

IEEE 802.16m network coding allowed on access link

IEEE 802.16 Presentation Submission Template (Rev. 9)

Document Number:

IEEE C802.16m-09/0824r2

Date Submitted:

2009-04-24.

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Venue:

IEEE 802.16 Session #61 Cairo, Egypt

Base Contribution:

None

Purpose:

To address the FFS item in 16m SDD section 11.4.3

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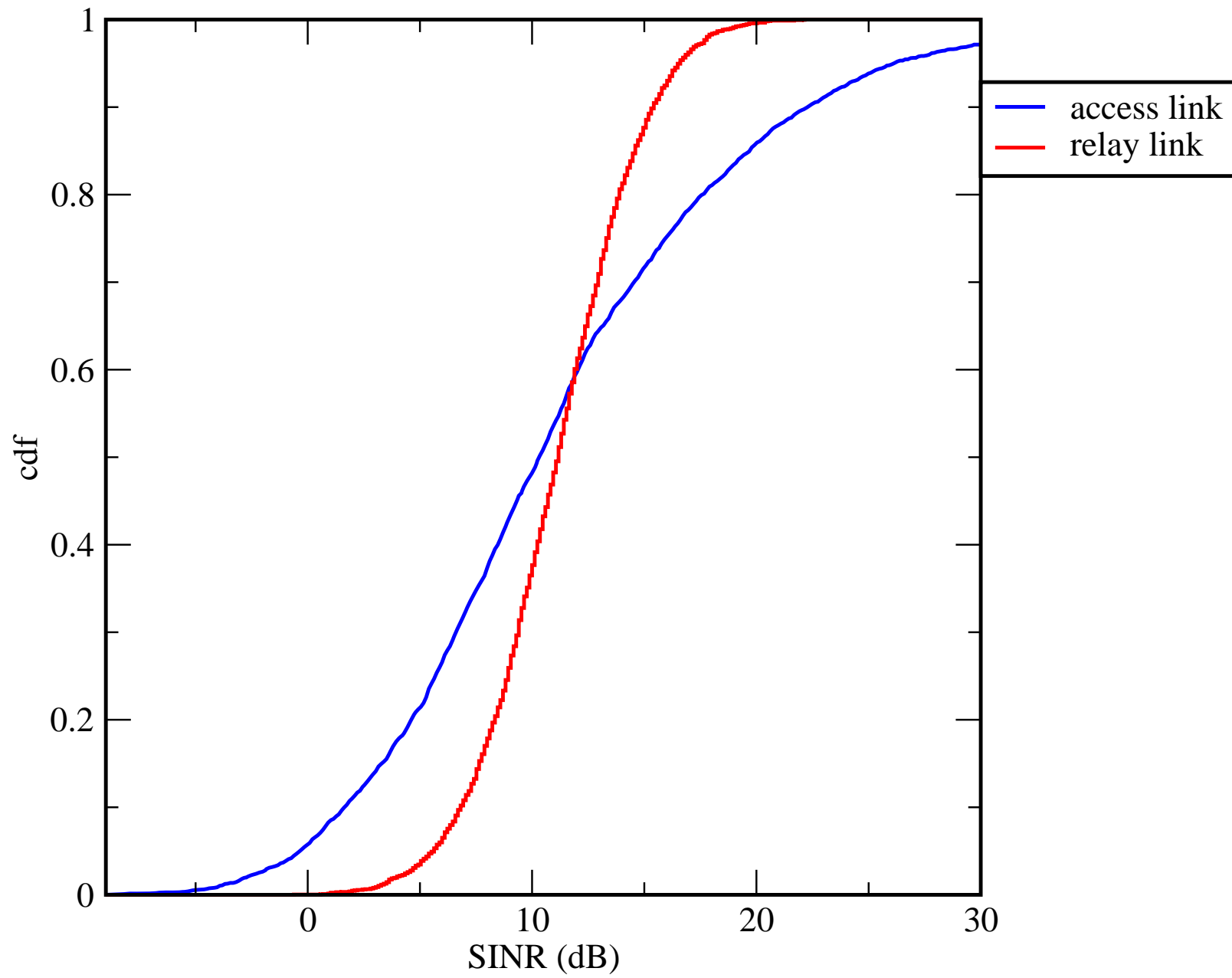
Introduction

- Currently in 16m network coding zone, the transmission to AMS is FFS
- Given there are opportunities for network coded transmissions to AMS, what is to be studied is whether network coding provides enough gains on access link, whose channel condition is assumed to be quite different from the relay link

