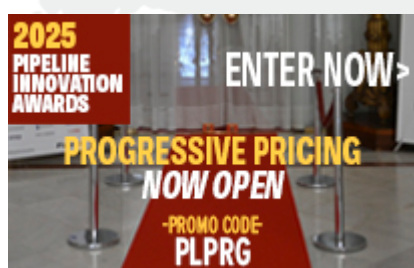


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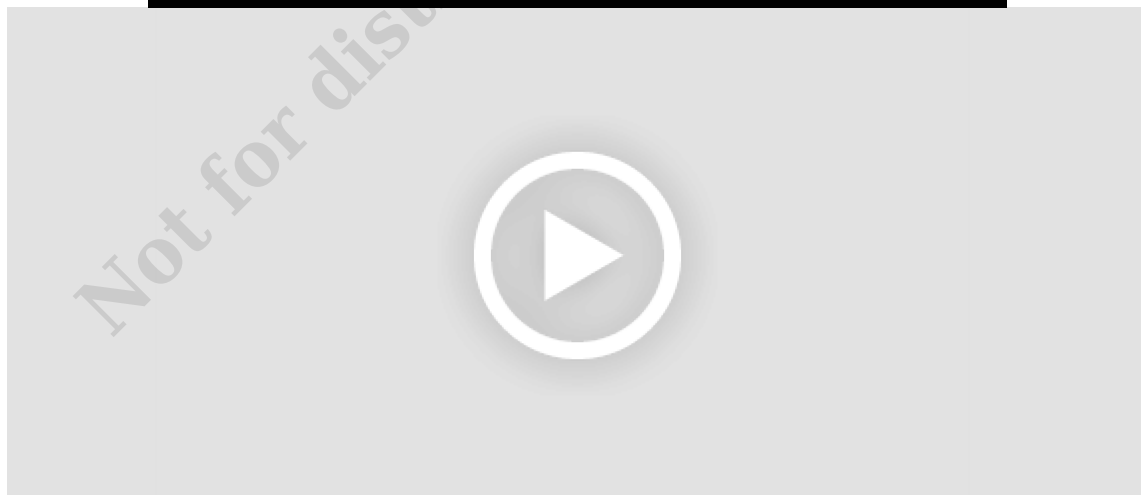
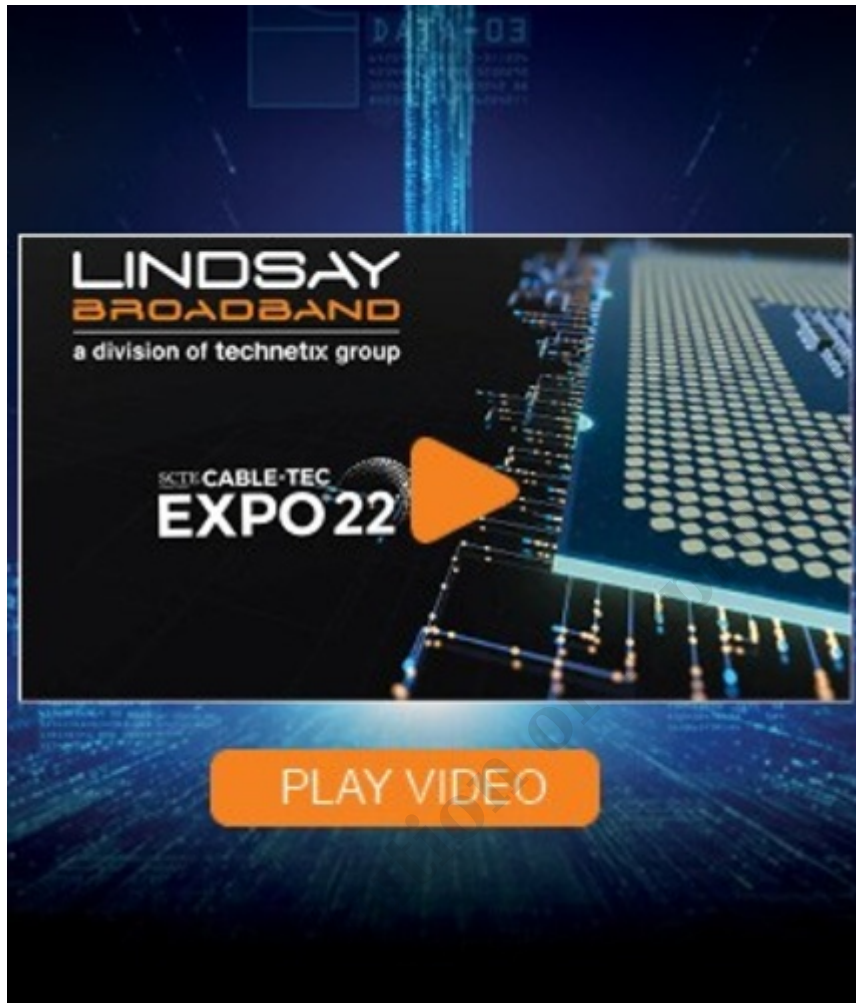
