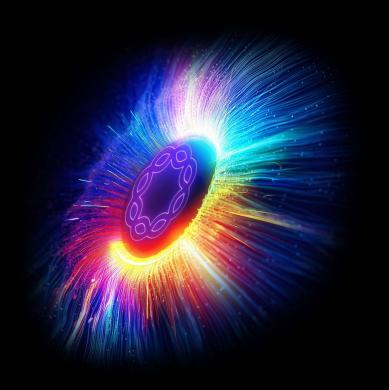
ribbon INSIGHTS





Dan RedingtonEVP of Global Sales





You're Visiting a Hub of Innovation







Honeywell





































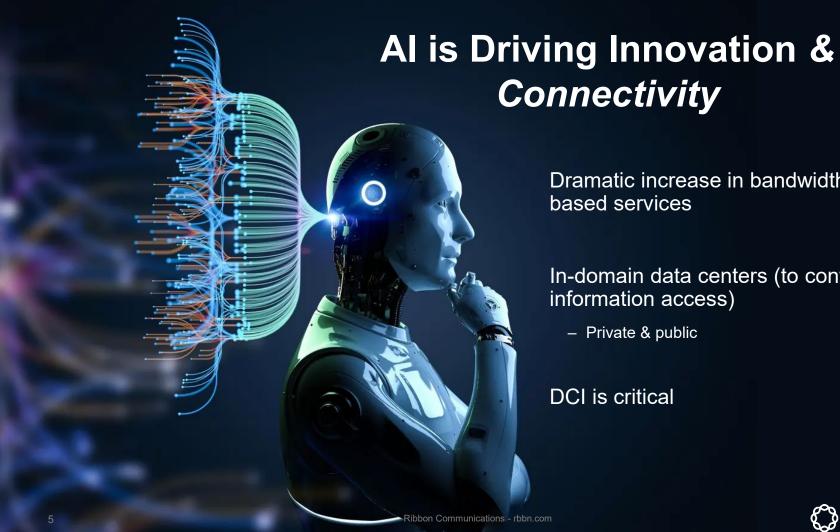
Deloitte.











Dramatic increase in bandwidth for Albased services

In-domain data centers (to control information access)

Private & public

DCI is critical



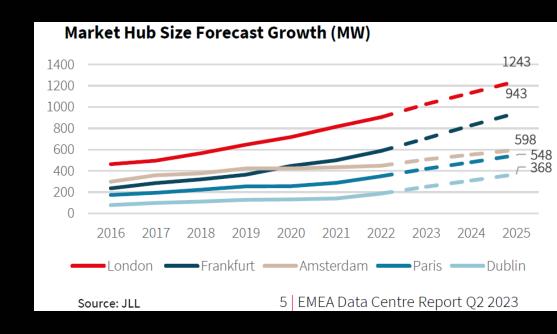
Datacenter Build-outs Are Accelerating

2024 --12.2K Megawatts (MW) of datacenter capacity

2029 -- Expected ~18K MW

~8% Annual growth rate (CAGR)

Source: Mordor Intelligence





The Cost of Failure is Increasing

Brand damage

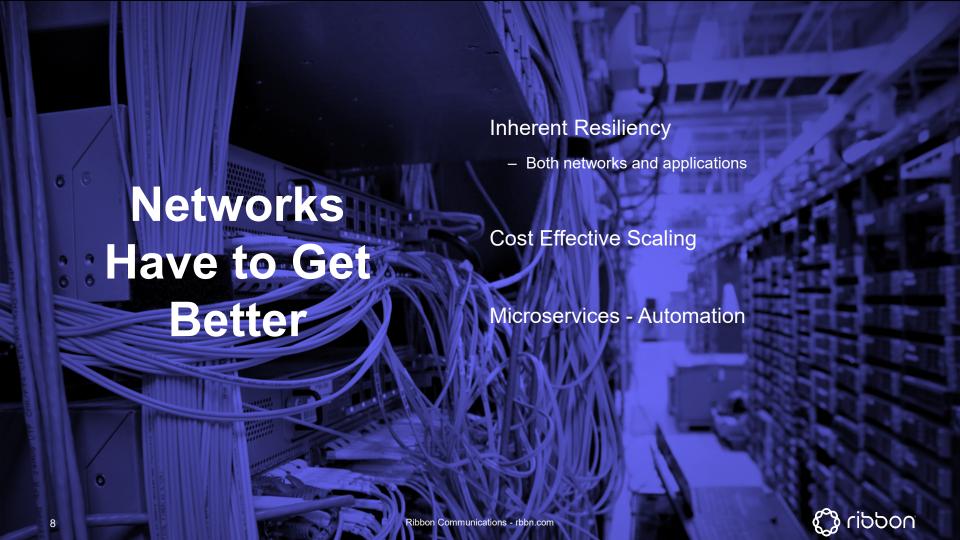
Financial damage

- Lost business
- Ransomware

Career damage



"Our preliminary review suggests that Delta, unlike its competitors, apparently has not modernized its IT infrastructure," Mark Cheffo, an attorney representing Microsoft, wrote in an Aug. 6 letter to Delta.



Security Has to Get Better

Zero Trust... Encryption Everywhere

Fraud Protection

Automated Upgrades





With Better Tools

End-to-end Observability

Intelligent Automation & Orchestration

Most Probable Cause



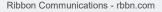


TIME TO ENGAGE



- NETWORKING
- DEMONSTRATIONS

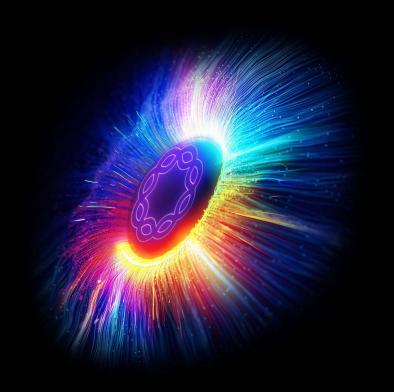




Thank You



ribbon INSIGHTS



Partnering... The Winning Formula

David Hiscock

VP of Global Channels & Partners



Partner Program – Together We Grow

Enhancing Your Profitability

Deal registration - Now automated in Ribbon Partner Portal

Enhanced Rewards in 2024 – Why leave Money on the table?

New promotions - Edge 6k, 8K and DCI 9400 & 9600

Renewals dashboard





Partner Program – Together We Grow

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Increasing Sales Velocity

New training courses - Incentive to get trained by end of the year!





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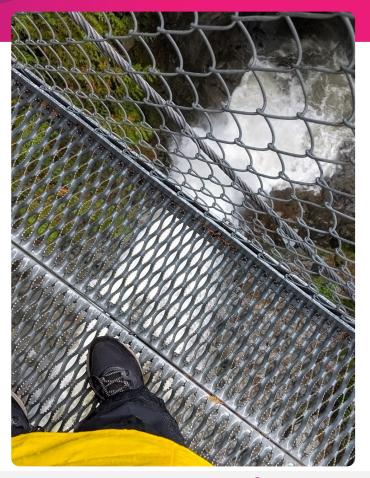
Winning Together





The First Step...is Crossing the Bridge...

- You have the depth, but do you have Breadth?
 - You have invested your Time to be here, Explore what you are missing





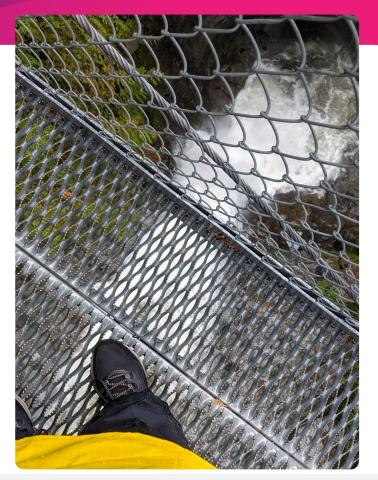
The First Step...is Crossing the Bridge...

You have the depth, but do you have Breadth?

You have invested your Time to be here, Explore what you are missing

Winning with our Partners in a Changing World

- Why? Trusted to Deliver Secure Mission Critical Networks
- Microsoft Metaswitch announcement? Infinera to Nokia?
- We can help you secure your customer base and restore Trust





The First Step...is Crossing the Bridge...

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Winning with our Partners in a Changing World

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- Microsoft Metaswitch announcement? Infinera to Nokia?
- We can help you secure your customer base and restore Trust

Our DNA is delivering Mission Critical Networks

For BOTH Voice and Networking Services







Don't Leave Here...Without

- Engaging
 - Products People Peers
 - Ribbon and our partner community





Don't Leave Here...Without

- Engaging
 - Products People Peers
 - Ribbon and our partner community
- Committing to an action plan for growth
 - Training, new products, new markets





Don't Leave Here...Without

- Engaging
 - Products People Peers
 - Ribbon and our partner community
- Committing to an action plan for growth
 - Training, new products, new markets
- Giving us your feedback
 - In a group or 1:1



ribbon' INSIGHTS



Ribbon Product Strategy





Mark Cobbold



Harel Misha



Which Global Group is Disrupting the Most Networks?



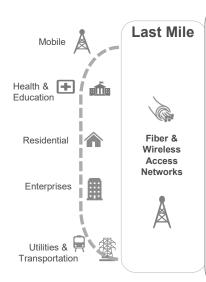


Not all threats are complicated – but they are still impactful





Today's Typical Middle Mile Networks



Middle Mile

- Multiple different "bespoke" backhaul networks
- Difficult to guarantee service performance
- Expensive to scale
- Nailed up connectivity
- Challenging to manage

Core



User Applications Network Services Command & Control



Improving the Middle Mile



Reduce CapEx

- Support converged network modernization
- Maximise network utilization across IP and Optical



Support Enhanced Services

- Provide backhaul for access bandwidth expansion
- Enable new, differentiated, services

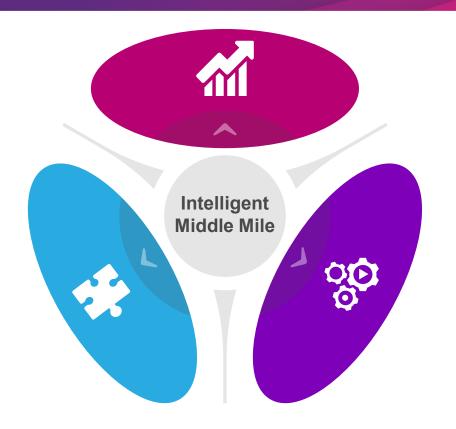


Improve Efficiency

- Simplify operations for complex networks
- Improve network insights and analytics



RIBBON: Making The Middle Mile Intelligent - Deliver Better Value



Cost Effective Scalable Bandwidth

IP Optical network technology innovation centered around reducing CapEx, with service-aware, cost per transported bit optimized solutions that support right-fit, pay-as-you-grow architectures

Flexible, Adaptable

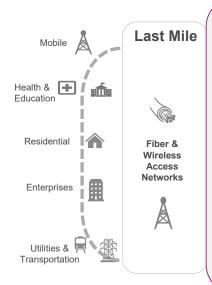
Introduction of Ribbon solutions supporting the continuous **network modernization** and evolution required to support the **rapid**, cost-effective, introduction of **enhanced services** and **new network technology**

Increase Intelligence & Automation

Continuous software innovation on our Muse cloud native domain controller to improve operational efficiency with advanced **automation**, **analytics** and **low-code tools**.



Ribbon's Intelligent Middle Mile



Ribbon's Intelligent Middle Mile

Service Aware, Forecast Tolerant, Intent Driven

- Intelligent Automated SDN

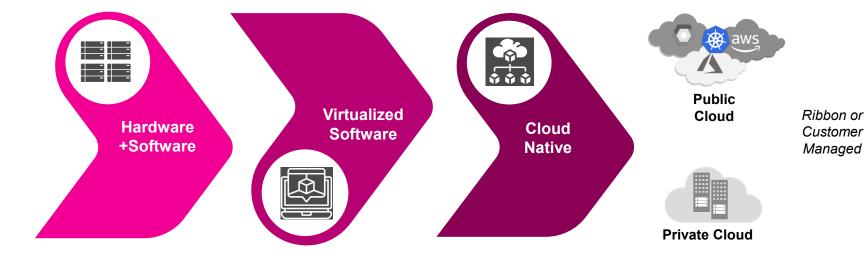
 Multilayer Domain Control
- Service Aware
 IP Routing & Packet Transport
- Lowest cost per bit
 Optical Networking





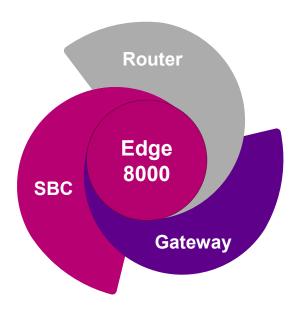


Software Has to Get Better Too





Example - Modern Enterprise Edge Platform



- SBC SWe Edge Deployed as VNF
 - HA option & more scale than older products
- 10GB Router
 — Deployed as VNF
 - Full featured enterprise edge router
 - Can be deployed in concert with Neptune & Muse
- Gateway Options for Legacy Integration
 - PRI & Analog



Cloud Native Solves Common Challenges

Challenges with Current Approach

Operational Efficiency

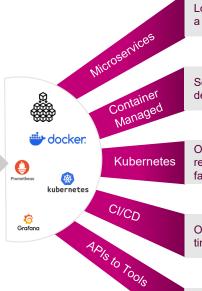
Multiple siloed tools for provisioning, & reconfiguration

Service Innovation & Speed

Too many resources tied up fixing bugs & features vs areas of growth

Automation

Long upgrade cycles, high costs associated with downtime



Loosely coupled independent services, perform a single function, shares host OS

Self containing s/w packages easy to create, deploy and tear down

Open-source tool for LCM, scale instances real-time, automates deployment, scaling & failover

On demand deployment of new code, faster time to change and restore

Real-time insights, granular KPIs for each microservice with Open-source tools

















Tools Have to get Better



Strategy to Bring Together Ribbon Assets - with Al acumen

Phased approach to bring together Ribbon assets

Built on a common platform – all cloud-native design

Leverage value of common solution





Al Reduces Customer Cost to Deploy & Manage

acumen

Predictive Capacity
Planning and
Maintenance

Automated Network
Performance and
Optimization

Automated Network
Resource Scaling

Data Aggregation and Enrichment

Automated Test
Cases and Upgrades

Security Threat
Detection and
Response

Customer Experience Enhancement

Service Provisioning and Activation

Full Stack Intelligence to **Simplify Ops** and Enable **Proactive Automation**



Security Has to Get Better



Secured Middle Mile

Configurable Domain Control Security



Secured NBI and SBI Protocols



Advanced RBAC Mechanism



Configurable Security Policies

Future Proof Secured Network



Encrypted Optical Services



Encrypted Network Links (MACSec)



Quantum Key
Distribution (QKD)

Secured Development



Secure Development Lifecycle



Threat Modeling & Risk Analysis



Security Focused Code Reviews

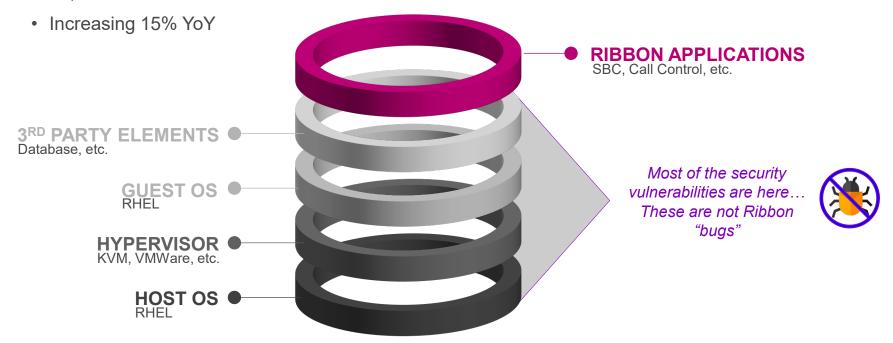


Security Scanning & Testing



All of Your Systems Use Opensource Software Stacks....

- 80 software security vulnerabilities discovered per day worldwide
- 29,000+ in 2023

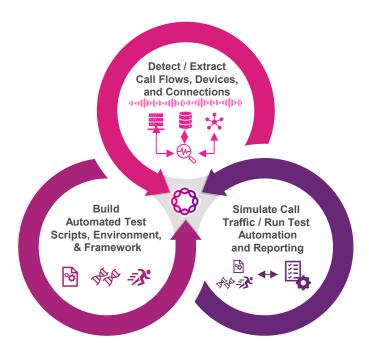




Automate and Accelerate Software Upgrades

Automates Testing and Enables Faster **Software Upgrades**

Speed up testing cycles and automate testing processes. Ribbon LEAP's is already taking those steps





Our Strategic Intent





Thank You





Market trends in Unified Communications, Contact Center, Al and network evolution

Tom Arbuthnot
Co-founder and Principal,
Empowering.Cloud





Agenda

- The Phone / Unified Communications Market
- The Contact Center Market
- The Impact of AI current and future
- What do Enterprise customers actually care about?
- The Impact on Networks



Why Listen to me?