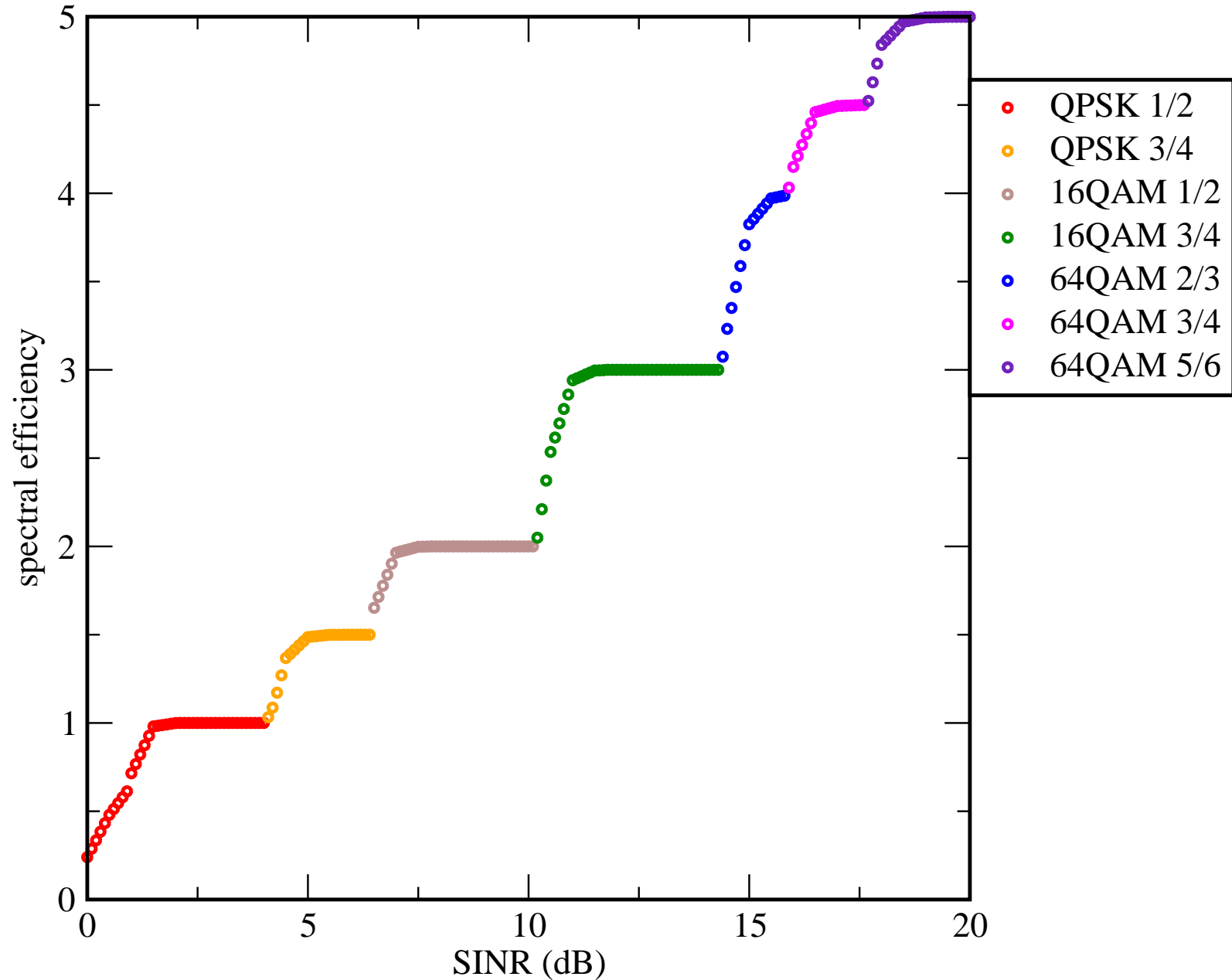
Analysis assumption

- ART Scenario in EMD
- ARS uses the the Omni-directional antenna to transmit to both ABS and AMSs
- ABS has rx antennas pointed to its subordinate ARS with 20dBi boresight gain and 20° 3dB-beam width when at network coding sub-frame
- Fading assumption
 - RS-BS LOS flat fading
 - RS-MS ITU pedestrian B
- Independent shadowing on access and relay links
- Antenna height: 32m above AMS
- About 40% AMS attached to ARS

NC zone SINR



MCS selection threshold



MCS selection of each link

- For each link, effective SINRs are calculated for each modulation order. The MCS with highest spectral efficiency based on the previous slide is chosen for the link
- If the modulation orders of the 2 links are different, the lower modulation order is chosen. The link with loss of modulation order uses the highest code rate of the chosen modulation order

