VoLTE: Particularities from Measurements to Analysis

Haarlem, 9.5.2016 – Alberto Pérez
1. Introduction
2. VoLTE – a new old technology
3. Measuring VoLTE – Test Scenarios
4. Analysing VoLTE – Particularities
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Consulting and engineering services for mobile operators in network strategy, deployment and quality assurance. Maximized customer experience, minimized network cost.
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VoLTE has been officially deployed already in 33 countries by 58 operators.

It is expected that by 2019 56% of LTE-related cellular subscriptions will be using VoLTE.
2. VoLTE – a new old technology

- Fundamentally VoLTE allows subscribers to make mobile voice calls, a service that has been available since the origins of mobile cellular networks

- VoLTE main benefits from End-User QoS standpoint:
  - VoLTE supports higher quality calls (7KHz bandwidth, AMR-WB 23.85kbps)
  - Faster call setup times
  - Improved battery life (compared to using 3rd party VoIP apps)
  - Enable simultaneous voice and LTE data

- Technologically it is though an implementation challenge for the operators that will result in a more efficient use of the spectrum for such a basic service
1. Introduction
2. VoLTE – a new old technology
3. Measuring VoLTE – Test Scenarios
4. Analysing VoLTE – Particularities
3. Measuring VoLTE - Considerations

Assuming VoLTE service is deployed within the network, the number of different voice call use case scenarios is rather big:

- VoLTE enable subscribers calling:
  - VoLTE enable subscriber
  - LTE enable subscriber
  - 2G/3G subscriber
  - PSTN

- LTE enable subscriber calling:
  - VoLTE enable subscriber
  - LTE enable subscriber
  - 2G/3G subscriber
  - PSTN

- 2G / 3G subscriber calling:
  - VoLTE enable subscriber
  - LTE enable subscriber
  - 2G/3G subscriber
  - PSTN
3. Measuring VoLTE – Test Scenarios

1. VoLTE to VoLTE mobile-to-mobile call
   a. Short calls for testing Accessibility and/or Integrity (MOS)
   b. Long calls (until drop) for testing Retainability and/or Integrity (MOS)

2. VoLTE to 2G/3G/LTE/PSTN
   a. Short calls for testing Accessibility
   b. Long calls (until drop) for testing Retainability
      – Test focus on Session Border Management (routing between EPC/IMS and other networks)

3. VoLTE to ‘Any’ with background data activity
   – Test focus on QoS Class Identifier (QCI) Integrity

4. LTE to 2G/3G/LTE/PSTN
   – No VoLTE specific test scenario. Test focus on CSFB Integrity

5. 2G/3G to 2G/3G mobile-to-mobile call
   – For comparison with VoLTE
3. Measuring VoLTE – Test Scenarios

In addition, mobility should also be considered:

1. VoLTE to legacy interworking
   – Test focus on SRVCC

2. VoLTE to VoWiFi
   – Test focus on ePDG
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2. VoLTE – a new old technology
3. Measuring VoLTE – Test Scenarios
4. Analysing VoLTE – Particularities
4. Analysing VoLTE - KPIs

- From End-User point of view Voice call service is characterised by the following KPIs:
  - Call Setup Success Rate (CSSR)
  - Call Drops
  - Call Success Rates (CSR)
  - Call Setup Time (CST)
  - Voice Audio Quality (MOS)

- From end-user perspective VoLTE is essentially providing voice call service, thus same KPIs apply when depicting VoLTE Accessibility, Retainability and Integrity
4. Analysing VoLTE - Particularities

- Omnitele has come across a number of particular issues when testing VoLTE in networks where service has not been deployed yet

1. MOS distribution includes number of very low scores
   - Even in good network conditions MOS might be unexpectedly low -> high delay or jitter may cause degraded audio quality
   - MOS values tend to decrease in areas where handovers are increased. Occasionally silence is detected after handover

2. Call continuity issues might occur after handovers
   - No RTP packets received after handover -> SIP server disconnection

3. Measurement equipment might not identify all call events always correctly
4. Analysing VoLTE - Troubleshooting

Therefore it is worth considering other KPIs in order to troubleshoot issues with premature VoLTE networks:

- RTP loss / delay / jitter
- Impact of handovers (even successful)
- Over-the-air packet loss
- Over-the-air packet delay
- Duration of SIP messages (180Ring / 200OK / Traffic Start)
- QCI distribution
thank you for your attention!

questions
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