xSIGHT™ MME Assurance

MME Challenge

The year 2014 marked the first year the number of cellular connections exceeded the number of humans on the planet. Global mobile broadband subscribers totaled 2.3 billion by year-end with an average per month usage of 2GB per device. With 1.46 million apps available for download, consumers downloaded 62.5 billion mobile apps in the first half of 2014 alone with many of these being extremely chatty always-on apps.

LTE access enables this mobile broadband ecosystem growth, and new technologies like LTE-A, small cells, using LTE in wearables, and LTE M2M solutions, such as the connected car and healthcare, are driving continued mobile broadband growth, placing never-ceasing pressure on communication service providers' (CSPs) LTE networks.

The key control node for the CSP LTE access network is the Mobility Management Entity (MME) node. This LTE System Architecture Evolution (SAE) core network node is the key signaling node for LTE access, bearing the brunt of all signaling for LTE access. The signaling it handles includes UE access authentication (Diameter), non-radio UE (NAS) signaling, bearer activation/deactivation, temporary UE identity management, UE paging, RAN handovers, 3G/4G mobility, and idle mobile tracking to name a few. In short, poor MME performance can quickly degrade services for a significant number of subscribers.

Sustained MME signaling loads in adverse conditions can approach 1500 messages per UE per hour in adverse conditions. Poor MME monitoring visibility can lead to extended outages and subscriber churn.

The signaling loads that MMEs bear in the LTE network are massive. In large LTE deployments, an MME can experience a sustained load of over 500 to 800 messages per UE during normal busy hours with up to 1500 per UE per hour under adverse conditions. MMEs need to handle these large loads while dealing with the increased loads placed upon them from the introduction of new devices (wearables, M2M), VoLTE, and continued rapid growth of data usage driven by the ever-growing smartphone app ecosystem. As CSPs consider network functions virtualization (NFV), implementing it requires them to also consider the increase in network signaling loads that are associated with moving from actual equipment to virtual network functions (VNFs). There could be a significant increase in signaling in general as VNFs are reassembled dynamically to create actual service logic in a virtualized network environment.

Given CSPs are averaging a 1.3 to 3% average monthly churn rate, it is critical to maintain visibility to MME nodes and MME services. Poor monitoring visibility can lead to extended outages or LTE service degradation and lead to overall customer dissatisfaction.

A Network Assurance Market Problem

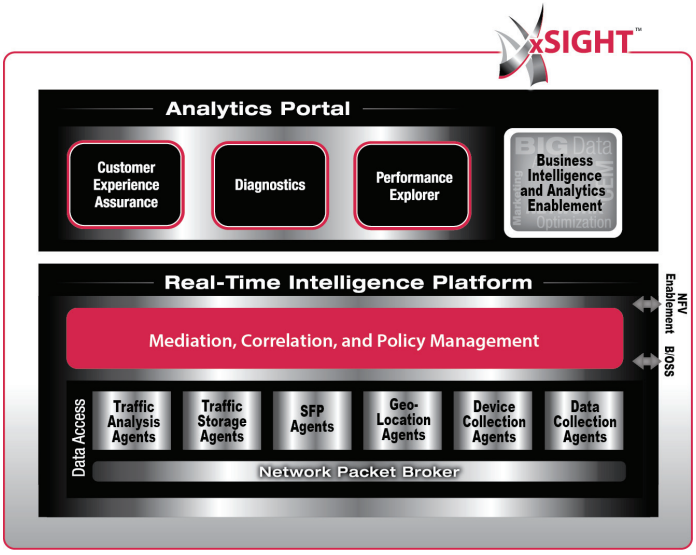
Despite the introduction of LTE by CSPs to the mobile ecosystem in 2010, traditional network assurance solutions have not evolved into solutions sufficient to monitor MME nodes for network assurance. For adequate MME network assurance, the following requirements are critical:

- Stability — the network elements that are being monitored adhere to carrier class reliability. It stands to reason that the monitoring solution used should also have high reliability. This means any MME monitoring solution must not lose data, drop packets, run out of computing resources, or crash.
- Usability — any solution must be able to proactively and accurately identify problems having the greatest impact on customer experience, and it must do so in real time. This means the data has to render in the user interface quickly, the data needs to be accurate, and the workflows need to be intuitive and flexible, quickly guiding the issue's root cause.
- Performance — any monitoring solution must be able to handle an MME's large signaling traffic, but it also must be able to scale with the signaling associated with the explosive growth of mobile broadband to eliminate frequent forklift-replacement of network assurance solutions.
- Openness — any monitoring solution should support the ability to optimize existing operator assets, share data across applications, and support virtual and non-virtual environments.
- Financially Scalable — given this explosive growth, an MME monitoring solution must break the traffic growth cost curve, that is, a significant improvement in CapEx, OpEx, footprint, and scalability to be viable.

