3GPP RAN Workshop on Release 12 and onwards
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A proposal for potential technologies for Release 12 and onwards

Electronics and Telecommunications Research Institute

ETRI

Contents

- Release 12 enhancements
  - CoMP enhancements
  - New carrier-type enhancements
  - MTC enhancements

- Mid-and-long-term evolution
  - Device-to-Device communications
  - 3D beamforming

CoMP enhancements

- Target scenarios
  - Focusing on intra- and inter-cell CoMP in HetNet deployments
  - Including X2-interface based multi point coordination

- Areas for improvements
  - UE feedback for DL CoMP in support of
    - Coherent joint transmission
    - MU-MIMO
  - UL CoMP
    - UL Power control
      - Path-loss estimation targeting intended reception points
    - Efficient joint reception and coordinated scheduling/beamforming

New carrier-type enhancements

- Introduction of standalone NCT
  - Operation without an associated backward compatible carrier
    - NCT as a primary cell
- Benefits
  - System overhead reduction by introducing reduced CRS or CRS free carriers
  - Frequency domain ICIC in HetNet environments
- Technical issues
  - Initial access to standalone NCT
  - DM-RS based control signaling
  - RRM measurements

MTC enhancements

- Support of additional scenarios
  - Low latency, high priority services
  - Medium/high mobility
- Areas for improvements
  - Minimization of control signaling overhead
  - Reduction of protocol overhead for MTC traffic

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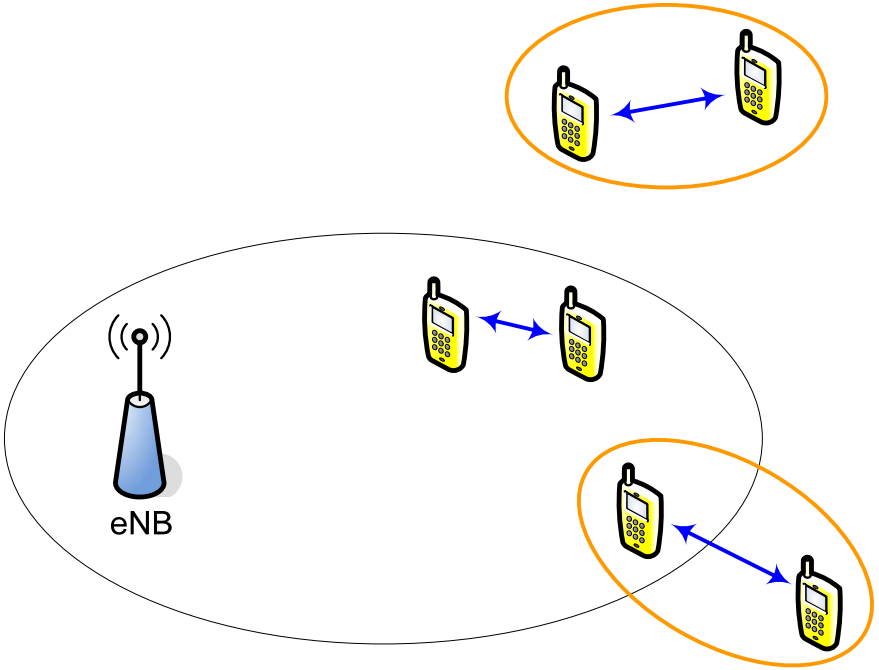
Device-to-Device communications (1/3)

- Use cases
  - Proximity based commercial/social services
  - Network offloading
  - Direct machine-type communications
  - Public safety

