

# LTE-Advanced: Self-backhauling for cost reduction

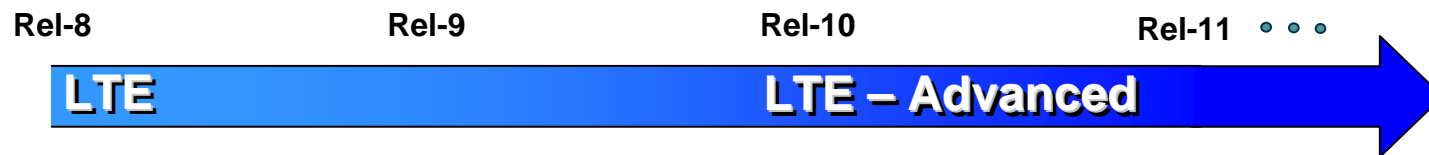
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Ericsson Research

# Outline

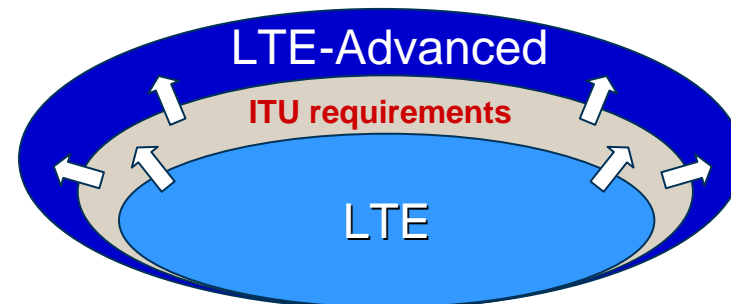
- LTE-Advanced
- Multihop classification
- Self-backhauling concept
  - In-band and out-band
  - Protocol architecture
- Conclusions

# LTE-Advanced

- The next major release of 3GPP Long Term Evolution (LTE)

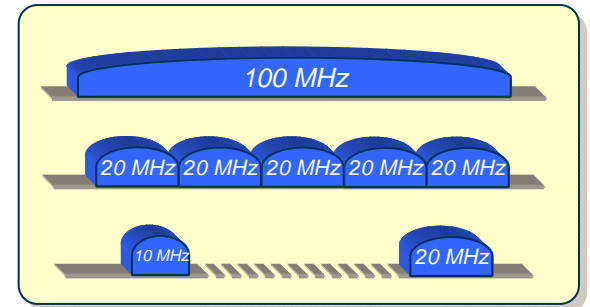


- The 3GPP candidate for IMT-Advanced radio access
- Expands LTE to fulfill and exceed ITU requirements for IMT-Advanced

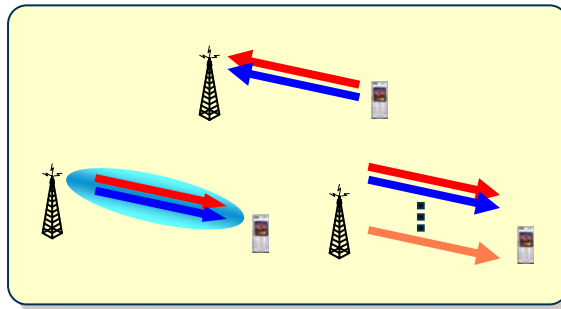


# Key Technical Components

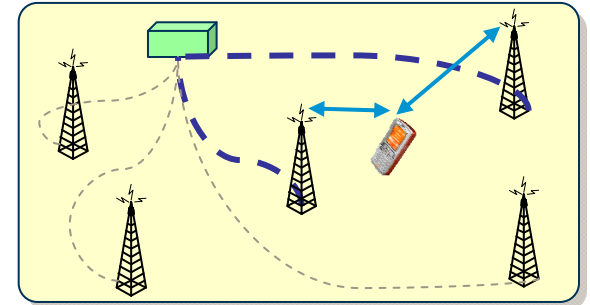
- Spectrum and carrier aggregation for operation on wider bandwidth



