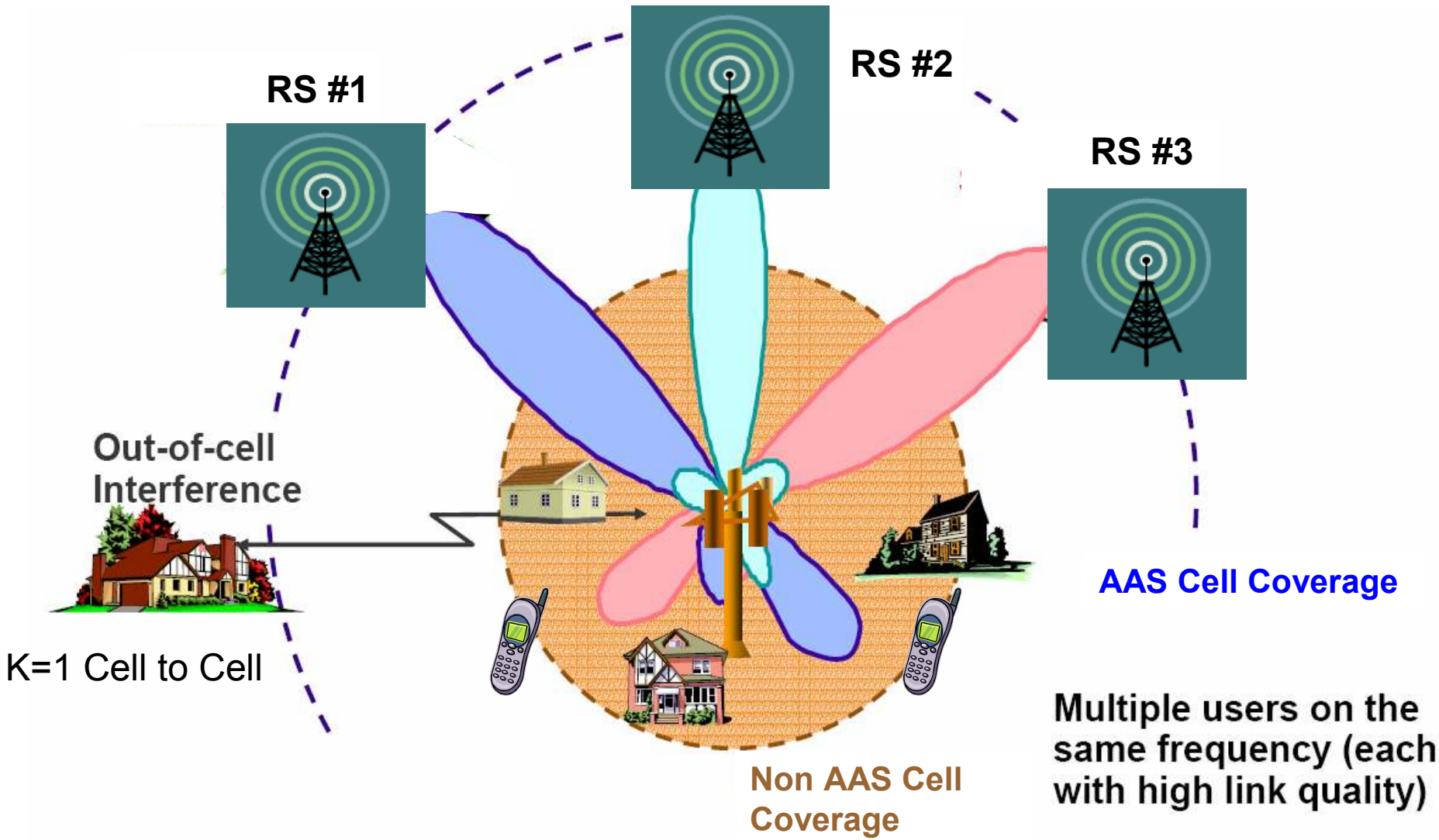
Motivation:
MR-BS w/ 18 RS nodes

- Relay Nodes
  - DL spectral efficiency
    ~ 1 bps/Hz
  - 18 nodes, 50% Loading
- MR-BS
  - DL spectral efficiency required
    ~ 9 bps/Hz
  - Coherence BW of Relay Link
    ~ 200 kHz



