

HARQ ACK Channel and Retransmission Dummy Pattern Performance Comparison

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Purpose:

Performance comparison of HARQ ACK/NAK channels and re-transmission dummy pattern

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Background

- Several ACK/NACK channels schemes are proposed for MR system.
 - Performance and overhead tradeoff should be compared
- Several re-transmission dummy patterns are proposed for MR system
 - Performance should be compared and optimized
- This draft serves a placeholder for reporting the simulation results to the HARQ ad-hoc
 - Simulations working is running

CQICH Coding

- Assume x_{ij} as the transmit symbol at data tone j of the tile i , where $i = 0, 1, \dots, 5$, and $j = 0, 1, \dots, 7$.
- $\mathbf{X}=[x_{ij}]$ is selected from the codebook P .
 - $\mathbf{p}=[p_{ij}]$ is a codeword of the codebook P containing 64 different codewords.
 - p_{ij} is selected from a QPSK constellation.
 - Each codeword represents a 6-bit binary number.
- Assume y_{ijk} as the received symbol at the receive antenna number k .

Coherent Detector

- \hat{h}_{ijk} represents estimated channel between transmit antenna and the k th receive antenna for the data tone j and tile i .
 - Channel is estimated based on the received pilots per each tile.
 - The best channel estimation method is to average the 4 pilots over a uplink tile.
- Coherent detection is defined as follows:

$$\hat{p} = \arg \max_{p = [p_{ij}] \in P} \operatorname{Re} \left\{ \sum_{i, j, k} \hat{h}_{ijk}^i p_{ij}^i y_{ijk} \right\}$$

Non-coherent Detector

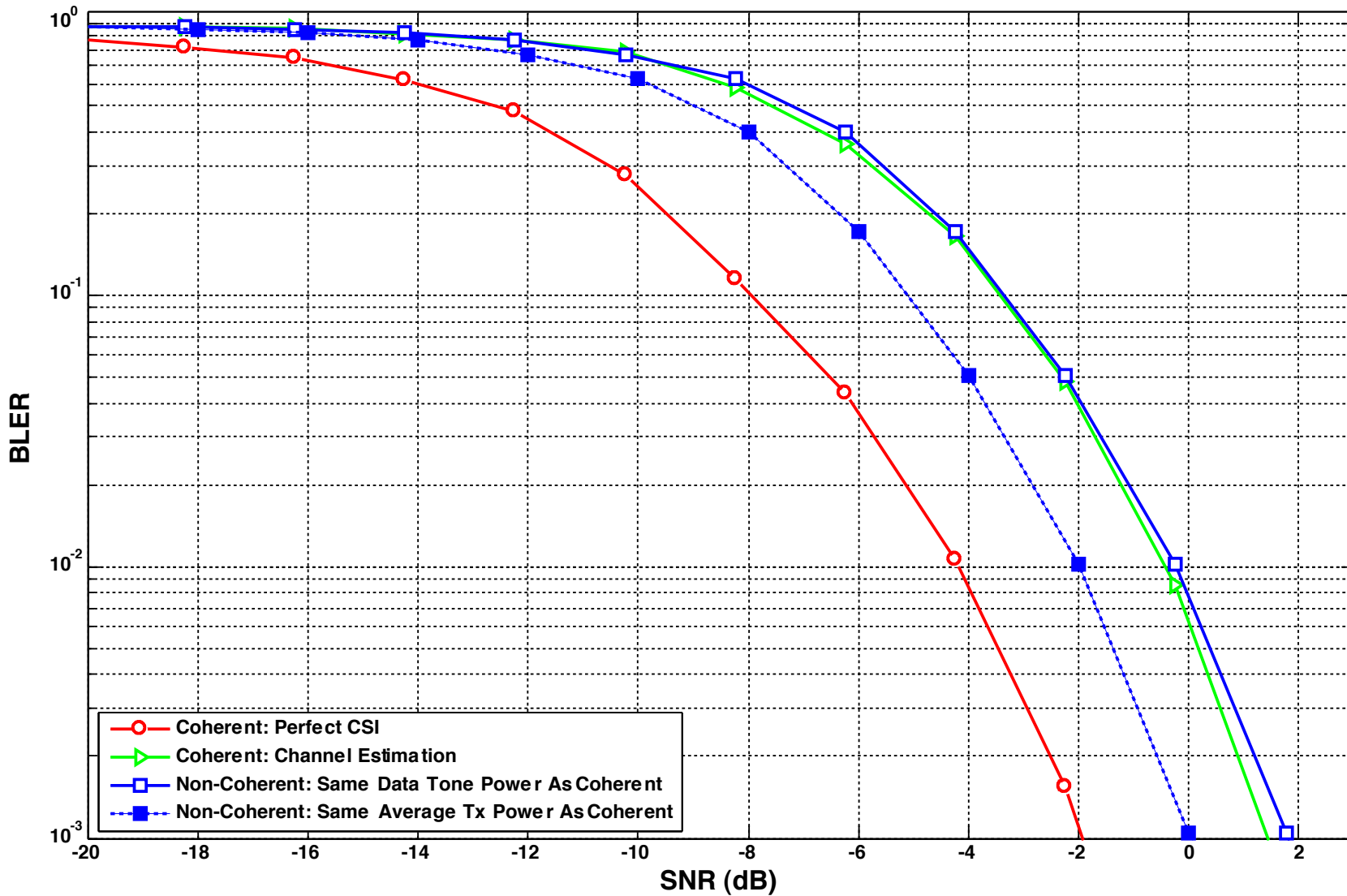
- No channel estimation
- Non-coherent detection is defined as follows:

$$\hat{p} = \arg \max_{p = [p_{ij}] \in P} \sum_{i,k} \left| \sum_j p_{ij}^i y_{ijk} \right|^2$$