- Tom Arbuthnot
- Originally at Cisco partner, Call Manager 4/5/6/7
- Modality Systems
 - 2010 to 2022 OCS, Lync, SfB, Teams
 - Large Enterprise Customer. projects and strategy
- Microsoft MVP since 2011 and Microsoft Certified Master
- Solutions Director Pure IP (part-time)
- Co-founder Empowering.Cloud
 - Microsoft Teams Community and Research
 - Teams Insider Podcast
 - M365 Perspective Newsletter

Unified Communications



UC / UCaaS Market - Homogenization

- Fewer big players
- The core feature set very similar each quickly clone the other's features
- The suite does create some value and pull
- Hyperscalers keep on scaling
- Teams broken out from M365 but minimal impact
- Optimising lines/numbers
 - By 2025, 25% of office workers in the U.S. and Europe will not be provided wireline/fixed telephony, up from 5% in 2020 before the COVID-19 pandemic began.
- Cloud is the area of growth

- Microsoft Teams
 - 320M Active users
 - 20M Phone seats
 - Driving with AI and suite
- Cisco Webex
 - 250M active users
 - 13m Phone users
 - Driving from on-prem to cloud, OC story
- Zoom
 - 7M Zoom Phone seats
 - Driving to suite, driving on CC
- Ring Central
 - 5M seats (2022)
- 8x8
- Broadsoft



Al in UCaaS – Single player to multi-player



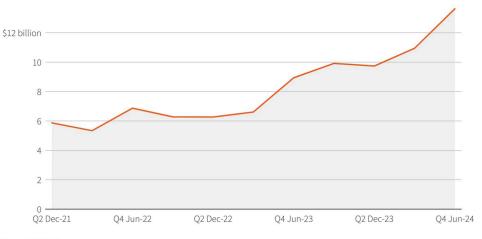
- Meeting Summary
- Searching Intelligently over multiple assets
 - Chat, Email, Files, Recordings
- All the UCaaS Platforms integrating Al
- Bringing AI to Phone driving phone to cloud

Coming

- Agents to assist a team
- "Virtual PM"
- Working with/for the team/project
- Microsoft, Google, Meta, and Amazon spending heavily on Al
 - Microsoft approximately \$13 billion in OpenAl.
 - Capital Group analysts forecast capital expenditures spending from tech giants Microsoft, Alphabet, Meta, and Amazon totalling \$189 billion in 2024,
 - Goldman Sachs analysts project that big tech companies are set to collectively spend over \$1 trillion on artificial intelligence over the next five years



Rising AI investments push up Microsoft's capex



Source: LSEG data Reuters Graphics



UC - What is important to Customers?

- Spend Optimisation
 - Rationalising PSTN/numbers
 - Fixed and mobile?
 - Less platforms/complexity
 - Leverage existing investment
- Al
 - Meeting Summaries are a hit
 - Other use cases the value still being debated / hard adoption curve
- POTS switch off / PBX End of life is driving the move to cloud

Contact Center



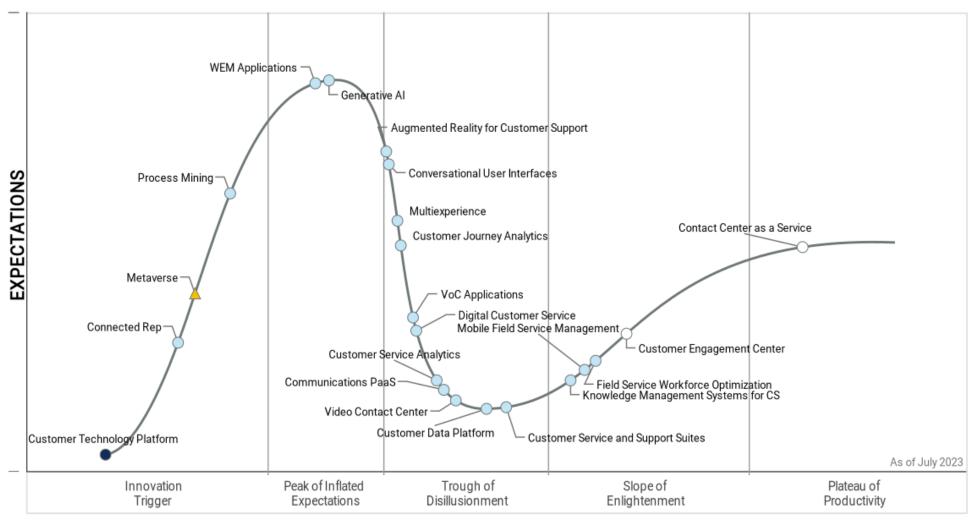
Contact Center / CCaaS Market

- Many more solutions and innovation
- Slower to move to cloud
- Video uptake slow, but proving powerful where used
- UCaaS Solutions going after light contact center scenarios
 - Teams Queues app
 - Zoom Contact Center

- Big Players
 - Genesys
 - NICE
 - Five9
 - Amazon Connect
 - Cisco
 - Microsoft gunning for Gartner top right with Dynamics 365 Contact Center



Garner Hype Cycle – Customer Experience





Contact Center - The Impact of Al

- Gartner predicts that by 2025, 80% of customer service and support organizations will be applying generative AI technology in some form to improve agent productivity and customer experience (CX)
- 38% of leaders see improving customer experience and retention as the primary purpose of initiatives to deploy applications trained on large language models – Gartner 2024 Poll
- Contact Center will be heavily disrupted by Al



Contact Center What is important to Customers?

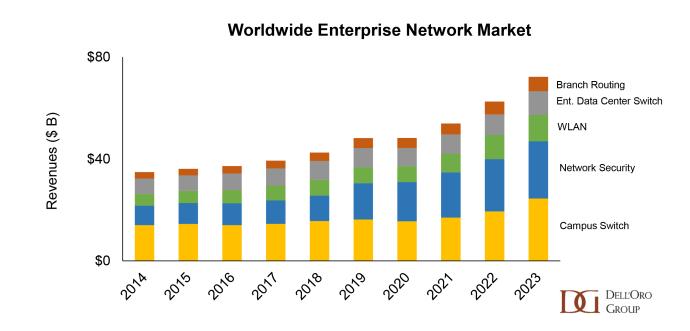
- Data-driven improvement Must be measurable.
- Acceptance that the cloud is viable for CC
 - Moving from Prem to Cloud for future features and flexibility
 - However, connectivity reliability is key
- Agent Skilling/Coaching (AI) staff turnover a real challenge
- Considering AI for customer-facing, but mostly agent-facing right now

Impact on Networking



UCaaS, CCaaS and Al Impact on Networking

- Telephony moving to IP and Cloud/aaS
- Cloud and Remote working have changed the flow of traffic
 - Where are the services and data?
 - Multi-Cloud networking
 - Software Defined Networks
 - Video increase
- Increase in Video
 - Multi-Stream
 - Room Systems
 - Lower cost point
 - Multi-camera
- Mobile First / UC integrations on the rise new networking needs
- 4G/5G Connectivity resilience
- Need for more and more reliable bandwidth to and from Enterprise and the Hyperscalers



https://www.delloro.com/worldwide-enterprise-networkspending-follows-roller-coaster-trajectory/



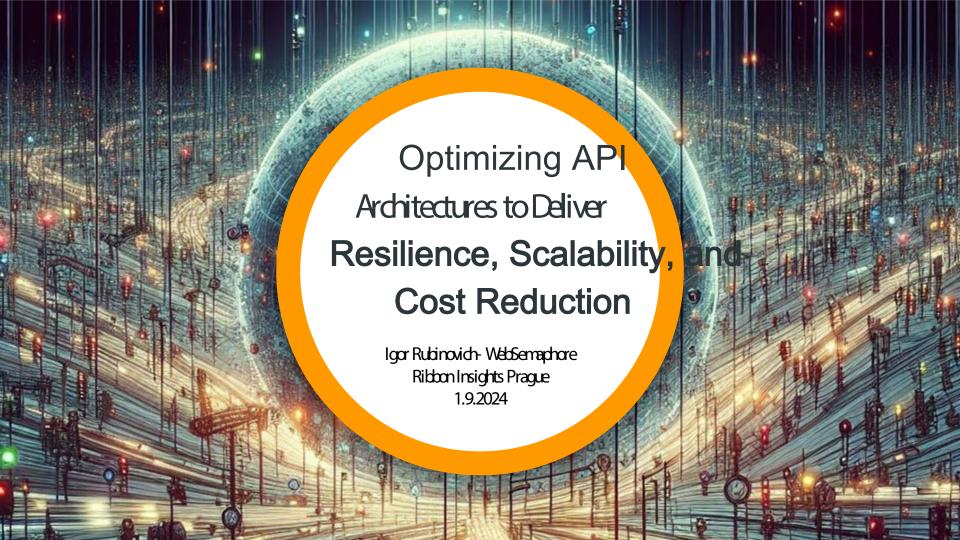
Summary

- UC
 - Drive to cloud
 - Platform Homogenization
 - More Mobile integration to UCaaS
- Contact Center
 - Moving to cloud
 - Lots of competition and innovation
 - Ripe for AI disruption
- Network Impact
 - More traffic between enterprises and cloud providers



Thank you

Tom Arbuthnot Empowering.Cloud



Data now



consumer grade



Instant payment Send now, receive in a few seconds Processed ASAP Up to date Compliant

enterprise grade



Scheduled ETL Events now, jam tomorrow



Igor Rubinovich

In the invisible workforce since ~2000

Monster.com, DHL, Merck

Cloud, Architecture, Full Stack

Israel

In Prague since 2006

Founder of

WebSemaphore.com - concurrency management as a service



APIs are everywhere

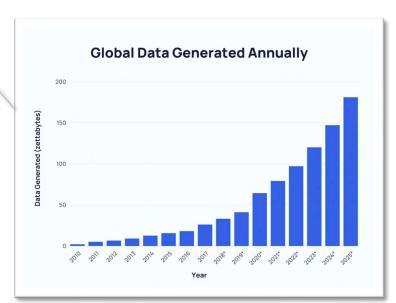


Total: 150 zetabytes

Daily: 0.41 exabytes (0.4+ mln terabytes)

APIs account for 57% of all Internet traffic

Cloudflare API Report, 2024



In Zettabytes = 1K Exabytes = 1 Bln Terabytes

Pharma Use Case





Goal: Integrate Salesforce and an internal Oracle database in near-realtime

Benefits: Cost reduction and Data availability

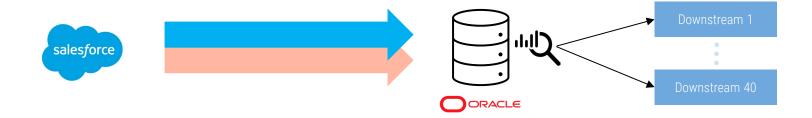
Realtime vs Scheduled



Near-Realtime + serverless

- + Data availability
- + Lower operational cost

- Tougher Scalability constraints
- Orchestration, complexity



Scheduled Extract Transform Load (ETL)

- + Tools, Control, Reliability
- + Limited coordination

- Data availability
- License cost

Scale



200+ Countries





230+ Salesforce Object types

Near-realtime Streams

~50K Global

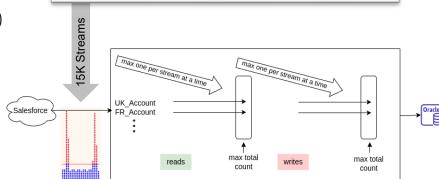
~15K Per region

Problem

Load → Concurrency → Scalability

- APIs can't handle spikes cloud or not
- Must lock resources (licenses, connections, compute)
- Lossless
- Service availability and continuity, recovery





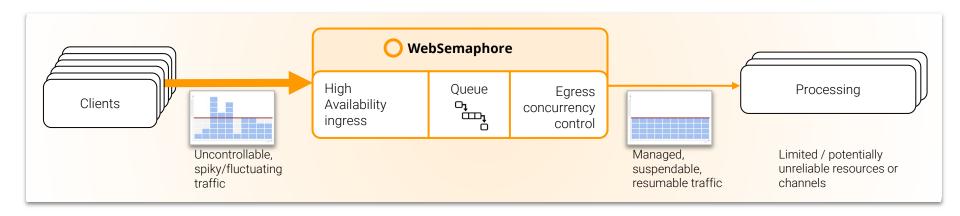
1. All processing resources are finite

Solution

Dynamic concurrency control

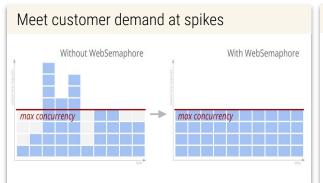
- High Availability ingress
- Dynamic concurrency control

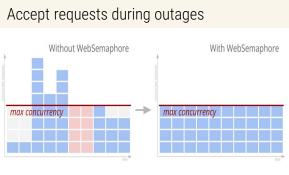
- Unlimited buffering capacity and time
- Failure recovery

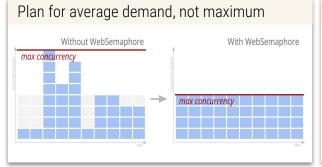


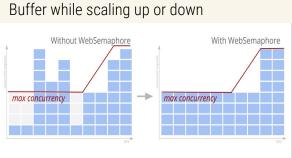
Benefits

- Service Availability
- Business Continuity
- Disaster Recovery
- Cost and Capacity









Complexity and Risk

- Distraction from business case
- Expertise and effort
- Complexity



- Inefficiency, disasters
- Lost business
- Reputation, competition

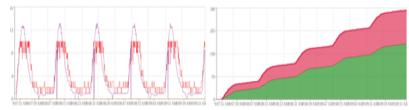
1. All processing resources are finite

2. Concurrency is complex

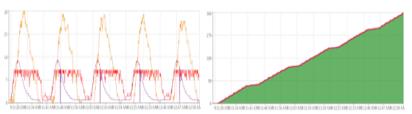
WebSemaphore

On-demand concurrency management as a service

- Traffic amortization / backpressure
- Efficient resource utilization over time
- Configurable API access concurrency



60% success - synchronous (spike arrest) with concurrency 10



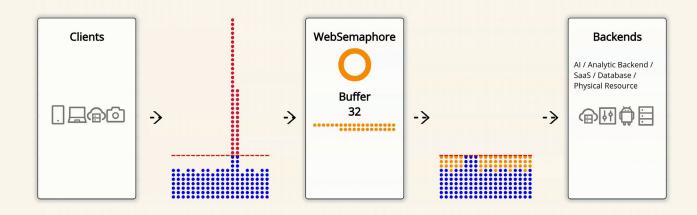
100% success - asynchronous with concurrency 10

Flattening the API traffic curve

websemaphore.com







websemaphare.com





Q & A





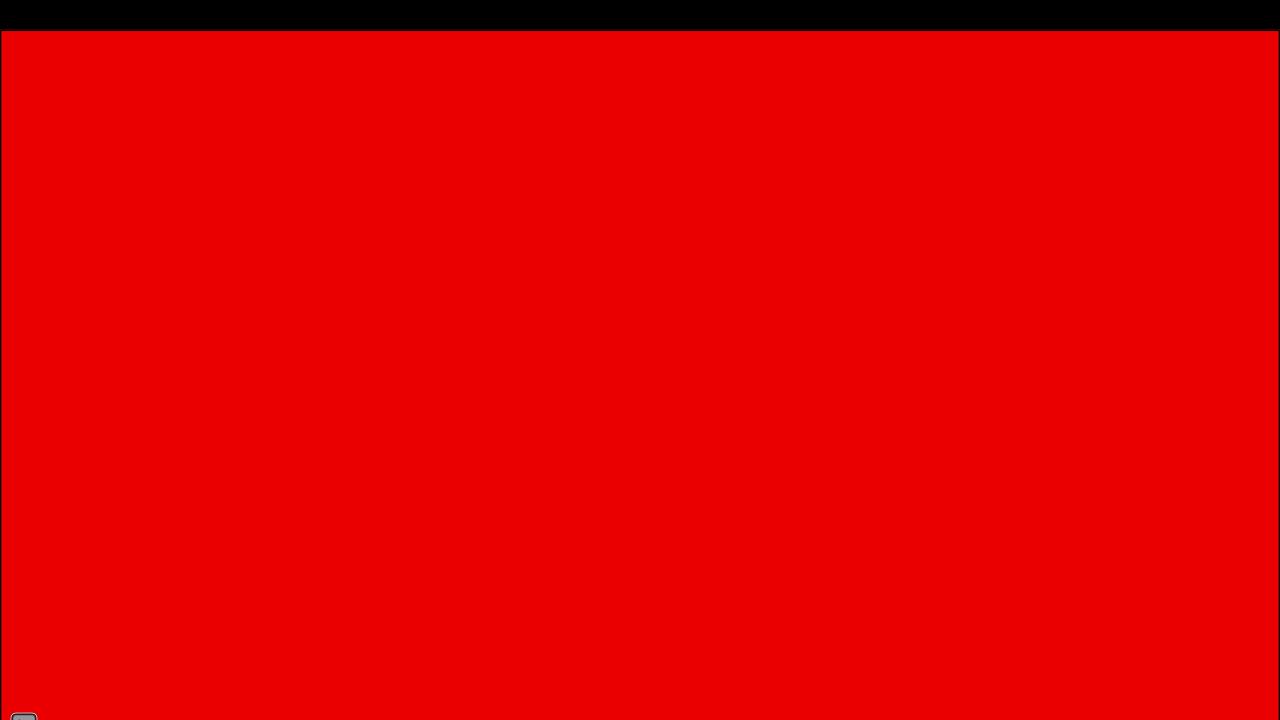
ribbon' INSIGHTS

Speaker: Mr. Tanmoy/Jay & Punit

Sept 10-12 | Prague

Cloud Communication Journey





Transformation **Need**: What Analyst Say

On-Premise Centric

- Complex Network infra
- Business Continuity
- IT Management

Fixed Scalability

- Require Pre-Planning
- Under/Over Usage

Fragmented

- No visibility to Biz application
- Non Inter connectivity

Monolithic

Standard Feature

End to End Management investment

- IT
- HW /Network infrastructure



Mobility & Reliability

Infra-Less

Maintenance free



Scalable on Demand

No Over/Under Utilization



Complete Single View



Technological & Business OrientedSentiment Analysis
Quality Analysis



Cost Optimization

Market Stats (O)

