

Routing and QoS Management in an IMS/IPX environment

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TOPICS



- International call quality assurance
- Voice quality testing
- HD voice specific
- New routing requirements
- Active end-to-end testing
- Conclusions





Move to an all-IP infrastructure

- The technology transition introduces new challenges
- Risk of quality problems - bad customer experience
- Need for testing is greater than ever

■ Transport Parameters:

- Round-Trip Delay
- Jitter
- Packet Loss

■ Service Parameters:

- MOS – Voice Quality
- ALOC – Average Length of Call
- ASR – Answer Seizure Ratio
- NER – Network Efficiency Ratio (corrects for user behavior)
- PGRD – Post Gateway Ring Delay (delay to receiving alerting)
- CLI Transparency
- Coming up: HD Voice Capability



Accurate measurements are hard to achieve in practise

Voice Quality Testing – Importance & Challenges

- Increasing demand for HD Voice and VoLTE
- Technical complexity during transition to all-IP requires rigorous testing

Challenges

- Different MOS standards
- Not an absolute truth – Subject to user perception
- MOS not used like CLI and ASR as external SLA measurement
- Need for one MOS standard with high level of accuracy

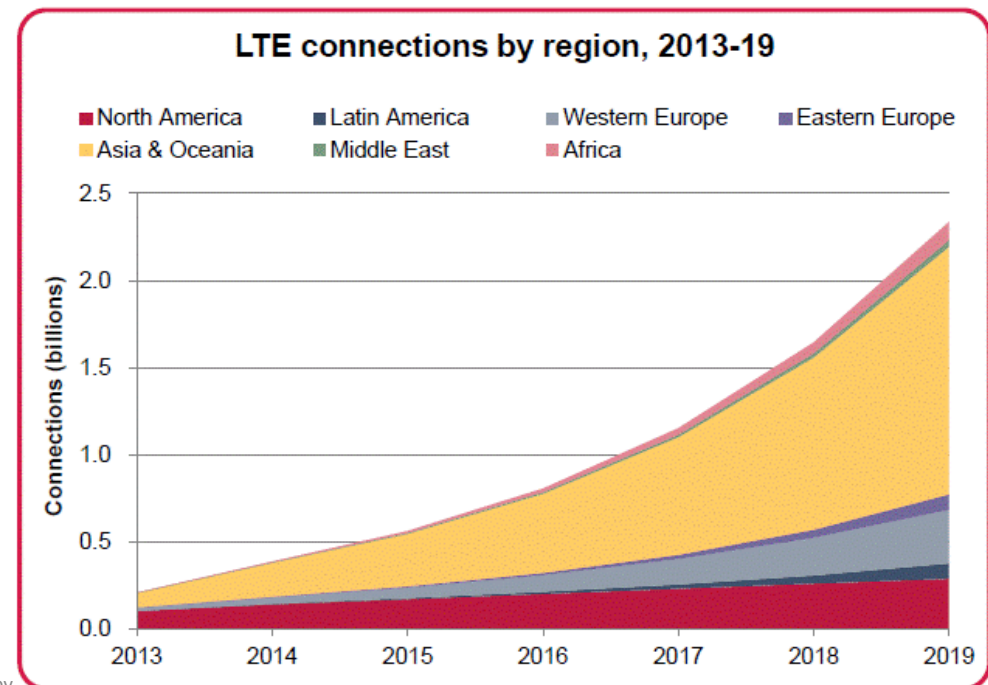


Voice Quality Testing – Methods

- Most frequently used scale is MOS – Quality rating from 1 to 5
- Several methods for evaluating voice quality
- Method accuracy is key: As close to scores of subjective evaluation tests as possible

	PESQ (P.862) & POLQA (P.863)	P.563	E-Model (G.107)	P.564
Primary use	End-to-end testing	Network monitoring*	Network planning	Network monitoring
Type	Active (Intrusive)	Passive* (Non-intrusive)	Passive (Non-intrusive)	Passive (Non-intrusive)
Input	Speech signal	Speech signal	Quality parameters	IP packet header info
MOS measurement	MOS-LQO (listening quality, objective)	MOS-LQO	MOS-CQE (conversation quality, estimated)	MOS-LQO
Comments	<ul style="list-style-type: none"> • POLQA successor of PESQ, designed for HD Voice • Accurate • Requires end-to-end control 	<ul style="list-style-type: none"> • Does not require end-to-end control * Can be used for active end-to-end testing as well 	<ul style="list-style-type: none"> • Defines R factor - can be converted to MOS • Rough estimation • Limited HD Voice support 	<ul style="list-style-type: none"> • Reflects IP impairments on part of the end-to-end connection

