VIAVI

xSIGHT for VoLTE Customer Experience Assurance (CEA)

LTE delivers greater bandwidth and improved performance, enabling high-quality customer experience with broadband data services. With the introduction of IP multimedia subsystem (IMS) architecture, LTE networks can deliver voice calls as just another broadband data service—voice over LTE, or VoLTE. However, workflows and solutions for detecting and resolving customer-impacting faults in LTE mobile broadband networks are significantly different from previous-generation mobile networking technologies. VoLTE is no exception.

Delivering effective assurance workflows for VoLTE services requires several key functionalities:

- Visibility into all of the complex signaling transactions required to set up, and tear down VoLTE calls and handover calls between cells

- Determination of actual customer QoE, such as voice quality, during VoLTE calls

- Analysis of customer experience, service, and network performance across multiple dimensions (for example, device type, location, or cell) in real time

- Visibility into handovers between VoLTE and 2/3G networks associated with CSFB and eSRVCC operations

The Viavi Solutions xSIGHT™ portfolio represents a new generation of mobile assurance system. It delivers all the above functionality and enables the enhanced assurance workflows required for VoLTE services.

Key Benefits

- Greater customer satisfaction with VoLTE services

- Higher productivity for VoLTE service assurance teams

- Improved effectiveness for RAN optimization teams

- Faster root-cause identification

Key Features

- Comprehensive signaling VoLTE call KPIs covering EPC and IMS networks

- VoLTE call voice quality measurements with granularity down to 6 sec

- Full VoLTE call multi-protocol correlation for faster troubleshooting

- KPIs covering circuit switched fall back (CSFB) and enhanced single radio voice call continuity (eSRVCC) operations

- A VoLTE-service-specific application workflow including automated in-context launch of transaction tracing analysis

- VoLTE-metric KPI feed for external Viavi and 3rd-party applications

- Works in both physical and virtualized environments

Comprehensive VoLTE Network Interface Coverage and Performance KPIs

The xSIGHT VoLTE CEA application includes data-access software agents that passively monitor both control- and user-plane VoLTE traffic at all key interface points across both LTE evolved packet core (EPC) and IMS networks. These monitored interface points include those associated with VoLTE handovers to-and-from 2/3G networks, specifically pre-calling CSFB handovers and intra-call eSRVCC handovers.

By correlating and analyzing traffic monitored at these interface points, xSIGHT can generate a comprehensive set of VoLTE performance metrics covering both call signaling and call voice quality. xSIGHT can also capture and store VoLTE/CSFB/eSRVCC signaling traffic for analysis by a protocol transaction tracing and decode application, an essential tool required for the diagnosis of more in-depth VoLTE service issues. Figure 1 shows some of the VoLTE network interfaces supported by xSIGHT.
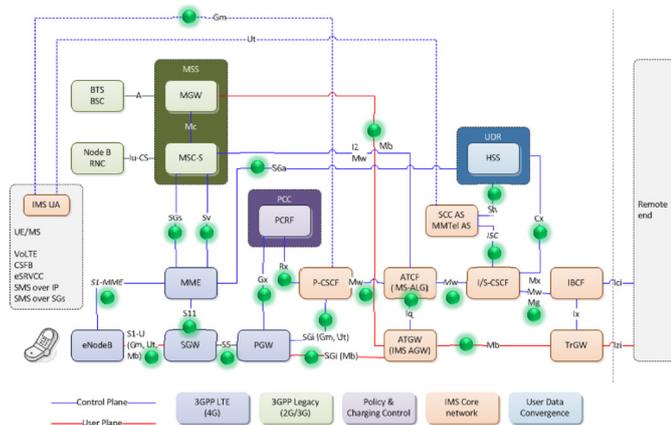

Figure 1. xSIGHT monitored interfaces for VoLTE

VoLTE-Service-Specific, Real-Time Application Workflow

The xSIGHT CEA solution provides a VoLTE-service-specific application workflow that delivers higher productivity for solution users. Within the CEA application, a comprehensive set of VoLTE EPC and IMS performance metrics is organized and displayed in a service-logical way—for example, grouped into customer-experience categories such as service accessibility, retainability, integrity (service quality), and mobility. Organizing metrics in this way, as opposed to grouping by network interface, enables the user to much more quickly identify (and hence resolve) customer-impacting issues.

