The Customer Age

Rapid and consistent evolution is present in the telecom space, and communications service providers (CSP) are experiencing a new level of bandwidth demands that are defined by customer behaviors. The rate in which consumers are adopting new technology habits is increasing traffic considerably, largely because of the proliferation of online applications, video streaming, gaming, and smartphone usage.

Market saturation and evolving consumer interests increase competitive pressure on CSPs, whose space is quickly becoming over-saturated and highly competitive, and the emergence of “over-the-top” (OTT) vendors and lack of differentiation pose great threats to the existing players. To stand out, CSPs must be able to offer highly interactive applications and services that can be delivered quickly to market and easily customized by market segment. The vast convergence of computing, network, and storage functions in the cloud also pose concerns. Cloud-based computing requires that applications be simple to install and maintain.

To further differentiate, CSPs provide increasingly complex service level agreements (SLA) in response to evolving consumer and enterprise customer requirements, so they can focus their attention toward customers who represent a sizeable revenue percentage.

The need to thoroughly differentiate the company and its products or services are common concerns for CSPs. An opportunity for strong differentiation is to adopt and utilize assurance and analytics applications that generate new revenue by delivering innovative real-time and historical network, service, and customer intelligence. Doing this helps reduce customer churn, supports efforts to lower operational and capital expenditures (OpEx/CapEx), and allows CSPs to identify new revenue sources.

The carrier-grade Viavi xSIGHT Real-Time Intelligence (RTI) Platform in use in several networks worldwide has proven to scale in the largest network in North America. The platform powers the xSIGHT Portal, a cloud-based portal for all Viavi assurance and analytics applications. It also supports efficient, flexible, scalable, and configurable data collection and analysis to help CSPs adopt best practices and improve customer satisfaction, maintain profitability, and increase market share, despite the extremely competitive climate.
Key Challenges for CSPs

- Increase customer satisfaction and experience
- Leverage and monetize the vast amount of network, service, and customer intelligence
- Increase internal efficiency and productivity
- Manage increased demands for network and system resources
- Efficiently manage complex service level agreements

Volatile Marketplace

Staying current with evolving consumer demands can be strenuous, especially with rapidly emerging technology advancements and innovations. Yet striving to provide successful assurance and analytics applications is a challenging, albeit achievable, goal. However, CSPs must first understand the complexity and difficulties that they face regarding the volatile nature of the telecom market.

For example, applications and services are becoming increasingly more complex and use distributed environments with multiple network service components running across many different systems. This requires changes to the way network systems are managed and operated, such as using infrastructure virtualization and cost-effective network monitoring appliances to simplify deployment and configuration.

Rapidly advancing CSP networks and application environments increases the need to successfully implement intelligent management systems that can adapt to adding new network services, technologies, and application types. Modern networks consist of multiple domains that use various devices to deliver a variety of services (see Figure 1). Without the tools and systems available to correlate data across the diverse domains and services will require significant efforts toward consolidating the information.

With the advent of IP convergence, CSPs are also faced with the challenge of transitioning to IP while maintaining existing legacy systems. This requires creating and maintaining a hybrid technology environment for the short term, until they can replace the existing infrastructure with the long-term packet network. At the same time, transitioning to IP requires highly complex network configuration using dedicated tools to ensure that new services are provided with the highest levels of functionality, reliability, and quality.

In addition to the stress of keeping up with the changing technology, ongoing concerns for expanding efficiency capabilities, while preventing operating costs from rising and increasing customer satisfaction, are never far from mind. Lack of visibility, poor service quality, and degradations all prevent CSPs from operating at an efficient capacity and, therefore, cause them to incur unnecessary OpEx.

