



# ONEVision xInsight

Providing the best network insight and customer insight to improve service quality from the customer perspective.

- ▶ Providing the best network insight and customer insight regarding service quality and traffic flow.
- ▶ Providing the environment where root cause can be analyzed promptly by conducting end-to-end correlation of packet data at the call level.
- ▶ If the quality degradation issue occurs, conducting real-time analysis on customers influenced by the issue.
- ▶ Providing focused monitoring and analysis environment on VoLTE for 4G (LTE) mobile service operators.
- ▶ Processing hundreds of billions of records (equivalent to hundreds of TB) at high speed daily without performance degradation based on validated big data platform.
- ▶ Being utilized by various organizations including network operating department, department related to network optimization at the initial stage of service or customer care or marketing department.

**mobigen**

Make The Best For Smart Business

Communication Service Providers (CSPs) are implementing various policies to boost customer demand for data services and to secure a competitive advantage in today's fiercely contested communications service environment. However, most CSPs know that offering a cheap rate system or providing a high-functioning service will have limitations in attracting customers. Therefore, CSPs are exploring ways to provide a continuous high-quality service by monitoring and improving the service quality experienced by individual customers as a way of resolving customer complaints over quality, reducing churn and attracting new customers.

ONEVision xInsight is a system that provides service assurance from the perspective of customers and an environment for customer experience data analytics based on a high-functioning packet probe appliance and big data DB. xInsight provides visibility of the whole network path quality, from the mobile phone of the individual customer, access network, and core network, to the application. This is achieved by analyzing signaling and user data packets collected in real time from wire and wireless communications networks including 3G and LTE and through correlation at the individual call unit level.

The End-to-End monitoring function, which is the basic function of xInsight, provides network-wide quality visibility, enabling the operator of the system to identify the root cause of any problem that occurs in the network and take appropriate action.

In addition, xInsight provides the perfect network insight and customer insight by providing a big data analytics environment related to quality and traffic.

## Expected Benefits

- Support for optimization of network performance, maximization of root cause analysis capability, maximization of operating cost efficiency and minimization of operating loss due to quality degradation and churn.
- Real-time monitoring and analysis of the overall traffic in large-scale commercial networks without impacting existing services.
- Provide an environment where not only problems at the application level can be analyzed, including video call, email, web and SNS, but also problems of control plane signaling.
- Contribute to the improvement of the actual user experience through quality monitoring from the perspective of the customer, reflecting know-how of large LTE communications operators accumulated through experience in nationwide commercial networks over many years.
- Resolve customer complaints at an early stage by providing an efficient and proactive customer care environment.

## Features

### Deep Packet Capture

The probe appliance equipped with a high-functioning packet filtering and analysis engine developed by Mobigen captures, in real time, all signaling and user data packets that pass through the network without loss. In the LTE network scenario, probe capacity can be expanded flexibly depending on the increase of EPC core equipment capacity (40 ~ 100 GbE).

### Packet Correlation at the Customer Call Unit Level

The visibility of the end-to-end path for each customer call is secured through a correlation between the control plane flow and user data plane flow as well as a correlation between the control signal and user bearer.

### Prompt Root Cause Analysis

Root cause analysis on quality degradation is easy because information on each end-to-end session is integrated and provided by correlating the signaling and user data packet captured for each interface at the call level according to call procedure.

### Analysis on Customer Impact Caused by Problems

If problems including service quality degradation should occur, it is possible to promptly identify which customers are impacted and what is the root cause of the problem. Therefore it is possible to prevent customer complaints at an early stage.

### Providing a Focused Monitoring Environment on VoLTE Call Quality

For VoLTE service providers, we provide a real-time monitoring function for the SIP quality of each VoLTE call at the individual customer level, in addition to voice quality issues including loss, jitters, silences, and incomplete syllables. In addition, if a provider provides both the legacy networks including the 3G and LTE networks, we provide the analysis environment for LTE to 3G CSFB (Circuit Switched FallBack) or SRVCC (Single Radio Voice Call Continuity), which are useful for LTE service coverage optimization.

### Providing Application Visibility

Real-time visibility is provided so that quality information and the utilization state of each application can be identified. The traffic usage state, trend and service quality of all applications used by the customer are monitored at the application level. Also, an environment is provided whereby analysis on the cause of quality degradation can be conducted.