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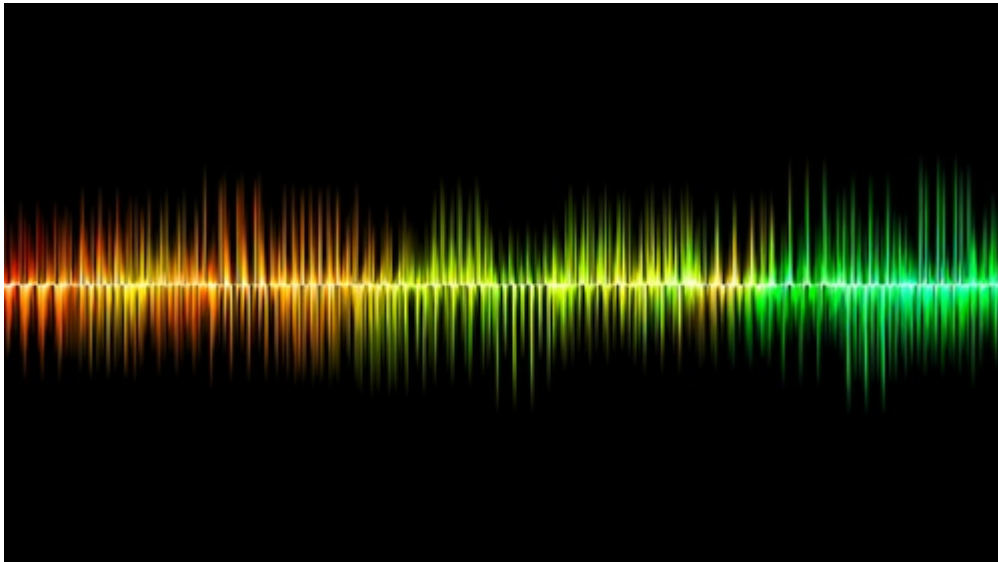
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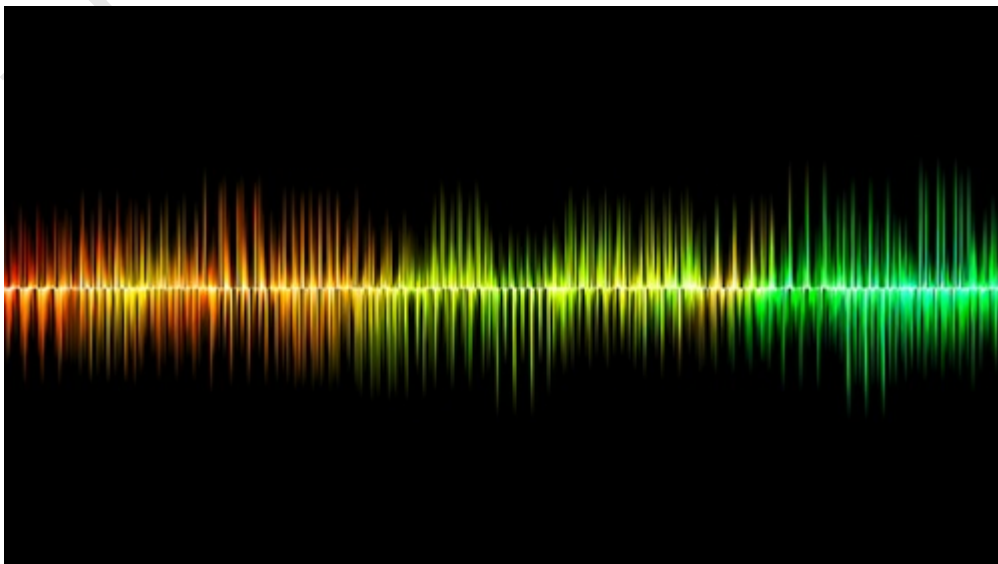
End-to-End Solutions for Broadband Networks

