VOICE OVER LTE (VOLTE)

Håvard Austad

Agenda

- LTE
- HD voice
- VoIP
- Challenges
- VoLGA
- VoLTE
- Summary

LTE

- High speed ”all-IP” network
- Only packet switched
- No separate voice channel
- HD video
- *HD voice*

HD voice

- Human speech: 80Hz – 14KHz
- Regular voice/narrowband 300Hz – 3.4KHz
- LTE: Adaptive multi-rate wideband codec (multiple samplerate depending on the audio)
- 16KHz sampling (regualar phone:8kHz)
- “Capture” 50Hz to 7kHz

VoIP

- Voice over IP
- Encapsulate the voice payload in IP-packets
- Looks and feels like a regular IP-packet
- Has to be prioritized

<table>
<tr><th colspan="2">4-bit</th><th>8-bit</th><th>16-bit</th><th colspan="2">32-bit</th></tr>
<tr><td colspan="2">Ver.</td><td>Header Length</td><td>Type of Service</td><td colspan="2">Total Length</td></tr>
<tr><td colspan="3">Identification</td><td>Flags</td><td>Offset</td></tr>
<tr><td colspan="2">Time To Live</td><td colspan="2">Protocol</td><td colspan="2">Checksum</td></tr>
<tr><td colspan="5">Source Address</td></tr>
<tr><td colspan="5">Destination Address</td></tr>
<tr><td colspan="5">Options and Padding</td></tr>
</table>

Challenges

- Time critical traffic
- Packet loss
- Quality of Service
- Asynchrony uplink and downlink
- Unequal power UE and BTS (different packet loss rate)