### Real-time Customer Insight

Real-time analysis on the actual quality experienced by customers and traffic usage for the end-to-end session of each customer (call signaling, access to individual application, etc.) is possible. This includes customer level call history and a session trace function on the intuitive user interface.

### Providing a Big Data Analytics Environment

Hundreds of billions of records (equivalent to hundreds of TB) are processed at high speed on a daily basis without performance decrease. This is achieved by applying a big data platform that has been improved and validated in a large communication operator's commercial service network over several years and which supports a distributed environment.

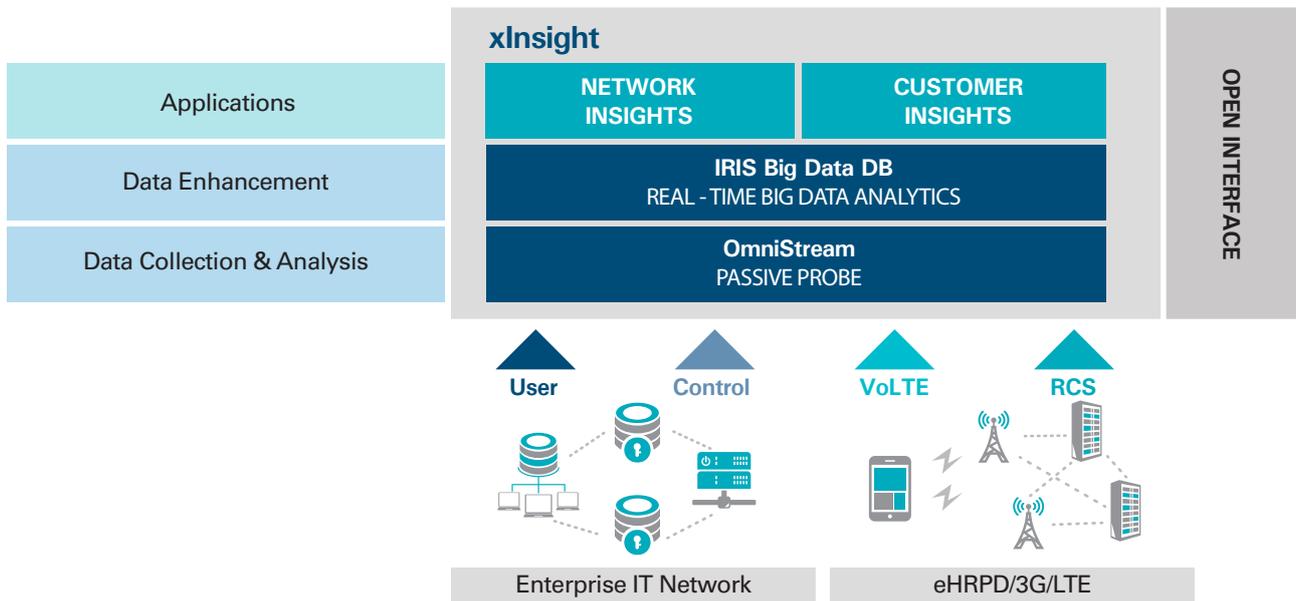
### Multi-network Support

An end-to-end monitoring environment from the perspective of users of various kinds of broadband IP network services including wire, WCDMA, eHRPD and LTE is provided.

### Data Replication

The customer specific quality data processed based on packet data is copied and saved in duplicate in distributed node preventing the disruption of analysis work if a systems error occurs.

## xInsight Architecture



### Packet Collection and Analysis Device Recognized for Its Reliability and Performance

OmniStream, which is a packet collection and analysis device in the form of an appliance, captures signal and user data packets in real time in major sessions of mobile/wire, wireless broadband IP networks using switch mirroring or the tap method.

By default, OmniStream has space for storing collected packets for at least 24 hours. In the case of the LTE network, this can be expanded flexibly to process up to 100GbE of traffic depending on the capacity expansion of the EPC core equipment.

### E2E Correlation and Standard xDR Creation at Unit Call Level

OmniStream conducts correlation of signaling and user data packets collected in real time at the call unit in accordance with the standard call processing procedures proposed by 3GPP. And it automatically generates xDR (Extended Data Record), which is its own standard format. Based on the xDR, various kinds of quality indicators (KPI, KQI, QoS, QoE, CEI, etc.) required for real-time monitoring and analysis are provided. In particular, xDR provides integrated information for all sessions including terminal-EPC RAN-EPC Core-Application offering an actual quality management environment where users can conduct quality degradation monitoring and root cause analysis from the E2E (End-to-End) perspective.