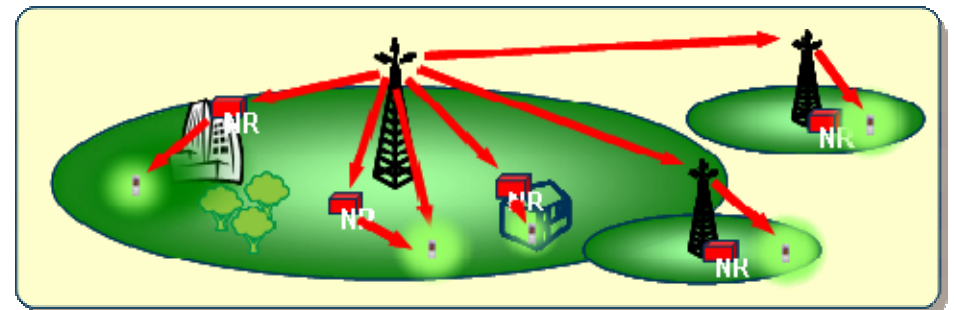
- Multi-antenna solutions



- Coordinated multi-point transmission/reception



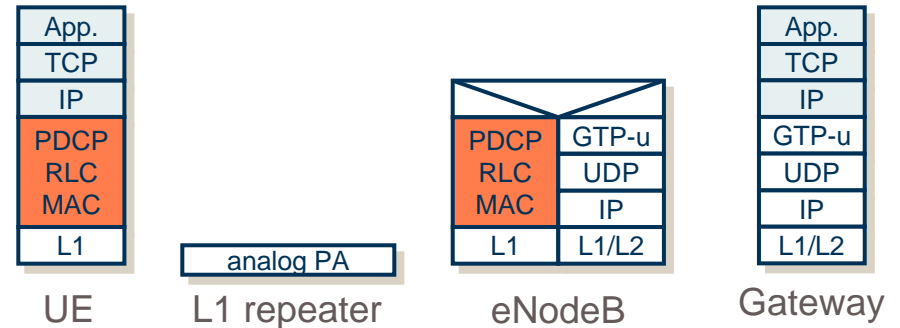
- Multihop functionality



# Multihop Classification

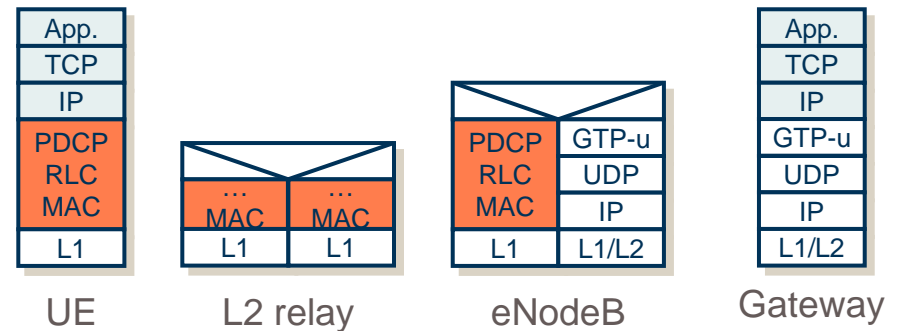
## Layer 1 repeater

- Minimum delay (+)
- Reuse of resources (+)
- No interference & noise suppression (-)



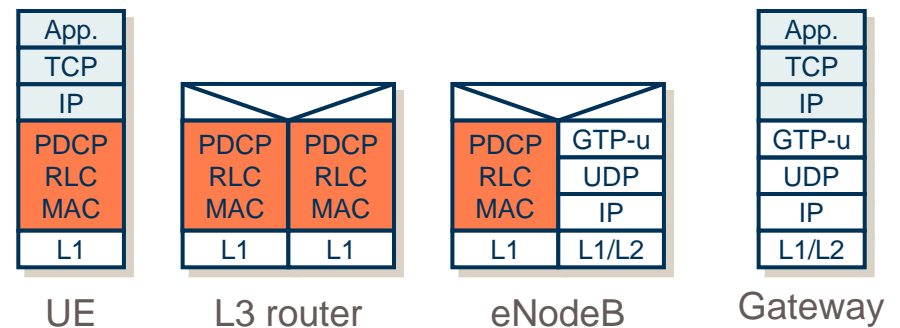
## Layer 2 relay

- Noise suppression (+)
- Delay (-)
- Split of resources (-)
- Heavy standard impact (-)