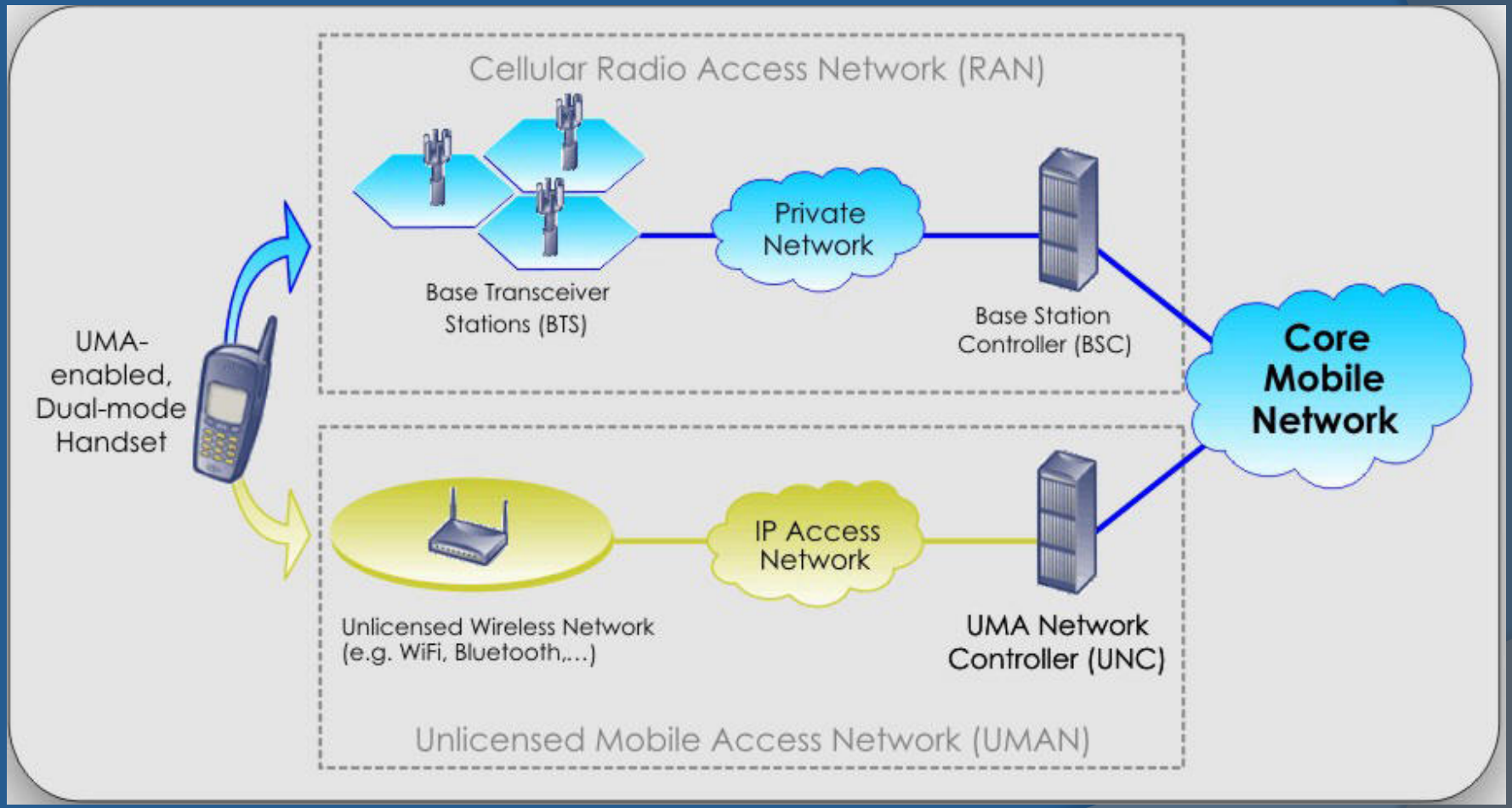
Circuit switched fallback

- Falls back to 3G/GSM for voice
- LTE only for data
- Telenor

VoLGA

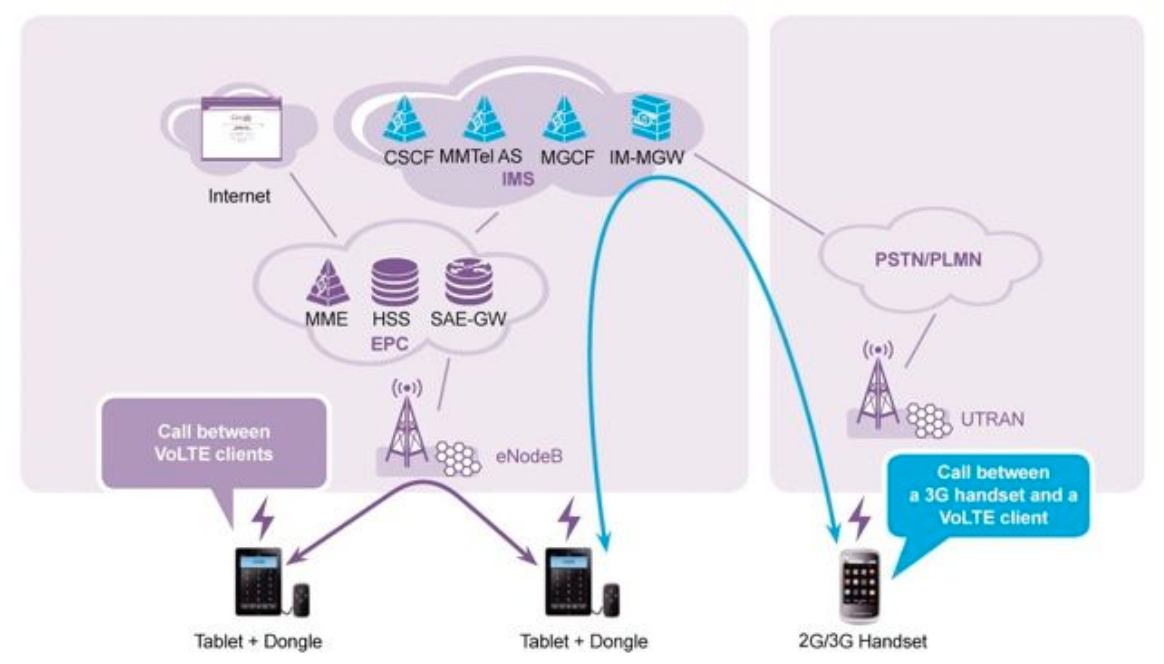
- Voice over LTE via GAN (Generic Access Network)
- GAN uses wifi or cell network to connect to the core network
- VoLGA replace wifi with LTE