In case you missed Lindsay Broadband - a division of Technetix group at the SCTE Cable-Tec Expo, this video highlights the must-have, end-to-end solutions for your network.



Predicting Colonial Pipeline: Mitigating Risk and Compliance

Mitigating risk and compliance for lawful intercept using lawful intelligence is explored in this Pipeline article feature SS8. Learn how CSPs can comply with lawful intercept regulation, while empowering law information with critical, real-time data.





Podcast: The Evolution to 6G

The world's eyes are already looking forward to the potential of 6G. Demands resulting from innovative use cases, for instance specific requirements from different industries and other user groups, as well as overarching goals like sustainability, are driving the standardization and development of mobile technologies.

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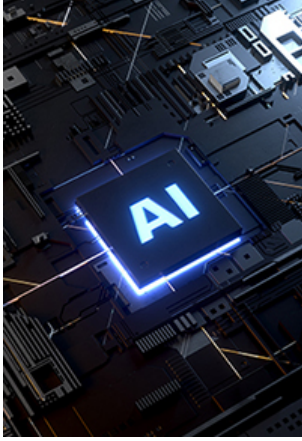
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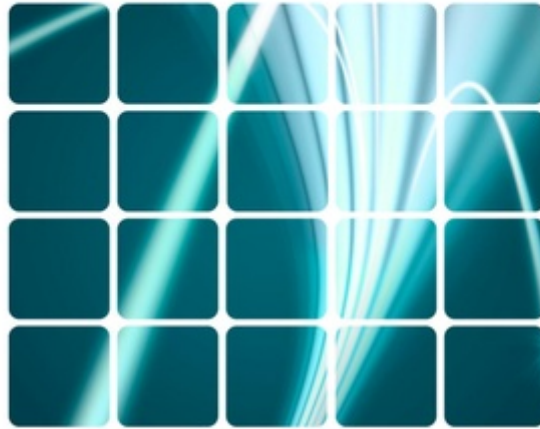


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WHITEPAPER, BY ROBERT MORRISON

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FSP 3000 OLS

A versatile and truly open line system

5G and cloud-based applications offer enterprises, carriers and service providers enormous potential for growth. However, this continuous and rapid change also creates the need for more network capacity and flexibility. It's essential to build today's networks on an open, flexible and scalable optical layer ready to accommodate evolving demand and innovation. Featuring a fully modular and open design, our FSP 3000 open line system (OLS) provides complete versatility and best performance in metro, core and data center interconnect (DCI) applications.

Truly open

Open disaggregated optical networking is one of the industry's hottest trends. By decoupling terminal functions from the line system, this approach offers complete flexibility to adopt the latest technology when and where needed. Our FSP 3000 OLS is truly open, allowing total freedom to evolve and optimize each network layer separately. Network operators can leverage and expand their infrastructure at any time with the technology of their choice. What's more, with open and standard interfaces, our FSP 3000 OLS easily integrates into software-controlled networks.

Build your own OLS

Our FSP 3000 OLS empowers network operators to create the solution that meets their exact requirements. With a modular architecture, multiple amplification and multiplexing options, and different chassis sizes, our FSP 3000 OLS enables customized solutions. Operators can simply mix and match the optimum filters and amplifiers and pack them into the best-fitting shelf. This makes our FSP 3000 OLS ideal for any type of network infrastructure.

Future-proof investment

Coherent modulation schemes are becoming increasingly diverse to maximize transport network capacity and minimize the cost-per-bit of transport. Flexible terminals with variable modulation formats and baud rates enable highest capacity-reach ratio. The ultimate network performance relies also on line system capabilities, and that's why open line systems have increasingly become important strategic assets. With a combination of high-performance features, our FSP 3000 OLS transports any coherent modulation format as well as all varying signal baud rates with best performance. The high-resolution fingrid and modular architecture of our ROADM guarantee a future-proof OLS that can scale and accommodate any modulation format and baud rate. What's more, our FSP 3000 OLS provides a new level of flexibility with configurations able to support direct detect technologies.

Your benefits

- **Open hardware**
No technology or vendor lock-in; successfully tested in multi-vendor environments
- **Open programmable interfaces**
Easy integration into software-defined networks with open, programmatic APIs
- **For any type of network infrastructure**
Modular design with multiple filter and filter options to meet your exact requirements
- **Purpose-built components**
Amplifiers and filter options engineered for metro, core and DCI-specific demands, and optimum transport of latest innovation, e.g., 400ZR and high baud rates
- **Visualization and control**
Comprehensive monitoring and diagnostic tools, spectrum visualization and fiber surveillance
- **Eco design**
High-density design with low power consumption
- **Flexible footprint**
Chassis sizes from 1RU to 12RU, ETSI / data center rack, AC/DC power options



MDS CareStream

Provide real-time access to accounts and services, give customers the tools they need to self-serve and reduce cycle time, offer personalized customer interactions, provide exceptional support and reduce churn.

Consolidated Account Management

Communication Service Providers (CSPs) are faced with the challenge of how to increase revenues and drive up profitability despite intense competition and slow growth in core markets. In developed economies, market saturation is making it increasingly difficult for CSPs to attract net new customers, emphasizing the need for them to retain customers and optimize customer lifetime value. In response, many CSPs are focusing on customer experience improvement programs to increase customer satisfaction, loyalty, and profitability.

Businesses are demanding access to self-service tools that allow them to monitor their organizational spend, take direct control of their services and inventory and, get convenient access to help and support. Fortunately for CSPs, providing online self-service tools to business customers is a win-win situation, allowing CSPs to deliver personalized customer interactions anytime, anywhere and at lower cost.