As enterprise demand for complex SLA compliance becomes commonplace, managing it without the necessary resources can strain CSPs’ bottom lines. Enterprise customers that want a certain level of complexity may find it worthwhile to acquire based on the revenue they can generate; but without that capability, attracting those customers will pose great challenges.
**Key Features**

- Real-time transaction and flow analytics engine
- Flexible modeling of service and network topologies
- Intuitive policy editor to define complex objectives and SLAs
- Advanced reporting capabilities
- Highly optimized data storage and retrieval
- Shortened analysis processing time by using data in-memory
- Efficient data collection by retrieving only needed metrics
- Configurable collection frequency at the device or interface level

**Complete Platform**

The platform features a state-of-the-art real-time transaction and flow analytics engine, end-to-end correlation, in-memory analysis, advanced service policies, and models that capture the complex relationships between customers, applications, services, and the underlying networks. The xSIGHT RTI Platform is capable of collecting data from network elements, element management systems (EMS), and other data sources, such as Viavi agents, third-party probes and feeds, and business/operational support systems (B/OSS) and applications.

The platform architecture consists of two main layers: the data collection layer and the mediation layer (see Figure 2). The data collection layer collects data from the various sources. For transaction and flow records data, the mediation layer performs extremely fast analysis, aggregation, filtering, and enrichment, based on configurable criteria to generate performance metrics and data analytics. The mediation layer abstracts and normalizes the collected data. It is extremely important to eliminate the differences in performance metric implementations by different vendors as well as differences in data collected from different sources. The mediation layer identifies relationships between data retrieved from different network domains, device types, and data sources. It also calculates the values for key performance indicators (KPI) and evaluates KPI values vs. performance targets in real time. This layer also enables the correlations required for impact and root-cause analysis functions. Impact analysis correlates network issues with the services and customers they affect, while root-cause analysis correlates the customer experience and service performance problems with relevant network issues for service delivery.

Mediation-layer capabilities can be grouped into these six main categories: real-time transaction and flow analytics engine, service modeling, policy and SLA definition, reporting, data processing, and data collection.

Figure 2. xSIGHT RTI Platform Architecture
Transaction and Flow Analytics Engine

The xSIGHT RTI Platform supports collecting, aggregating, analyzing, and storing transaction and network flow data. Transaction and network flow records, collected from Viavi network access agents or from any third-party probes or feeds, are analyzed, aggregated, filtered, and enriched based on configurable criteria to generate performance metrics and data analytics along various relevant customer, service, and network dimensions. The performance metrics are used, in combination with metrics provided by other sources, to rapidly identify performance issues through various policies and applications dashboards. The rich analytics gained from transaction and network flow records processing are stored in a high-performance analytics database that is optimized for read-intensive applications. The xSIGHT RTI Platform provides the functions needed to access the analytics database and perform interactive analysis of the stored data. It also provides an API for access to the analytics database by third-party applications.

Service Modeling

By supporting flexible configuration modeling of customer, application, service, and underlying network domain and topology relationships, the xSIGHT RTI Platform enables xSIGHT Portal-based applications to deliver accurate end-to-end service performance views, root-cause issue analysis, and impact analysis, such as network problem impact to services and customers. The comprehensive platform also lets users easily define and configure new KPIs without changing the applications. This capability lets CSPs quickly add new performance measurements or services and applications quality measurements to immediately identify when customers may be impacted by poor performance.

Policy and SLA Definition

Through the xSIGHT RTI Platform, CSPs can adopt best practices for customer experience assurance using the intuitive service policy editor to define complex service policies, SLAs (based on a combination of multiple policies), and alarm consolidation (see Figure 3). CSPs can use this to attract and retain important customers that represent a large percentage of revenue and to offer them services that are more tailored to their specific needs and wants.

Reporting

The xSIGHT RTI Platform provides extremely advanced reporting capabilities, such as:

- Real-time reporting (where data for reports is available as soon as it is collected from the network and provides immediate visibility into a problem that has occurred or is about to occur)
- Template-based reports (where users create a new report using a template rather than starting from scratch)
- Automated delivery (lets users deliver reports automatically via e-mail to interested parties)
- Multi-tenancy (which gives various users access to reporting systems and only lets each see specific information based on their access privileges).

Data Processing

All the data received from the collectors is centrally processed for end-to-end correlation to calculate KPIs based on multiple measurements obtained from various network domains, device types, or traffic-analysis-agent types along the service path. The data is immediately processed using in-memory analysis for faster results, because the necessary information is preloaded into the system’s memory, which avoids delays in querying stored data for analysis. The platform’s patented database storage and query optimization technology is important because it gives users immediate results as they occur; the system can service more queries in the same amount of time; and its query optimization enables the server to run more efficiently, consume less power, and use less memory.

