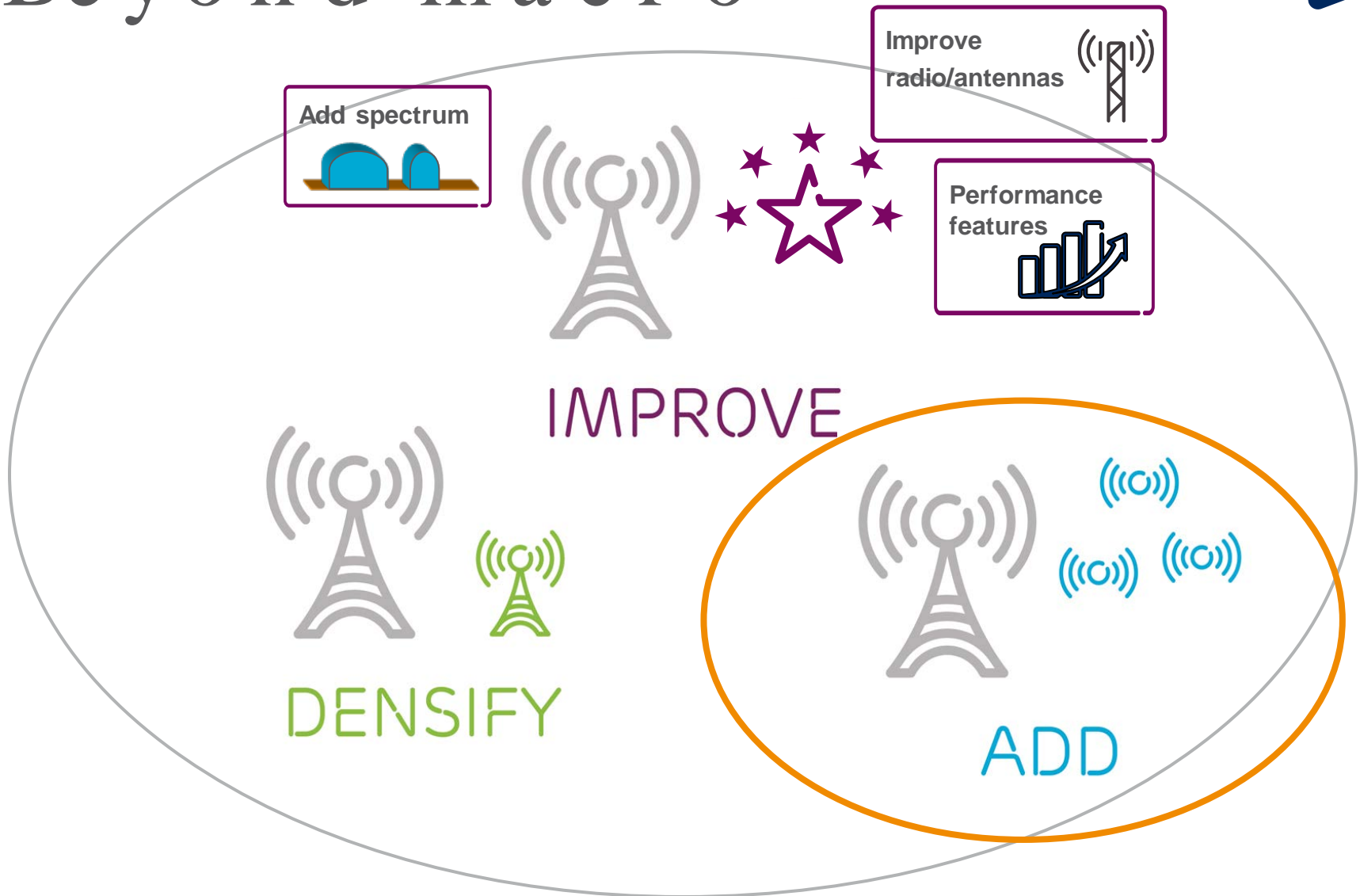


coordination in heterogeneous deployments

Beyond Macro Session

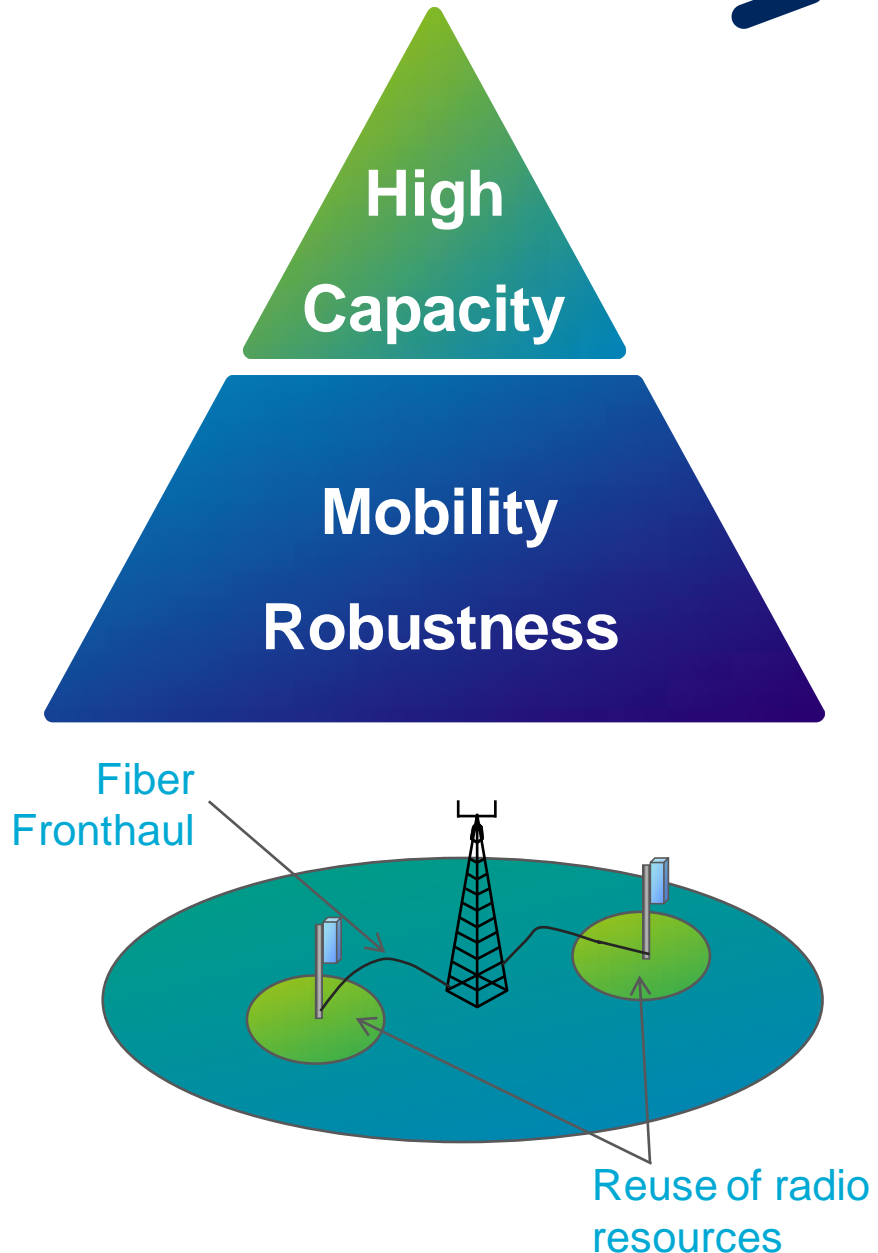
Beyond macro



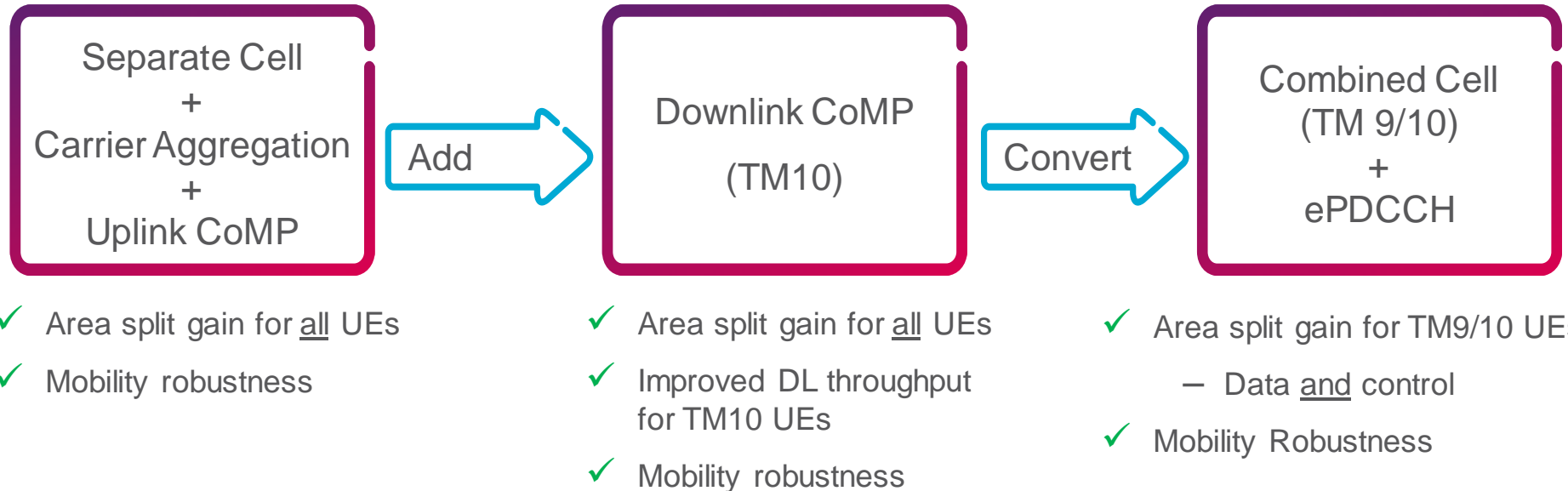
small cell deployment objectives



- › Critical deployment objectives
 1. High capacity: “area split gain”
 2. Mobility robustness
- › C-RAN architecture for tight co-ordination
 - Centralized baseband + RRU deployment
 - CPRI over fiber “fronthaul”
- › Enables interference management
 - Uplink CoMP
 - Downlink CoMP