MDS CareStream

MDS CareStream enables CSPs to provide business customers with online access to their account and service data. It delivers a presentation layer that consolidates information from multiple billing and CRM systems and provides the customer with a single view of services, allowing them to manage their convergent services at a time and place of their choice. Powered by a sophisticated business process engine, MDS CareStream can orchestrate and streamline the processing of service updates across existing infrastructure elements, providing process assurance.

Advantages for CSPs

Single View of Products and Services

MDS CareStream is billing-system agnostic. The powerful integration capabilities enable data aggregation from disparate BSS systems, allowing CSPs to provide business customers with a holistic view of their convergent services. In addition, CSP care staff can use MDS CareStream to provide them with a unified view of the customer's services and account information, enabling them to resolve customer inquiries faster and offer a better experience.



MDS CareStream Account and Usage

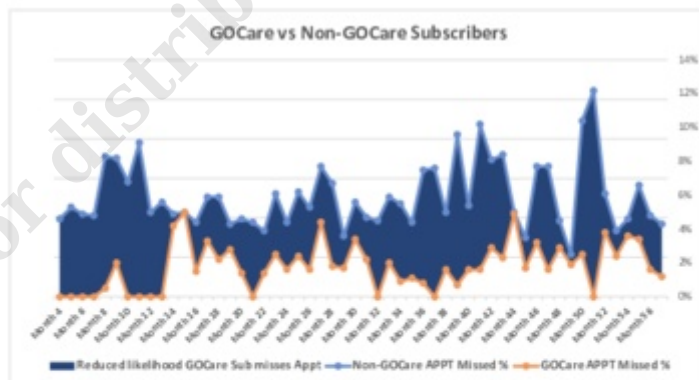
Lighttouch Integration

MDS CareStream abstracts the presentation of customer information from the underlying BSS infrastructure. Its use of open standards and SOA-compliant services accelerates integration with legacy systems, reduces deployment time and eliminates the need for costly, and complex, billing transformation projects. The customizable business process orchestration capabilities enable MDS CareStream to control and co-ordinate the processing of service updates across existing infrastructure elements, offering robust business processes and service assurance.

MDS CareStream



Missed Appointment Analysis



When possible, it makes sense to compare the behavior of a customer opted in to GOCare vs customers that are NOT opted in to GOCare. Prior to the GOCare deployment, this operator averaged roughly 8% - 8% of subscriber appointments as "no access". AFTER the GOCare deployment, GOCare subscribers were routinely below 2% of subscriber appointments as "no access" or 70% fewer missed appointments for GOCare subscribers. As the opt-in rate increased, GOCare was successful in dramatically reducing the overall missed appointment rate. At an estimated \$150 cost per truck roll, the savings in missed appointments more than covered the cost of the GOCare offering.

Potential OpEx Impact:

Missed Appointment Analysis: Calculate an estimated 8% missed appointment KPI monthly, multiplied by an assumed \$150/truck roll. A 70% reduction in missed appointments represents an EBITDA improvement of significant revenue annually.

In addition to the savings of OpEx, assuming the "no access" improvement applies equally to new installs, the improved completion ratio will **accelerate revenues** at improved margins.

TCP Technology and Testing Methodologies

By Hammad Dicks, Product Specialist, EXFO

As enterprises use more and more applications, such as Voice-over-IP (VoIP), Customer Relationship Management (CRM) and Enterprise Resource Planning (ERP), service providers are now faced with the obligation to enforce stringent service level agreements (SLA). Furthermore, the typical SLA parameters such as throughput, latency, jitter and frame loss only cover the network performance up to the IP (Internet Protocol) layer and do not necessarily reflect the true user experience. How can service providers make sure that the end-user's most important applications make use of the full bandwidth?

TRANSMISSION CONTROL PROTOCOL

TCP is one of the two original components of the IP suite commonly referred to as TCP/IP. It provides connection-oriented, end-to-end communication services at an intermediate level between application programs and the IP. It offers reliable communication and guarantees orderly delivery to the upper layers for non-real-time applications such as email, FTP, HTTP, etc. The term connection-oriented means that the two applications must establish a TCP connection before they can exchange data.



Figure 1: OSI reference model and network layers

HOW TCP OPERATES

The primary purpose of TCP is to provide reliable connection services between hosts. However, this becomes challenging on less reliable networks such as the Internet. This hurdle is overcome by the implementation of flow control, which ensures the integrity of each segment sent, and the congestion control mechanism for each byte stream, which allows the receiver to limit the amount of data a sender can transmit. To accomplish this, TCP provides the following:

Basic Data Transfer

TCP is able to transfer a continuous stream of bytes in each direction between applications by packaging the traffic into TCP segments, which are passed to the IP layer for transmission. TCP has the ability to decide when to block or forward data.

Reliability

TCP is able to recover from data that is damaged, lost, duplicated or delivered out of order by assigning a sequence number to each byte transmitted, and requiring a positive acknowledgment (ACK) from the far end. If the ACK is not received within the timeout interval, the data is retransmitted. In addition, the receiver uses the sequence number to rearrange segments that may be received out of order and eliminate duplicate segments. A checksum added to each transmitted segment is checked at the receiving end to discard damaged segments.