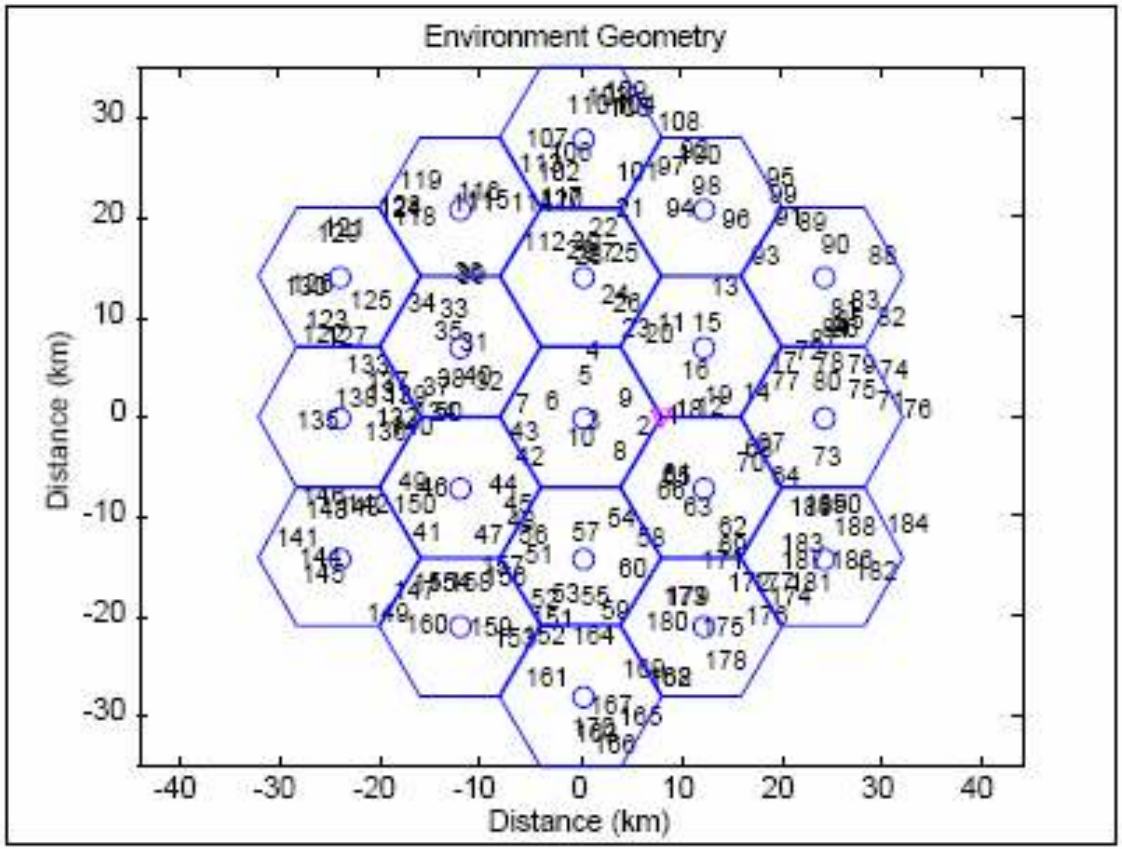


Multi-user Beamforming, Relay Link