- A turning point has been reached : The majority of Tier-1 operators have chosen to either go live with VoLTE services or invest in them
 - Over 80 service providers worldwide are deploying VoLTE (domestic)
 - International VoLTE is the next logical step
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- Currently VoLTE generally only works when the calling and called party are on the same network
 - VoLTE interoperability agreements required



- Quality Assurance is key for the success of international HD voice



THE GOOD NEWS:

- Number of HD voice operators is rapidly increasing
- HD voice enabled handsets
- International HD connections are taking off



THE CHALLENGES:

- Mix of technologies
- OTT providers a strong alternative
- Operator has to provide excellent Quality and Service Availability

**132 HD voice operators in 81 countries
(supporting AMR-WB)**

16 VoLTE on LTE networks

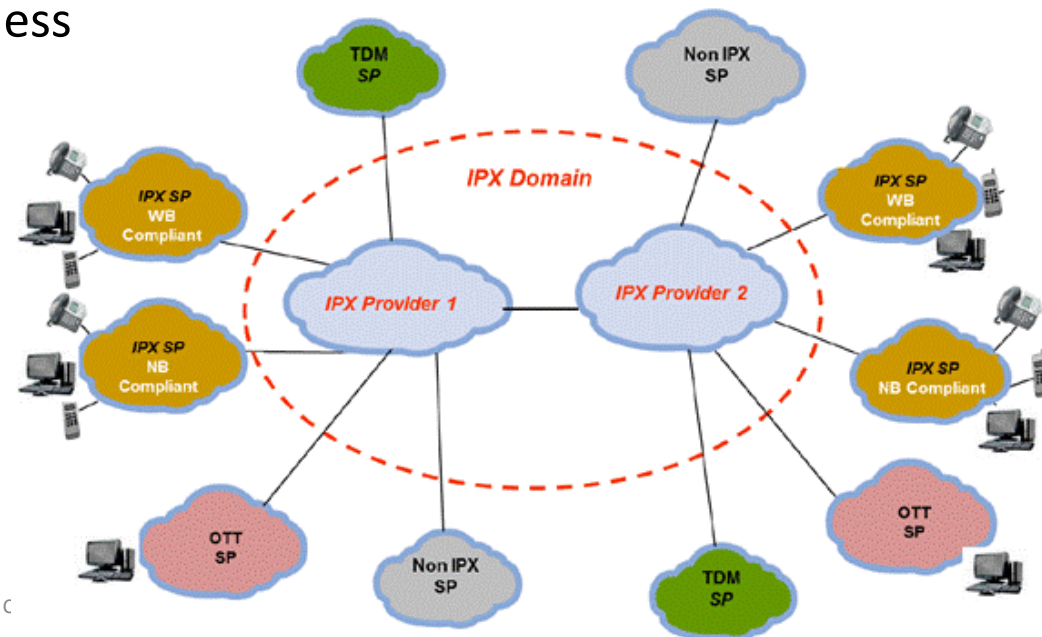
120 on 3G/HSPA networks

14 on GSM networks

Source: GSA, April 2015. Numbers excluding MVNOs

HD Voice – New Routing Requirements

- Central role of the IPX provider – Facilitate a seamless global multi-service platform
- Additional routing complexity
 - HD Voice capability - New routing criteria
 - Wideband codec continuity - Avoid transcoding when possible
 - Need for increased service provider and number portability awareness
 - Might want to differentiate the HD voice product with a price premium



Active End-to-end Voice Quality Testing

- Two approaches to control quality
 - Active testing
 - Passive monitoringboth having distinct advantages
- Passive monitoring
 - Strong in measuring e.g. ASR, PDD, Packet loss, jitter, delay
 - Difficult to provide accurate MOS measurements