Flow Control

The receiver controls the amount of data the transmitter can send by returning a window size value with every ACK. The window size value indicates the number of bytes the sender may transmit before receiving further permission. In addition, the sequence numbers and receive windows behave like clocks that shift every time the recipient receives and acknowledges a new data segment. The sequence number loops back to zero, once it runs out of numbers. Figure 2 is a visual representation of the sequence numbers and its maximum values in the TCP.

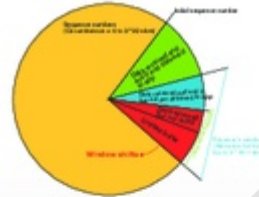


Figure 2: TCP window

Multiplexing

Many processes or communications can run within a single TCP host. A network socket uniquely identifies each connection by binding ports to processes. Consequently, multiple sockets can be used during a single exchange between two hosts, thus reducing the impact of high-latency networks and the window allocation buffer limit.

Managed BSS for Accelerated Business Growth

Managed Telecom solutions that enhance the customer experience and power growth for established Network Operators, and unleash the potential of new markets for Greenfield Virtual Network Enablers

The Challenges for Market Growth

Communication Service Providers (CSPs) in today's Telecoms industry are keenly aware of the need to innovate and grow market share while controlling cost to serve and improving margins.

Managed BSS solutions

Business Customer
Management
- for Network Operators &
VNEs

VNE
for Network Operators &
VNEs

MDS Managed Service Solutions

Opportunities for Established Operators

For established Mobile Network Operators faced with declining revenues, opportunities exist to (a) drive acquisition/retention activities through improved customer experience, and (b) maximize the value of the business customer base through enhanced corporate service offerings.

(a) Customer Experience – Improving the experience of existing customers, often with a range of service offerings distributed across many source billing systems, requires the adoption of a 'Single View' approach to customer management and reporting:

- Single View of Customer
- Single View of Products
- Single Point of Contact
- Single Bill and Reporting.

This is especially relevant for multinational corporations that operate across regional boundaries

in multiple languages and currencies that have little or no centralised telecoms account management and cost analysis.

The typical approach to achieving a single view of the customer is through billing transformation, which can be a costly and complex initiative.

(b) Enhanced Corporate Service Offerings – Convergence, whether in the form of Unified Communications or Fixed-Mobile Convergence, is an expectation driven by the market. This presents CSPs with a whole new set of challenges that reach far beyond IT systems. The convergence of mobile, fixed-line and IP services crosses the entire customer lifecycle, including:

- Order Capture – for multiple services with different requirements and lead times
- Order Management – that includes hardware, software and network provisioning
- Rating & Billing – for recurring charges, usage charges, one-time charges, credits and adjustments across multiple integrated services
- Care & Manage – unified account management, e-bill presentation and online analysis.

New Channels to Market for Greenfield Operators

For Greenfield Virtual Network Enablers (VNEs) the recent resurgence of interest in the VNE business model, and the fact that convergent services are fast becoming a necessity rather than a nice-to-have, presents an opportunity for a broader range of service providers to grow revenues in the B2B market, including:



Managed BSS for Accelerated Business Growth

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HAVE THE
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to grow your
infrastructure,
WE
HAVE THE
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to bring it
to life**



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EMC STORAGE RESOURCE MANAGEMENT SUITE

How Storage Resource Management Suite Meets Today's Storage Management Challenges

Abstract

The Storage Resource Management Suite provides comprehensive monitoring, reporting, and analysis for heterogeneous block, file, and virtualized storage environments. It enables you to visualize applications to storage dependencies, analyze configurations and capacity growth, and optimize your environment to improve return on investment. This white paper outlines the common use cases Storage Resource Management Suite addresses.

March 2013

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INTO A PERFORMANCE-DRIVEN LEADER



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White Paper

**Managing Complex Multi-Enterprise
Selling & Ordering Process Critical for
Next-Gen Order Management Solutions**

Prepared by

Ari Banerjee
Senior Analyst, *Heavy Reading*



www.heavyreading.com

On behalf of

Sterling Commerce
An IBM Company

www.sterlingcommerce.com

November 2010

Whitepapers



Want to get where you're going without getting stranded? You need to ensure network integrity. Our solutions allow you to know and control what's in the network, where it is, how it's configured, and who can access it.

Know where you're going

The next generation of networks — whether LTE, fiber, net, IMS, or optical — replaces centralized architectures with highly distributed functions. While these new networks are designed to increase flexibility and profits, they do add a new level of complexity to the network. Suddenly, you're maintaining far more hardware and software configurations and are left exposed to the types of errors that can lead to outages and degraded customer experience. Nakina Systems' solutions power integrity in the world's largest networks, and they are provided in partnership with the world's largest and most advanced equipment manufacturers.