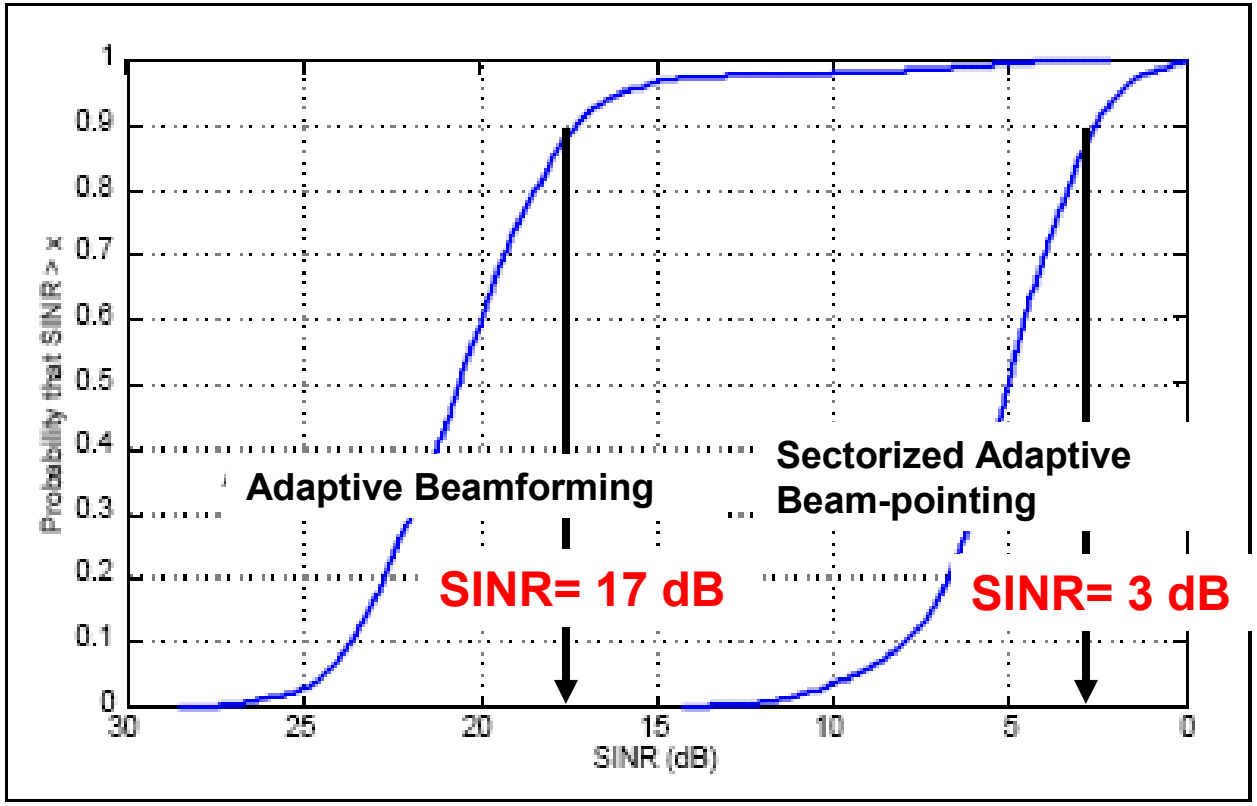
Multiple "Spatial Planes" -> Higher Spectral Efficiency