Another advantage of xSIGHT architecture is that it delivers performance results and analysis of these results across multiple dimensions in real time. Results and selected multi-dimensional analysis (for example, VoLTE customer experience analyzed by device type, location, and/or customer group) are delivered every minute with voice-quality measurement granularity down to six seconds. The results and analysis are available via the solution's external application feed. The combination of a VoLTE-specific workflow and real-time multi-dimensional analysis of performance enables proactive assurance workflows that can detect and resolve issues before they impact customers. In the past, assurance workflows were typically reactive and were only used to diagnose issues reported by customers.

Figure 2 shows an example workflow from the xSIGHT VoLTE CEA application. Note how any pending customer QoE issues with the VoLTE service can be quickly identified at the top level. Thereafter, by drilling down on performance metrics, an issue's root cause can be identified in real time. When a user selects a drill-down, xSIGHT automatically filters results to only those VoLTE calls meeting that selection. At the deepest drill-down level, the xSIGHT Diagnostics transaction tracing application launches for only those contributing VoLTE calls.
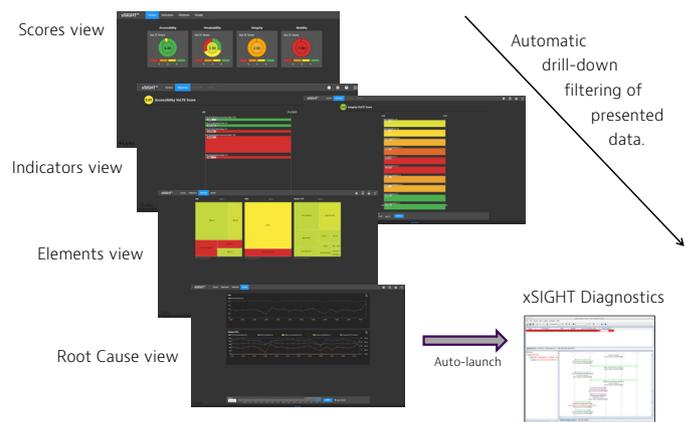

Figure 2. xSIGHT CEA application views in the VoLTE workflow

xSIGHT VoLTE Applications, Feed, and Data-Access Agents

The xSIGHT VoLTE solution includes the following three applications: CEA, Performance Explorer, and Diagnostics. The first two are metric-based applications, used for issue detection, prioritization, and diagnosis, while the third is a protocol transaction tracing and decode application for in-depth diagnoses of customer-impacting issues. The solution also offers a fully flexible feed for the supply of performance metrics and analysis to external Viavi or 3rd-party applications.

CEA

This metric-based application focuses on the delivered VoLTE customer experience and associated KPIs. It delivers multi-dimensional KPI analysis in real time, linking the customer experience to the underlying network and service performance. CEA enables the industry's most powerful assurance workflows with customer "impact analysis" of detected network/service issues and customer issue diagnosis via (low-skilled) KPI drill-down with automatic data filtering.

Performance Explorer (PE)

PE is a fully-flexible, metric-based application enabling in-depth analysis of any user-selected network, service, or customer-performance KPIs. This application is ideal for specific network investigations, including comparing performance before and after an event (such as when managing network changes) and problem root-cause investigations.

Diagnostics

Diagnostics provides detailed transaction tracing and decoding for a selected subscriber individual VoLTE call. When integrated with a Viavi-patented indexing database technology (available in the xSIGHT Traffic Storage Agent), Diagnostics provides industry-recognized in-depth troubleshooting at a fraction of the cost of traditional solutions. The CEA and PE applications automatically launch Diagnostics via the transfer of impacted IMSIs (such as subscribers).
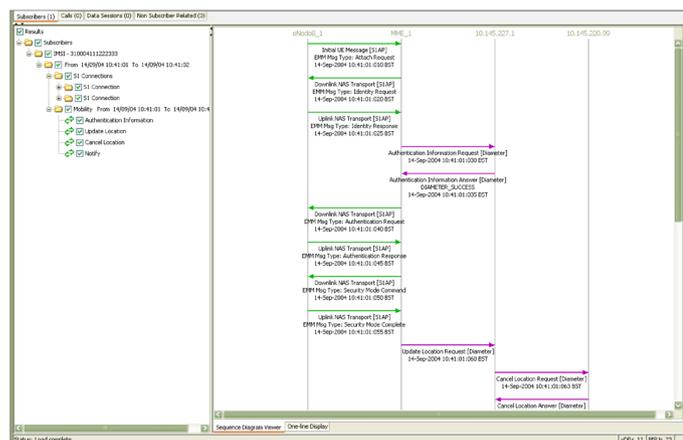

Figure 3. Typical xSIGHT Diagnostics application screenshot

VoLTE Feed

This feed supplies external 3rd-party applications with control-and user-plane performance metrics and customer-identification information for monitored VoLTE calls. Feed is supplied (via the xSIGHT Real-Time Intelligence platform) in a number of formats, including comma separated variable (CSV), and contains only those data fields selected by the solution user.