Chart your course

Nakina Systems and our integrity platform partners deliver software solutions that ensure your network is always headed where you intend.

Together, we help our customers:

- Accelerate network upgrades and new installs by providing a baseline readout of network elements software configuration before and after the upgrade.
- Reduce the drift between the gold standard network design and the network in operation through online auditing, discrepancy checking, and locking down the network with centralized security management and
- Improve asset utilization and reduce network hardware maintenance expenses by identifying discrepancies in inventory and assets records through automated network discovery.

Nakina Network Integrity Management Solutions empower next generation networks to deliver on their promises.

Our customers roll out services more rapidly, upgrade networks with less effort, and experience fewer outages because they partner with Nakina Systems.

Pick the right navigator

Nakina Systems takes a unique approach to the competing challenges of expanding networks and shrinking resources. By focusing on the issue of network integrity, we have freed millions of dollars from customer networks, helped service providers to deliver new offerings faster, and have helped decrease service outages across our customer base.

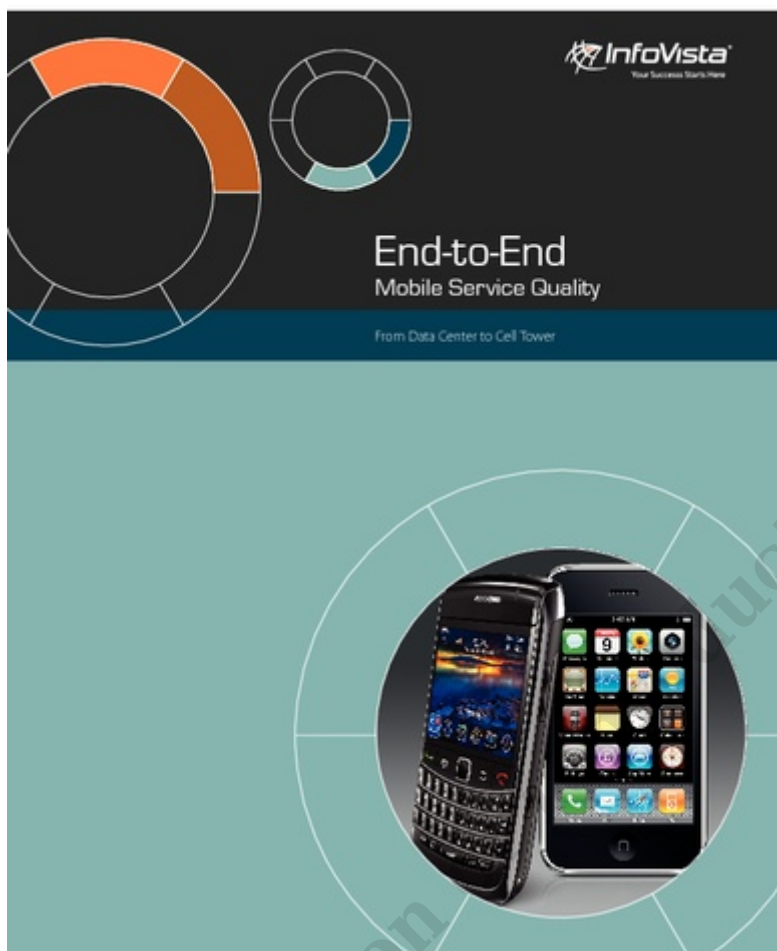
We are:

- Responsive to our customers, providing solutions to problems faster, more creatively, and more flexibly.
- Aggressive in our search to add value to our customers' operations.
- Consistently and relentlessly improving our technology, practices, and processes to achieve success for our customers and other stakeholders.

Nakina Systems has developed its framework and applications working with the world's most demanding customers in the world's largest and most complex networks. We understand carrier requirements, testing, scalability, and reliability.



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Enterprise Customer Experience Transformation with
e-billing and e-care

MDS 2010 White Paper Series



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NetDesigner Network Rollout, Resource and Asset Management

VISUALIZE your network
TRACK network rollout
DESIGN in hours not weeks
MAINTAIN accurate data

AUTOMATE network provisioning
INTEGRATE with the enterprise
MINIMIZE costly errors

NetDesigner streamlines the complex process of planning, implementing, operating, and optimizing next generation networks. Components of NetDesigner can be deployed on a standalone basis or integrated to enable end-to-end automation.

NetDesigner is an Esri GIS-based geospatial network design and management solution for complex, multi-domain networks. NetDesigner optimizes resources, enhances workflow, improves customer service, and maximizes operational efficiency allowing for unprecedented cost savings.



Centralized repository and single workspace

NetDesigner offers a consolidated workspace and a single, accurate data repository to enable planning, design, construction, and operations for a next generation network.

Automated design

Design automation within NetDesigner enables engineers to develop a baseline network design

within hours instead of weeks. Design parameters can be customized by changing business rules to meet unique requirements.