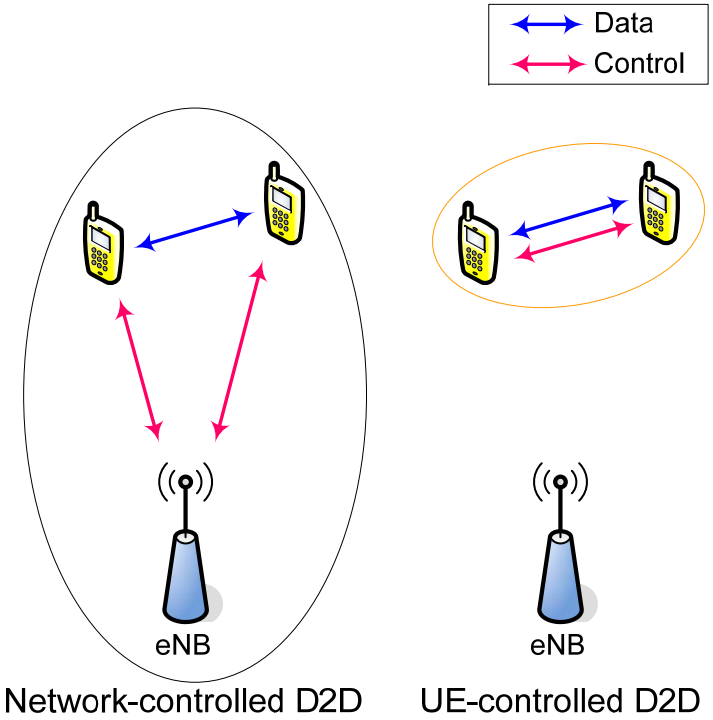
- Benefits
  - Increased spectral efficiency
  - Reduced power consumption
  - Cellular coverage extension
  - Direct communications outside the network coverage



Device-to-Device communications (2/3)

- Spectrum
  - Sharing with a cellular carrier
  - Using a dedicated carrier

- Approaches
  - Network-controlled D2D
    - Connection control
    - Resource allocation
    - Link adaptation
  - UE-controlled D2D
    - Distributed connection/link scheduling
  - Network- and UE-controlled D2D
    - Hybrid control by network and UE



Device-to-Device communications (3/3)

- High priority
  - Network-controlled D2D
  - Network- and UE-controlled D2D
- Initial Phase (Release 12): Feasibility study
  - Device discovery
  - Direct communications
- Mid-term Phase (Release 13+): Specification
  - Network-controlled D2D
  - Network- and UE-controlled D2D
  - UE-controlled D2D for public safety

3D beamforming (1/3)

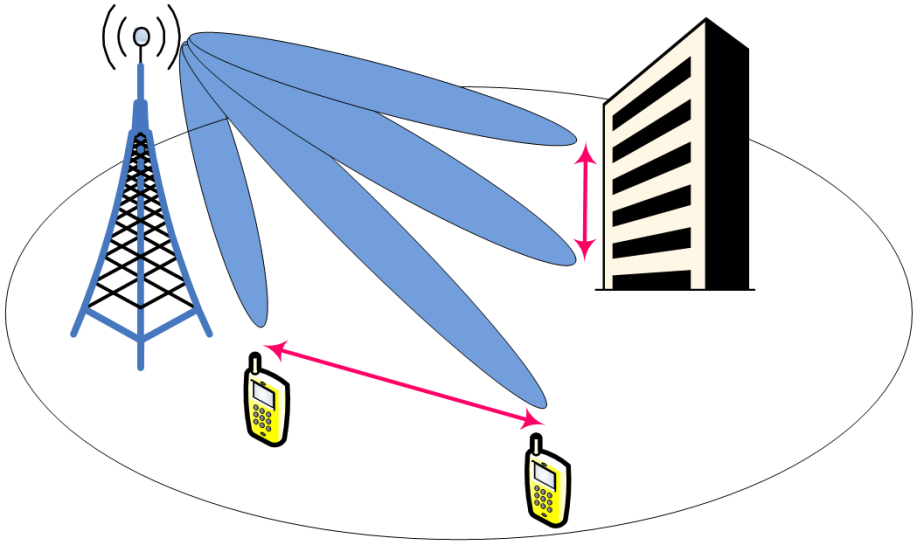
- Motivation
  - MIMO for high link reliability and system throughput
  - MU-MIMO can achieve high spectral efficiency by simultaneously serving many UEs in the same resource.
  - MU-MIMO in LTE
    - Maximum 8 Tx antennas
    - Up to 4 UEs

- MU-MIMO enhancements using 3D beamforming with large number of Tx antennas

3D beamforming (2/3)

- 3D beamforming for efficient MU-MIMO
  - Beamforming in both horizontal and vertical directions
    - Adaptive horizontal and vertical beamforming
  - Beam resolution can be improved by increasing the number of antennas
    - At least 10s of Tx antennas