	On Premise	Private Cloud	Public Cloud	
Application				
Telephony				

On Premise **Private Cloud Public Cloud** Application ribbon tecnomic Telephony





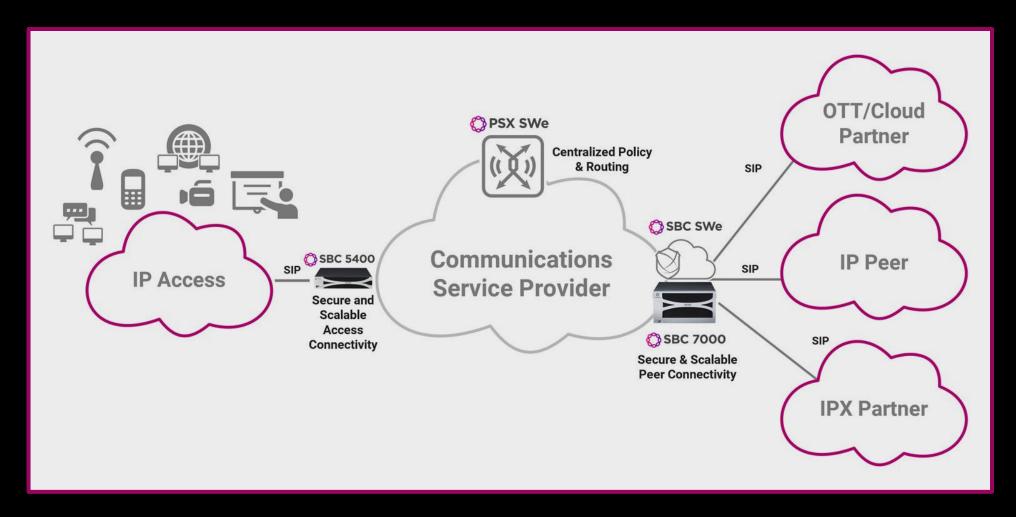
- Implementation of SIP: Core & Access
- Monetization of the SIP trunk
- Roll out of UCAAS & CCAAS
- Gateway to Cloud communication with
 - Operator connect
 - Direct routing as service
- Value added application
 - Compliance recording
 - Billing
 - Data residency



1. Implementation of SIP: Core & Access

Service provider

1. Implementation of SIP: Core & Access



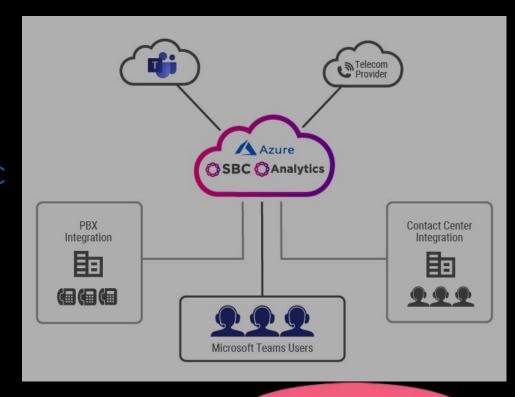


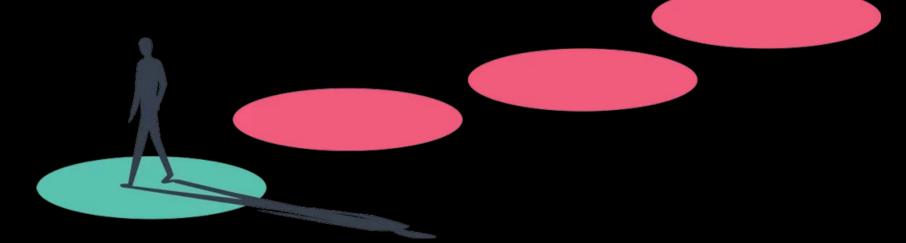
2. Monetization of the SIP trunk



2. Monetization of SIP Trunk

- ❖ Bundle SIP Trunk as per the requirement along with SBC
- Provide voice security as part of the services
- Provide access point for Third party voice application





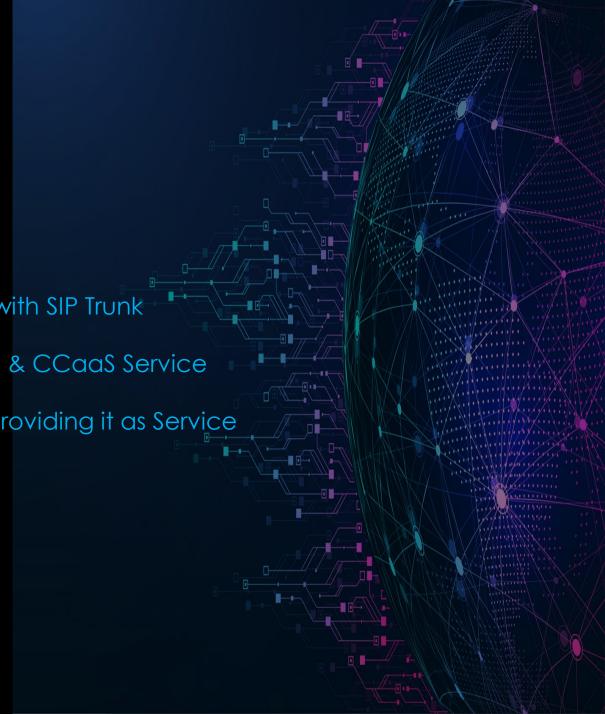


3. Roll out of UCAAS & CCAAS



3. Roll out of UCAAS & CCAAS

- Enabling enterprise voice as Service bundling with SIP Trunk
- Aggregating Telco service with UCaaS service & CCaaS Service
- Hosting infraless communication Service and providing it as Service





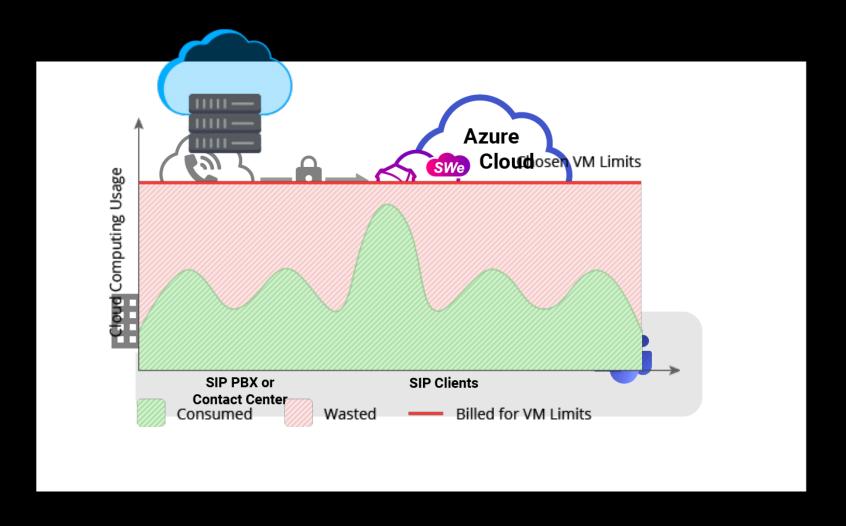


- Zero infra setup
- Pay as you enable and expand
- Adopt Presence / Al / Language
- Global Application roll out
- Integration to application on cloud
- Security / Data governance & Residency
- Voice as core
- Telco regulation & Compliance



Zero infra setup

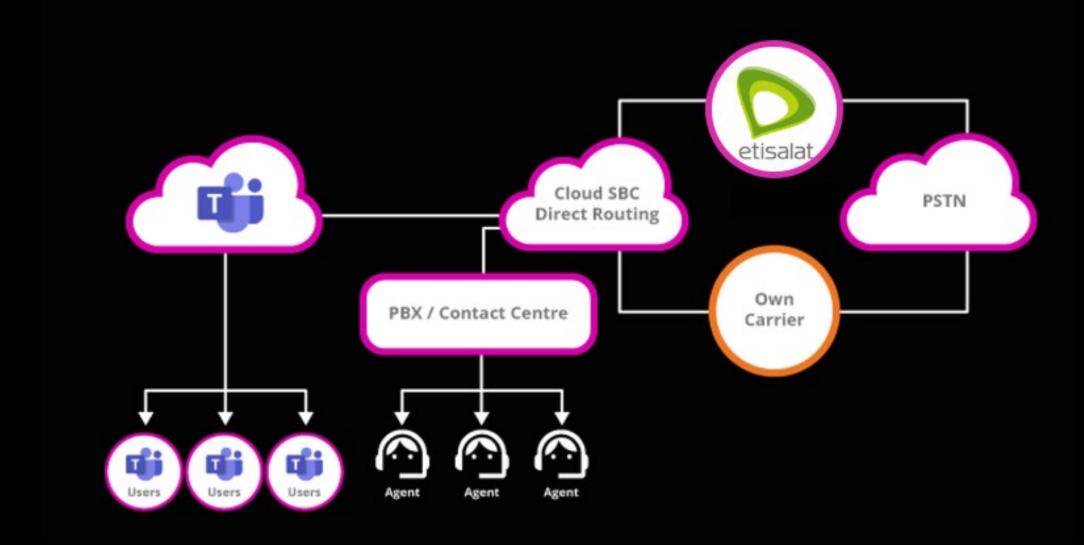
Clayuelsblacke of heatelgrateironice SaaS



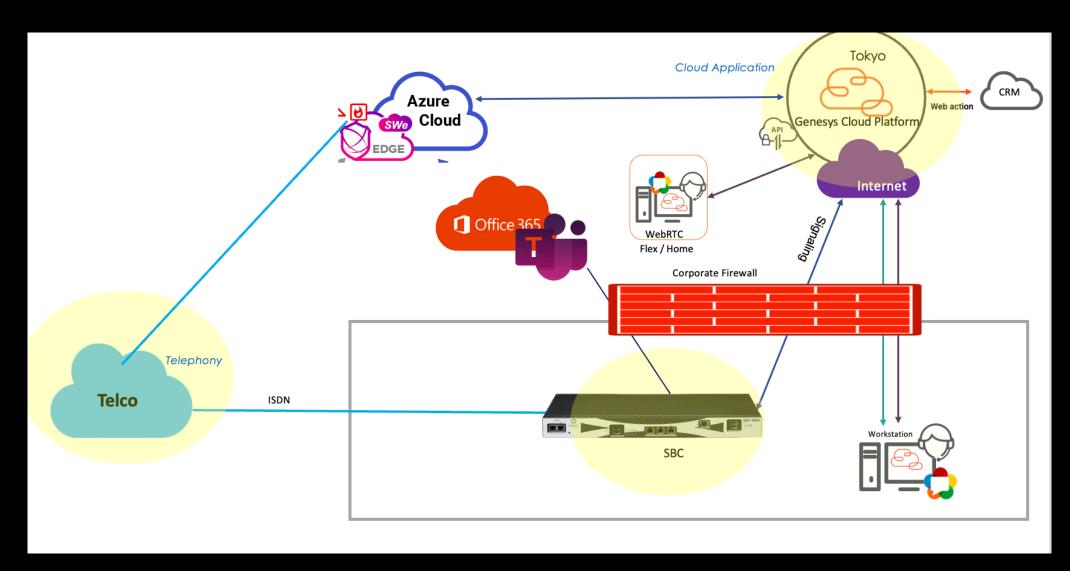
Case Studies



SBC as Service for Service Provider



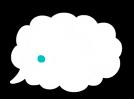
Manulife SBC service for enterprise



Summary

<u>Summary</u>

Cloud communication is the <u>future</u>



- SBC plays the core element in the Cloud transformation
 - Service provider



Enterprise



- products meets the 360 requirement
 - Core
 - Access
 - CPE on premises

Seamless Customer Migration





Integrated Collaborative Solutions in Healthcare





About Us







Key Facts:

Established: 1993

PE Backed since 2018

Five key Acquisitions made this decade

Customers: over 2,500

Turnover: £70+ million

• Employees: 260

Highly Accredited

Charterhouse is a UC and Networking Specialist

Pentesec is a Best-in-class Cyber Security Consultancy

Symity is a Gold Microsoft Partner

Our Mission, Vision and Values

- Mission: Making it easy for our Customers to Connect,
 Communicate and Collaborate Securely.
- Vision: Passionate People Always Trusted by our Customers to Deliver the Right Technology Solution.
- Values: Be Yourself, Do the Right Thing, Take Responsibility, Love What you Do

Offices:

- Bishopsgate, London
- Mann Island, Liverpool
- Lynch Wood, Peterborough

Strategic Partners













Challenges in the NHS





Multiple systems in ICS's and even in some trusts, making it hard to use and costly and complex to maintain



New expectations from the public, a lot shaped by covid, for ways of interacting



New buildings/infrastructure/tools need connecting to existing systems



Growing number of ICS's - needing to make disparate technologies talk

The Opportunities to Help

















Aid Collaboration











Why Ribbon?





Global Presence - Established and Proven



Wide Choice of Deployment models from software to hardware and in all capacities



Easy to integrate

Case Study – Blackpool Teaching

CHARTERHOUSE CONNECT. COLLABORATE. SECURE





quobis: maximizing sales: partnering with MSPs and leveraging sell-through opps





Innove

Quobis Communications Platform

IMS & App Servers

R&D projects



Know

Monitoring Tools

Diagnosis & remediation

Service level auditing



Evolve

Open source & 3° party vendors

UC networking

Consultancy on architecture & training

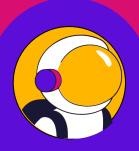


Protect

VoIP fraud prevention

Security consulting & Training

Security as a Service



Care

24/7 L2-L3 Support

Preventive, corrective and evolutive

Know your market

- In Spain we estimate 85% of the enterprise SBCs are through telcos.
- Three major telcos share 90% of the enterprise sales. Long-tail enterprise telcos (~50) are less open to collaborate (focused on open-source, internal development, etc).







- The best option here is to build a market strategy for the big players.
- Other interesting verticals are call centers and BPOs (low investment capacity) and 20+ largest enterprises (banks, utilities, etc), but only ~40% own a SBC.

Benefits for telcos of working with Quobis and Ribbon

SBCs are available in stock to reduce delivery times to 24 hours*

Quobis guarantees prices and generates savings**

Support activation from delivery***

Expert help in identifying necessary items

 Quobis can take care of the removal and conditioning of cancelled SBCs ****

Units available at no cost for PoCs and tests

Quobis laboratory for tests

rcidos ** Mismo precio que mayorista con mejor cambio USD/EUR onibilidad del equipo **** SBCs sin vinculación a cliente final

^{*} Modelos hardware 1000 y 2000 preestablecidos

^{***} Un mes sin coste de soporte desde disponibilidad del equipo

Benefits of working with Ribbon

After 17+ years integrating SBCs, we observe these key points working with Ribbon as a partner

- Sales support: partner managers, presales guys, etc. are more open to help us in the sales journey (availability to have calls with customers, valuable webinar, help with the quotes, etc). A really motivated team.
- Portfolio: plenty of options to accommodate business needs in terms of sessions, PRI/FXS interfaces, etc. In +95% the product fits better that the competitors (and it's not only a matter of price)
- Time to market: Ribbon works like a SME in terms of bureaucracy, etc. Time to process POs, quotes, delivery of devices, access to support is really fast!



Assets management

Each of the major telcos in Spain manage hundreds of SBCs. This is a pain for them.

Quobis provides services:

- Stock available for new deployments and reduction of delivery times
- Pick up SBCs at the customer premises (after project/deal completion)
- SBC **reconditioning** for new customers
- Efficient support activation and management of periodic renewals
- Management of certificates









Specialized support

Dedicated team of experienced engineers, to manage real-time communications network services.

Quobis offers a 24x7 technical support center, providing everything needed to keep communication services running:

- Corrective support: troubleshooting, escalation to manufacturers, and requests for changes or enhancements.
- **Preventive support:** automation of software updates, log/alarm management, etc.
- **Proactive Support:** permanent monitoring of networks to act immediately if something goes wrong..
- Managed services: infrastructure management.



Making it easy for presales guys

Hotline for presales guys of the major telcos, included a

dedicated sales manager

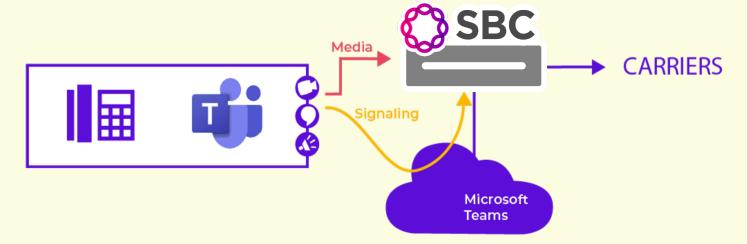
 We provide a tool designed to get the cost of hardware, licenses, professional services and support

~80% of the opportunities no need to contact with Quobis or Ribbon to get a reference quote.

Características	Selección	
Conectividad entre PBX y eSBC	MISMA RED LAN	*
Modelo de PBX	MS TEAMS	
Transcoding	NO	
Cifrado entre SBC y PBX	SI	-
SBC Hardware o Virtual	HARDWARE	
	NO	
Número de sesiones: Hardware (5-900), virtual (5-995)	200	
¿debe tener doble fuente?	NO	
Alta disponibilidad (SA o HA)	НА	
Número y ubicación de las sedes	misma sede	
Instalación fuera de horario laboral (Lunes-Viernes 8h-18h)	NO	
Soporte ¿10x5 o 24x7?	10x5	
¿Quobis configura el voice tenant en la PBX (Teams, Zoom, otros)?	NO	
Monitorización proactiva (panel de estadísticas y envío de alertas)	NO	,

Laboratory for customer demos and problem replication

- Quobis laboratory for tests and proofs of concept, including interconnection with MS Teams, Zoom, Google Voice, etc.
- Call generator and monitoring tools



Value added on top of SBC integration

Quobis has a development department with experience in SIP and WebRTC to generate customized solutions for clients.

