ALU is pioneering cost-effective multimode solutions for HRPD/LTE in standards and network and handset product solutions.
Key Questions to Consider for LTE enhanced Packet Core Deployments

Network Topology:
- What applications will be used with LTE?
- What are projected traffic models?
- Design topology for voice, best-effort data, mobile peer-to-peer applications?
- What are geographic redundancy & load sharing plans?

Reuse of Existing Packet Core Equipment vs. New:
- Consider how old is existing equipment - is it up for the task?
  - Consider extra traffic demands LTE will put on it
  - Playing a part in the open application value chain: Importance of DPI & policy management
- Consider benefits of integration with backhaul concentration routers?
  - Integrated E2E IP QoS management
- Consider the network topology - same as before, or more distributed?
- Co-location of functions in a single platform?
- Application optimization schemes (e.g. leveraging multiple PDN capability)?
## Radical changes or evolution?

<table>
<thead>
<tr>
<th></th>
<th>Existing paradigm (3G)</th>
<th>How long?</th>
<th>LTE</th>
<th>R / E ?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Voice</strong></td>
<td>Circuit switched</td>
<td>20 years</td>
<td>- no Circuit Switched core</td>
<td>R</td>
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<td></td>
<td></td>
<td></td>
<td>- all voice is VoIP</td>
<td></td>
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<tr>
<td><strong>Broadband services</strong></td>
<td>Today: Best effort (WAP, SMS), Limited</td>
<td>10 years</td>
<td>Real-time, interactive,</td>
<td>R</td>
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<tr>
<td></td>
<td>expensive “broadband”</td>
<td></td>
<td>low latency, true broadband QoE</td>
<td></td>
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<tr>
<td><strong>Network data delivery to terminals</strong></td>
<td>Possible in theory via GPRS; Mostly blocked by the operators</td>
<td>since SMS</td>
<td>Possible and probable: fully managed and charged by PCRF; network protection by DPI (optional)</td>
<td>R</td>
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<tr>
<td><strong>Multisession data</strong></td>
<td>“Wait until you finish with mini-web</td>
<td>n/a</td>
<td>All about bearers, sessions, flows:</td>
<td>R</td>
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<td></td>
<td>browsing or the long conference call, so you can get your push-emails”</td>
<td></td>
<td>- user-initiated</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>- network-initiated</td>
<td></td>
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<tr>
<td><strong>QoS</strong></td>
<td>No e2e QoS - only CoS! In theory: up to 8</td>
<td>Since R4</td>
<td>9 QoS, strictly defined parameters, e2e QCI, SDF, bearers...</td>
<td>R</td>
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<tr>
<td></td>
<td>CoS</td>
<td></td>
<td>(3GPP TS 23.207)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>In practice: 2-4 (voice/control, best-effort data)</td>
<td>Since R4</td>
<td></td>
<td></td>
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<tr>
<td><strong>Policy Management</strong></td>
<td>Theory: PCRF introduced in 3GPP R7</td>
<td>Since R4</td>
<td>True network-wide policy control and management (PCRF, PCEF)</td>
<td>R</td>
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<tr>
<td></td>
<td>Practice: RADIUS authentication</td>
<td></td>
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<tr>
<td><strong>Mobility Management</strong></td>
<td>Part of RAN; Mobility hidden from core</td>
<td>From</td>
<td>- no RNCs (radio mgt. by eNB)</td>
<td>R-E</td>
</tr>
<tr>
<td></td>
<td>network</td>
<td>beginning</td>
<td>- mobility visible and moved to core (managed from the core network)</td>
<td></td>
</tr>
</tbody>
</table>
Key implications on user plane and control plane

User plane has many common attributes with fixed broadband
- Broadband capacity
- QoS for multi-service delivery
- Per-user and per-application policies
- Highly available network elements

Control plane gets new mobile-specific attributes
- Mobility across networks and operators
- Distributed mobility management
- Massive increase in scalability
- Dynamic policy management

Diagram:
- GSM/GPRS/EDGE
- WCDMA/HSPA
- CDMA/EV-DO
- LTE
- eNode B
- IP channel
- Service Delivery Platforms
- Evolved Packet Core
- SGW
- MME
- PCRF
- PDN GW
Leverage Transport layer Convergence for Seamless Evolution

End-to-End IP nature of LTE facilitates convergence of Mobile-Transport layers to optimize performance

- Seamless convergence of backhaul/backbone networks for 2G/3G/LTE
- Deliver sophisticated consistent end-to-end IP QoS across mobile & transport layers
- Lower Total Cost of Ownership (TCO) via flexible alignment of mobility (EPC) functions with transport, backhaul and aggregation