### Topology Monitoring from Network Perspective

xInsight provides an environment where quality degradation caused in each piece of equipment or in the interface of such equipment can be monitored in real time on a single screen in accordance with the call procedure. In the case of a 3G/LTE service, service quality situations including MME, PGW, SGW, DNS, EIR, Authentication Server, and eNB involved in 3GPP call procedures can be monitored on a single screen. The drill-down function of topology monitoring provides an intuitive and convenient environment for identifying the root cause of the problem or conducting more precise analysis.

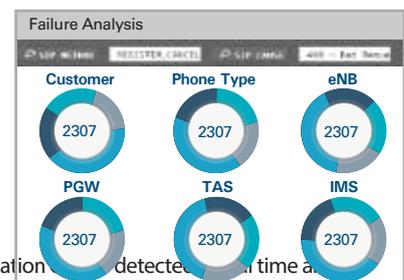


VoLTE Quality

xInsight provides an environment that enables focused monitoring of VoLTE service quality, which is one of the key features of the LTE service environment. With this function, the network operator can monitor VoLTE call attempts, call drops, session initiation, SIP Register and Subscribe situations. In addition, major QoS information related to the VoLTE service including packet losses/jitters/ silences/ incomplete syllables is provided. Moreover, this function can be utilized for the optimization of the VoLTE service in its initial stage as CSFB (Circuit-Switched Fallback) or SRVCC (Single Radio Voice Call Continuity) situations can be identified through existing networks like 3G outside of the LTE service coverage.

### Quality Analysis for Customers Impacted by Service Quality Degradation

If quality is degraded due to problems caused in the network or service, the quality degradation situation can be detected in real time and customers impacted by the problem can be identified immediately. The network operator or customer care manager can actively use this function to identify the customer experience regarding quality and resolve the situation before customers raise complaints.



## Quality Monitoring from the Perspective of Customers

xInsight enables prompt detection of quality degradation caused by a certain application problem and action, as it is possible to conduct real-time monitoring on individual application service quality including network equipment quality, upload/download traffic change, TCP/HTTP success rates, response speed and retransmission.

Various statistical methods are applied depending on the data characteristics of each piece of equipment and application to which a network service is provided while the threshold of major monitoring items is set automatically. If a threshold is crossed for a certain monitoring item, an alarm is raised to enable operators to easily recognize the situation.

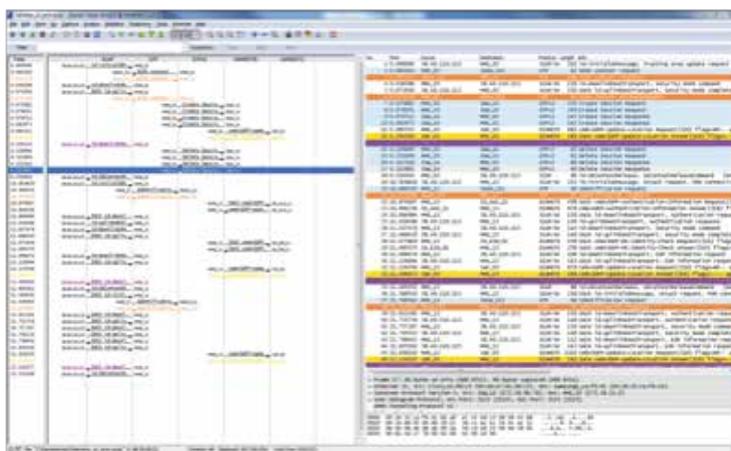
In addition, a web-based intuitive GUI is provided so that traffic congestion and quality degradation information is drilled down from the network wide level to the network session, equipment and major application level, enabling prompt identification of the cause of the problem and corrective action.

xInsight provides an environment where the operator analyzes the whole network through correlation depending on the call flow of each customer. Therefore it is possible to monitor and analyze the root cause of the problem, impacted session, equipment and customer in real time.

## Packet Viewer

If the service quality or network performance provided to a customer decreases, the relevant call or session can be analyzed in detail to identify the cause. The Packet Viewer provided by xInsight is a call and session trace tool that can analyze call procedure messages related to a specific failure cause on an LTE call flow diagram which is classified based on each LTE interface protocol (e.g. S1AP, GTP, Diameter, etc.) and packet raw data (PCAP).