It uses open source solutions to provide consulting, support and develop ad-hoc voice servers with specific functionalities.

- Kamailio for SIP signaling management and header manipulation
- Freeswitch, RTP Engine and Asterisk for media changes
- Janus with WebRTC media manager





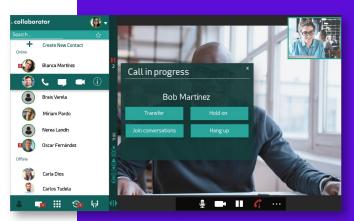


- Numbering changes
- Voiceover server
- SIPREC recorders
- CDR managers
- Media manipulation
- Presence servers
- Avalanche management systems
- Call balancers

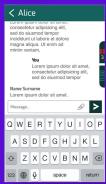
9: collaborator

A enterprise-level multi-device unified communications client

- Compatible with any connected device.
- Fully customizable.
- Professional-grade call control.
- Flexible integration with corporate directories.
- Easy to federate with existing PBXs





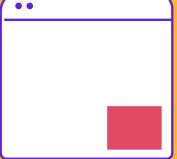


quobis: communications platform

Integrated communications and ad-hoc interfaces



SDKs iOS& Android



Java Script SDK



IOT SDK





Unified Communications Client







Why do you need to monitor your network with Quobis?

We are experts in SIP infrastructures, and have 12 years of experience using leading monitoring technologies.

Technology is just a part of the mix of services that you need to monitor your network with efficacy. The most critical, is the human factor, who convert data into insights, and then into actions.

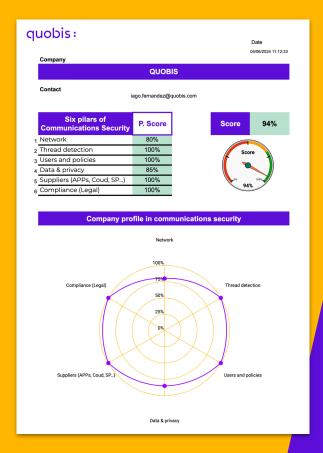
Work with Quobis means, have the right info when it's needed, without care about the complexity behind.



Verifying voice security policies

Free self-assessment test to extract information on the degree of maturity of voice security policies in each corporation, based on answering 35 questions.

Optionally, with an hour of consulting by Quobis to clarify the results.





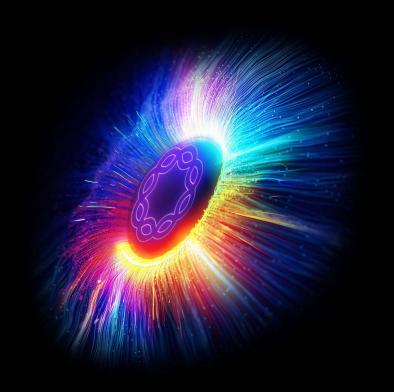
Security as a service

Add security to managed services:

- Communications architecture (encrypted network, SBC, etc.)
- Network component security patches
- Proactive monitoring and anomaly detection
- Custody and encryption of critical data
- User permission management
- Certification maintenance and legal compliance



ribbon INSIGHTS







Agenda

- 1. Brief overview of the Syserso Group
- 2. Partnership Ribbon and Syserso Networks
- **3.** Use case from the energy supply sector





Systems, Services, Solutions





Services and support for telecommunications networks

- As a system integrator and service provider, Syserso Networks offers products and services for future-proof telecommunications networks for public and private network operators, with a focus on critical infrastructure operators (CRITIS) such as energy suppliers and municipal utilities.
- Syserso Networks' experts take care of the project planning, construction, provision, installation, maintenance, and protection (cyber security) of its customers' transport, access and VoIP networks.
- The company also offers its customers specific training and customized service and security concepts, including operational support and managed services.
- As a member of the Alliance for Cyber Security, Syserso Networks operates its own Security Operations Center (SOC) and provides comprehensive security solutions such as anomaly detection and transport encryption for critical infrastructure operators.





Single source for ICT, IT and security products and services

- Acquisition of SHD in 2023, a market-leading IT and IT security integrator and service provider in Germany with more than 170 experts
- Enables the Group to offer its customers complete ICT, IT and OT/IT security products and services from a single source

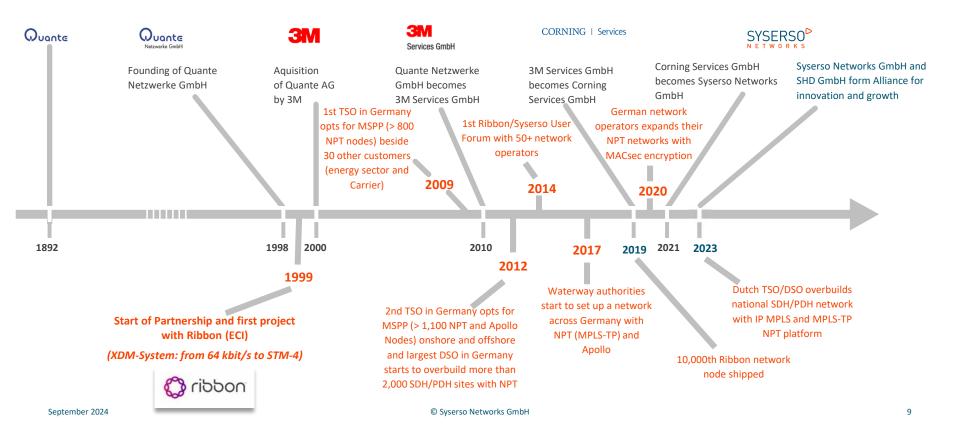




Ribbon and Syserso Networks celebrate 25 years of partnership



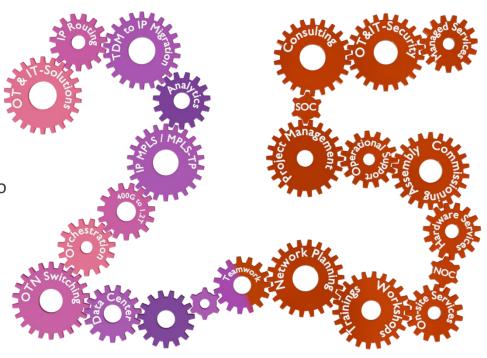
Ribbon and Syserso Networks partnership: Milestones





Ribbon and Syserso Networks collaboration: Success Story

- More than 25 years of successful partnership based on mutual trust and expertise
- Combination of leading Ribbon technology and high-quality customized services from Syserso Networks, tailored to individual customer requirements
- In-depth application-level expertise from Syserso Networks` experts, going beyond pure Ribbon products to provide comprehensive solutions
- Joint market presence to attract new customers and support existing customers in the future
- We look forward to the next 25 years of partnership







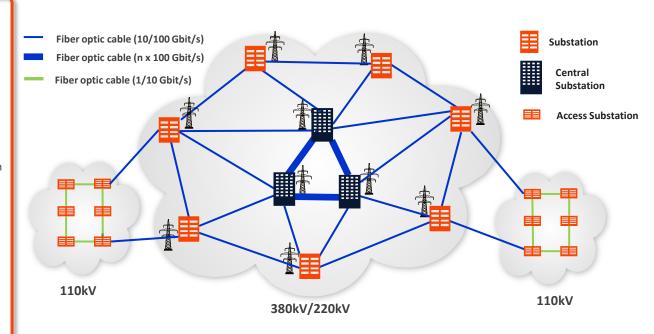
Use case of a national energy supply company (1/2)

Networks size:

~ 400 substations, including 34 central substations and offshore-platforms

Requirements:

- Migration of an existing PDH-SDH network to a future proof fully-redundant IP MPLS / MPLS-TP solution
- All transmission paths should be redundant and equipped with MACsec encryption
- In addition to Ethernet interfaces, the MPLS solution must also support common TDM interfaces
- Support line differential protection and distance protection (E0, E12, E&M, IEEE C.37.94)
- Implementation of a Proof of Concept (PoC) based on detailed low-level designs in advance of the rollout for the entire network, including
 - Renewal of the IP network layer
 - New MPLS transport layer
 - New xWDM optical transport layer
 - Complete network synchronization
 - Subracks including power supply systems
- Only security-cleared personnel may be used in the project and for subsequent support

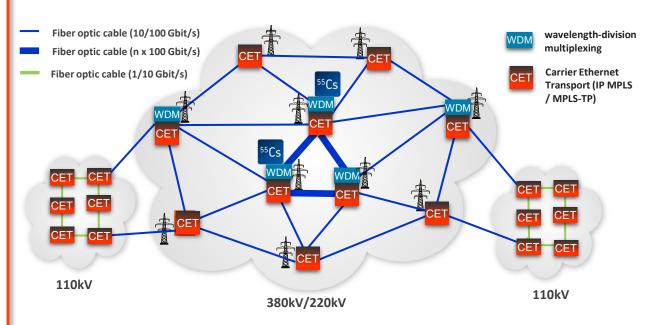




Use case of a national energy supply company (2/2)

Turnkey implementation by Syserso Networks

- Network planning and project management
- Supply, installation and commissioning of hardware and software for each Network Layer incl. synchronization systems, power supply systems and cabinets
- MPLS transport layer and xDWDM optical layer with approximately 1,100 NPT and Apollo nodes
- Security concept including development of an encryption key management for the entire network
- Training and workshops for the customer personnel
- Migration support for existing services connected to the PDH/SDH system
- 2n level operational support via a service contract as part of the completion of each network section
- Syserso employees are security-cleared experts in the field of:
- advanced sabotage protection
- secret and espionage protection



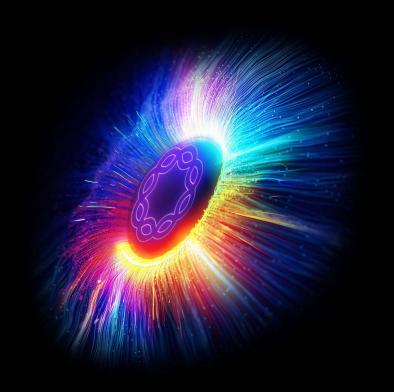


Thank You





ribbon INSIGHTS



Muse Intelligent Automation

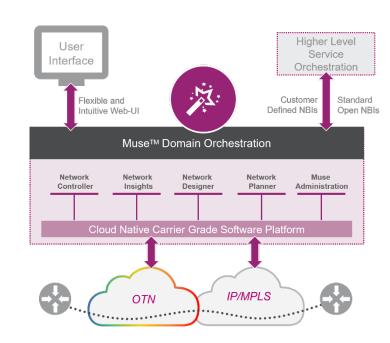
Harel Misha

Head of IP Optical Software Line of Business



What is Muse?

- Ribbon's SDN Applications Suite
- Multiple roles:
 - "Legacy" FCAPS
 - NMS and EMS functionalities for IP Optical networks
 - SDN Capabilities
 - · Open Interfaces, Automation, Insights and Analytics
 - Network Planning
 - · Topology and site design, Optical Simulations, Demands Optimization
- Cloud-Native Eco-System
- Multi-Vendor Architecture
 - Separation between SBIs and Business Logic





SDN Market Trends and Requirements



Network Automation to reduce OpEx and improve Time to Market



Advanced Analytics to improve CapEx utilization



Multi-Vendor capability to remove vendor-locking



Flexible integration with OSS/BSS/Service Orchestrator systems



Cloud Native architecture to meet modern security and infrastructure standards

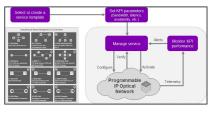


Muse – Answering Market Trends

Network Automation

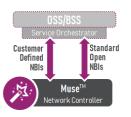


Workflow Engine

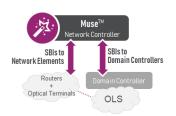


Closed Loop Automation

Multi-Vendor and OSS Integration



Flexible NBI

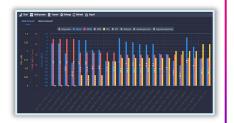


Flexible SBI

Advanced Analytics



Network Insights



Network Health

Cloud Native Architecture



Microservices Architecture



K8S Infrastructure



Low-Code: Best Fit, Fastest Time-to-Market

Adjust Enhance System Capabilities According to Your Needs



Design

Automations
Service Templates
BI Reports
Node Models



Build

Network Designer
Network Insights



Publish

Network Controller
Network Planner
Network Insights



Use

Automate repetitive actions

Avoid Human Errors

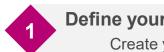
Reduce Time-to-Market

Reduce TCO



Low-Code Workflow Engine - Automation in Your Pace

Implement network automation at your own pace tailored to your specific needs



Define your automations

Create your own workflows based on your needs



Choose how to execute them

Manual, Scheduled, Triggered or via API

3

Control the process

Monitor the active operations, stop/pause at any time



Be proactive
Reduce OpEx
Improve Time-To-Market

Control

Introduce automation gradually
Run automations on demand
Supervise what happens in your network

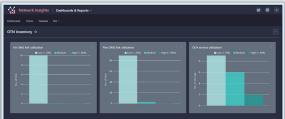


Insights and Analytics

Enhance your CaPex utilization through the use of Business Intelligence reports

- BI reports that provide insights about the network and services
- Use Pre-Defined reports or create your own using Low-Code tools
- Automatic synchronization with the most updated network data
- Integration with the Workflow Engine to gather data from any source









Network Health Analysis

Optimize your OpEx through proactive management utilizing advanced monitoring tools

Signal Health

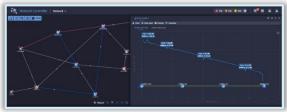
- Real time optical channels status monitoring
- · Comparing current and historical optical impairments data
- Calculating span loss contribution to OSNR degradation
- Support for native and alien lambda

Fiber Health

- Advanced OTDR monitoring
- Integration with GIS systems
- Auto Trigger OTDR test based on network events
- Historical trend analyses to catch degradations early







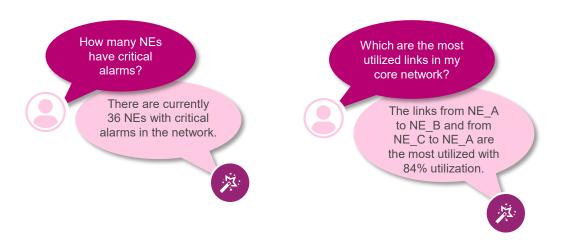


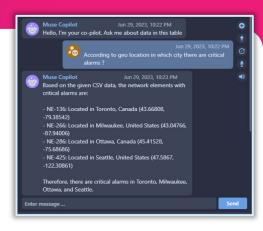


Muse Agent – A Natural Way to Operate Networks

Embrace a more intuitive and interactive user experience

- Enables natural language conversations with Muse applications
- Ask questions and gain insights and suggestions
- Request to perform actions and network configurations









Wrap-Up

Added-Value Application Suite



Automated

Reduce OpEx and minimize human errors by automating NOC operations



Multi-Layer

E2E IP-Optical network visibility for easy provisioning, troubleshooting and maintenance



Open

Flexible, open and standard interfaces for quick integration in SDN ecosystems



Secured

Secured SW platform with encrypted APIs and advanced RBAC for maximum security

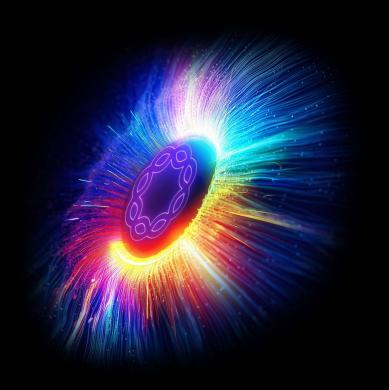


Thank You





ribbon INSIGHTS



Service Aware Routing

Ezra Yehezkel

VP, IP Product Management



Drive Towards An Intelligent IP Optical Middle Mile

→ Access Networks Investment has Peaked (5G, FTTH, FANs)

Increasing Capacity and Service Demands in the Middle Mile

\$ Lower TCO for Middle Mile Network

Automation and Multilayer Integration





NPT Product Strategy to Lead in the Middle Mile With Lowest TCO



Switching Capacity

Industry leading merchant silicon NPUs



IP Routing Software

Multiservice supporting all operator service needs



Open Architectures

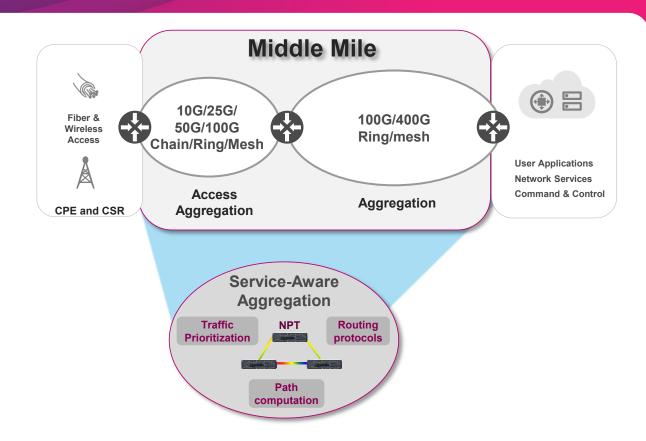
Open hardware and software architectures

Focus on Aggregation challenges: Openness, Tough Environment, Automation



IP Aggregation In The Intelligent Middle Mile

- Right-fit form factors; capacity, redundancy
- Many interface rates
- Many service types
- Multiple access networks
- Multiple network topologies