c-ran evolution path

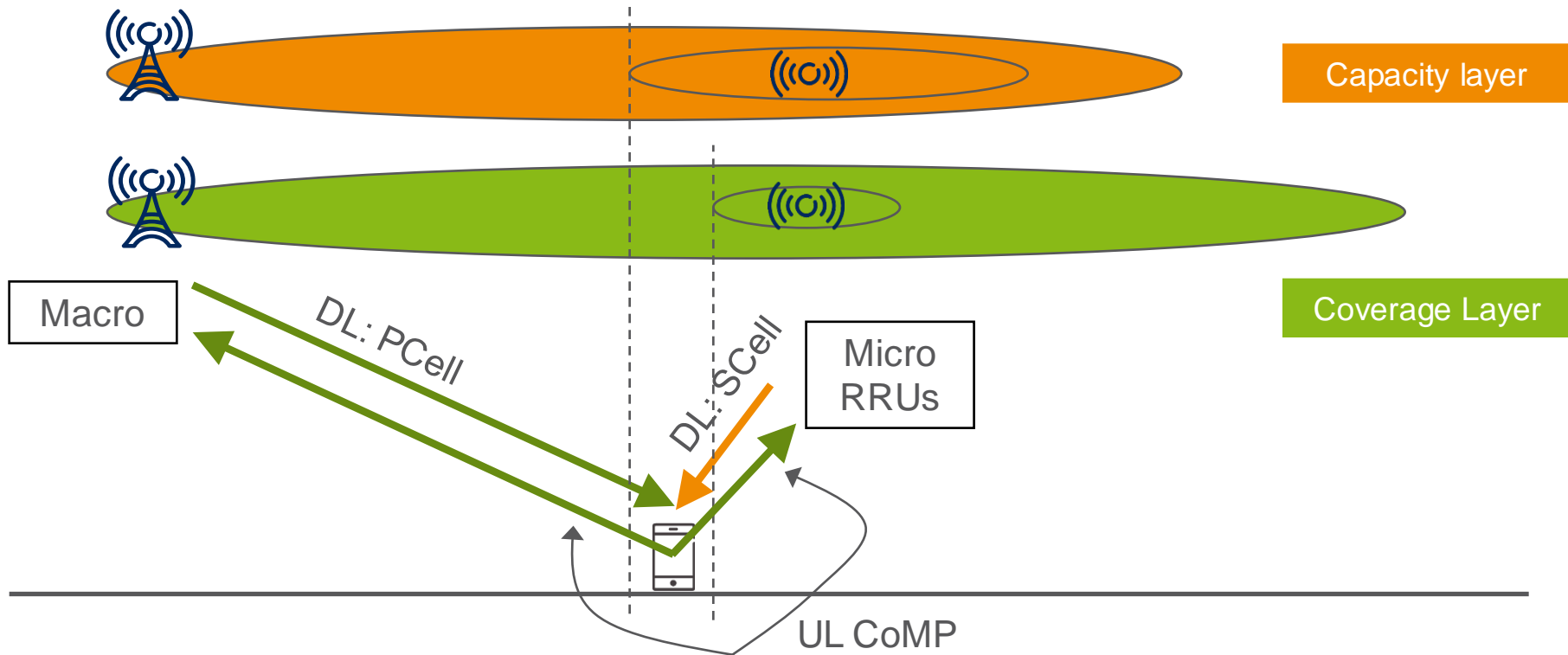


Increasing penetration of Rel-10/11 devices

TM 9/10: Area split gain for data channel

ePDCCH: Area split gain for control channel

baseline deployment



- › All bands deployed at all nodes as separate cells
 - High capacity and mobility robustness
- › Always best node association for PCell and SCell (Carrier Aggregation)
- › Interference management achieved with UL-CoMP
 - Best node association in UL