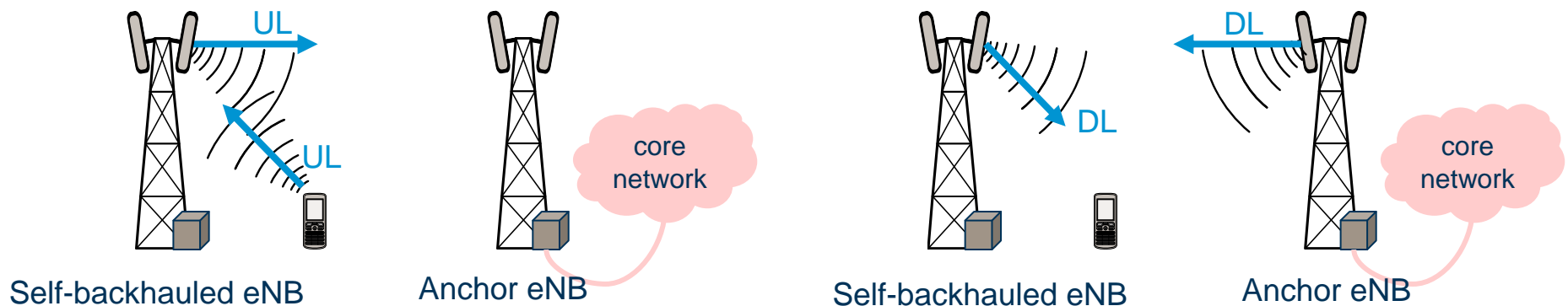
## Layer 3 wireless routing

- Similar pros and cons as Layer 2 relay, but with much less standard impact (+)
- Implicitly backward compatible (+)



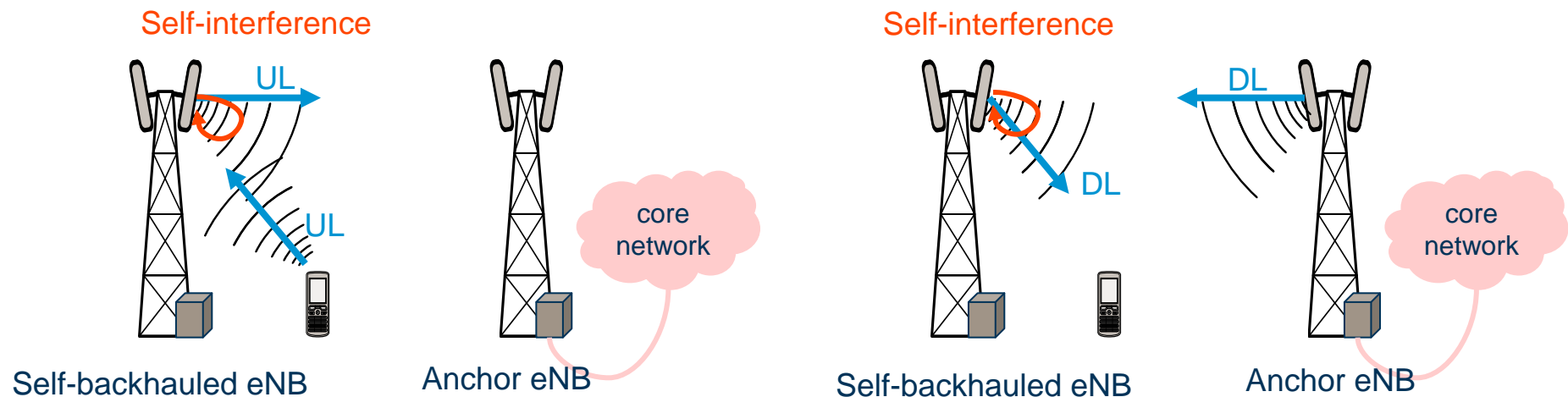
# LTE Self-Backhauling

- Operating the eNB's backhaul over LTE radio (Realisation of L3 Wireless Router)
- Promises cost-efficiency where LTE radio resources can be spent for backhauling
- Complement to other transport network technologies
  - Microwave links require LOS
  - Fibre might not be economically feasible to deploy everywhere