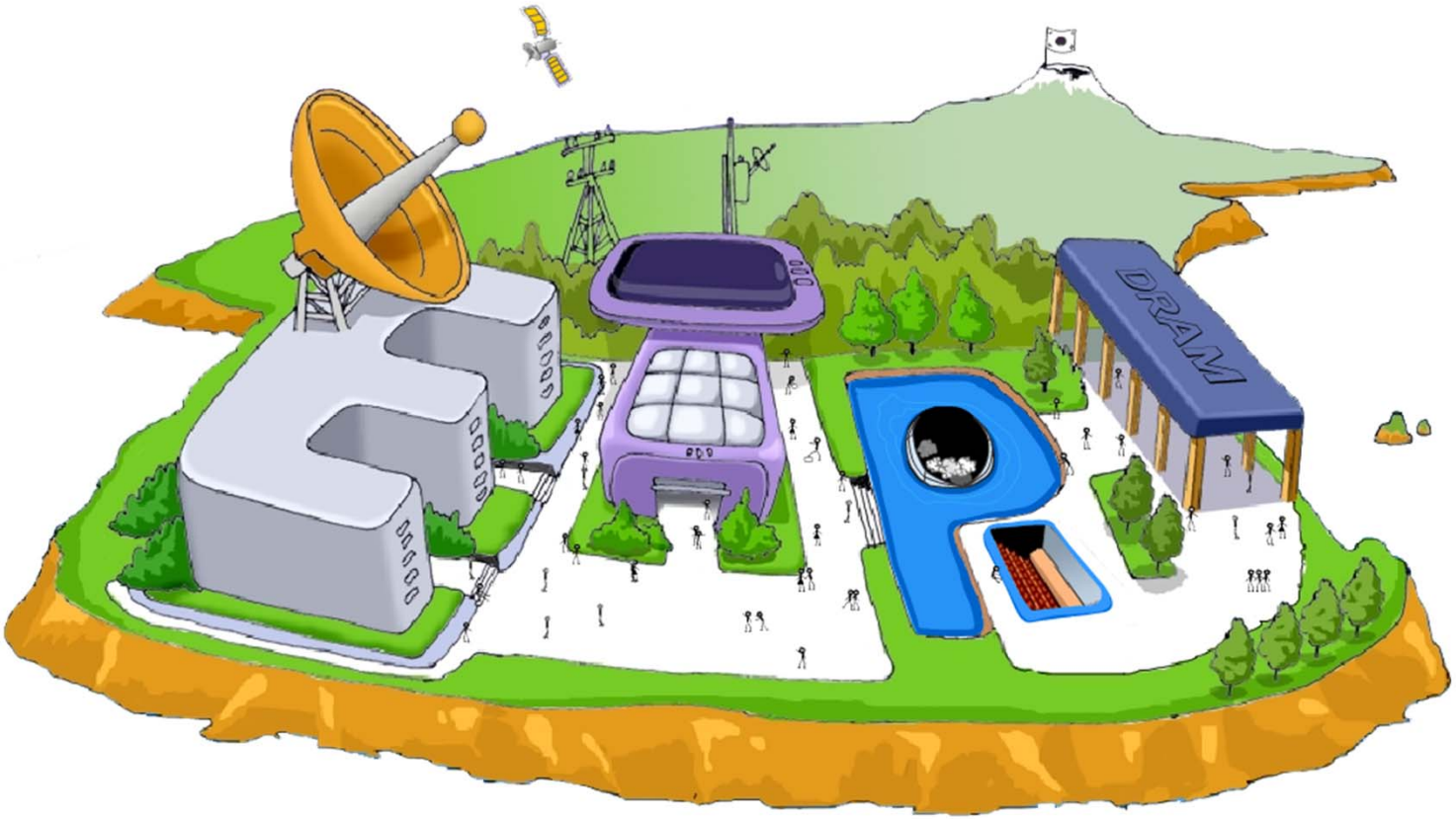
- Benefits
  - 3D spatial resource reuse
    - Higher spectral efficiency
  - More accurate beamforming
    - Higher SINR



3D beamforming (3/3)

- Technical issues
  - CSI acquisition mechanism
  - Reference signal design
  - Codebook design

- Time plan
  - Release 12/13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