

LTE-Advanced: Self-backhauling for cost reduction

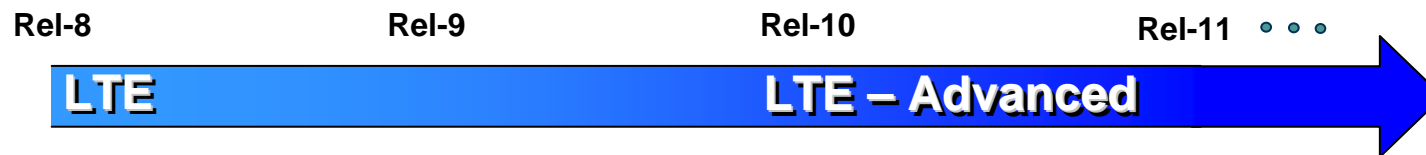
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Outline

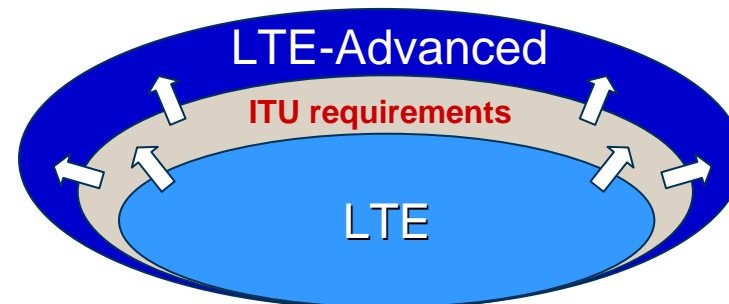
- LTE-Advanced
- Multihop classification
- Self-backhauling concept
 - In-band and out-band
 - Protocol architecture
- Conclusions

LTE-Advanced

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

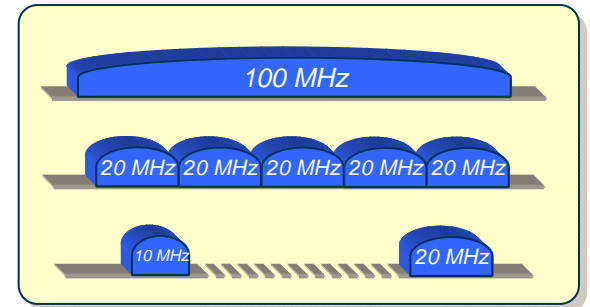


- The 3GPP candidate for IMT-Advanced radio access
- Expands LTE to fulfill and exceed ITU requirements for IMT-Advanced

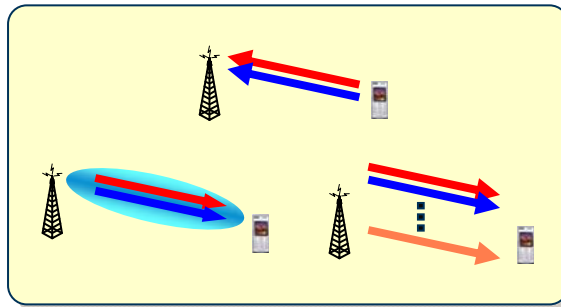


Key Technical Components

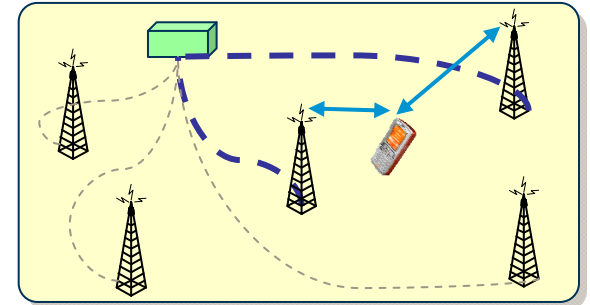
- Spectrum and carrier aggregation for operation on wider bandwidth