Data Collection

A successful, scalable data collection method must be easy to use as well as efficient, flexible, and configurable. The xSIGHT RTI Platform’s efficient data collection methods only collect the necessary metrics and automatically determine the metric needed based on the applications of interest. This flexibility is evident when changing the frequency of data collection in the way it efficiently handles diverse data sources. The collection functions can be distributed across multiple software or hardware components (collectors) that interact with network elements, EMSs, and other data sources to retrieve data using load-balancing methods. These collectors are automatically monitored and can immediately transfer the workload to a different collector if they detect a failure. This cost-effectively adds more collection capacity and ensures that the system continues to function after a failure without losing any data. Collectors can be deployed across all the different network domains, with each one responsible for data specific to only that domain. Because of the platform’s network abstraction layer between the collection and analysis functions, support for new networks or data sources can be added very quickly by implementing new collectors.
Key Benefits

- Highly scalable to support future growth
- Rich database of analytics along customer, service, and network dimensions
- Ability to identify and maximize new sources of revenue
- Increased productivity through end-to-end visibility
- Reduced churn from proactively responding to problems
- Improved performance efficiency
- Efficient data collection from diverse data sources

Unparalleled Scalability and Visibility

The Viavi xSIGHT RTI Platform helps CSPs’ operations teams work more efficiently and productively, increase customer satisfaction, and prevent OpEx/CapEx increases. CSPs gain value through the platform’s advanced features.

The real-time transaction and flow analytics engine can process data records collected from Viavi agents or from any third-party probes or feeds giving CSPs greater flexibility by enabling them to leverage all their existing data sources and investments. The processing and aggregation is done based on configurable criteria which reflect the specific performance metrics and analytics the xSIGHT applications need and use.

In this regard, not only can the engine generate performance metrics along one of the customer, service, or network dimensions, but it is also highly optimized to seamlessly extract and generate performance metrics along all of those dimensions with the same speed and flexibility. This is a major breakthrough compared to other systems available in the industry since the RTI Platform can effectively and efficiently enable a variety of applications for customer, service, and network assurance. This gives CSPs a much more cost-efficient system, because it eliminates having to deploy multiple, separate, monitoring platforms that each focus on a customer, a service, or a network. It also translates into an extremely powerful, comprehensive, and accurate assurance approach overall because of the customer, service, and network performance relationship correlations it makes that can be directly exposed, modeled, analyzed, made visible, and acted upon.

For example, its accuracy enables CSPs to prioritize problems by identifying network elements or network domains that are causing the biggest problems so they can begin resolving them immediately. This helps to reduce mean-time-to-repair and positively impacts churn and customer satisfaction.

The state-of-the-art policy editor lets the support team select various elements from a predefined list so they can more productively allocate their efforts, and it helps to attract enterprise customers who want high-revenue, complex SLAs. The editor also lets CSPs define how policy violations are consolidated, so that the generated alarms provide meaningful data and prevent the use of resources on alarms that are irrelevant to the customer experience.

The RTI Platform feature lets CSPs easily define new KPIs to quickly implement new ways to measure service performance and customer experience. The new KPIs give CSPs powerful insight into the customer experience, so they can take immediate action to prevent end-customer impact and to reduce financial penalties with enterprise SLAs.

The valuable in-memory analysis provides immediate visibility into the customer experience and dramatically improves performance efficiency. CSPs’ operations personnel can query and interact with in-memory data, which is significantly faster than accessing data from a disk. This increases internal efficiency and productivity because the system can service more queries in the same amount of time. This feature also helps the server run more efficiently, which prevents CSPs from incurring IT costs.

The RTI Platform’s data collection technology minimizes stress on data sources, bandwidth requirements, and allows new sources to be added quickly. It can also efficiently handle diverse data sources, thus supporting the evolution of CSP network environments. Once collected, the data is correlated across all network domains for end-to-end visibility, which increases network service operations’ productivity and effectiveness. It is simple to add support for new metrics through configuration, which improves service performance measurements. Collection methods are scalable, prevent exponential growth in IT expenses, and are also fault-tolerant, thus preventing data loss which is crucial for CSPs. When their systems are down, they cannot report data, valuable information about SLAs, and/or can lose customers or cause existing data to no longer be accurate.
The xSIGHT RTI Platform Advantage

The RTI Platform provides many unique features that are specifically relevant for analytics, service and network modeling, real-time analysis and correlation, and data collection.