Powerful business intelligence and planning

NetDesigner allows users to plan "what-if" scenarios, simulating what it would mean to bring network resources to underserved communities and targeted businesses. Users can integrate with visual, schematic map elements, and third-party data (e.g. ARRA, Connected Nations, demographics, census data, wire-center information, FCC data, flood plain barriers, environmentally sensitive areas, etc.) to get a comprehensive and visual overview of a proposed or as-built network. The Bill of Materials functionality allows users to quickly acquire project costs and/or material costs of any design and generate equipment reports.

Modular, flexible, standards-based solution

NetDesigner is modular and can be deployed as a standalone solution or integrated with other applications to manage fiber, wireless, copper, coax, and hybrid networks, structures, and other assets. Using standard out-of-the-box APIs, NetDesigner may be integrated with systems such as OSS, BSS, ERP, Facilities Management, and many others to automate end-to-end service provisioning, customer relationship management, and network operations.



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Dynamic Product Management for Communication Service
Providers (CSPs) – The Time is Now

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MATRIXX CONVERGENT CHARGING

As communications business models evolve and mature, marketing organizations are constantly creating new services, payment models are evolving, and devices are becoming increasingly sophisticated. Customer segments are becoming more defined and granular, and what once was either a prepaid or a postpaid relationship has grown into a multi-faceted array of payment options. These mix and match payment methods also provide options to charge physical goods to a mobile account or access personal funds as a customer would at a bank.

Devices and access methods are also multiplying making the picture yet more complex for service providers. Their subscribers have a choice of Smartphones, set top boxes, tablets, PCs, laptops, gaming consoles, and mp3 players to access services via cable, DSL, FTTH, 3G, Wi-Fi, Wi-Max and new LTE networks. However, competition is fierce and network access charges are becoming commoditized.

Communications service providers are challenged with rising above these complex operational and service delivery environments to focus on the customer. Regardless of device, access method or

payment option, customers should be presented with compelling, integrated service bundles that are intuitive and customizable to fit their personal needs. Convergent charging applications play a key role in delivering a differentiated and consistent customer experience as they provide the central link between services, payment methods, and devices.

MATRIXX Convergent Charging provides a highly flexible, hyper-efficient application that runs on low cost, commoditized hardware and which easily integrates with existing billing systems. It helps the marketing department and the business implement initiatives to strengthen the brand and increase customer value while providing dramatic scale and driving cost out of operations.

Increase Customer Value

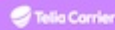
MATRIXX Convergent Charging enables service providers to better monetize their portfolio of services and content and increase customer lifetime value. It provides a flexible and configurable set of pricing, charging and balance management features so that service providers can quickly and cost-effectively implement a convergent charging layer without disrupting existing IT and network assets.

Functional Highlights

- ▶ Bundle products and services together regardless of access network
- ▶ Quickly deploy new pricing models, promotions or discounts
- ▶ Manage balances and payment relationships
- ▶ Develop and implement loyalty programs and preferred pricing
- ▶ Track and enforce usage quotas, allowances and credit limits
- ▶ Bundle services together to provide cross-product discounts
- ▶ Roll out the same offers across prepaid and postpaid subscribers
- ▶ Share balances across devices, such as sharing a data allowance across a laptop, tablet and Smartphone
- ▶ Create prepaid/postpaid hybrid offerings

MATRIXX Software

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CLOUD CONNECT



TRANSFORM YOUR BUSINESS IN THE CLOUD

Extend your network perimeter to the cloud with dedicated and private connections to AWS, Google, Azure, Oracle, and IBM — using Telia Carrier's global backbone.

CONTROLLED CLOUD CONNECTIVITY

Using our direct connections to the major cloud providers, we provide you with a secure on-ramp to the cloud. Cloud Connect is a private and dedicated connection that bypasses the public internet — giving you more control of your bandwidth, with high levels of security and reliability.

FLEXIBLE PRICING

We offer flexible pricing options to accommodate your changing bandwidth needs. You have the freedom to modify contract terms at short notice and configure your

connection to suit your business needs. The service options are easily accessible by using our online portal with simple purchasing options.

REACH MULTIPLE CLOUDS AT SCALE

Cloud Connect allows you to use a single port to connect to one or multiple cloud providers — making it a cost-efficient way to scale cloud connectivity. Your bandwidth needs for cloud usage will always be serviceable as we operate with ample capacity to ensure our global backbone is optimized for highly scalable, burstable workloads.

DID YOU KNOW?

You can order your Cloud Connect service in less than 1 minute, using our online portal MyCarrier!

BENEFITS IN BRIEF

CONTROL

Your traffic traverses our global backbone, bypassing the public internet. Providing a more predictable cloud experience.

FLEXIBILITY

Our pricing model accommodates your changeable bandwidth needs, with choice of 1Gbps and 10Gbps ports and freedom to change contract terms on short notice.

SCALABILITY

We have ample capacity on our backbone to support bandwidth-intensive workloads.



