



3GPP TSG RAN WG1 Meeting #53  
Kansas City, USA, 5 – 9, May 2008

R1-082034

# Candidate Technologies for LTE-Advanced



# Motivation for further LTE-Advanced technologies

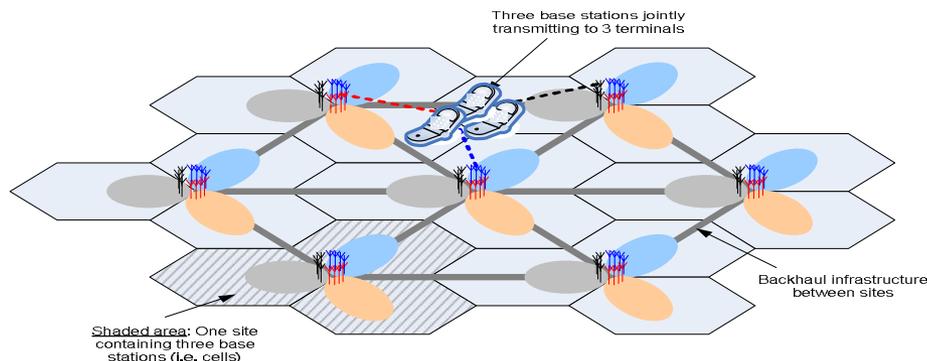
- LTE-Advanced technology is expected to further increase the system performance in terms of spectral efficiency, cell edge throughput, coverage and latency.
- Current MIMO based LTE improvement techniques suffer mostly from intercell interference.
  - To increase performance, study of advanced antenna concepts is essential.
  - Recent research shows that multi-cell antenna techniques cope with intercell interference and are the most consequent further development of MIMO techniques.
  - Multi-cell antenna techniques allow improvement of both spectral efficiency and cell edge performance.
- Techniques to improve coverage and system deployment to be considered as well.
  - Techniques to be studied should meet the concerns for larger bandwidth and higher carrier frequency deployments.
- The techniques proposed in the following should be subject of the SI.



# Candidate Technologies for LTE-Advanced

- Network MIMO

- Multiple base stations cooperate to transmit/receive signals to/from certain users > application of MU-MIMO across different cells
- Base stations are interconnected by means of a fast (meshed) backbone
- DL: Signals might be precoded in order to eliminate inter-cell interference
- UL: Signals received at different BS might be combined in an appropriate way to improve performance
- Significant increase in capacity and spectral efficiency for both sector and cell edge are reachable, see [1], [2].
- Bandwidth, delay and technology of inter-cell communication link need consideration .



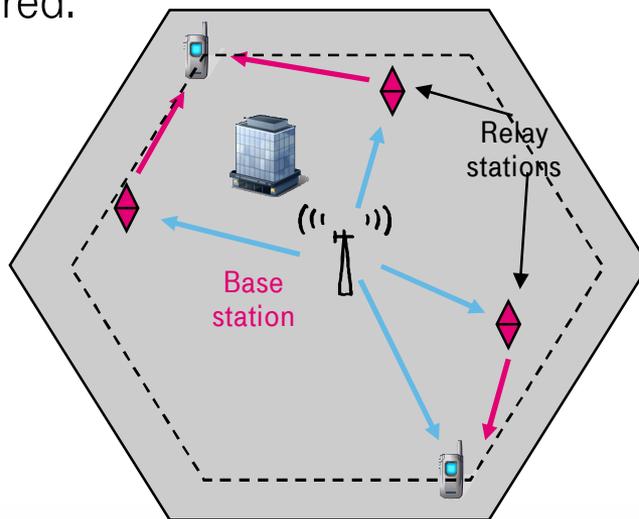
- Reference
- [1] P. Marsch, S. Khattak and G. Fettweis, A Framework for Determining Realistic Capacity Bounds for Distributed Antenna Systems, in Proceedings of the IEEE Information Theory Workshop (ITW'06), Chengdu, China, October 2006
- [2] P. Marsch and G. Fettweis, A Decentralized Optimization Approach to Backhaul-Constrained Distributed Antenna Systems, in Proceedings of the 16th IST Mobile & Wireless Communications Summit (IST Summit'07), Budapest, Hungary, 01. - 04. July 2007



# Candidate Technologies for LTE-Advanced

- Relaying

- Relays to extend coverage to be considered especially at higher frequency deployments.
- Effective mitigation of path loss and shadowing effects
- Co-operative RRM incl. interference management functionalities to improve capacity should be studied.
- Relays must maintain low latency and low complexity.
- UE based relaying maybe a possible candidate, practical deployment aspects must be considered.



# Candidate Technologies for LTE-Advanced

- Active antennas
  - Motivation for active antenna is easy and economical deployment
  - Antenna test concept has to be studied.
  - Interfaces between active antennas/remote radio heads and base band unit should be standardised by 3GPP.
- Self-backhauling
  - Flexible backhauling concepts required.
  - eNodeB backhauling using the same spectrum as for user access, to be studied.
- Spectrum aggregation
  - Aggregation of contiguous and non-contiguous spectrum in different bands.
  - Primary duplex communication system combined with additional secondary radio resources.
  - Band aggregation must consider backward compatibility concept and number of scenarios for aggregation should be limited.

