MAC/RLC protocol design in heterogeneous networks

✓ General Framework
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- Definition of QoS guarantees (jitter, bit rates, …)

- QoS Parameters Management:
  - Mapping
  - Requirements Balance
  - Adaptability
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- Impact to upper layer protocols (TCP, RSVP, …)
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- Decentralised MAC to reduce signalling
  - Definition of minimum information for the nodes to efficiently operate
  - Distributed Transmission and Control
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Cross-layer design

- Definition
- Selection
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➢ Context-aware MAC:

<table>
<thead>
<tr>
<th>State Information</th>
<th>Network A</th>
<th>Network B</th>
<th>Network C</th>
<th>Network D</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHY Level</td>
<td>$C_{A,PHY}$</td>
<td>$C_{B,PHY}$</td>
<td>$C_{C,PHY}$</td>
<td>$C_{D,PHY}$</td>
</tr>
<tr>
<td>MAC Level</td>
<td>$C_{A,MAC}$</td>
<td>$C_{B,MAC}$</td>
<td>$C_{C,MAC}$</td>
<td>$C_{D,MAC}$</td>
</tr>
<tr>
<td>RLC Level</td>
<td>$C_{A,RLC}$</td>
<td>$C_{B,RLC}$</td>
<td>$C_{C,RLC}$</td>
<td>$C_{D,RLC}$</td>
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<tr>
<td>Upper Layers</td>
<td>$C_{A,UP}$</td>
<td>$C_{B,UP}$</td>
<td>$C_{C,UP}$</td>
<td>$C_{D,UP}$</td>
</tr>
</tbody>
</table>

Define/Select Useful Information Vector

$C_{X,Y}$
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- Scheduling algorithms

- Congestion Control
- Mapping
- QoS
- Renegotiation
- End-to-Edge
- Edge-to-Edge
- Routing
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- Power Control:
  - Energy Saving
    - Discontinuous reception
    - Electro-chemical Battery Behaviour
    - Packet-switched Implications
  - Interference Reduction
    - Inter-cell
    - Intra-cell
    - Intra-system
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- Handover algorithms

- Horizontal
- Vertical

- RSSI
- Traffic
- QoS

- Smart Antennas
- MIMO
- Vertical Soft HO
- ??

- Node Controlled
- Node Assisted
- Network Controlled
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Admission Control:

- Access Point (System)
- Parameters: Local/Global
- Mobility: Prediction/Management
- Policy Control-> Everywhere?
- Decision strategy: Optimistic/Conservative
- Heterogeneous traffic patterns/flows
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- Congestion Control
  - Source Control
  - Network Control: Priority/Difficulty
  - QoS Renegotiation
  - QoS Remapping (between systems)
  - End-to-End Application adaptability