NPT Product Portfolio

NPT **XDR** Family

High Performance Routers

- NPT 2100
- NPT 2300
- NPT 2400
- NPT 2714

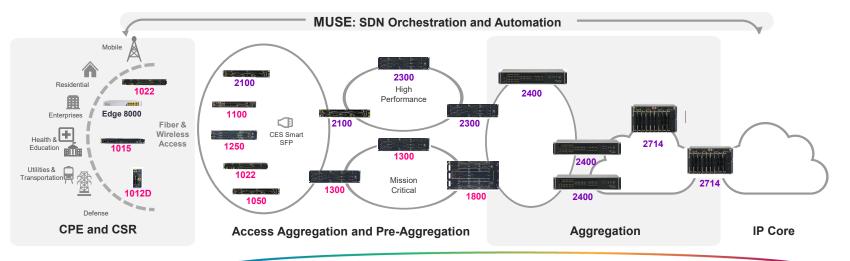
NPT **AR** Family

High Availability Routers

- NPT 1012D
- NPT 1100
- NPT 1015B
- NPT 1250NPT 1300
- NPT 1022 NPT 1050
- NPT 1800

Associated Products (not IP Optical)
CPE devices

- Edge 8100
- Edge 8300







Ribbon IP Wave rNOS IP/MPLS Feature Set

Services

- L2 VPN (VPWS/VPLS)
- L3 VPN (MP-BGP)
- EVPN-MPLS
 - EVPN-VPLS
 - EVPN-VPWS
 - EVPN "L3VPN"
 - Symmetric IRB & SFA
- PHT (Pseudowire Headend Termination)
- IRB & Bridge domain
- 6VPE
- PIM Multicast (IPv4 & IPv6)

Programmability

- Netconf/YANG
- BGP-LS
- PCEP
- Traffic Engineering
 - SR-TE
 - RSVP-TE
 - FlexAlgo

Routing

- IGP (OSPF & IS-IS) (IPv4 & IPv6)
- PE-CE protocols (Static & eBGP & OSPF)
- LDP
- Multi-Level & Multi-Instance IS-IS
- BGP-LU
- IS-IS SR
- OSPF SR
- RSVP-TE

Scalability

- vRR
- BGP-LU
- BGP RTC
- BGP-SR
- HoVPN
- sBFD

Protection

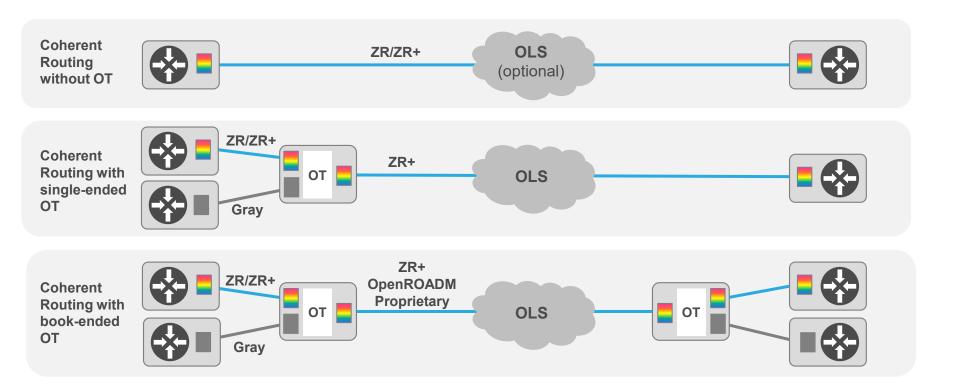
- IP BFD
- LDP FRR
- PW redundancy
- MS-PW
- VRRP
- IGP & eBGP ECMP
- BGP-PIC
- IP LFA
- TI LFA & Micro loop avoidance
- RSVP-TE FRR
- Object tracking agent

Monitoring

- TWAMP
- sFlow
- Y.1564
- Y.1731
- Ethernet CFM
- Link Delay Probe
- Telemetry

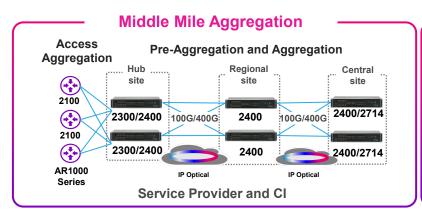


Coherent Routing with Optical Transport (OT) Configurations





Middle Mile Solutions Deployed with NPT



Broadband Backhaul & Networking

Muse

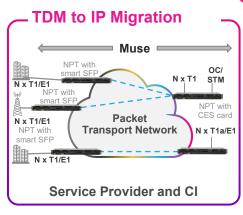
Education & Wireless Aggregation

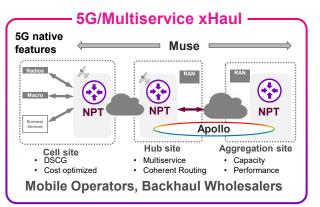
Enterprises NPT NPT

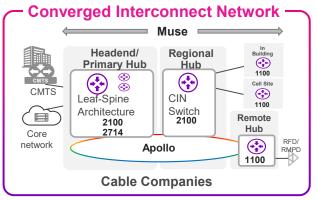
Utilities & Apollo

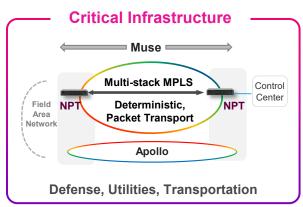
Transportation

ISPs (T1-rural), NRENs











Critical Infrastructure: New NPT Capabilities



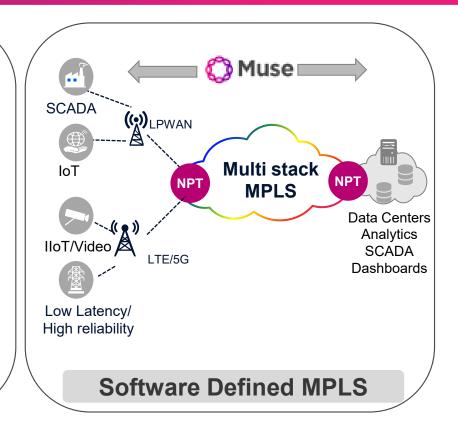


1012D

eEXT-2UH

- 1012D DIN Rail Mountable
 - Temperature Hardened -20c to +65C
- Extension shelf allows PCM services
 - (FXS, FXO, etc)
- MACsec cards
- Protection switch by service degradation

New AR 1000 Series Routers



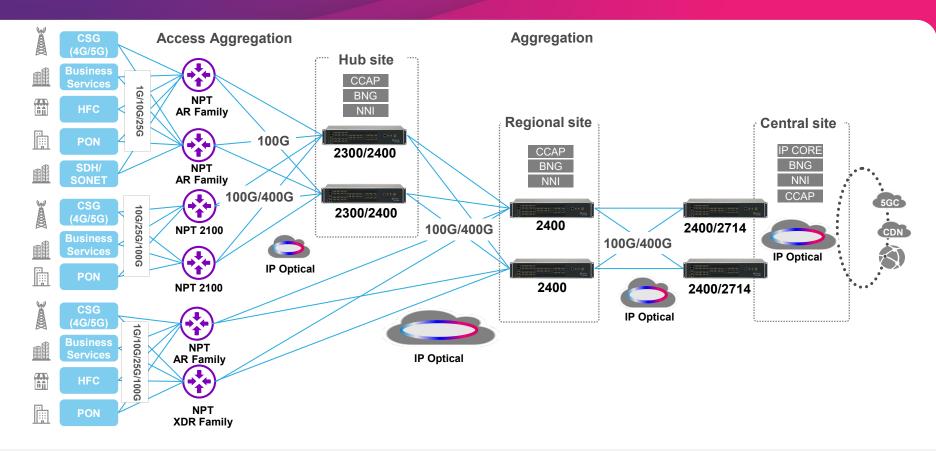


New NPT XDR 2000 Series Products

	Nev	v XDR 2000 Series R	Routers	
NPT 2400 High performance IP/MPLS Router	4.8T	J2: Optimized for 100G/400G interfaces	 100G/400G Metro Aggregation with DCO Extended TCAM \$/Bit Disruption for IP/MPLS NEs 	
NPT 2300 Multiservice IP/MPLS Router	2.4T	J2C: Optimized to support GE/10G/25G/100G/400G interfaces	 High-Capacity Modular Multi-Service Investment protection for NPT 1300 Mid-Capacity 400G Metro w/ DCO 	_/
NPT 2100 High performance Access Router	800G	Q2A: Optimized to support GE/10G/25G/100G/400G interfaces	Aggregating 1G/10G onto 100G rings Large 5G Cell Site Router 25G Access Low-Capacity 100G Metro with DCO	
NPT 1100 Access Edge Router	300G	QAX: Optimized to support GE/10G/25G/100G interfaces	10G AccessCell Site RouterLow-Capacity 100GMetro with DCO	
	Capacity	NPU Silicon	Application	



NPT Portfolio in Dual Homed Middle Mile





How NPT Helps You Succeed













AR Routers









XDR Routers



Proven Automated IP

Industry leading practical automation orchestration of proven IP portfolio and routing stack



Coherent Routing

Full support of coherent pluggables seamlessly supporting IPoDWDM, IPoOLS, IPoOLS



Optimized for the Middle Mile

Service-aware aggregation providing multiservice access, and performance guaranteed transport



Open Architecture

Ribbon's carrier-grade IP Wave rNOS spans across the whole portfolio and open, standards compliant, interfaces



Engineered for need

Right-fit, multilayer integration with IPoDWDM, IPoOLS, Colored/coherent interfaces



Better Economics

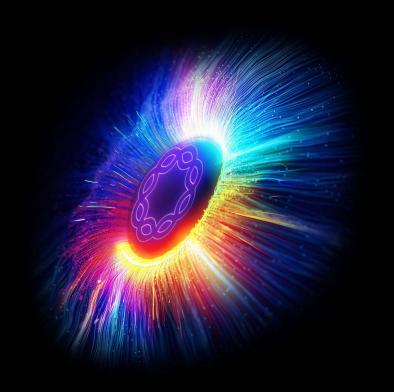
Right-fit form factors; modular, scalable, cost optimized supported by consulting and design tools



ribbon' INSIGHTS



ribbon INSIGHTS



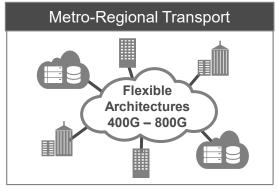
Apollo Optical Networking

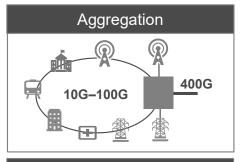
Rafi Leiman

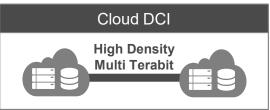
VP PLM Optical Networking



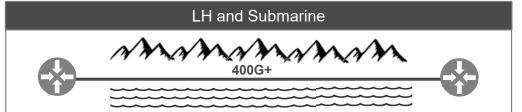
Why Apollo Very Strong Recognized Technology Addressing All Applications

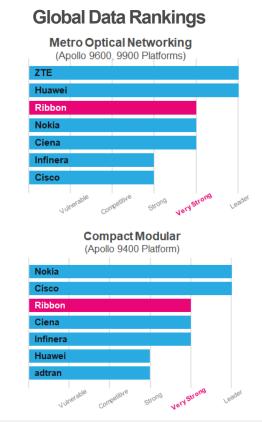














Apollo Optical Networking Portfolio

9400 Series High Density Applications

- Compact modular OT and **OLS** platforms
- Data center optimized with telco NEBS



9408

9458

9600 Series **Modular Applications**

- Rich set of transmission and OLS cards, usable across all platforms without engineering rules
- · Telco and data center







9608/D

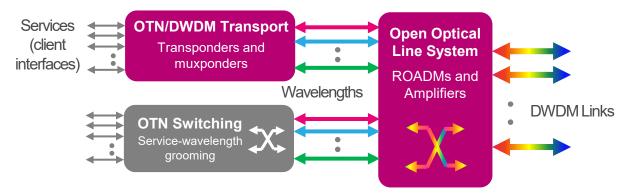


9624

9900 Series Scalable OTN Switching

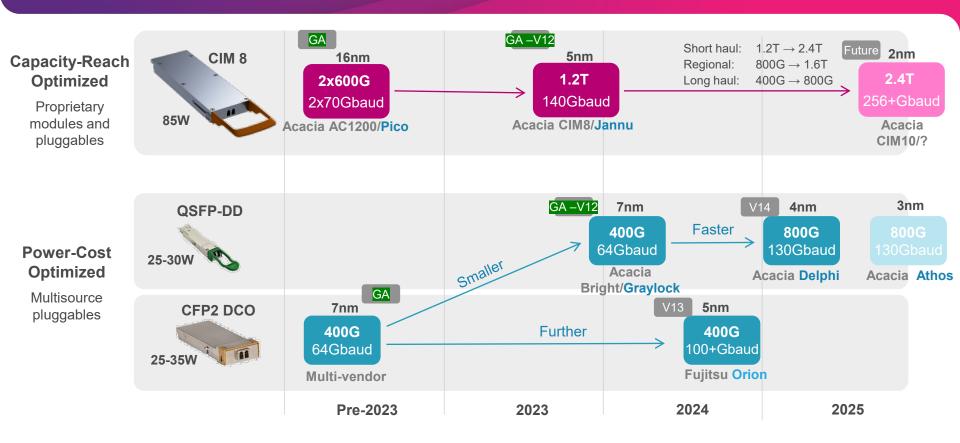
- Optimize wavelength fill
- Point-and-click provisioning

ASON restoration 9901X 9904X 9914 9932 400G 2.8T 5.6T 16T



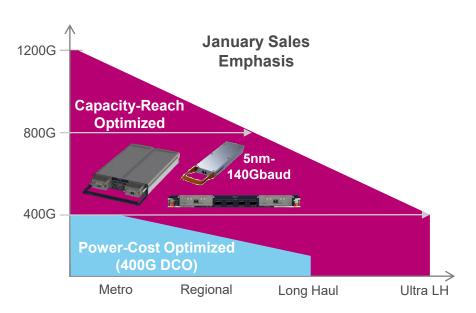


Apollo Roadmap for Industry-Best 0dbm+ Transceivers

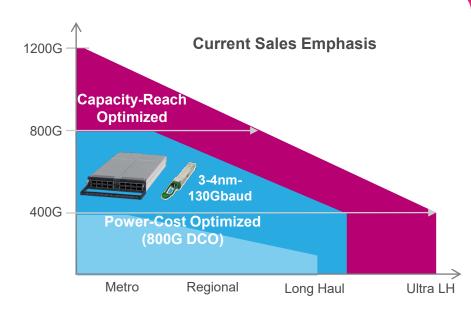




How to Engage New Customers



Capacity-reach optimized solutions where our 5nm-140Gbaud technology had nearly a year's lead



Power-cost optimized solutions where customer:

- Starts with 400G today
- Uniquely upgrades to 800G using 3-4nm-130Gbaud technology in 1H-2025



Apollo Options for 100GbE and 400GbE Transport

Apollo 9408 High Density Applications



Data Center 600mm deep F2B airflow

Apollo 9600 Series Modular Applications



R2L airflow (9608D F2B airflow)

Capacity-Reach (Performance) **Optimized**



TM800_2 with 2 x CIM8





5nm-140Gbaud to 800G

Power-Cost Optimized



TM400_2 with 2 x CFP2-DCO





- · 0dBM 400G Metro
- 0dbM 400G LH



Apollo Competitive Advantage

Capacity-Reach Optimized

1st to market 5nm-140Gbaud

- 1.2T DCI
- 800G Metro-Regional
- 400G ULH

Exclusive pluggable transceiver (except Cisco)

Ultra-low power < 0.12W/G

Compact modular and standard telco platforms

Apollo time advantage window is closing – SELL NOW



Power-Cost Optimized

Unique ability to deploy 400GZR+ today with an upgrade to 800G in 1H-2025 on the same blade

	🖒 ribbon	cisco.	ciena	NOKIA	% Infinera
800G Ready	Yes	No	No	No	No
2RU Density 400G	12.8T	12.8T	4.8T	3.2T	3.2T
2RU Density 800G	25.6T	N/A	N/A	N/A	N/A

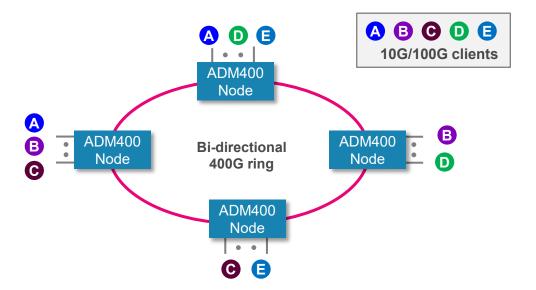
Attack Infinera outside of NA, where Nokia will be looking to replace that embedded base with Nokia products

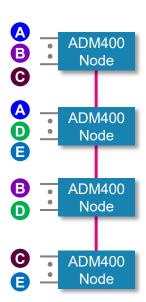




Apollo 9603 ADM400 Node for Ring and Chain Applications







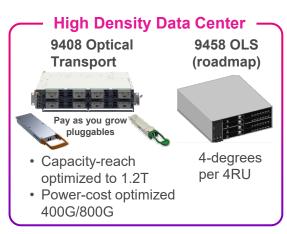


Complete Set of Building Blocks for All Applications

	OTN/DWDI	M Transport	Optical Line Systems	OTN Switching
Solution Type	Capacity-Reach Optimized	Power-Cost Optimized		
	9400 Se 9600	9900 Series		
Access Aggregation Point to point DCI		400G: ADM400 200G: CMR200 TM200EN 10G: AoC10C TR10_12R 400G: MPQ_8	EDFA & Raman amplifiers 4 - 20 degree ROADMs with multiple CDC-F options OTDR cards	9901X
Metro Networks	1.2T : MPJ1200_2 800G : TM800_2	FPQ_2 TM400_2 TM400ENB/R (encryption)		9904X
		200G: TR200_2		
Regional/LH Networks	400G: MPJ1200_2 TM800_2			9914 9932

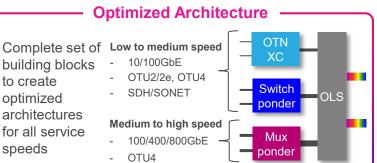


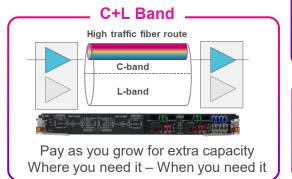
Apollo Optical Networking Highlights



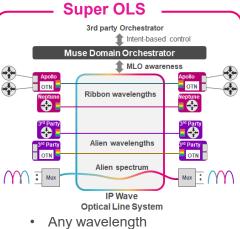


Unlimited 400G





OpenROADM interop



- Shared spectrum
- Dynamic WSON restoration
- Optical and fiber health







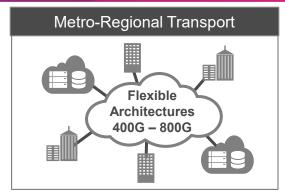
gNMI telemetry

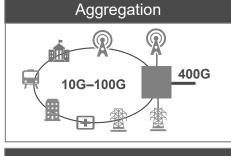
Optical overlay for SDN applications

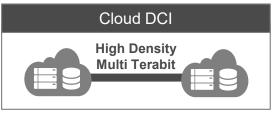


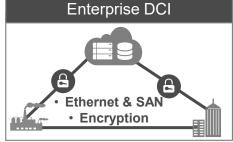
Why Apollo Addresses All Applications

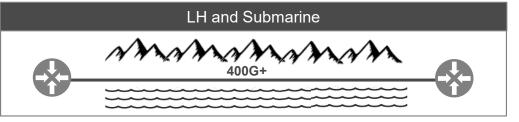
Questions?