The real-time transaction and flow analytics engine delivers unparalleled speed and flexibility because it only performs aggregation on specific criteria and only generates the necessary performance metrics and analytics, achieving tremendous efficiencies with results that are available in record time. This, in turn, enables the RTI Platform and the applications running on top of it to deliver unmatched visibility. This visibility lets CSPs see issues that impact the network, service, or customer performance sooner so they can act upon them immediately. Delivering unparalleled speed does not hinder flexibility. In fact, aggregation criteria can be quickly reconfigured for greater visibility into new or additional performance aspects along customer, service, or network dimensions. This lean yet flexible architecture also minimizes the amount of data generated and sent upstream compared to the size of the incoming transaction and flow record stream. It also minimizes the bandwidth requirements between collection entities and the RTI Platform’s centralized functions as well as the amount of data manipulated, analyzed, and stored by the central functions themselves. Finally, the engine generates and stores rich analytics in a high-performance analytics database for later retrieval. Rich analytics, however, are only valuable when they can be used effectively; therefore, this database has been designed to respond much faster compared to traditional relational databases.

This platform also provides the basis for successful impact and root-cause analyses, which are made possible by flexible and configurable modeling of the most complex relationships between customers, services, and the underlying network domains and topologies. It performs correlations in real time, immediately upon poll completion, and takes into account the data received from all the collectors. This eliminates the limitations associated with using built-in assumptions between the customer, service, and network relationships, which can require application changes to support each new relationship type, extending the time before new capabilities can be made available to customers.

All of the calculations that are required for determining KPI values based on the metrics collected, as well as the evaluation of the policy conditions, are performed in-memory as soon as the collected data is available. Because database queries are not required to perform these calculations, results can be processed very quickly allowing the system to display the results almost immediately. Viavi data storage and retrieval optimization technology enables the collection, analysis, and storage of very high volumes of measurements in record time without being affected by the data’s “bursty” nature.

The RTI Platform data model efficiently abstracts network device data to normalize the differences between the way network performance metrics are implemented by the different vendors, in addition to the differences in data collected from different sources. This enables the correlation of data from different network domains using standard KPIs based on a unified set of metrics. New network device types can be added faster because they only require creating new mapping between the vendor-specific or data-source-specific and the abstracted metrics, without impacting the rest of the application. This design also allows for very fast and efficient database storage and retrieval functions, thus eliminating limitations associated with hard-wiring modeling and presentation capabilities to vendor-specific metrics, which hinder end-to-end visibility across different vendor domains.

The platform ensures highly efficient, scalable data collection through increased control in defining data collection needs, such as how often and how much data to transfer at a time between the collection and analysis entities. This helps to minimize the amount of stress on the data sources as well as minimize the bandwidth requirements. In addition, the collection functions can be distributed on an unlimited number of entities. Combining very efficient use of collected data together with the fully distributed processing approach ensures very high collection scalability.
Summary

Huge increases in data traffic combined with a highly competitive environment are creating a lot of pressure for CSPs to optimize the use of their networks, reduce their operating costs, while at the same time shorten new service and feature delivery times. Using cost-effective assurance and analytics applications that are highly automated and flexible and that do not add any additional load for the network is key in terms of helping CSPs innovate their products and reduce their costs. The xSIGHT RTI Platform's key infrastructure features enable Viavi applications, accessed via the xSIGHT Portal, to address the most demanding assurance and analytics applications requirements. Its extremely efficient data collection, state-of-the-art flow, and transaction analytics engine, combined with in-memory processing for all analysis and correlation functions, add unparalleled scalability to the platform. At the same time, its extremely flexible service modeling and policy management capabilities enable Viavi solutions to easily expand their capabilities as required when adding new network device types, or as CSPs offer new types of services or SLAs.