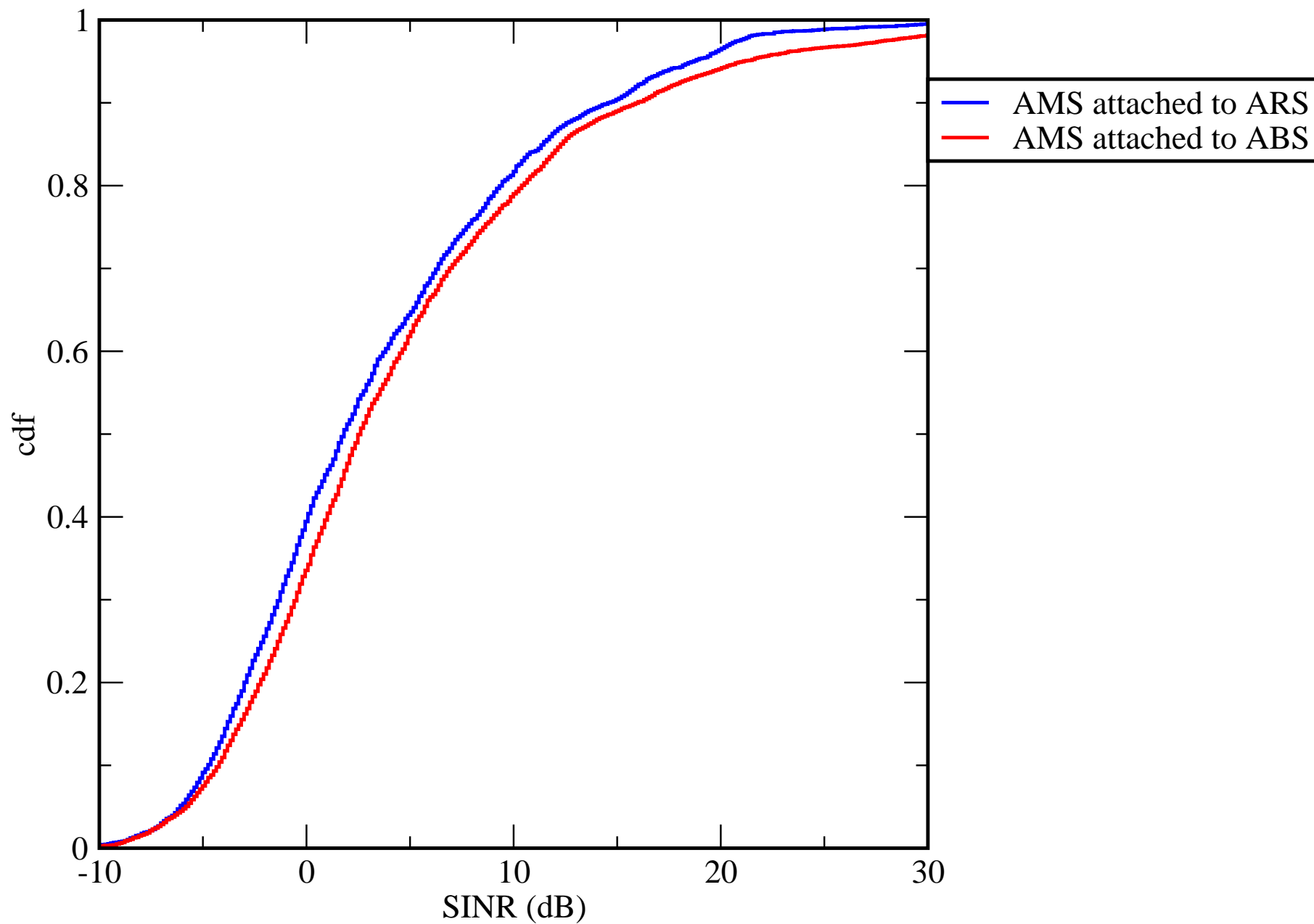
Network coding zone spectral efficiency

- Based on the simulation, the spectral efficiency per ARS (to AMS and ABS) with network coding is 4.4, based on the MCS selection procedure in the previous slide
- The access link average spectral efficiency per ARS with normal MCS selection is 2.27
- The relay link average spectral efficiency per ARS with normal MCS selection is 2.70
- Average loss of spectral efficiency due to modulation order mismatch = $2.27+2.7-4.4 = 0.57$
- Average sector spectral efficiency (2 ARS) = $2*4.4 = 8.8$

DL access zone spectral efficiency (for comparison)

- The SINR distribution is shown in the next slide
- The access link average spectral efficiency per ARS is 1.03
- The access link average spectral efficiency per ABS is 1.18
- Average sector spectral efficiency (2 ARS, 1ABS)= $1.18 + 2 * 1.03 = 3.24$

DL access zone SINR



Observation

- The spectral efficiency is high even with independent access, relay link channels, hence the gain of network coding is primarily limited by the opportunity of performing the network coding
- By allowing additional networked coded transmission to AMS, the utilization of the network-coding zone is increased because of the increased opportunity of performing the network coding

Proposed text change

- Network Coding Transmit Zone: An integer multiple of subframes located in the DL of the frame of the Odd Hop ARS which is directly attached to the ABS, where an Odd Hop ARS can transmit network coded transmissions to the ABS and Even Hop ARS or AMS.
~~Transmissions to the AMS in this zone are FFS.~~