u p l i n k c o m p

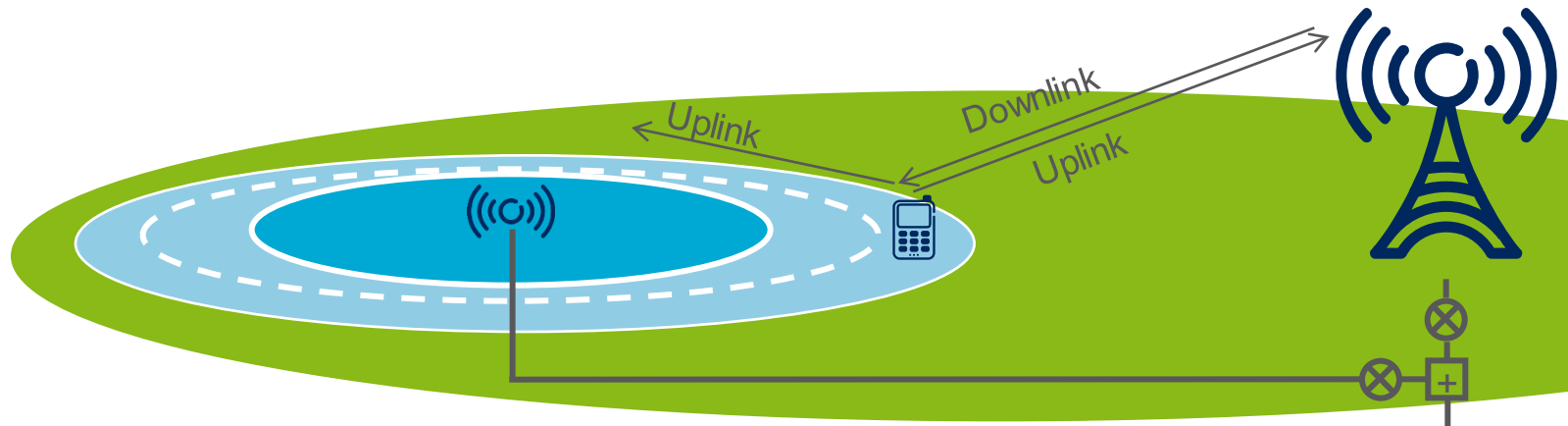


› What is it?

- Coherently combine received signals from multiple cells so that desired signal is amplified and interference suppressed
- Interference Rejection Combining

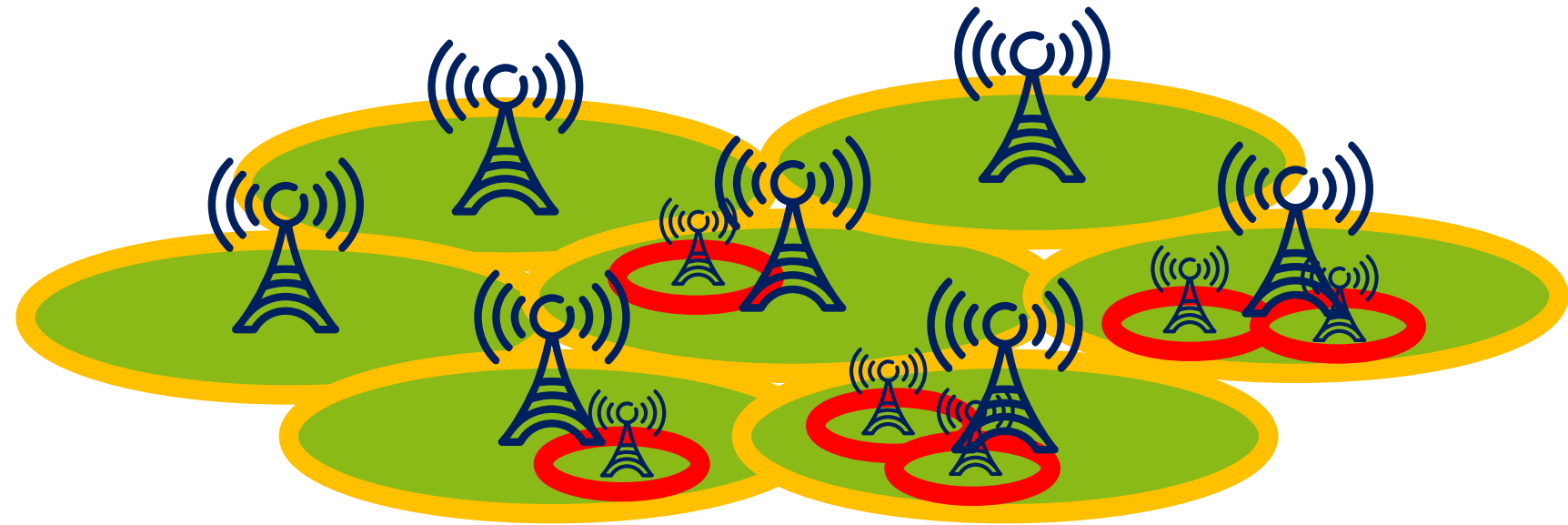
› Benefits

- Improved cell-edge user throughput in uplink
- Improved uplink coverage and capacity



Add Small Cells – Coordination Features

Where are the gains?