Traffic Analysis and Traffic Storage Agents

xSIGHT offers two agents for passively monitoring VoLTE (signaling and user-plane) traffic: the Traffic Analysis Agent (TAA) and the Traffic Storage Agent (TSA). These are software-only agents that run on commercial-off-the-shelf servers or on virtual machines in virtualized environments. The TAA can generate and store performance metrics for VoLTE control- and user-plane traffic, while the TSA can also capture and store VoLTE control-plane traffic. TSAs are therefore required for those solution deployments involving the xSIGHT Diagnostics transaction tracing and decoding application.

Viavi PLUS Professional Services

The Viavi professional service organization spans the globe to deliver a broad range of pre- and post-sale services including custom software development, system deployment/commissioning, education, and various levels of hardware/software support tailored to meet the exact requirements of Viavi customers.

Specifically for assurance systems such as the xSIGHT VoLTE solution, managed services can also be provided as well as on-site operational assistance or mentoring services delivered by Viavi experts.

xSIGHT VoLTE Solution KPI and Dimensions Summary

Tables 1 and 2 list example VoLTE metrics and analytical dimensions provided by the xSIGHT solution. Details on the individual metrics and dimensions available can be provided on request.

Table 1. Example xSIGHT VoLTE metrics

Customer QoE Category	Example Performance Metrics
VoLTE service accessibility	• Call setup success rate • Call setup time • Post dial delay • Number of call attempts • IMS — registration success rate • IMS — registration delay • IMS — number of IMS registration attempts • IMS — S-CSCF identification success rate • IMS — S-CSCF identification delay • IMS — location information request success ratioIMS — number of location information requests • IMS — TAS INVITE success rate • IMS — number of INVITES at TAS • IMS — TAS UPDATE success rate • IMS — number of INVITES at P-CSCF, I-CSCF, S-CSCF • IMS — number of updates at P-CSCF
VoLTE service retainability	• Dropped call rate/volume • Average call duration • IMS — number of UPDATEs at S-CSCF • IMS — number of UPDATEs at TAS
VoLTE service integrity (voice quality)	• MOS (uplink and downlink) • R-factor (uplink and downlink) • Jitter (uplink and downlink) • Packet loss (uplink and downlink) • Latency (uplink and downlink) • Number of concurrent RTP Streams • H.248 number of input octets per call
VoLTE service mobility	• CSFB success rate (MO and MT) • CSFB number of attempts (MO and MT) • CSFB MO context setup success ratio • CSFB number of MO context setup attempts • CSFB MT paging attempts success rate • CSFB setup time (MO and MT) • eSRVCC success rate — PS to CS and CS to PS • eSRVCC number of attempts — PS to CS and CS to PS • eSRVCC speech connection gap

Table 2. Example xSIGHT VoLTE analytical dimensions

Customer QoE Category	Example Analytical Dimensions
All categories	• NE (as appropriate) • UE type • IMS user agent • Customer group • CODEC • eNodeB ID

Complementary VoLTE Solutions

In addition to xSIGHT, Viavi offers a comprehensive portfolio covering all key aspects of VoLTE service experience and underlying network performance.

EtherASSURE

This Ethernet-focused performance monitoring solution verifies the quality of backhaul links being used for VoLTE calls. Where xSIGHT indicates poor VoLTE service integrity due to jitter, packet loss, or latency, EtherASSURE™ can quickly confirm whether the Ethernet backhaul links are a root cause of the poor VoLTE experience.

ariesoGEO

The ariesoGEO™ performance monitoring solution geo-locates (down to building resolution) all VoLTE calls. The combination of xSIGHT with ariesoGEO can therefore reveal who is making VoLTE calls, where the calls are being made/received, and how good (in terms of accessibility, retainability, integrity, and mobility) the calls were—a powerful combination of VoLTE call intelligence.

RANAdvisor

This is a RAN optimization solution that can simultaneously measure and troubleshoot network RF coverage and service delivery across all existing 2/3/4G technologies including LTE, VoIP, and VoLTE. The RANAdvisor™ portfolio includes TrueSite™, a portable, Android-based solution that enables comprehensive testing of any indoor network.

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