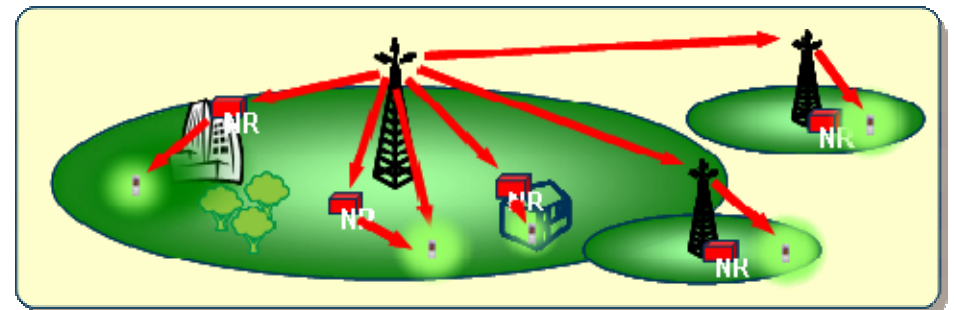
- Multi-antenna solutions



- Coordinated multi-point transmission/reception



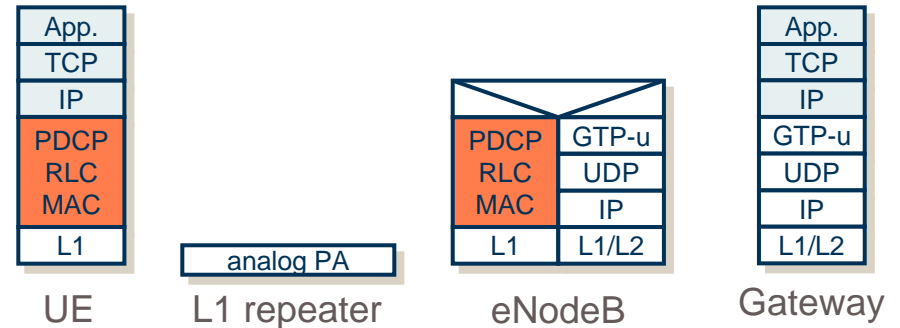
- Multihop functionality



Multihop Classification

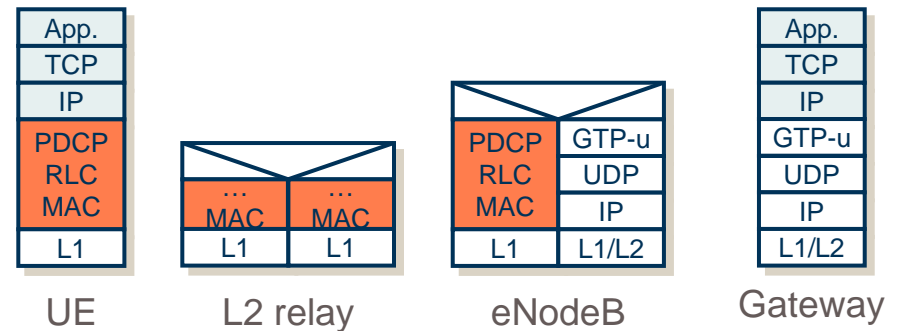
Layer 1 repeater

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



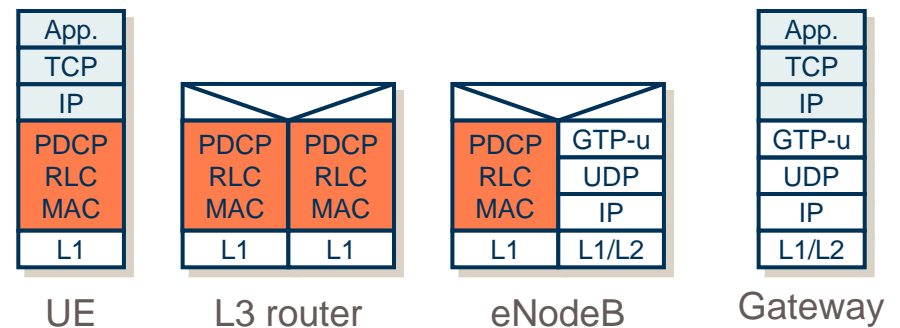
Layer 2 relay

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



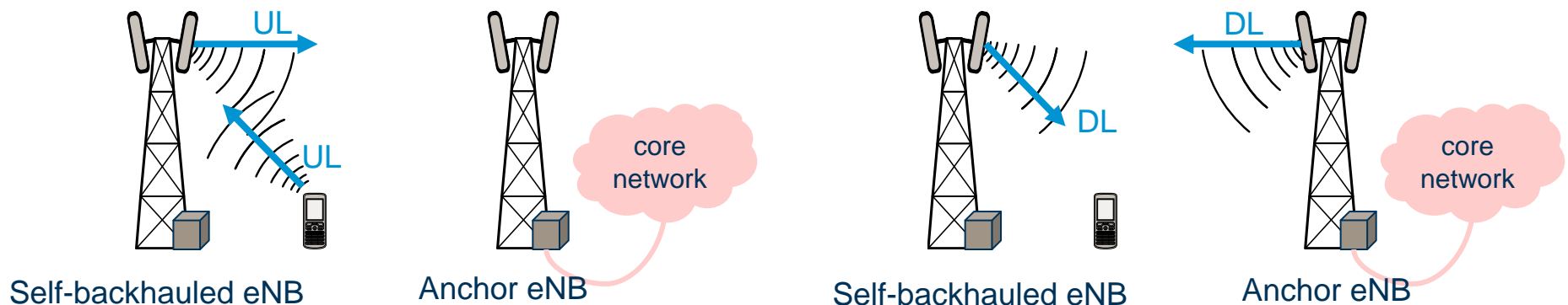
Layer 3 wireless routing

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