No UL CoMP Gain



Moderate UL CoMP Gain



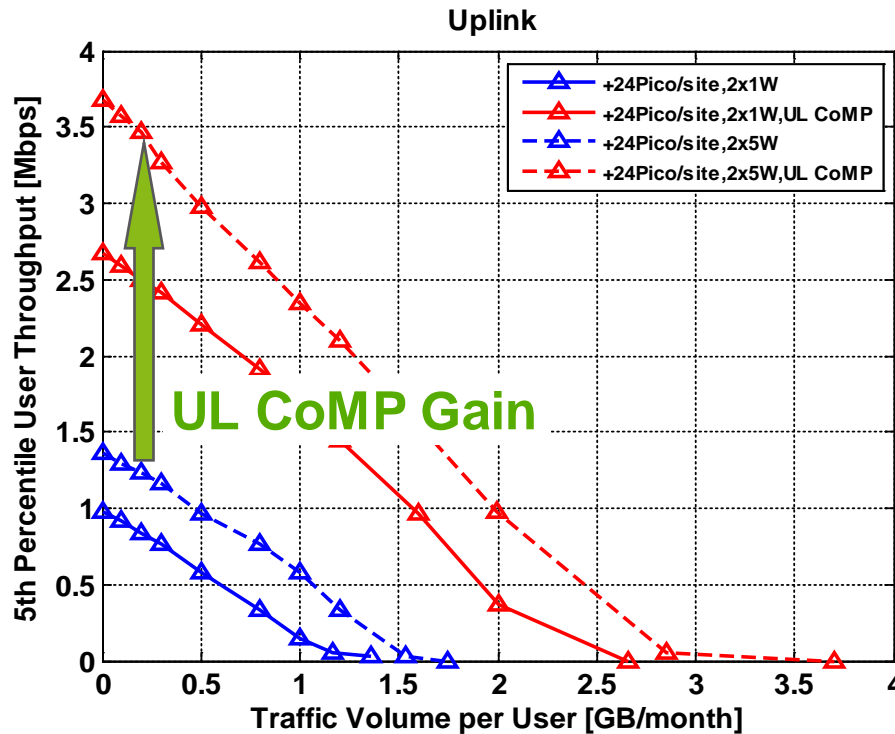
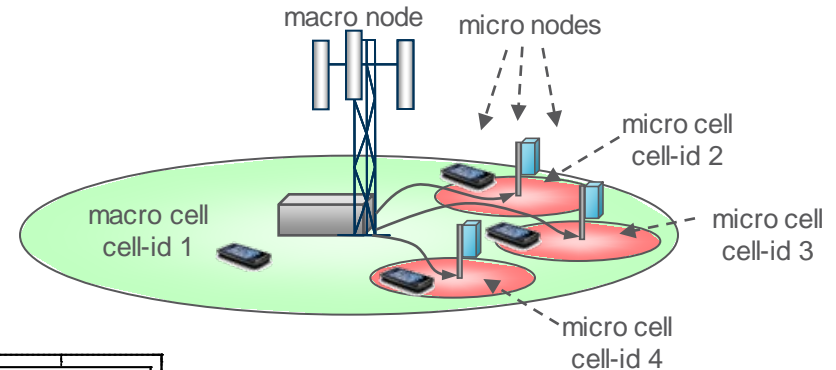
Large UL CoMP Gain

Uplink CoMP

heterogeneous Scenario



- › Heterogeneous deployment
 - 8 micros per macro cell, ISD 1732 m
 - IRC across macro and all micros
 - **Uniform** user distribution

