

Time-Domain CSI Feedback for MU-MIMO

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For discussion and approval by TGm

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Rationale

- CSI Feedback Schemes for MU-MIMO
 - Codebook-based feedback
 - Analog feedback
- Frequency-Domain CSI Feedback for Distributed MU-MIMO
 - Acquiring full-band CSI from sub-band CSIs by
 - Simple MMSE interpolation requiring the knowledge of the second-order statistics
 - Practical interpolation not achieving good enough performance due to neglecting the correlation at different subcarriers

Rationale (Cont'd)

- Frequency-Domain CSI Feedback for Short Multipath Delay
 - Not guaranteeing FSS gain or MU diversity gain from Best-M feedback schemes
 - Necessary to use the full-band CSI

Time-domain CSI feedback can resolve those problems.

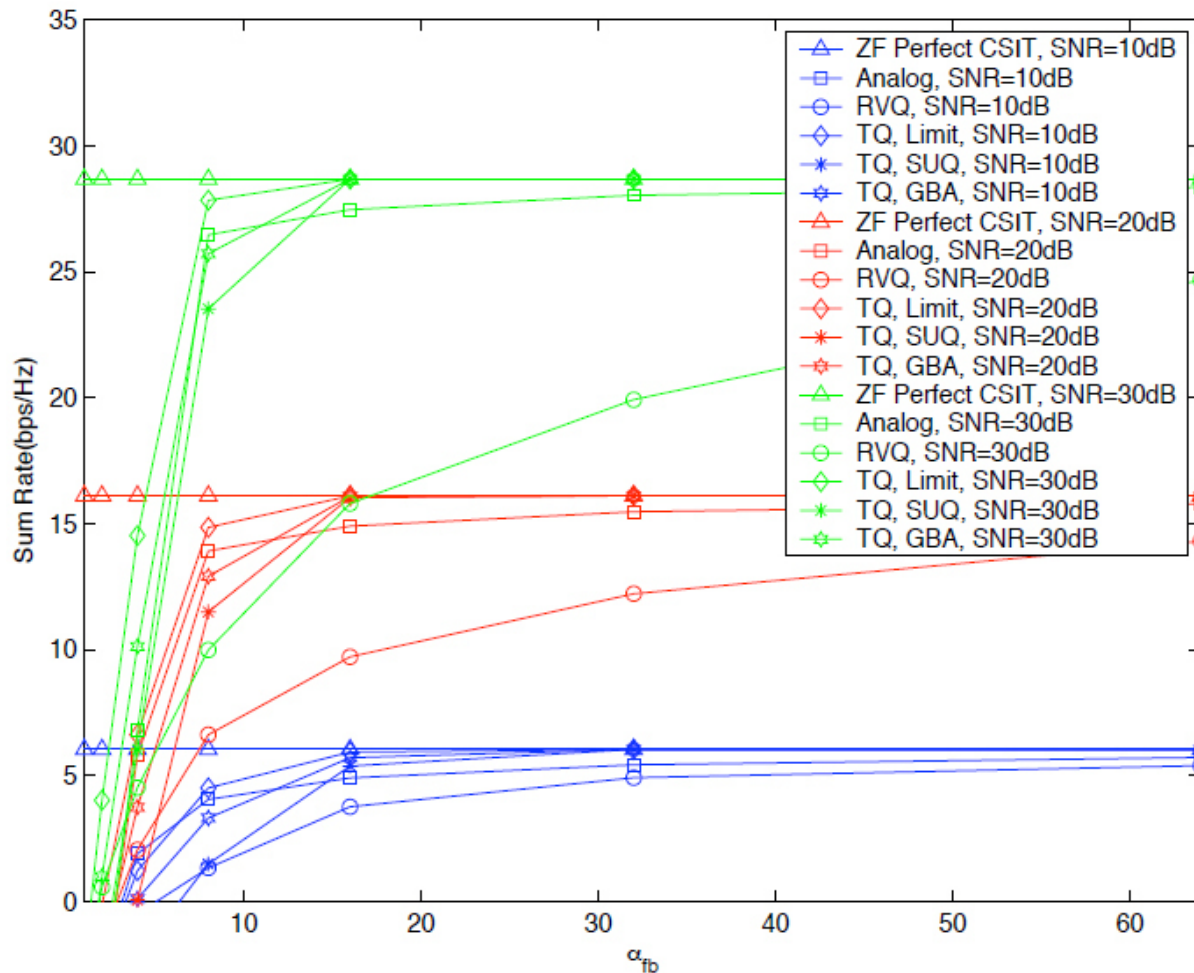
Time-Domain CSI Feedback

- Feedback Information
 - Transmitting only time impulse response
 - Requiring less overhead depending on multipath profile
 - Enabling to cover the whole channel bandwidth for distributed MU-MIMO
- Time-Domain Quantization Feedback
 - Training Stage
 - Measuring the multipath profile (i.e., delay profile and power profile)
 - Quantizing Stage
 - Based on the measured or known multipath profile, quantizing the time impulse response on the sampled delay profile
 - Power profile used for efficiently quantizing the impulses on each delay to reduce feedback overhead

Lower Bound on Sum-Rate

- System Parameters
 - Number of Tx antennas in BS: 4
 - Number of users with single antenna: 4
 - Number of subcarriers: 64
 - Multipath power profile: {0.5, 0.24, 0.17, 0.06, 0.03}
- Compared Schemes under ZFBF
 - Perfect CSIT
 - Analog feedback
 - Random vector quantization (RVQ) feedback
 - Time-domain quantization (TQ) feedback
 - Limit, scalar uniform quantization, greedy bit allocation

Lower Bound on Sum-Rate



– Time-domain quantization feedback with greedy bit allocation shows the best performance.

Suggested Remedy

- *At line 9 in page 85, add the following sentence*
 - *Codebook-based feedback and analog feedback are performed in frequency-domain. As well, time-domain CSI feedback such as time-domain quantization feedback is also supported.*