Wireless Network Simulation: 19 MR-BS w/ 10 RS nodes per BS



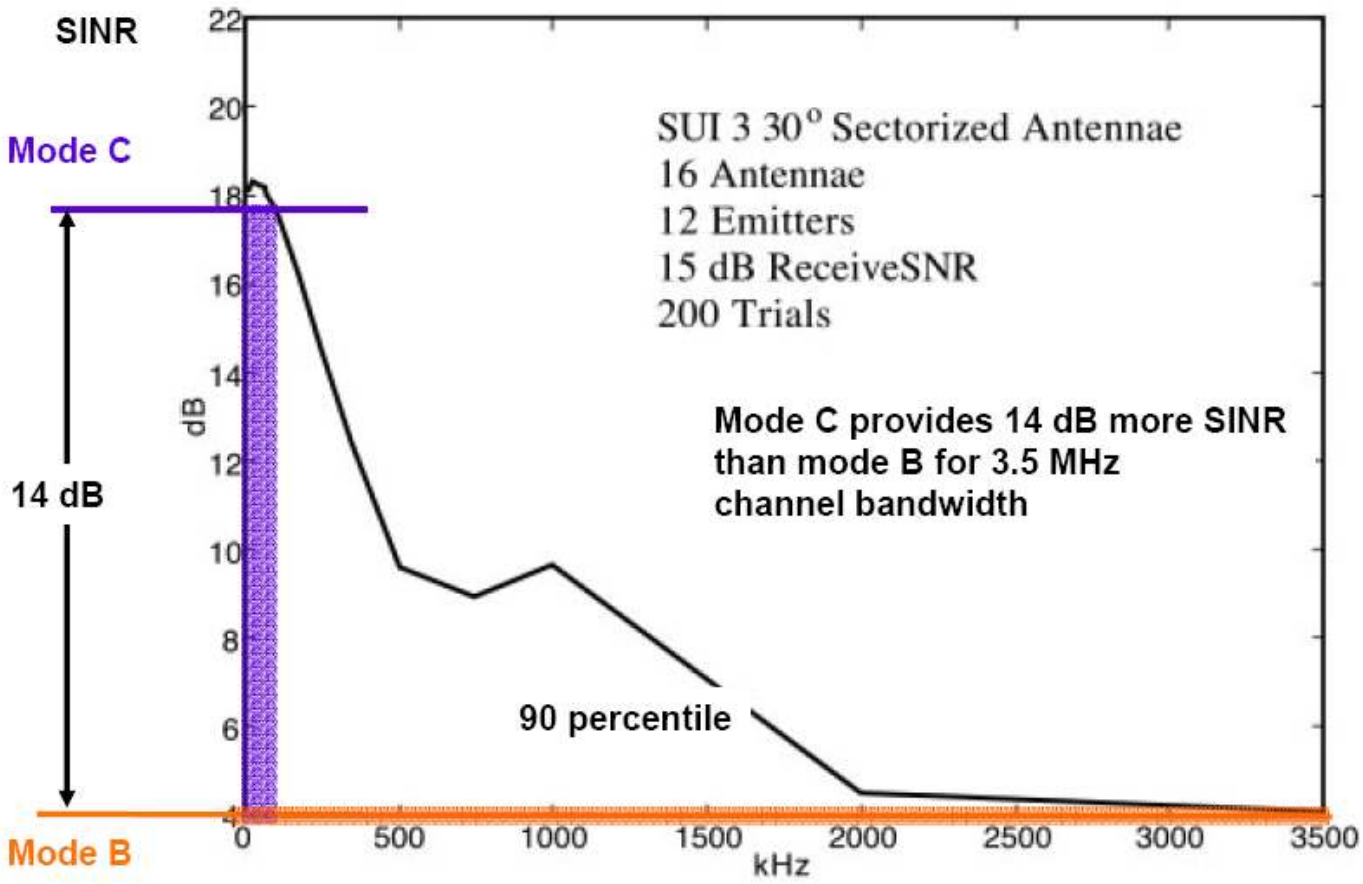
- 200 Monte Carlo Trials
- 190 co-channel links
- Random RS selection from uniform distribution
- Propagation: Geometric Elliptical Model w/ angle spread
- SUI-3s w/ Erceg B
- Log Normal Fading
- 16 antennas at MR-BS
- 1 antenna at RS
- Preamble Length = 64