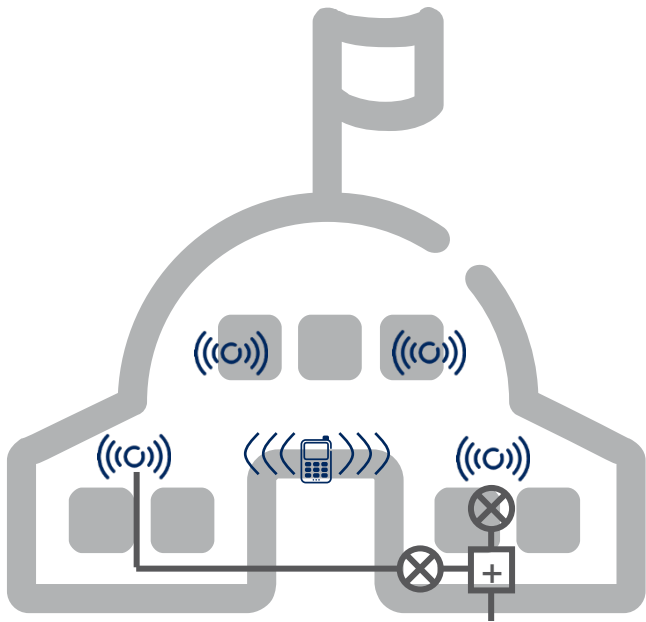


Large potential for UL CoMP in HetNet Scenario

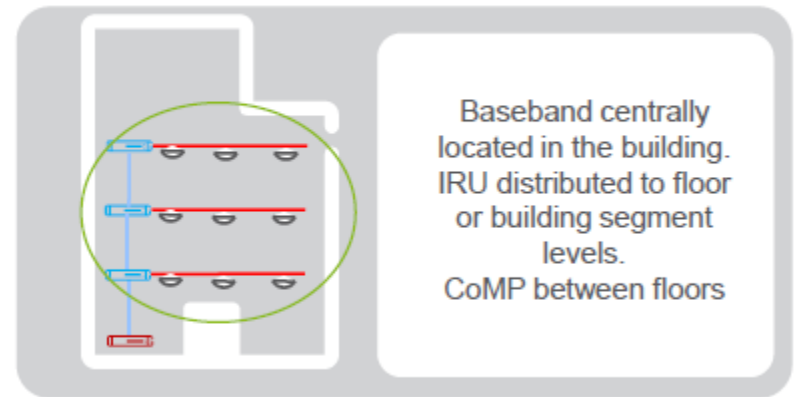
Comp in other scenarios



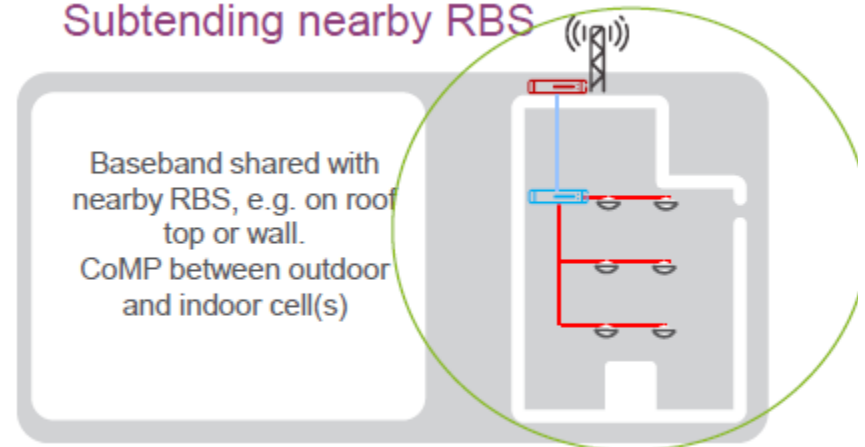
Large Public Space
(e.g., Train Station)



Large to Very Large Building



Subtending nearby RBS



downlink comp

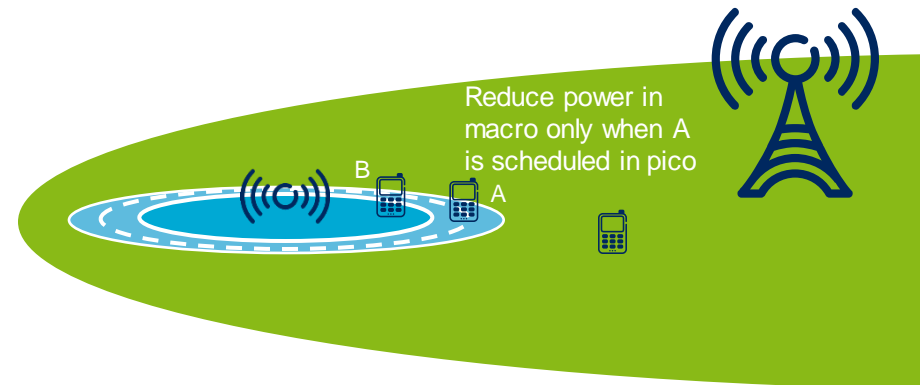
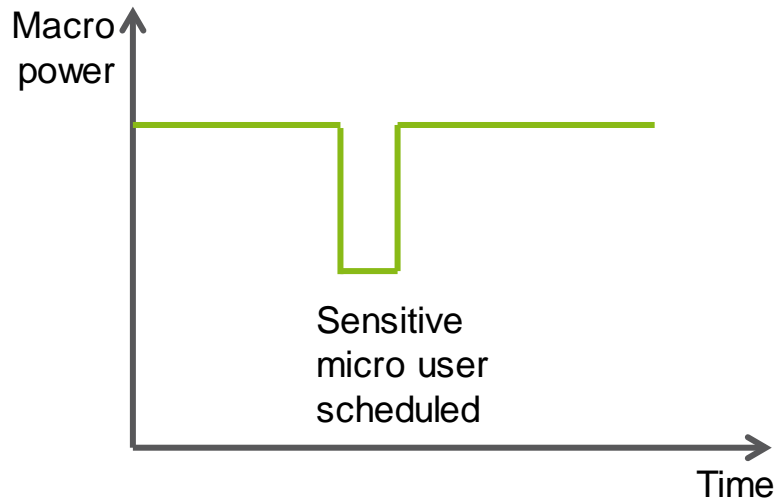
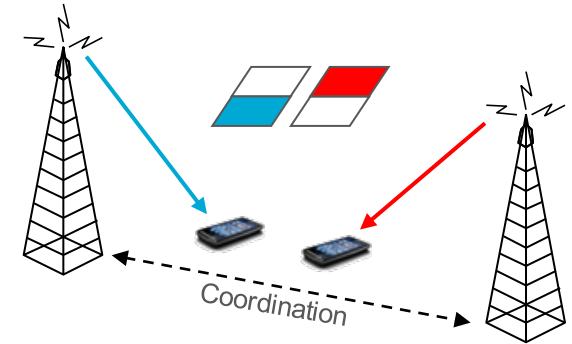


› What is it?

