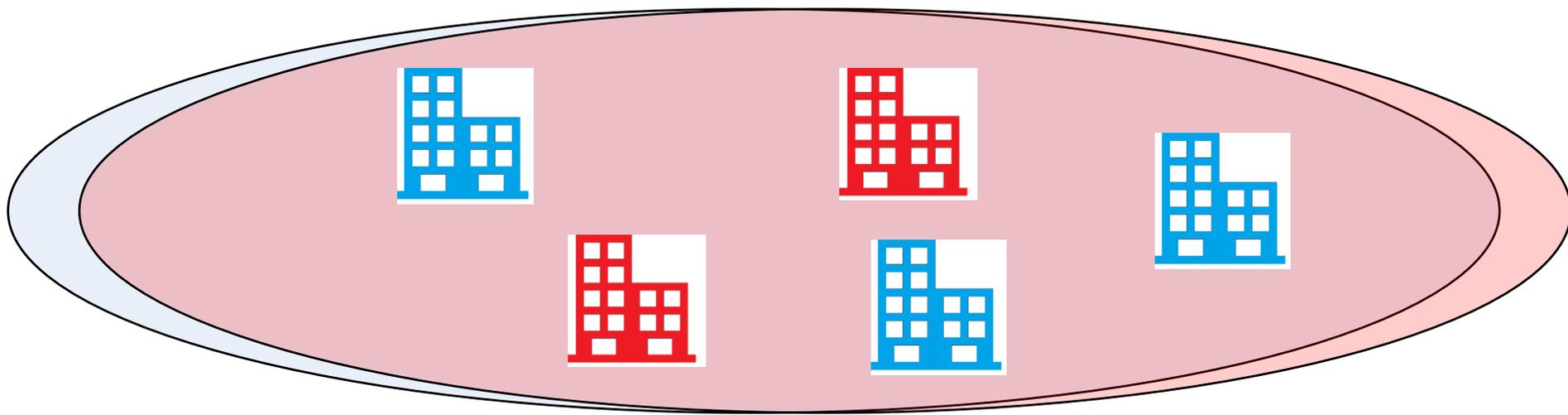


RAN#71, Gothenburg,
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RP-160089

Motivation for enhancements to
UMTS and LTE increased UE carrier
monitoring
Ericsson

Scenario for further increased UE carrier monitoring



- Operators A (red) and B (blue) have their own outdoor networks and share the provision of indoor coverage (eg cost of building installation)
- This can either be achieved with MOCN or separate PLMN for indoor coverage configured as EPLMN by cooperating networks

Motivation

- Operator A and B may already need release 12 incmon for their existing networks.
- When this arrangement is used, outdoor UEs need to have a neighbour list which includes
 - Frequencies used in the operator's own outdoor network
 - Frequencies used in the operator's own indoor network
 - Frequencies used in other operator's indoor network(s).
- Tight planning and coordination of indoor and outdoor frequencies used is more challenging in a multioperator scenario
- Conclusion → More frequencies need to be provided to the UE in neighbour lists
- Cellular UMTS/LTE + Wi-Fi already allows this kind of capability. Devices use UMTS or LTE for data outdoors, and search for and switch or offload traffic to Wi-Fi (potentially also provided by the mobile operator) when indoors.
 - In building LTE/UMTS coverage can offer seamless mobility and a better user experience (eg voice call handover).

Proposal for number of carriers to monitor

- E-UTRA interfrequency carriers : 16 (Rel12 RAN4 specifications already allow for 8 FDD + 8 TDD, however the proposal is to allow 16 E-UTRA carriers that may be any mixture of FDD, TDD or FS3)
- UTRA FDD interfrequency carriers : 8 (Rel 12 RAN4 specification allow for 5 FDD interfrequency UTRA carriers, or 6 interRAT UTRA carriers)
- Total layers : At least 20 interfrequency+interRAT (Rel12 RAN4 specifications allow for 12 interfrequency+interRAT layers)
- Mostly supported by existing RAN2 signalling.
- One limitation in UMTS (25.331) is that the number of E-UTRA interRAT frequencies is limited to 8 so this may need to be addressed.
- Intention is to reuse the basic signalling and framework for incmon. Minimise the work needed by RAN2 to extend incmon.

Measurement delays

- With rel-12 incmon, cell identification and measurement reporting delays may become quite long (especially for the reduced performance group) because the total delays are scaled by the number of frequencies in the relevant performance group.
- If the number of frequencies increases further, delays will become even longer following the same approach.
- UEs are becoming increasingly capable from a hardware perspective. Carrier aggregation UE with multiple RF chains are likely to be commonplace in future, and such designs should be able to measure multiple measurement objects simultaneously.

Measurement delays(2)

- The release 13 study item on measurement gap enhancement looked at some ways to exploit UE with multiple RF chains
- While the study was focussed more on per CC configuration of measurement gaps, but it would also be possible for a UE with multiple RF chains to measure on multiple frequencies in one measurement gap
- This would be specified for release 12 incmon and enhanced incmon so that carrier aggregation UE with multiple receivers can provide faster measurement results.