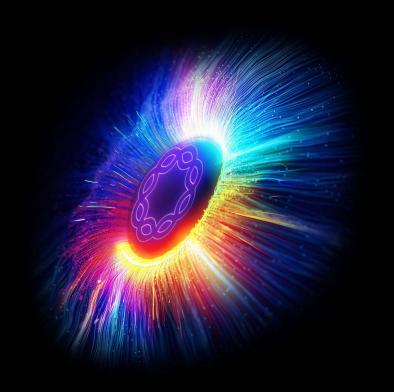


Thank You





ribbon INSIGHTS



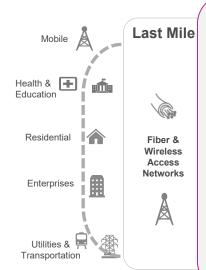
Selling to Mission Critical Private Network Verticals

David Stokes

Head of IP Solution and Portfolio Marketing



Today's Typical Networks



Middle Mile

- Multiple different "bespoke" backhaul networks
- Difficult to guarantee service performance
- Expensive to scale
- Nailed up connectivity
- Challenging to manage

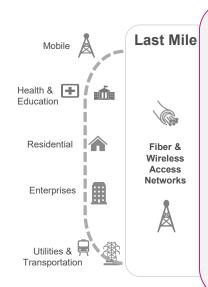
Core



User Applications
Network Services
Command & Control



Ribbon's Intelligent Middle Mile



Ribbon's Intelligent Middle Mile

Service Aware, Forecast Tolerant, Intent Driven



Intelligent Automated SDN **Multilayer Domain Control**



Service Aware

IP Routing & Packet Transport



APOLL

Lowest cost per bit
Optical Networking



Core



User Applications Network Services Command & Control



Where Ribbon's Intelligent Middle Mile Plays

Not supported by Ribbon's Intelligent Middle Mile

Market **Sectors**

Access Aggregation and Pre-Aggregation

Aggregation

Service Edge & Core

Applications & Services

Mobile 5G xhaul MBH

Enterprises

TDM Migration

Residential Broadband

Smart Cities

Government

Transportation

Utilities

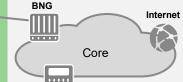
Defense

Backhaul

Cell Site Router

Access Aggregation & Transport

Aggregation & Transport



Data Center

Interconnect

Service Aware

Packet and Optical

Transport

Mission Critical Class

with Service Isolation

 (\mathbf{X})

DCBR

CMTS

DCBR

















Carrier Ethernet 4G/5G xHaul **VPNs**

5G FH, MH, BH

MBH

Ethernet, TDM

- **Broadband Backhaul**
- **Enterprise Services**
- **TDM Migration**
- Converged Multiservice Aggregation

Access Aggregation & Transport

(MSO Regional Hub)

Aggregation & Transport (MSO Headend)

Converged Interconnect Network

Access Aggregation, Aggregation, **Transport**

Mission Critical Class with Service Isolation

- Mission-critical class services
- Legacy Migration

FTTx FWA

DOCSIS

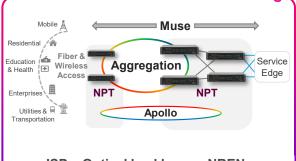
Coherent Routing Integrated with OT Helps Differentiate Ribbon

MULTI-LAYER DOMAIN CONTROL Coherent OLS ZR/ZR+ Routing (optional) without OT ZR+ ZR/ZR+ **OpenROADM** Coherent **Proprietary Routing with** OLS ОТ OT book-ended OT Gray



Ribbon Are Trusted As Middle Mile Experts

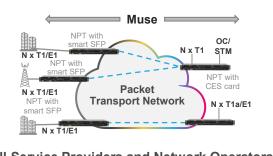
.Broadband Backhaul & Networking .



ISPs, Optical backbones, NRENs

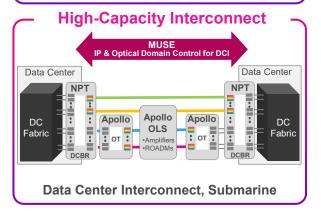
Muse Muse Macro NPT NPT NPT Apollo Aggregation site Mobile Operators, Backhaul Wholesalers

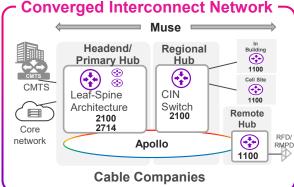




All Service Providers and Network Operators

Critical Infrastructure Muse Multi-stack MPLS NPT Deterministic, Packet Transport Apollo Defense, Utilities, Transportation

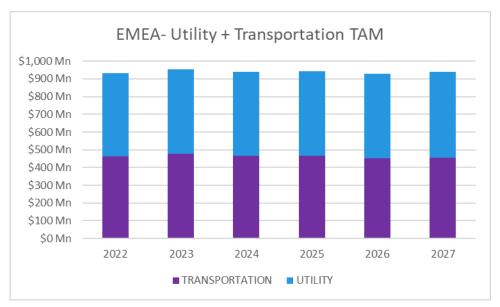






Mission Critical Networks: Large Opportunity For Ribbon's Partners

- Urgent need to modernize to become smart
- Telecoms is at the heart of this modernization
- Broadband evolution increases the TAM



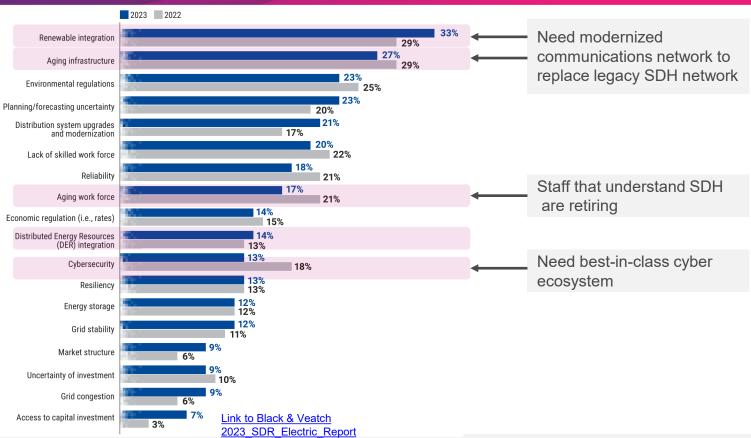
Source: Cignal AI & Ribbon

Ribbon's IP Optical Middle Mile For Mission Critical Networks Optimized For Critical Infrastructure Modernization, Field-proven Globally



Example: Issues Facing Utilities in North America

What are the three most challenging issues facing the electric industry in your region today





Telecommunications is the Foundation for Modernization

Critical Infrastructures must become "SMART"

- Digitalization, decarbonization, regulation, economics, and new applications driven by customers and regulators
- Evolution in Field Area Networks (FANs), 5G, FRMCS, sensors, AMI, drives huge increase in communication traffic
- Need to transport information securely in real-time
- "SMART" needs a modernized communications network
 - SDH networks are end-of-life AND not suitable for today's applications and devices
 - Need a deterministic packet and optical transport network able to support multiple legacy and emerging devices and applications



Traditional and Evolving Requirements

Mission Critical 1.0

- Rapid recovery in the event of failures
- "Always-on", robust faulttolerant network
- Strict performance constrains

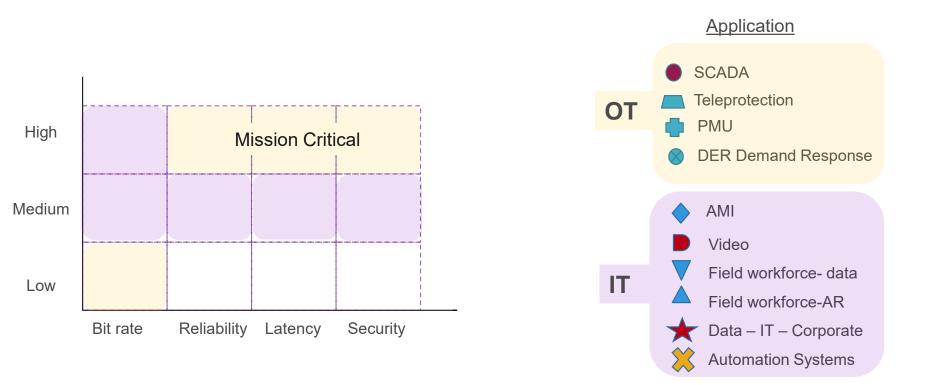


Mission Critical 2.0

- Network Growth
- Migration to Ethernet, IP traffic
- Seamless transition path to new technologies
- Secure convergence of IT and OT traffic
- Cybersecurity
- Virtualization and Edge/Fog Computing
- Smart everything
- Massive deployment of advanced FAN technology
- Broadband Capable



Not All Services are Created Equal

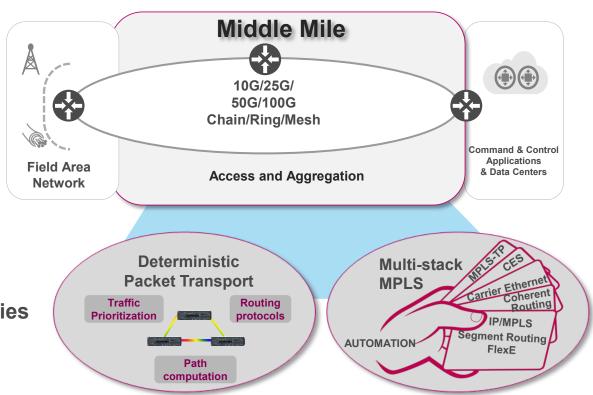


Challenge To Converge OT And IT Networks



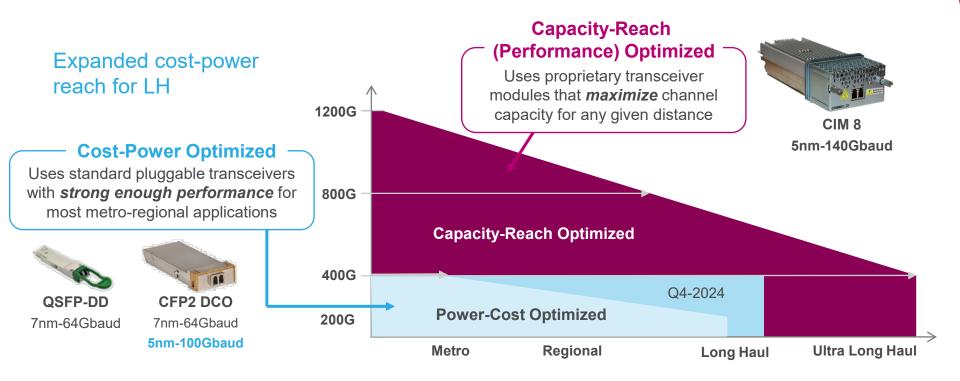
NPT – A Trusted Proven Platform In Mission Critical Networks

- All devices with Multiple Interfaces
 - Legacy PCM
 - Legacy SDH
 - Modern devices
- Multiple FANs
- Deterministic & Dynamic Packet Transport
- Right-fit packet transport technologies and topologies
- Right-fit form factors
- Automated



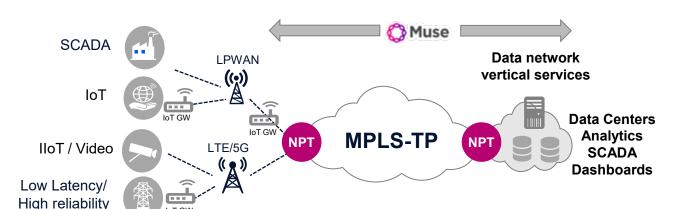


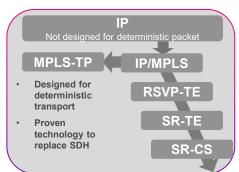
Ribbon's Industry Leading Optical Networking





Mission Critical Operators Trust MPLS-TP





Transport-like OAM

IoT GW

- In-band OAM
- Performance monitoring for SLA verification
- Alarms and fault notifications

Transport-like Operations

- SDH look and feel
- No IP forwarding or control plane
- Static provisioning
- Operation through NMS
- Bi-directional paths
- IEEE 1588v2 and Sync Ethernet

Transport-like Resilience

- Sub-50ms OAM driven protection switching
- Linear (1+1, 1:1, 1:N) and Ring protection
- Short and assured E2E latency and jitter



Continuous Modernization of NPT for Mission Critical Operators



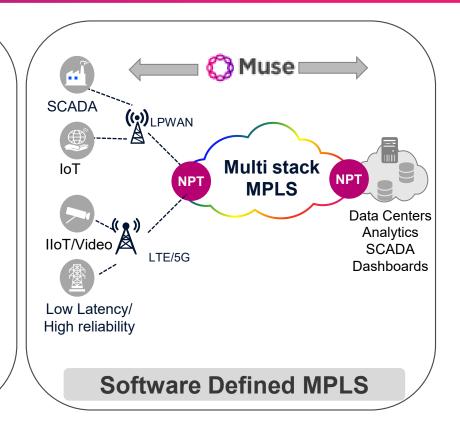


1012D

eEXT-2UH

- 1012D DIN Rail Mountable
 - Temperature Hardened -20c to +65C
- Extension shelf allows PCM services
 - (FXS, FXO, etc)
- MACsec cards
 - 100G or 400G slots
- Protection switch by service degrade
 - For CESoMPLS services using MPLS-TP

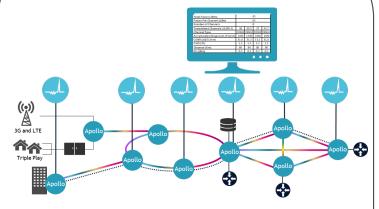
New AR 1000 Series Routers





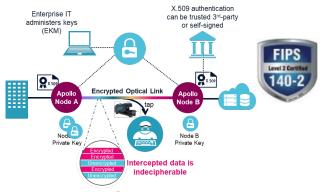
Apollo Meets Needs of Mission Critical Operators

Fiber Health Management



- Integrated solution
- Monitoring of optical power, noise, OSNR, distance, rate, etc...
- **Trend analysis** for preventive maintenance and pin-point location of fiber cuts

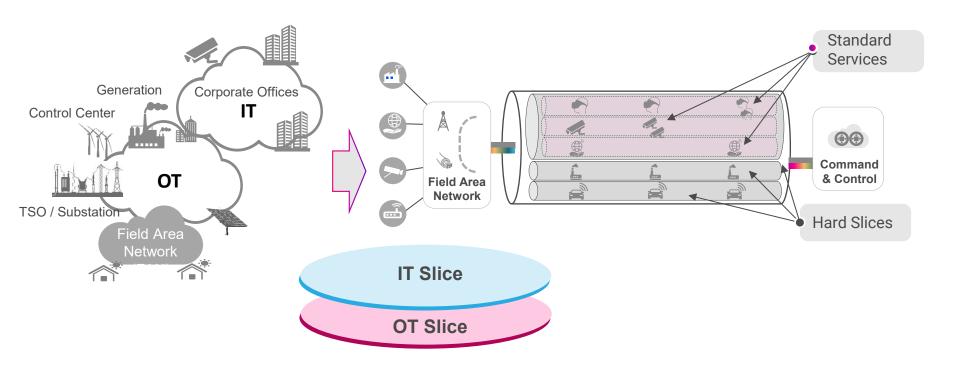
Optical Encryption



- High-level AES-256 encoding
- Customer key administration
- FIPS 140-2 certified
- Per-service or entire wavelength encryption
- No impact on latency and overhead