Packet Viewer supports protocol decoding on the L7 layer service, TCP/UDP decoding on the L4 layer service and IP decoding on the L3 layer service.



## High-speed Processing of Large Volume Data

xInsight adopts IRIS, which is a big data DB verified for its performance and reliability through application on large scale networks with more than 10 million subscribers. IRIS is a big data processing platform developed by Mobigen based on its technology for large volume high-speed data processing that has been gathered over the past 10 years. IRIS processes and saves more than 100 billion records (equivalent to hundreds of TB) that have been collected from the network and processed per day. The system operator or data analyst can have access to data saved in IRIS through standard SQL for analysis for various purposes including network operation, optimization, capacity analysis, customer care and marketing.

## Traffic Analysis

Network data generated when customer use data service provides not only service quality information but also useful information that enables analysis on traffic volume trends and call patterns of the customer. This data can be utilized in various areas including in engineering or by a marketing department. The data can be analysed for a long time to improve the utilization rate of network resources reducing CAPEX or to develop a business model to create new value (Data Monetization). xInsight provides the following functions that enable mid to long term analysis based on traffic data

- Analysis on traffic patterns and quality at the service user level.
- Analysis on customers impacted by quality degradation and analysis on call patterns at the subscriber level.
- Analysis on traffic and service quality at the Top-N application level.
- Trend analysis on traffic at the application, host, URL, handset/equipment level.
- Analysis on traffic and calling patterns of heavy users and customer characteristic levels.

## Near Real-time Customer Analysis through High-speed Call History Inquiry

xInsight keeps tens to hundreds of billions of xDRs generated per day depending on network size for at least 10 days. If an operator requests or makes an inquiry regarding the call history of a certain customer for a specified period through GUI, inquiry results for customer analysis including service usage time, applications used and service quality are provided in a way in which privacy is not violated. It contributes to the improvement of work efficiency.

## Use Cases

Division	As-Is	To-Be
Network Operation	<ul style="list-style-type: none"> <li>▶ Quality management based on statistics provided by the system periodically (every 30 minutes or one hour)</li> <li>▶ Difficulty in improving quality due to complex network structure</li> <li>▶ Difficulty in post management including cause analysis after VOC is received.</li> </ul>	<ul style="list-style-type: none"> <li>▶ Quality management at the customer level</li> <li>▶ Service quality analysis depending on call flow</li> <li>▶ Proactive troubleshooting before VOC is caused</li> <li>▶ Major use case:               <ul style="list-style-type: none"> <li>• Analysis on the impact on network (quality change) after package application and EPC parameter change</li> <li>• Heavy user extraction and provision of data for control</li> <li>• Quality analysis at the subscriber level and detection of abnormal patterns under operation policy</li> <li>• Traffic monitoring and excessive load control support at the application level</li> <li>• Detection of network impact through new application analysis and response in advance</li> <li>• Improvement in unnecessary network resources occupying elements by analyzing application attempts to access network</li> </ul> </li> </ul>
Network Optimization	<ul style="list-style-type: none"> <li>▶ Investment decision by coverage and VOC based on system level peak hour traffic.</li> </ul>	<ul style="list-style-type: none"> <li>▶ Efficient investment decisions by analyzing traffic and service quality at the cell unit</li> <li>▶ Major use case:               <ul style="list-style-type: none"> <li>• Support for optimization of paging</li> <li>• Improvement of transition phenomenon at the boundary between 3G and 4G</li> <li>• Improvement of CSFB quality between 3G and 4G</li> <li>• Improvement of excessive handover phenomenon at the boundary between eNB and cell service</li> </ul> </li> </ul>
Customer Care	<ul style="list-style-type: none"> <li>▶ Passive response to customer dependent on information provided by customer               <ul style="list-style-type: none"> <li>• Long delays in handling customer complaints</li> <li>• Possibility of identifying cause of VOC inaccurately</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▶ Possibility of identifying cause of the problem in a rapid and correct manner through call history analysis at the customer level and improvement of first call resolution rate by responding to VOC rapidly.</li> </ul>

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## About Mobigen

Mobigen provides telecom service carriers and enterprises proven big data solutions and service assurance solutions for wired, wireless and IP service networks.

For more information, please visit [www.mobigen.com](http://www.mobigen.com) or contact [global@mobigen.com](mailto:global@mobigen.com)