

3GPP TSG-RAN WG1#85

R1-165104

Nanjing, China 23rd - 27th May 2016



SOURCE: ERICSSON

TITLE: FECOMP MOTIVATIONS AND TECHNIQUES

AGENDA ITEM: 6.2.11.3

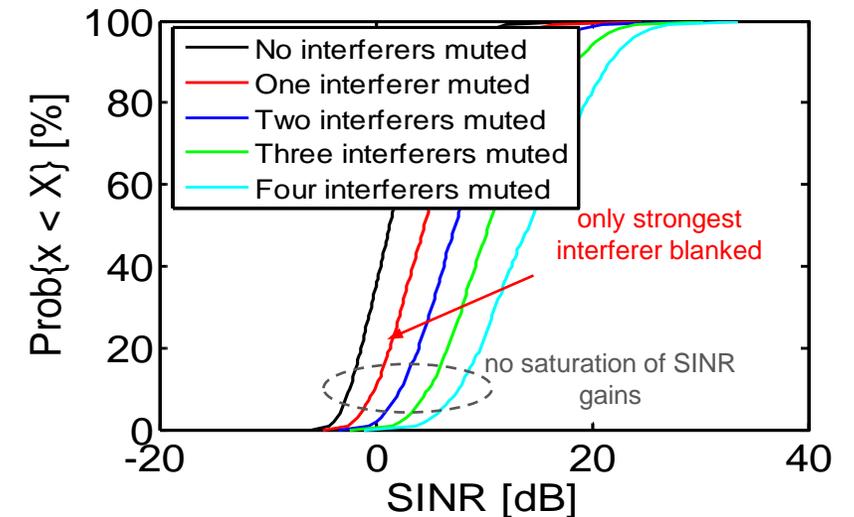
DOCUMENT FOR: DISCUSSION

FECOMP MOTIVATION: CAPACITY



- › Network deployments becoming increasingly dense to meet capacity demands
- › More TPs mutually interfere as density increases
- › Enhancements to large CoMP clusters show promise to improve performance
 - SINR gains do not saturate even with many interferers nulled/blanked.
- › Various CoMP schemes may improve capacity in large CoMP clusters
 - Coordinated Scheduling may be useful in scenarios with few eNB Tx ports
 - Coordinated Beamforming may be useful in scenarios with many eNB Tx ports with EBF/FD-MIMO
 - › eFD-MIMO Rich CSI may have further gains

SINR with Increasing Suppressed Interference



Suppressing Interference in Large Comp Clusters
is Promising to Improve Capacity

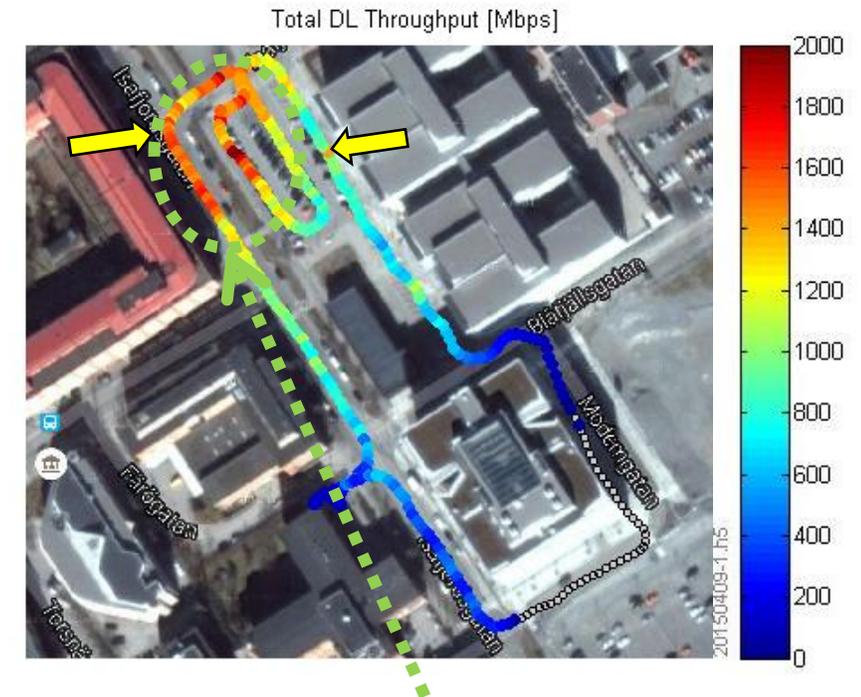
FECOMP MOTIVATION: PEAK THROUGHPUT



- › Non-coherent Joint Transmission can be used to improve peak rate
 - Splitting SU-MIMO Layers over TPs (a.k.a ‘Distributed MIMO’) allows 1 UE to receive more layers when a TP’s channel is rank deficient (e.g. LOS)
 - SU-MIMO performance is enhanced when:
 - › When one TP is LOS, and another TP has sufficiently high SINR
 - › System is lightly loaded and increased interference from serving 1 UE on multiple TPs is acceptable
 - › Backhaul between TPs is ideal