- Scheduling of time/frequency resources coordinated among transmission points
- TM10 enables feedback of CSI for multiple interference hypotheses

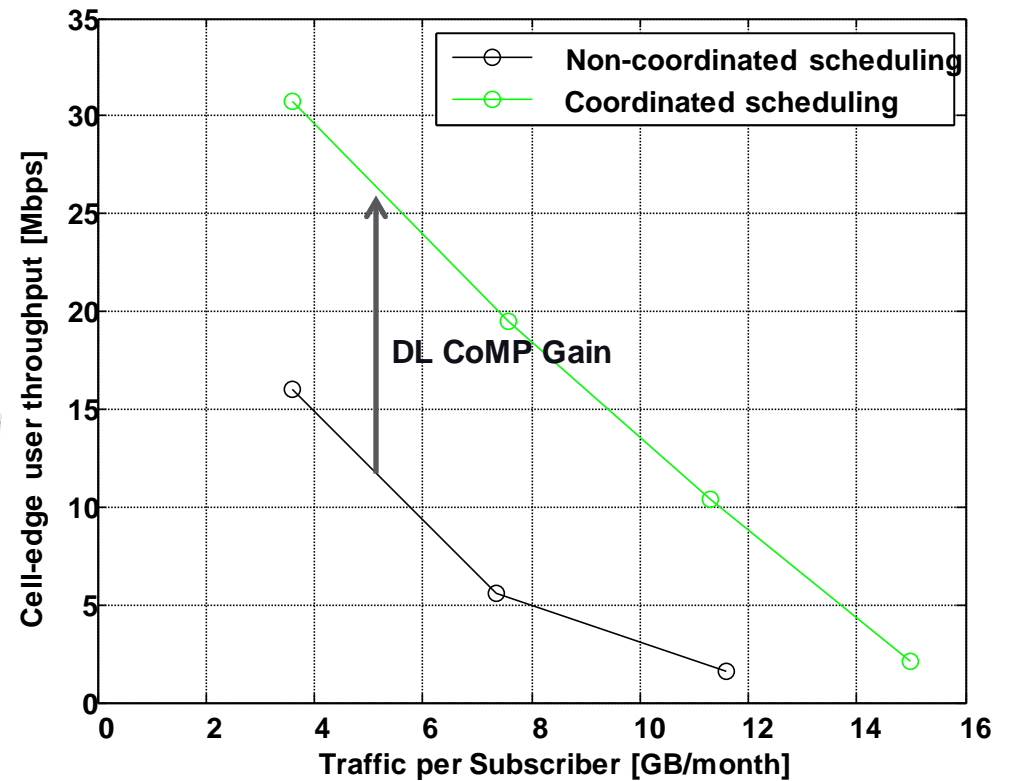
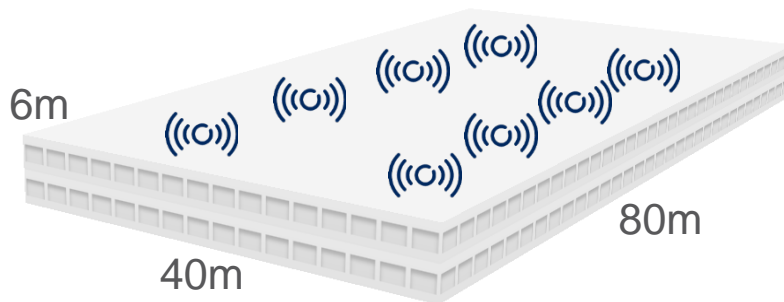
› Benefit

- Help UEs that experience heavy interference from a neighboring cell



Add Small Cells – Coordination Features

Downlink CoMP improves indoor LTE

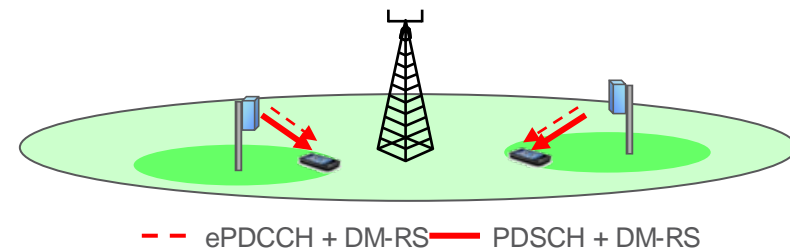
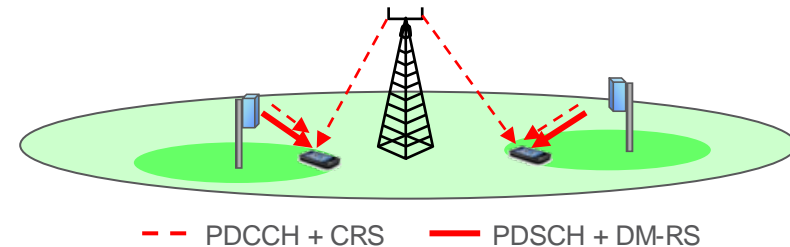
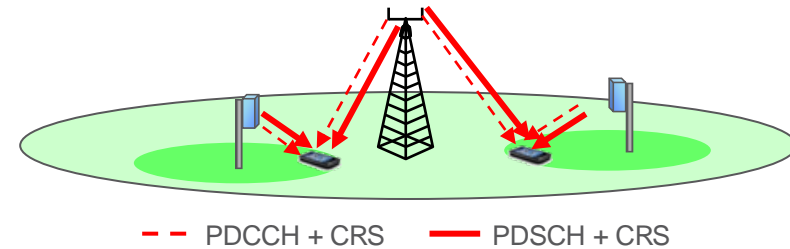