VoLGA

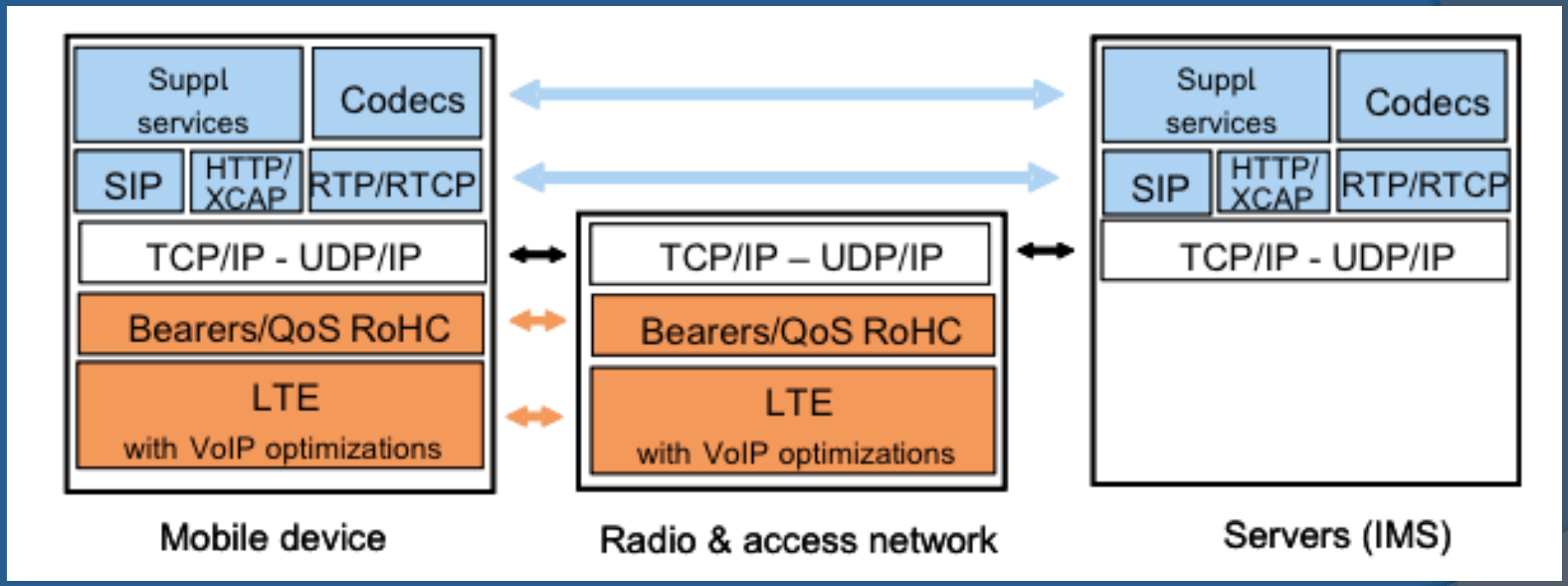

Cellular Radio Access Network (RAN)
Base Transceiver Stations (BTS)
Private Network
Base Station Controller (BSC)
UMA-enabled, Dual-mode Handset
Core Mobile Network
IP Access Network
Unlicensed Wireless Network (e.g. WiFi, Bluetooth,...)
UMA Network Controller (UNC)
Unlicensed Mobile Access Network (UMAN)

VoLTE

- Voice over LTE
- IP Multimedia System (IMS)
- SIP -> IMS servers
- RTP to receiver



VoLTE


Suppl services
Codecs
SIP
HTTP/ XCAP
RTP/RTCP
TCP/IP - UDP/IP
Bearers/QoS RoHC
LTE
with VoIP optimizations
Mobile device
TCP/IP – UDP/IP
Bearers/QoS RoHC
LTE
with VoIP optimizations
Radio & access network
Suppl services
Codecs
SIP
HTTP/ XCAP
RTP/RTCP
TCP/IP - UDP/IP
Servers (IMS)

Summary

- All-IP network gives different challenges
- New requiems to the network
- High Definition voice
- QoS in the entire network
- Circuit switched fallback
- VoLGA uses GAN for talking to the core
- VoLTE uses IMS and IMS servers