Convergence With Segregation A Ribbon Differentiator



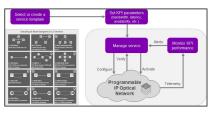


Muse Is The Secret Sauce That Helps You Position

Network Automation

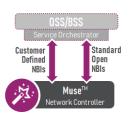


Workflow Engine

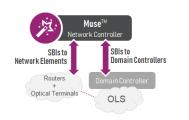


Closed Loop Automation

Multi-Vendor and OSS Integration



Flexible NBI



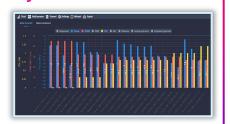
Flexible SBI

Advanced Analytics



Network Insights

19



Network Health

Cloud Native Architecture



Microservices Architecture



K8S Infrastructure

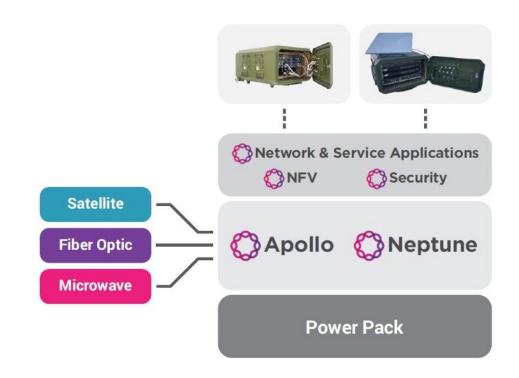


Ribbon's Network In A Box

Rapid Disaster Recovery Solution

Dedicated teams provide expertise & immediate solutions

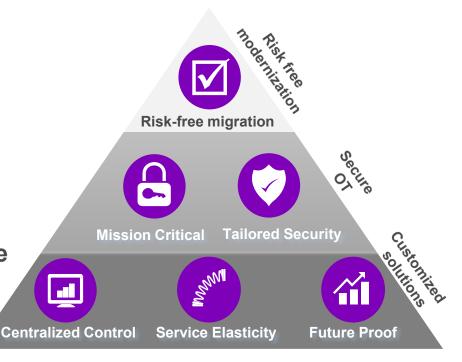
- · Pre-packaged and tailorable solutions
- · Multiple connectivity options
- Multi-technology integration
- Redundancy options
- Optional military grade connectors
- Cyber security options





Ribbon Brings Your Customers Field Proven, Risk-free Migration

- Risk-free transition:
 Field proven, tailorable migration
- Holistic Security:
 Protects Critical infrastructure from attack
- Optimized for Critical Infrastructure
 Mission critical grade platforms



Proven, Reliable, Secure, Tailored Modernization



Critical Infrastructure Competitive Overview

	Vendors focused on IP for Service Providers	Vendors focused on Optical for Service Providers	Vendors focused on Critical Infrastructure	C rippon	
Ability to Deliver	Prioritize T1s	Prioritize T1s	Prioritize Cls	Market Leading Delivery Times	
IP/Packet for Critical Infrastructure	Market leading L3/L2, Don't position MPLS-TP Limited support for legacy i/fs on new products	Limited IP experience and capabilities Support for MPLS-TP Lack support for legacy on new products	Cl optimized TDM modernization Support for MPLS-TP Not an expert and late to the market in IP	 CI optimized TDM modernization Multi-stack MPLS provides rich L2/L3 Support for legacy i/fs over PTN 	
IP Optical Capabilities and Integration	Focus on IP Moderate optical integration Leaders in management solutions for IP	Focus on Optical Moderate IP integration Moderate IP mgmt capabilities	Weak or no layer 3 IP Weak DWDM Mgmt solutions optimized for CI, but old platforms	 Balanced IP Optical focus Rich integration story with coherent routing Leader in IP Optical mgmt. with Muse 	
Range of Products	Huge range IP of products, form factors	Great range of optical products, limited L3	Products optimized for CI, with fan-less, low-cost options	Modular, redundant hardware and interfaces optimized for Cl	



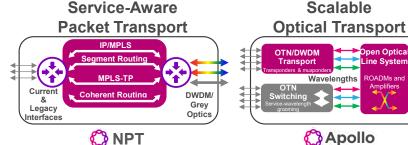
Ribbon Has the Toolkit for you to Win - You Win, We Win



Multi-layer Automated Network Control, Health and Security







- •Proven, Local Expertise, Experience and Processes
- Critical Infrastructure is a **key focus** and investment for Ribbon
- Technology architected for mission—
 critical class communications
- Muse Automation Removes the pain of making your network work
- Large vendor capability with **Startup**agility



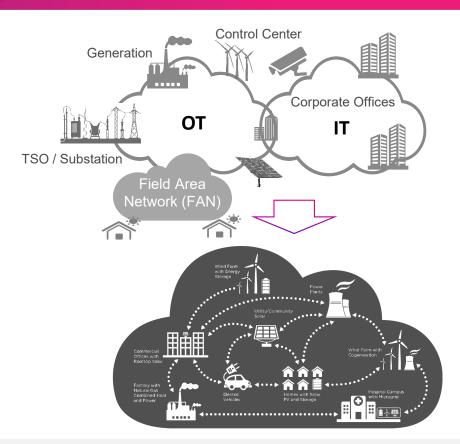
Utility Network Modernization





Trends in the Energy Industry

- The 3D's
- Migration to Ethernet/IP
 - Substation level → HSR/PRP, IEC 61850, IIoT
 - AMI → IEC 62056
 - Cyber security → IEC 62443 / BSI / NERC-CI
 - DER → IEEE 2030
- Massive growth in traffic and data volume
 - Video surveillance and CCTV
 - Asset Management, DERMS and DCS
 - WAMS and SIPS → huge number of PMUs and IIoT
 - Adoption of Cloud network topology and service models

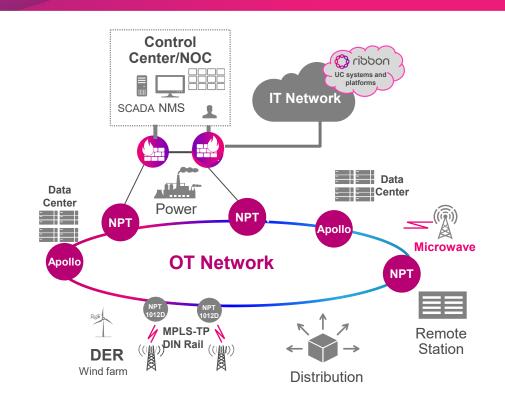




Ribbon: Providing Integrated, Tailorable Solutions for Utilities

Optimized for Utilities

- Risk-free Modernization
 - Multi-stack MPLS, proven processes
- Mission Critical Grade
 - Latency, jitter, avaliability, form factors
- Multi-layer Automated
 - Seamless IP Optical with advanced tools
- Tailorable and Scalable
 - Range of form factors
- Utility Network Secuirty & Standards Compliant
 - Secure NE SDLC, ISO 27000, NERC-CIP enabled, Common Criteria
 - IEEE 1613, IEC 61850, IEC 62443, EM 50121, others

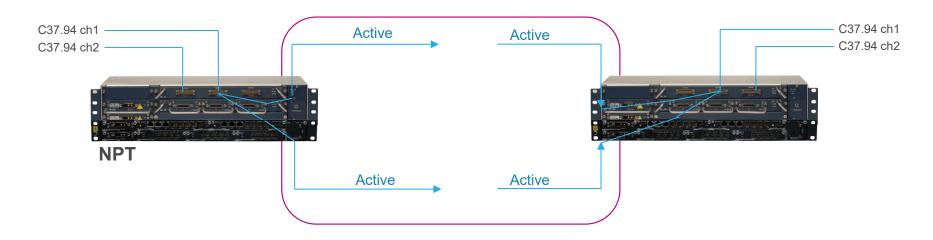




Proven Support for Teleprotection Services on MPLS-TP Network

EM 10E modules provide hitless switching with 1+1 transport layer protection, supporting:

- Teleprotection C37.94 services symmetry field proven in live networks in Austria and Switzerland
- Hitless switching to any EM_10 sub-module services
- Ensuring no packet losses during packet switching
- Equal latency for main and protection paths (LSPs are co-routed)

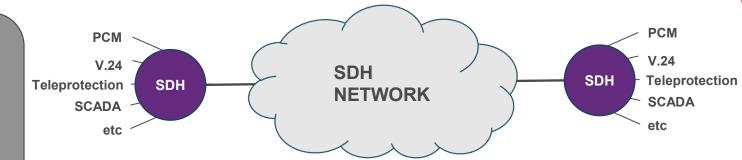




Risk-free migration - Initial Starting Point Can Be Different...

LEGACY SDH NETWORK

- End of Life
- Not optimized for transporting new packetbased OT service and applications



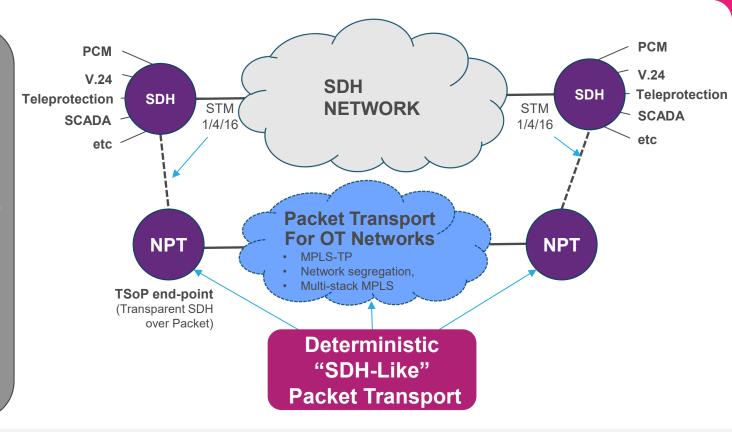


Risk-free migration - STEP 1: Underlay Packet Transport Network

UNDERLAY NETWORK

- 1. Build new PTN underlay infrastructure.*
- NPT supports SDH Endpoints (STM-1/4/16)
- Create Transparent HO-CES Services on MPLS-TP Network
- 4. Test TSoP bearer services.
- Physically migrate the WAN Service End-Points onto the new Transport network keeping the SDH OH information for DCN connectivity etc.

*e.g. BiDi SFPs possible, if fibers are limited

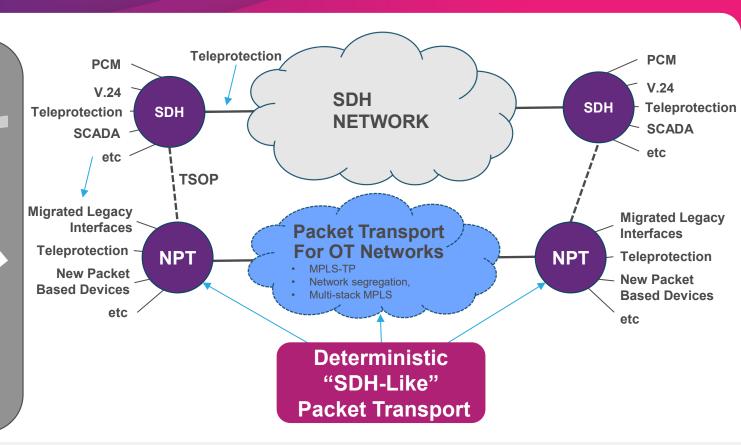




Risk-free migration - STEP 2: Move Client End-Points

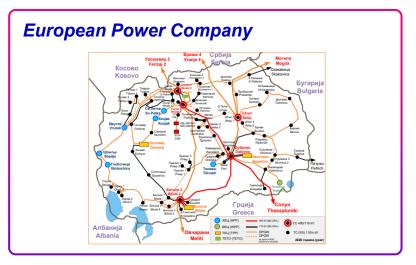
RISK-FREE TAILORED MIGRATION

- Migrate End Points from legacy to new Packet Transport Network (PTN).
 At rate you want.
- Support new packetbased end points
- Teleprotection remains on SDH until confident to move to MPLS-TP

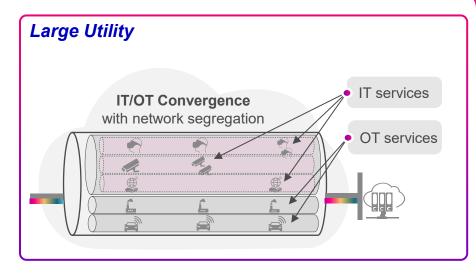




Case Study Examples



- Field proven, risk-free, for migrating legacy network, using CES in conjunction with MPLS-TP
- Multi-stack IP/MPLS and MPLS-TP



 Complete IP Optical network with multilayer slicing based on SR-TE, Flex-Algo, FlexE, MPLS-TP, Wavelengths



Battlecard Risk Free Modernization for Energy Companies

Elevator Pitch Bullet Points:

- Field proven support of Teleprotection with CES & MPLS-TP
- Field proven mission critical technology, processes, people
- Seamless, risk-free, tailored migration based on 50+ years working with power industries
- Guaranteed deterministic performance, with multi-stack MPLS

Control Center/NOC

SCADA NMS

Electric Vehicles

OT Network

- MPLS-TP for SDH performance on the packet network
- Support for legacy PCM interfaces Data
- IT/OT convergence with network slicing for segregation
- Evolution to Utelco by extending IT/OT network
- Automated lifecycle management

7 1011011101101111	ooyere management
Applications	Interfaces
ICS/SCADA/ IIoT	V.35, X.21, RS-232/V.24, RS-449, V.36/V.11, Ethernet
Tele-protection	IEEE C37.94 , E&M, G.703 CoDir, serial, E1/T1
Voice	Ethernet, E1/T1, FXO/FXS/E&M, Omnibus
Video	Ethernet with PoE+
SONET	STS-1, OC-12, OC-3, DS1, DS3
SDH	STM-1, STM-4

Advantage-Benefit	Solution Features		
Packet Transport architected for power industry comms	Multi-stack MPLS simultaneously supports MPLS-TP, IP/MPLS, SR-TE, RSVP-TE, FlexE		
Form factors optimized for power industry comms	From DIN-rail to 6RU, modular, redundant, temperature hardened form factors.		
Integrated solution for multi- service access aggregation	CES for SDH/SONET and multi-stack MPLS for packet services on integrated aggregation platforms		
Single, segregated, network for IT/OT convergence	Use hard network slicing techniques to segregated network		
Best use of IP/Optical network resources	Coherent routing supported by Muse multilayer management system		
Improved operations lifecycle	Muse provides advanced tools for fault-free provisioning, rapid fault localization and fiber health		
Supports continuous network evolution	Multi-stack MPLS support seamless introduction of new routing technology's		

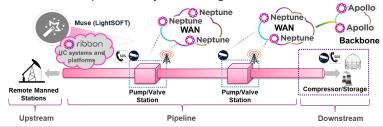
	Ribbon	Cisco	Ciena	Nokia	OTN	ABB
TDM to IP Migration	MPLS-TP CI optimized	Don't position MPLS-TP	MPLS-TP , old hardware	Don't position MPLS-TP	MPLS-TP , old hardware	MPLS-TP
IP Optical	Well integrated	Focus on RON	Focus on optical	Weak integration	No L3 IP, no DWDM	Weak L3, no DWDM
Management System	A leader in IP Optical	Leader in IP	Moderate IP Optical integration	IP Optical integration	CI Optimized but old	CI Optimized but old
Range of Products	Modular, redundant hardware	Huge range	Great optical, limited L3	Huge range	Good, with fanless & low-cost	Limited & high price



Battlecard Risk Free Modernization for Oil, Gas, Water

Elevator Pitch Bullet Points:

- Seamless, risk-free, tailored migration based on 50+ years working with power industries
- Field proven mission critical technology, processes, people
- Guaranteed deterministic performance, with multi-stack MPLS
- MPLS-TP provides SDH/SONET performance on packet network
- Support for legacy PCM interfaces
- IT/OT convergence with network slicing for segregation
- Evolution to Utelco by extending IT/OT network
- Automated IP Optical lifecycle management



Applications	Interfaces
ICS/SCADA/ IIoT	V.35, X.21, RS-232/V.24, RS-449, V.36/V.11, Ethernet
Voice	Ethernet, E1/T1, FXO/FXS/E&M, Omnibus
Video	Ethernet with PoE+
SONET	STS-1, OC-12, OC-3, DS1, DS3
SDH	STM-1, STM-4

Advantage-Benefit	Solution Features			
Packet Transport architected for power industry comms	Multi-stack MPLS simultaneously supports MPLS-TP, IP/MPLS, SR-TE, RSVP-TE, FlexE			
Form factors optimized for power industry comms	From DIN-rail to 6RU, modular, redundant, temperature hardened form factors.			
Integrated solution for multi- service access aggregation	CES for SDH/SONET and multi-stack MPLS for packet services on integrated aggregation platforms			
Single, segregated, network for IT/OT convergence	Use hard network slicing techniques to segregated network			
Best use of IP/Optical network resources	Coherent routing supported by Muse multilayer management system			
Improved operations lifecycle	Muse provides advanced tools for fault-free provisioning, rapid fault localization and fiber health			
Supports continuous network evolution	Multi-stack MPLS support seamless introduction of new routing technology's			

	Ribbon	Cisco	Ciena	Nokia	OTN	ABB
TDM to IP Migration	MPLS-TP CI optimized	Don't position MPLS-TP	MPLS-TP , old hardware	Don't position MPLS-TP	MPLS-TP , old hardware	MPLS-TP
IP Optical	Well integrated	Focus on RON	Focus on optical	Weak integration	No L3 IP, no DWDM	Weak L3, no DWDM
Management System	A leader in IP Optical	Leader in IP	Moderate IP Optical integration	IP Optical integration	CI Optimized but old	CI Optimized but old
Range of Products	Modular, redundant hardware	Huge range	Great optical, limited L3	Huge range	Good, with fanless & low-cost	Limited & high price