# LTE Self-Backhauling

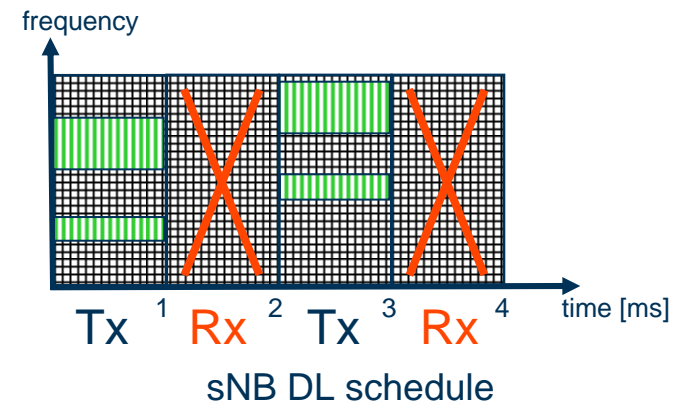
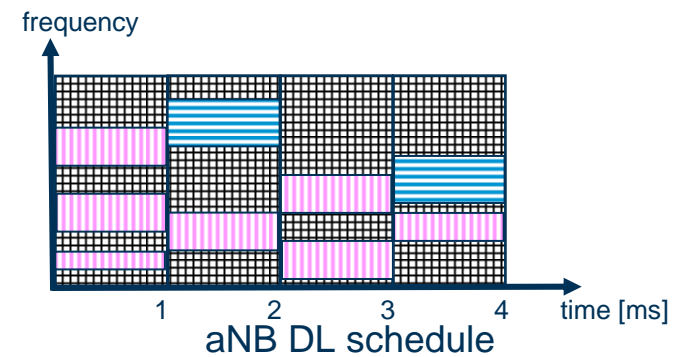
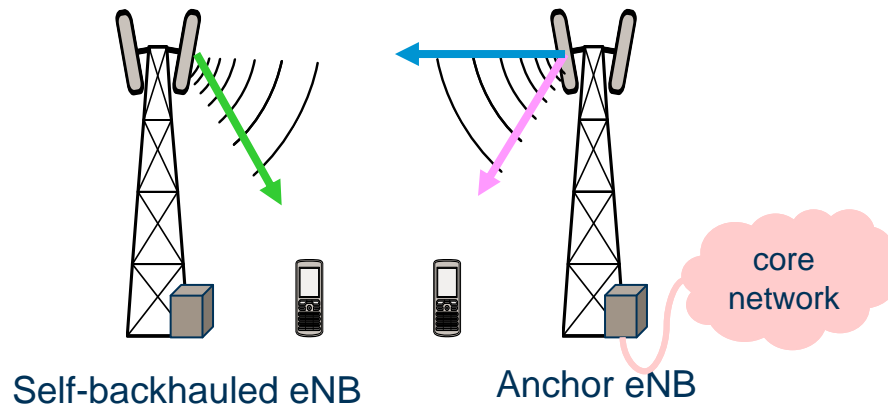
- Resource sharing between backhaul and access link
- Mitigation of self-interference by means of
  - Frequency separation of backhaul and access link (out-band)
  - Time domain separation by coordinated Tx and Rx phases (in-band)



# Coordinated Tx and Rx

## Example

- Anchor eNodeB schedules backhaul link
- Predictable Tx/Rx phases through persistent scheduling of self-backhauled eNB





# Conclusion

- Multihop functionality is likely to become part of the LTE-Advanced standards (LTE Release 10)
- Layer 3 wireless router is a promising candidate
  - Same benefits and drawbacks as Layer 2 relaying
  - Little standardisation effort
  - Perfectly applicable to self-backhauling of eNBs

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