Enter xSIGHT CEA Solution

The Viavi xSIGHT assurance portfolio addresses these critical requirements to provide a reliable, open, usable CEA solution that breaks the assurance cost curve and has the performance necessary to address today's MMEs and grow with the explosive traffic growth future networks face. The virtualization-ready portfolio includes all of the components needed for an effective CEA solution for MME assurance: the infrastructure platform, cloud-based analytics applications, and associated professional services. The solution allows CSPs to:

- Differentiate customer quality of experience (QoE) by proactively identifying and resolving problems that have the greatest impact with unparalleled visibility and speed
- Monetize network data by extracting relevant, actionable data from UE to core with better flexibility, speed, and accuracy than today's assurance solutions
- Accelerate time to revenue by testing and deploying new services in a fraction of the time it takes today's assurance solutions—all without compromising quality
- Improve the speed and scale of virtualization by enabling NFV milestones and maximizing success with industry-proven portfolio and leadership
- Scale with the explosive growth of mobile broadband while breaking the linear relationship between network costs and data volumes with the industry's most economically effective monitoring solution



xSIGHT CEA Solution

Customer MME Assurance Proofpoint

Viavi has proven MME assurance can meet these requirements. As an example, a tier 1 CSP engaged Viavi to solve a problem with adequate visibility for monitoring MMEs serving densely populated cities—with a high number of subscribers in complex mobility scenarios. Due to an incumbent solution's instability and lack of visibility to issues with these MMEs, the customer wanted to validate an MME monitoring solution that met these requirements:

- Full visibility to the S1-MME, S6a, S10, and S11 MME interfaces with NAS deciphering
- Stability — the proposed assurance solution must run without outages, packet drops, nor processing resource contention for 7 days; session persistency was also required
- Performance — the proposed solution would need to handle the customer's heaviest MME traffic profile of over 300 Mbps and grow to 500 Mbps without a forklift upgrade
- Usability — have visibility with the granularity required for proper network problem root cause analysis; requires user interface speed and workflow analysis that supports accurate issue identification while reducing the time required to detect and diagnose faults

The customer engaged five assurance vendors in a competitive trial with one of the more busy MMEs on its network.

Viavi's xSIGHT Solution Exceeds Customer Expectations

This competitive trial's results proved that a reliable, open, usable CEA solution with the performance necessary for timely root-cause analysis for issues with today's MMEs while growing with the future explosive traffic growth facing LTE networks is possible.

The results exceeded the customer's expectations:

- Stability — the assurance solution was stable with uninterrupted operation over 7 days duration without packet loss and ample processing resources available for significant further additional capacity
- Performance — the solution processed more than 370 Mbps of traffic, maintained identity/security contexts for > 2.5 million active subscribers
- Usability — Viavi demonstrated the ability to successfully isolate root causes for reputed attach reject failures with typical S1-MME EMM failure cause = "network failure". The issue was an international call roaming scenario whereby a partner CSP's HSS sent fragmented diameter messages which were unsupported by the customer's MME
- Added benefits realized — the solution provided for the competitive trial had a 2U footprint – the smallest footprint and lowest power consumption in the industry; sustained solution's CPU resource utilization was only 5%!

Viavi demonstrated the right solution with the lowest industry footprint for a tier 1 operator—exceeding customer expectations.

Customer Feedback

The customer was pleased enough with the competitive LTE assurance trial results to declare Viavi the winner. The customer sited these three benefits as the ones they most liked about the xSIGHT CEA solution:

- Great use of minimal footprint—lowering overall CSP costs.
- Search and network problem identification speed. Viavi significantly reduced the time required to detect and diagnose faults associated with LTE services.
- The Viavi CEA solution's open architecture can easily integrate with existing solutions for end-to-end assurance.

"Viavi, formerly JDSU, is innovating on solutions that break the data growth cost-curve associated with 4G/LTE and rolling out small-cells."

–Analysys Mason Service Assurance Market Shares Report (2014)

The Choice is Clear

The importance of CSP network availability has never been greater. Faster LTE access, with RF carrier aggregation introduced with LTE-Advanced, and better LTE access with LTE small cells proliferation, along with the continued explosion of apps and services (VoLTE and M2M services such as the connected car, healthcare services, and more) designed to engage and better subscribers' lives are making proper LTE network and service assurance paramount. CSPs can not afford to be blind to any service hiccups and one of the most critical nodes in the LTE network is the key signaling node, the MME. Viavi's xSIGHT CEA solution has been proven in a head-to-head MME competitive trial to be the solution that assures:

- Stability — in an always available, without data loss or dropped packets, running out of computing resources, or crashing solution
- Usability — a solution can proactively, flexibly, intuitively, and accurately identify problems having the greatest impact on customer experience and do so in real time.
- Performance — handles large amounts of MME signaling traffic and can scale with the explosive mobile broadband growth to eliminate frequent forklift-replacement of network assurance solutions.
- Openness — integrates with existing operator assets, shares data across applications, and supports virtual and nonvirtual environments
- Financially scalable — breaks the traffic growth cost curve by significantly improving CapEx, OpEx, footprint, and scalabiliy

Sources: chetansharma.com, ITU, appBrain, statisicbrain, ALU

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