Add small cells – train station / mall

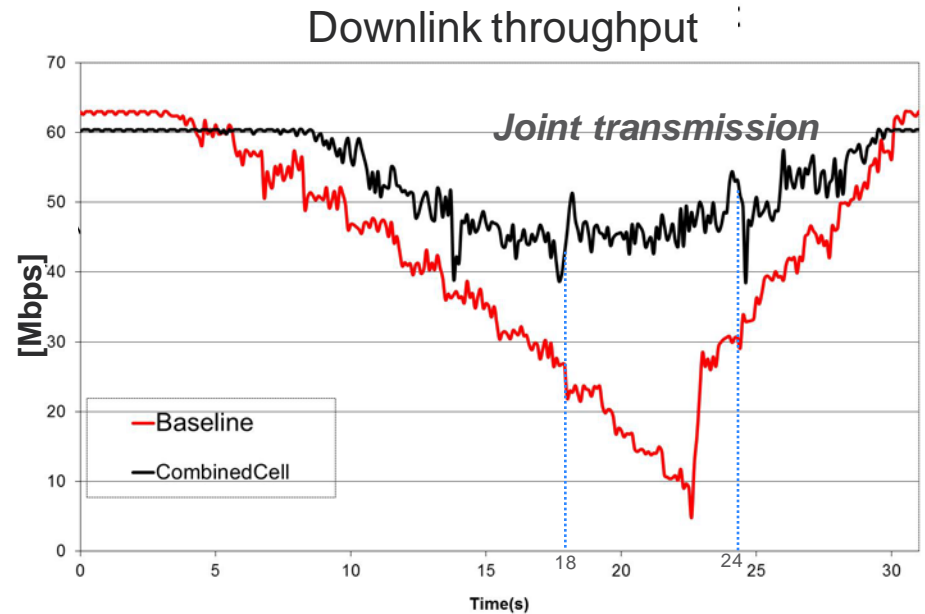
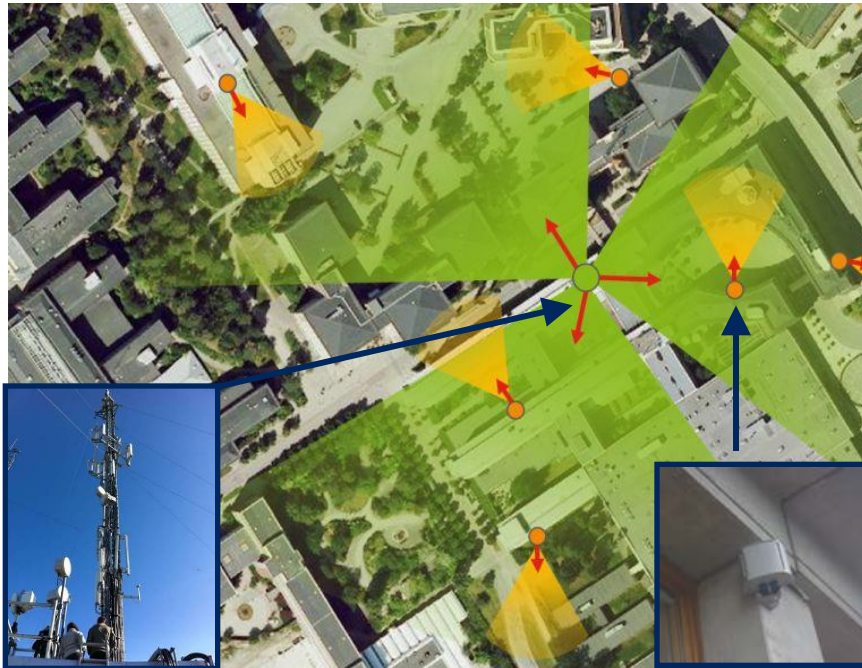
Combined Cell



- › Same Cell ID (PCI) for all transmission points
 - No handover between cells!
 - Mobility robustness ensured
- › Transmission point for data channel (PDSCH) dynamically selected
 - Requires TM9 or TM10
 - Achieves area split gain for data channel
- › Further improvement with Rel-11 control channel (ePDCCH)
 - Achieves area splitting gain for control as well



combined cell / DL CoMP field trial



Add small cells – city street / square



s u m m a r y

- › Tight co-ordination between cells is beneficial
 - Between macro and small cells
 - Between small cells
 - Between indoor and outdoor cells,
- › Achieved through C-RAN architecture
 - High capacity
 - Mobility robustness
- › Future proof
 - Deployment goals obtained from Day 1
 - Further improvements obtained as 3GPP co-ordination features become available in devices



ERICSSON