REAL 2015

Distributed MIMO



Area with dual TP/distr. MIMO throughput gain

Ref: R1-164956, “Multi-point MIMO Connectivity”

Non-coherent JT with SU-MIMO Layers Split Over TPs
Can Improve Peak Rate In Some Conditions

EXAMPLE DENSE DEPLOYMENT: INDOOR OFFICE



- › Dense user populations in indoor office environments
- › Large areas of open office
- › Wide applicability – a common scenario
- › Zero latency backhaul with relative ease
 - Within floor of building
- › High capacity demand → Dense deployment



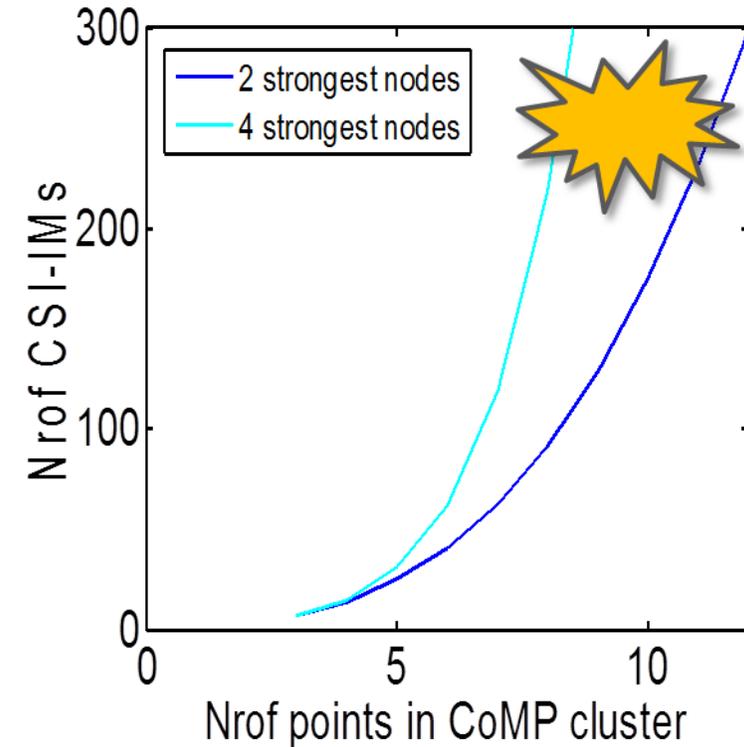
Lots of interference from many nodes!

ISSUES WITH CURRENT STANDARD FOR INDOOR COMP AND OTHER LARGE COMP CLUSTER SCENARIOS



- › Current CSI feedback does not scale with CoMP cluster size
 - CSI-IM overhead explodes
 - CSI-IM planning a nightmare
- › Great potential in CSI that captures interference suppression of multiple nodes
 - Not sufficient to only suppress strongest interferer
 - › No saturation of gains with many interferers suppressed

Suppression of Strongest Nodes

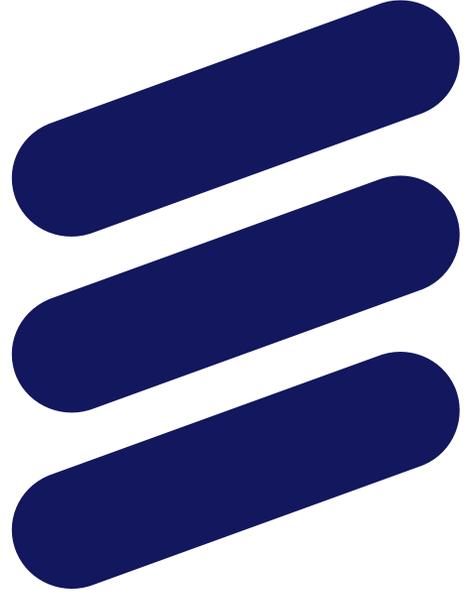


Scalable CSI feedback without planning issue!

SUMMARY & PROPOSALS



- › Indoor office offers great potential for CoMP capacity gains
 - Outdoor scenarios with high line of sight probability and high load are similar and offer great potential gain as well
- › Study CSI enhancements for large CoMP clusters
 - Address solutions to resolve problems such as:
 - › CSI-IM planning for large* CoMP clusters is a nightmare
 - (* larger than three cells)
 - › CSI-IM overhead explodes for large CoMP clusters
 - › Solutions should be scalable in increasing cluster size to reduce operator planning efforts while minimizing overhead
- › Study CSI enhancements for coordinated beamforming
 - Targeting LOS interference suppression in dense CoMP clusters
 - Targeting interference suppression towards longer term spatial distributions of victim UEs
- › Focus on solutions assuming ideal backhaul in order to maximize gain and simplify specification



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