Testing the Cloud

Mark Sylos, New Technologies EXFO Service Assurance

INTRODUCTION

Broadband, backbone and mobile wireless service providers see the cloud as an opportunity for growth. New applications running in the cloud drive new traffic to their network. The cloud also offers new revenues from new services that can be sold to customers. The business models for carriers and how they relate to the cloud are evolving quickly, but one fact is becoming clear: to achieve success in the cloud market, carriers must actively ensure that they offer a high quality of service to cloud consumers. The best way to assess cloud quality is to test the cloud.

A cloud is a shared computing platform available over the network used to run a variety of business or personal applications. The concept is hardly new; it has roots in service bureaus, outsourced data centers and utility computing. What makes the cloud work today is the rise of the web browser as a thin client that allows individual users to run any application, the wide availability of high-bandwidth networks, and virtualization technologies for computers, storage and networking. The cost savings, expanded reach, and improved quality gained by running an application in the cloud is proving to be a business success, as shown by the growth of cloud services into a market worth billions.



Figure 1. Cloud players: cloud users, cloud consumers, cloud providers and cloud carriers

Cloud services are sold to cloud consumers who have a business need. To meet that need, the cloud consumer deploys an application to be run in the cloud for a user community. The cloud itself is driven by cloud data centers that provide an environment for running the application. The data centers provide servers, storage and

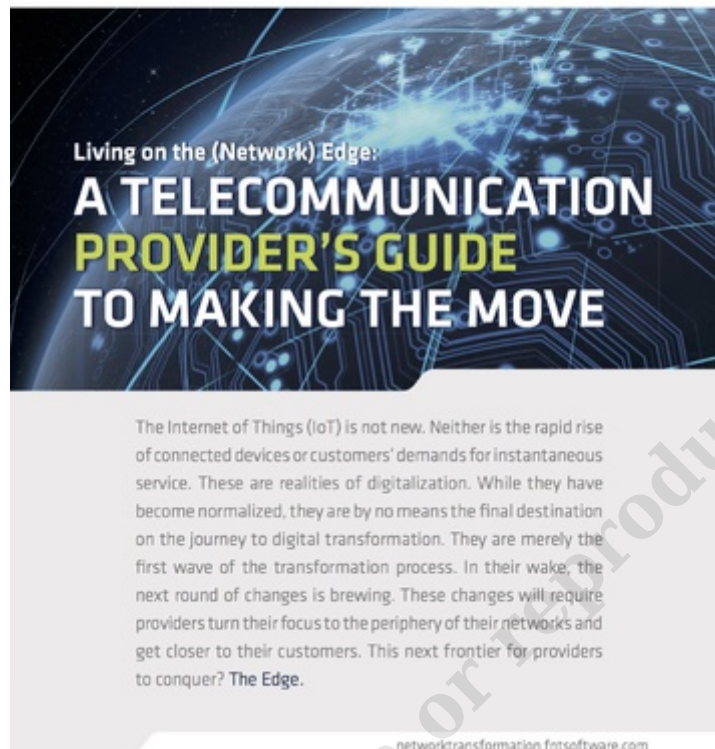
networking. User access to the cloud data centers is provided by cloud carriers. The cloud provider manages the cloud data centers and their servers, storage and networking. The carrier manages the interconnection between the user and the cloud data centers. The application may be owned and managed by the cloud consumer or the cloud provider.

The quality of the user's experience depends on both the carrier and the cloud provider. Together, they determine how well the application serves its users. The carrier manages bandwidth, latency, reachability, loss and other network key performance indicators (KPIs) that affect quality. The cloud provider manages process or utilization, storage, switch utilization and other resource KPIs that affect quality. But the KPIs that describe the quality of the service (QoS) provided to the consumer and the user are web download times, service availability, data delivery times, and other KPIs that are tied more directly to the service sold to cloud consumers. These service-oriented KPIs cannot be measured by any one actor; together, they either are determined by the business relationship between them, if they are independent, cloud carriers offer SLA guarantees to cloud providers. Cloud providers in turn offer SLAs to cloud consumers. If the carrier owns the cloud provider, then the single organization can offer the service-level agreements (SLA). These SLAs are one factor driving carriers and providers to test the cloud.

Actor	Definition
Cloud User	A person or organization that uses and benefits from the cloud.
Cloud Consumer	An organization or person that buys services from the cloud provider to use or run an application.
Cloud Provider	A person or organization that provides a cloud service.
Cloud Carrier	A communications service provider that provides connectivity and transport between users and the cloud or within the cloud.

Table 1. Cloud actors

In this complex business environment, carriers have strengths. First, they own the network that connects users to the application running in the cloud. Second, they provide the circuits that connect cloud data centers to the Internet and each other. Third, they can provide the security and privacy customers want through dedicated circuits or virtual private networks that isolate one customer's traffic from another's. Finally, they know how to offer a high-quality service backed by the guarantees of an SLA.



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