Simulation Results: SINR w/ 10 Co-channel RS



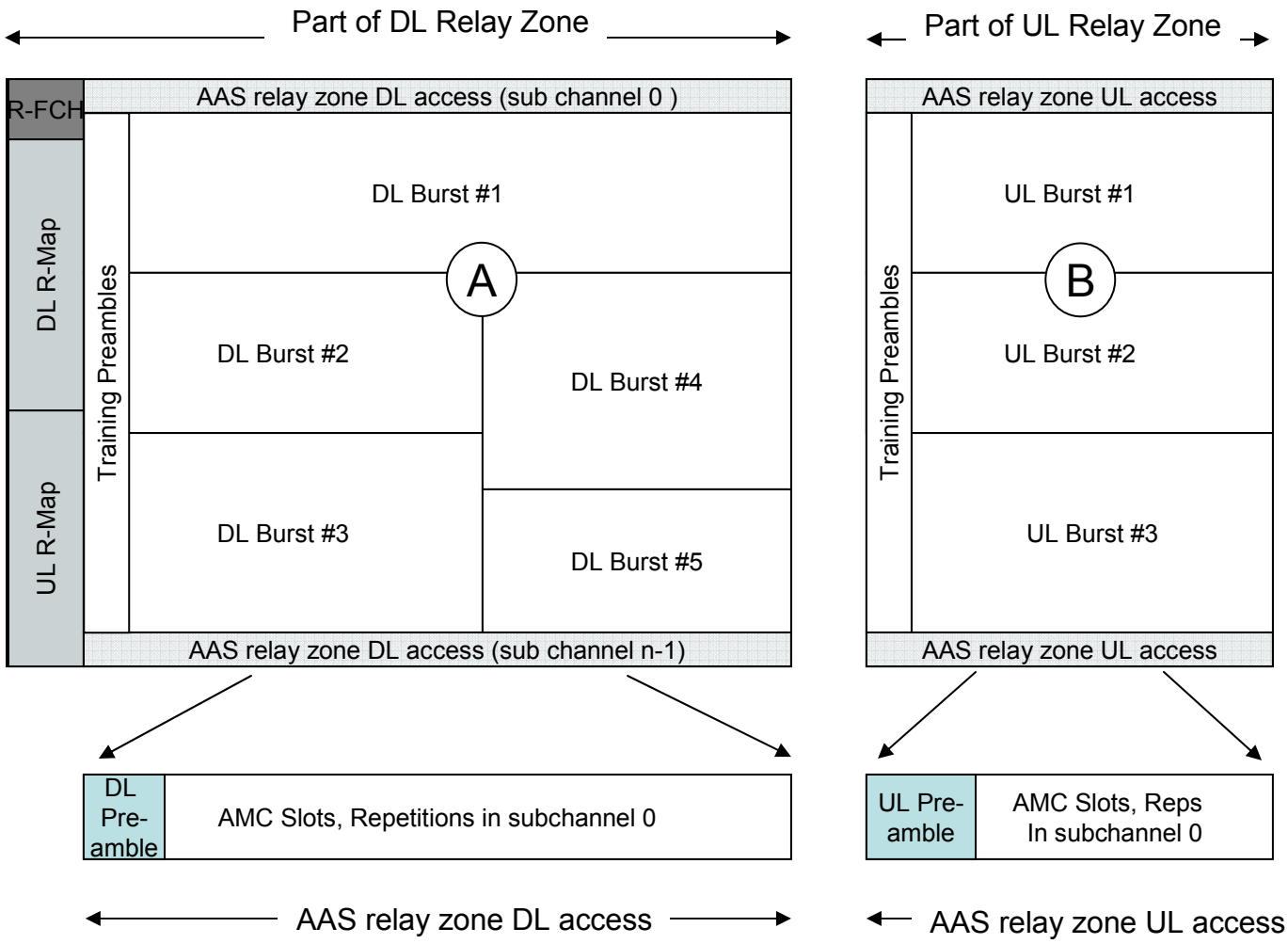
Adequate SINR for 10 Simultaneous Link at ¾ rate 64 QAM