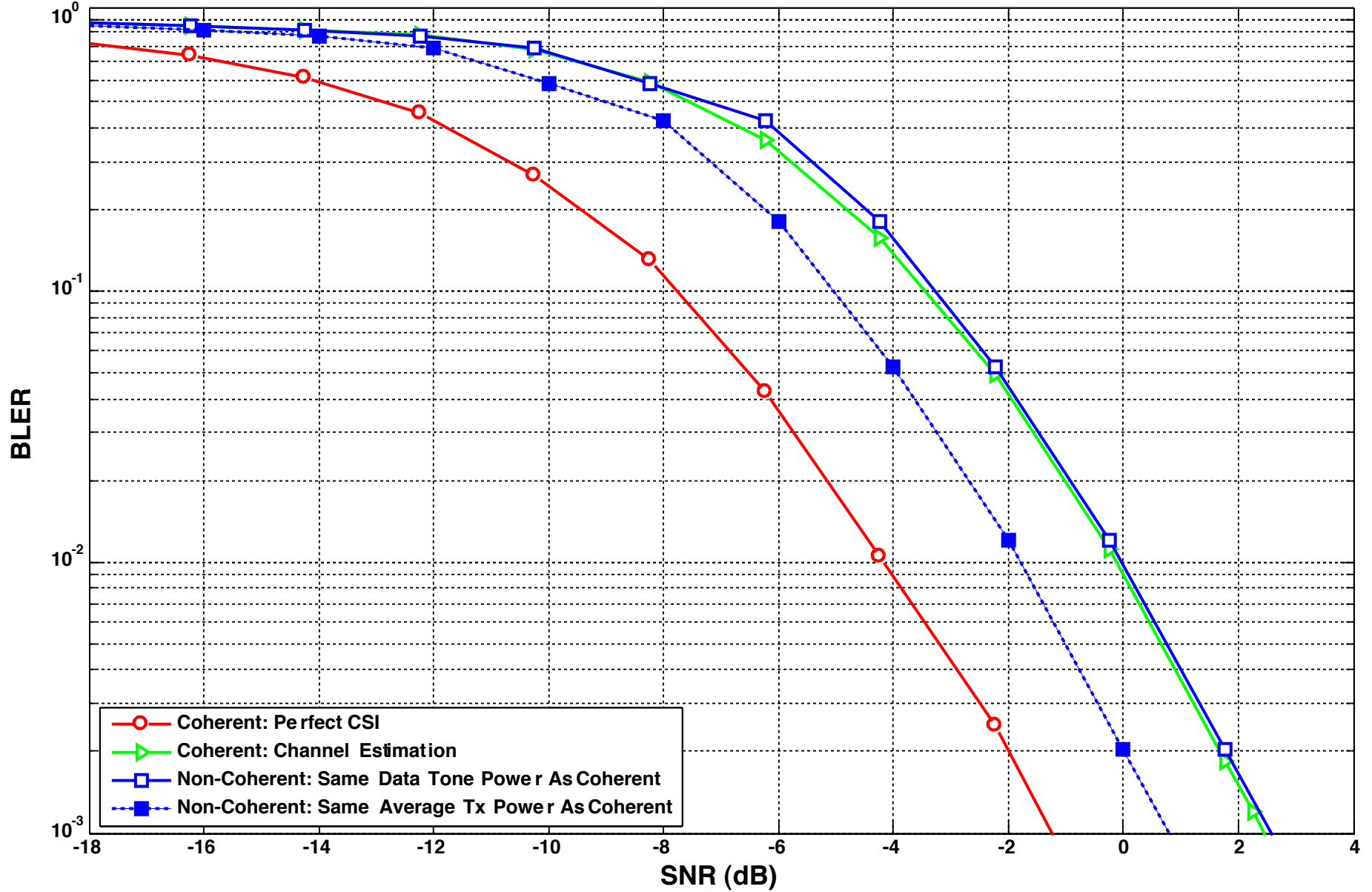
Pilot Overhead

- Coherent detection needs pilot for channel estimation.
- Pilot overhead for uplink tile is $10\log_{10}(12/8) \sim 1.7$ dB assuming no pilot power boost.
- Benefit of non-coherent detection is that there is no need to transmit pilots.
 - Null pilot tones
 - 1.7 dB power saving in comparison to coherent detection

PB 3 km/h 1 2



VA 30 km/h 1 2



VA 120 km/h 1 2