Active Testing – Advantages

Provides end-to-end testing, representing the user experience

Transparent to the transport network technologies used

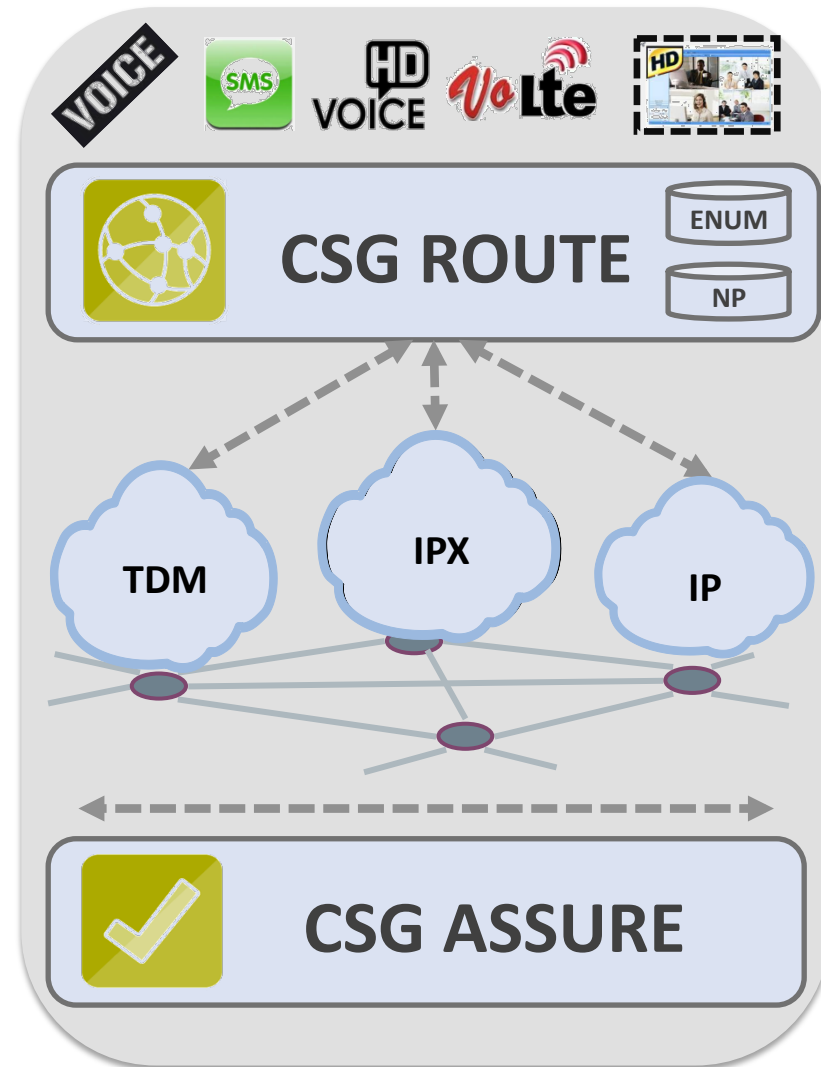
Accurate voice quality (MOS) assessment using POLQA

Full control of the testing scope, reproducible testing

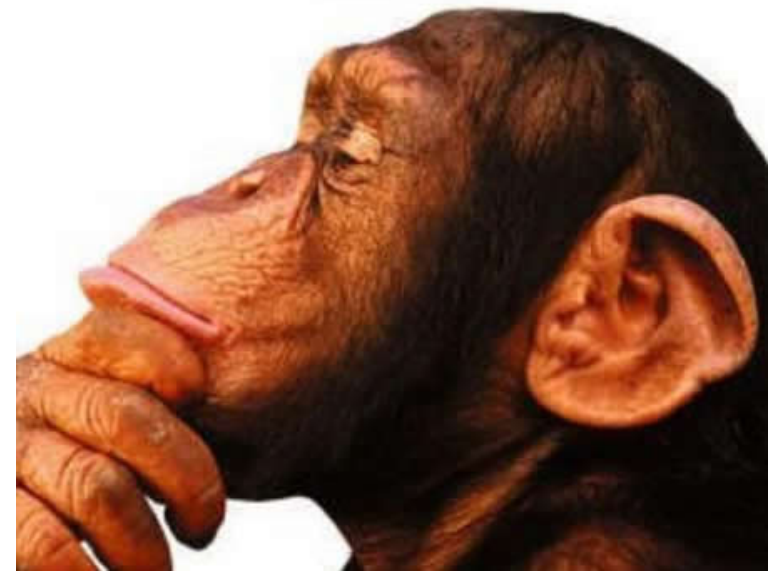


CSG Solution Approach

- ✓ Active end-to-end testing with Assure test nodes in 150 countries
- ✓ Support for LTE networks and HD voice quality testing using POLQA
- ✓ CSG Routing Server supporting lookup in ENUM and NP databases
- ✓ HD Voice codec as additional routing criteria



- The pressure is increasing on service providers and carriers to support international HD voice
- During the transition to an all-IP environment interoperability and end-to-end quality are key differentiators
- Powerful voice quality testing and routing optimization tools are important enablers





Thank You!