SINR Degradation as a Function of Preamble Bandwidth, Length = 64

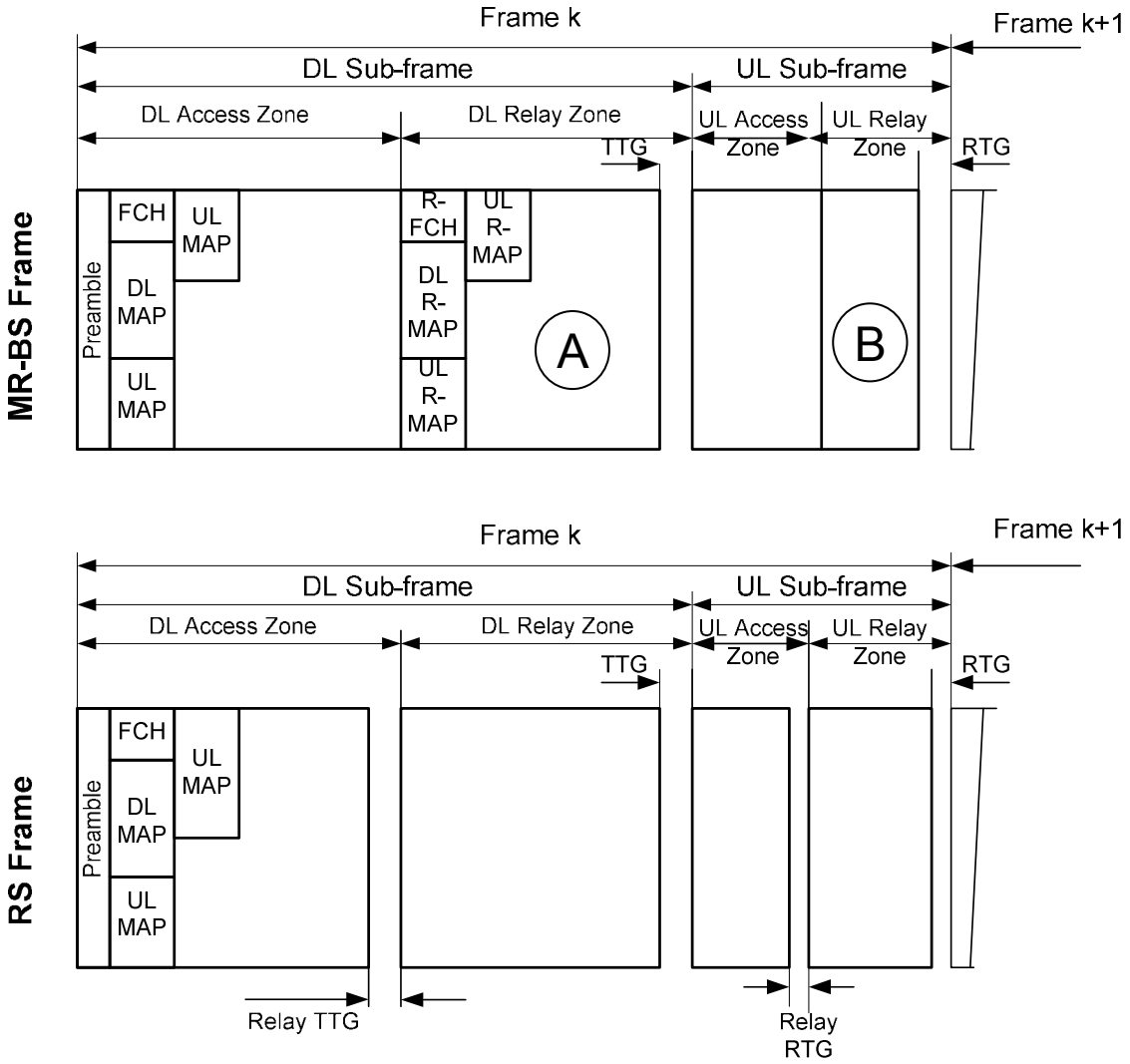


Recommend 1 bin x 8 symbol or 2 bin x 4 symbol preamble training

AAS Relay Zone Construction



Frame Structure Reference



Conclusion

- MR-BS to RS Link Requirements
  - O9, Multiple Antenna Support, Technical Requirements Guideline for Relay TG
  - Bandwidth concentration property of MR-BS
  - High Spectral Efficiency Required
  - High Bandwidth Request Activity
  - Low Coherence Bandwidth, 100 to 200 kHz
- Multi-user AAS Option proposed for MR-BS <-> RS Link
  - Longer UL training preambles to adapt larger arrays
  - Multiple “spatial planes” for payload transport
  - Multiple “spatial planes” for bandwidth request/ranging
  - Spectral efficiency ~ 9 bps/Hz with 16 antennas
- Proposed Text
  - Applies to MR-BS to RS link
  - Augment AAS_Zone definition & add preamble definition in section 8.4.4.8
  - Modify AAS_UL_IE