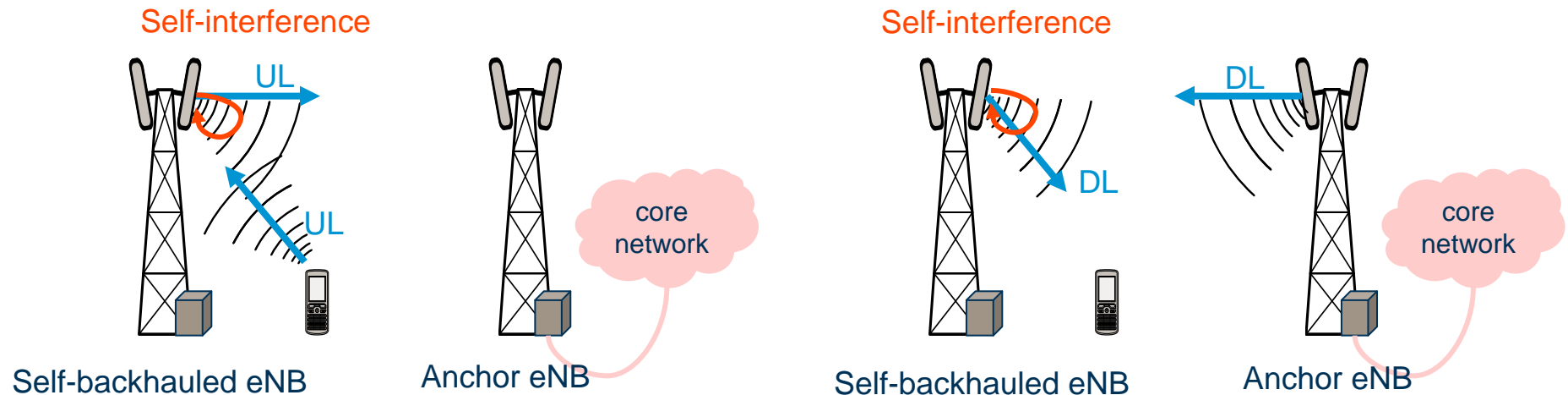
LTE Self-Backhauling

- 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

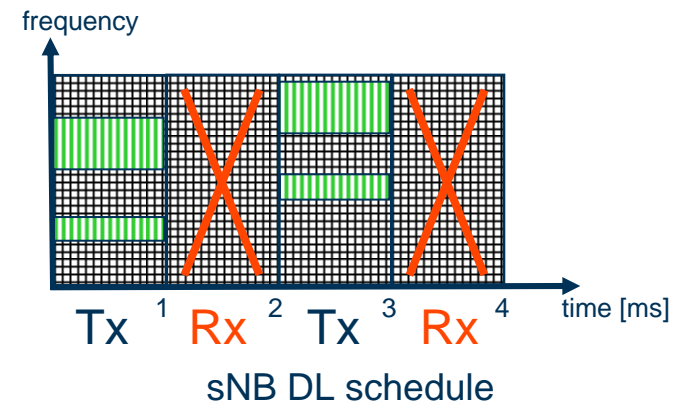
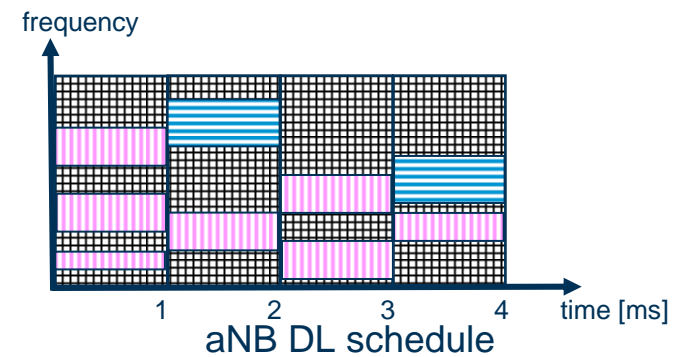
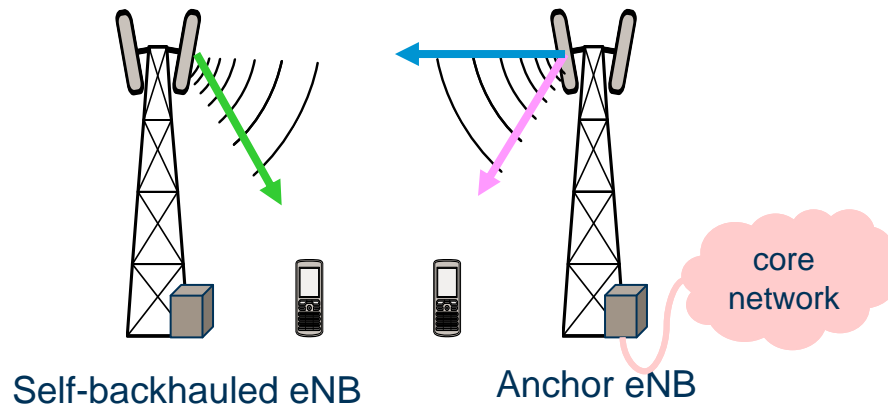
- Resource sharing between backhaul and access link
- Mitigation of self-interference by means of
 - Frequency separation of backhaul and access link (out-band)
 - Time domain separation by coordinated Tx and Rx phases (in-band)



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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