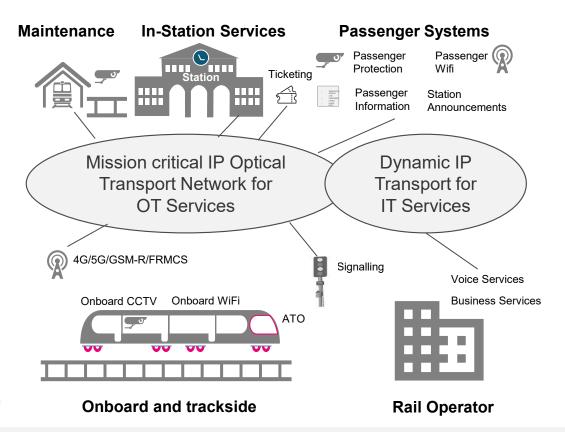
Transportation Network Modernization





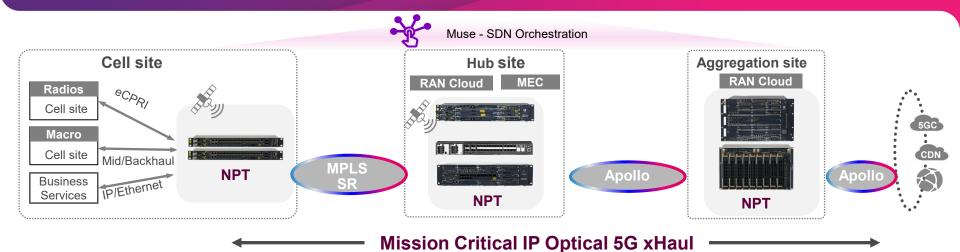
Evolution of the Rail Network

- Intelligent Automation
 - ERTMS, CBTC, RAMS and security, while increasing train frequency
- FRMCS
 - Next generation wireless communications
- Electrification and digitization
- Smart Mobility
 - Ticketing, Wi-Fi, infotainment, station monitoring and management
- Value Added Services
 - U-telco and other business
 initiatives
 Trackside Monitoring





Spotlight on FRMCS



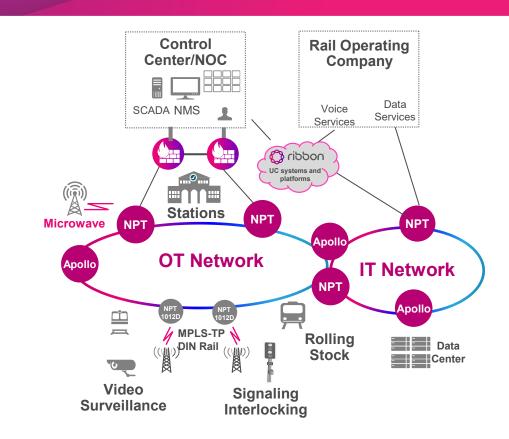
- **Proven 5G xHaul Expertise** with multiple form factors, advanced synchronization, multiple architectures, network slicing
- Leader In Mission Critical IP Optical Transport –with deterministic packet transport SR-MPLS and Dual Stack IP/MPLS & MPLS-TP, high availability with topology and hardware redundancy
- Automated IP Optical with automated multilayer lifecycle management



Ribbon: Providing Integrated, Tailorable Solutions for Rail

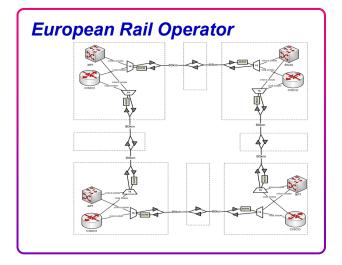
IP Optical Middle Mile Optimized for Rail

- FRMCS enabled
- Supports multiple access networks
- Industry leading Optical backbone solutions
- Mission Critical Grade
- Multilayer Automated
- Tailorable and Scalable
- Network Security & Standards Compliant

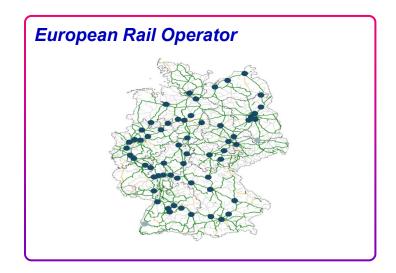




Case Study Examples



- Optical Backbone and Regional networks
- SDH to PTN modernization with CES and MPLS-TP, for station connectivity



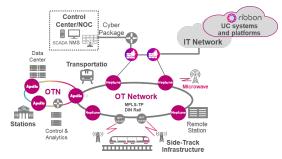
- State-of-the-art, highly resilient, scalable nationwide DWDM network
- Multiservice with scalability for future proof service growth as required



Battlecard Risk Free Modernization for Rail/Subway

Elevator Pitch Bullet Points:

- Support for FRMCS evolution with mission critical xHaul
- Seamless, risk-free, tailored migration based on 50+ years working with power industries
- Field proven mission critical technology, processes, people
- Guaranteed deterministic performance, with multi-stack MPLS
- MPLS-TP provides SDH performance on packet network
- Support for legacy PCM interfaces
- IT/OT convergence with network slicing for segregation
- Evolution to Utelco by extending IT/OT network
- Automated IP Optical lifecycle management



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Supports continuous network evolution	5G capabilities for FRMCS xHaul & multi-stack MPLS supports new routing technologies, as required		

	Ribbon	Cisco	Ciena	Nokia	OTN	ABB
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Smart City Network Modernization





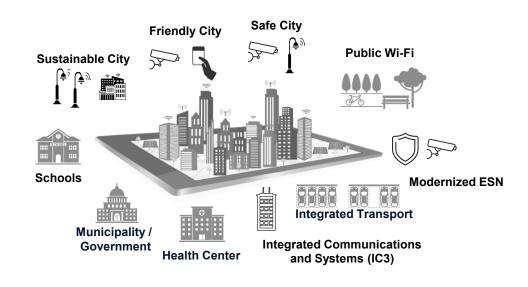
Cities Compete With Each Other, Locally and Globally

Drives Need for:

IoT, IIoT, AloT and CCTV

Requires a next generation communications network which is:

- Multi-tenant
- Supports multiple access networks
- Service-aware
- Scalable Bandwidth
- Highly reliable, always-available
- Secure





Case Study: Smart City Infrastructure

Traffic Sources



Connectivity of municipal buildings and services



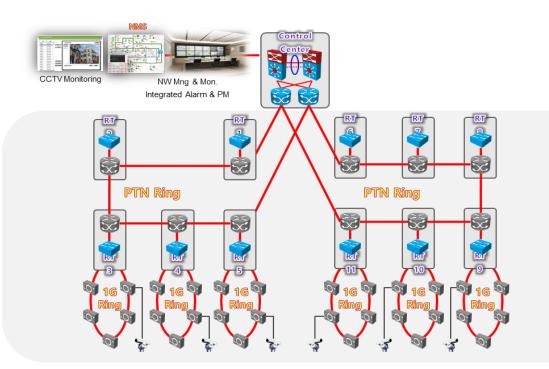
Traffic intersection surveillance



Safe City surveillance



Private network services



Control Center

Backbone:

Service delivery to meet performance needs

Aggregation:

Mission Critical and Best Effort Services

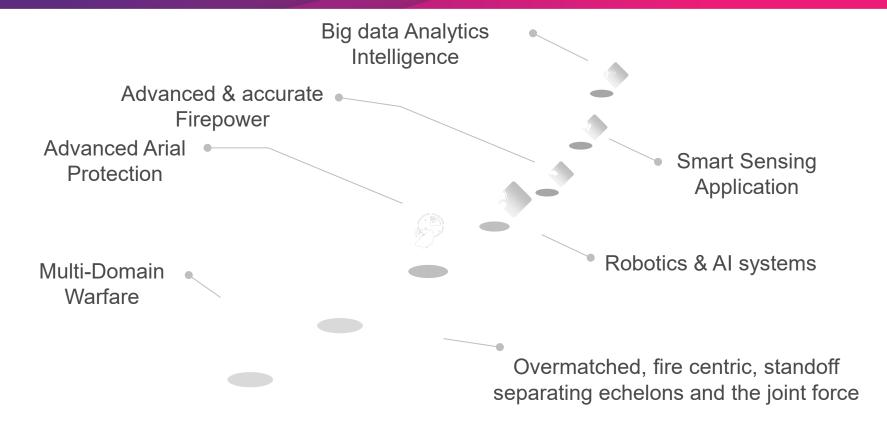


Defence Network Modernization

ribbon'
INSIGHTS



We Are In The Military Digitalization Era



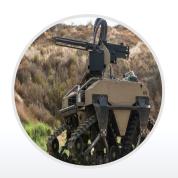


With Modernization Comes a New Set of Services

Interactive AR/VR



Autonomous Vehicles



M2M and Hive Traffic



Smarter Everything













Ribbon Turnkey Solution Provider

- Optimized to meet military standards and demands
- Putting experience of military networks into practice
- Full integration of COTS and non-COTS assets
- Nimble enough to react

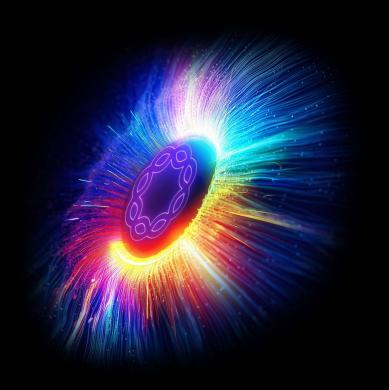




ribbon' INSIGHTS



ribbon INSIGHTS



Selling to Data Centers and **Enterprises**



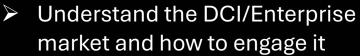
Jonathan Homa

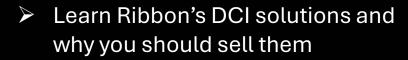
Filipe Correia

Goals for this Session



Data Center Interconnect (DCI)









DCI Markets

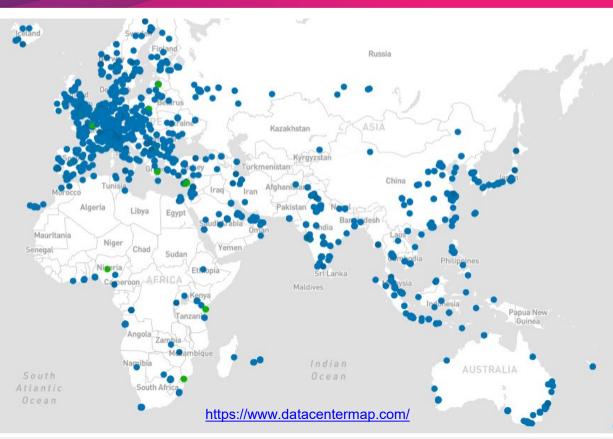
ribbon INSIGHTS



Data Centers Proliferation

10,000+ data centers worldwide consuming over 2% of electrical power







Three Main Types of Data Centers



Cloud Services

Used by cloud services providers like AWS, Azure, Google, IBM Cloud, and other public cloud providers, to host data and application services.



Colocation

Provides infrastructure such as space, cooling, bandwidth, and security to companies, who install data center elements including servers, storage, and firewalls.



Enterprise

Built, owned, and operated by companies for their internal use. Often they are housed on the corporate campus.



100 ↑ 1000

Approximate number of European target customers



Top European Cloud and CoLo Data Centers

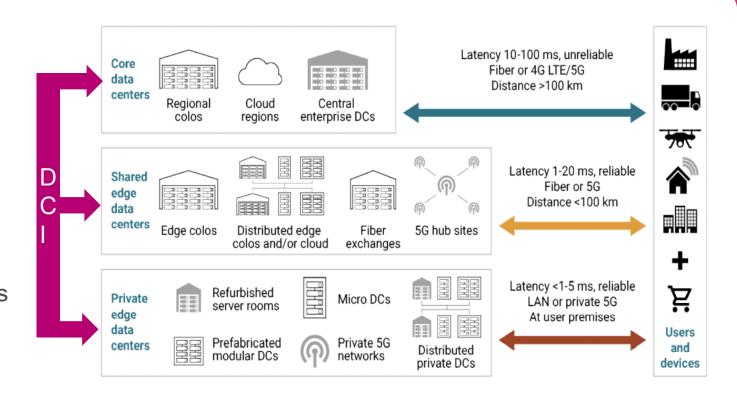
Amazon Web Services (AWS)	Cloud	Global
Microsoft Azure	Cloud	Global
Google Cloud Platform (GCP)	Cloud	Global
Meta Platforms (Facebook)	Internal Use	Global
Equinix	Retail	Global
Digital Realty	Wholesale	Global
NTT Global Data Centers	Wholesale	Global
KDDI / Telehouse	Retail	Global
Alibaba Cloud	Cloud	Global
Oracle Cloud	Cloud	Global
Vantage Data Centers	Wholesale	Global
STACK Infrastructure	Wholesale	Global
EdgeConneX	Hybrid	Global
IBM Cloud	Cloud	Global
Tencent Cloud	Cloud	Global
Yondr Group	Wholesale	Global
DigitalOcean	Cloud	Global
Linode	Cloud	Global
OVHcloud	Cloud	Europe, North America
Leaseweb	Cloud	Europe, North America
Global Switch	Wholesale	Europe, Asia Pacific
Colt Data Centre Services (DCS)	Wholesale	Europe, Asia Pacific
Ark Data Centres	Wholesale	Europe
Aruba Cloud	Retail	Europe
AtlasEdge Data Centres	Retail	Europe
atNorth	Hybrid	Europe
Bulk Infrastructure	Wholesale	Europe
DATA4	Wholesale	Europe
Echelon Data Centres	Wholesale	Europe
Global Technical Realty (GTR)	Wholesale	Europe
GlobalConnect	Retail	Europe
Green Datacenter	Hybrid	Europe
Green Mountain	Wholesale	Europe
IRIDEOS	Retail	Europe
IXcellerate	Wholesale	Europe
Kao Data	Retail	Europe
maincubes	Retail	Europe
nLighten	Retail	Europe
Pulsant	Retail	Europe
Verne Global	Hybrid	Europe
VIRTUS Data Centres	Wholesale	Europe

Adam Ecotech	Retail	Europe
AQ Compute	Wholesale	Europe
Atman	Retail	Europe
ClusterPower	Wholesale	Europe
Conapto	Retail	Europe
Custodian Data Centres	Retail	Europe
Datum Datacentres	Retail	Europe
EcoDataCenter	Wholesale	Europe
Etix Everywhere	Retail	Europe
Eurofiber (Dataplace)	Retail	Europe
Hetzner	Cloud	Europe
Hyperco	Wholesale	Europe
iomart	Retail	Europe
K2 Data Centres	Wholesale	Europe
KevlinX	Wholesale	Europe
MERLIN Properties	Wholesale	Europe
Node4	Retail	Europe
NorthC Datacenters	Retail	Europe
Penta Infra	Retail	Europe
Proximity Data Centres	Retail	Europe
Start Campus	Wholesale	Europe
Stratus Data Centres	Wholesale	Europe
Switch Datacenters	Wholesale	Europe
4D Data Centres	Retail	Europe
Asanti Datacentres	Retail	Europe
Beyond.pl	Retail	Europe
Borealis Data Center	Retail	Europe
Euclyde Data Centers	Retail	Europe
European Data Hub (EDH)	Retail	Europe
firstcolo	Retail	Europe
IP House	Retail	Europe
LCL Data Centers	Retail	Europe
Netia	Retail	Europe
Netwise	Retail	Europe
SDC SpaceNet	Retail	Europe
Six Degrees Group (6DG)	Retail	Europe
Stellium Data Centres	Retail	Europe
Keppel DC REIT	Wholesale	Asia Pacific, Europe
Pure Data Centres	Hybrid	Asia Pacific, Europe



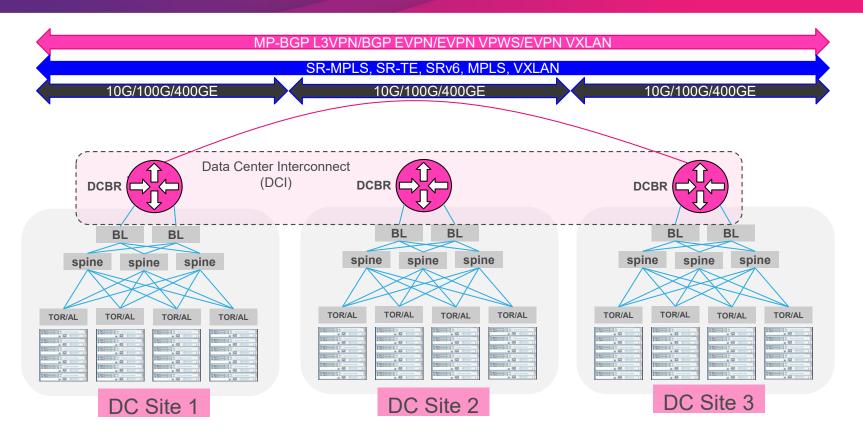
What Is Driving Data Center Interconnectivity

- Distribute data closer to users
- Backup or replicate data
- Mostly point-topoint connections





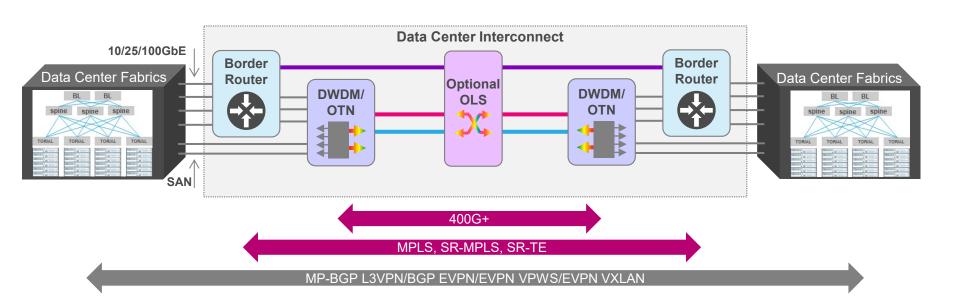
Data Center Infrastructure





DCI Solution Framework

SDN IP and Optical Domain Control for DCI

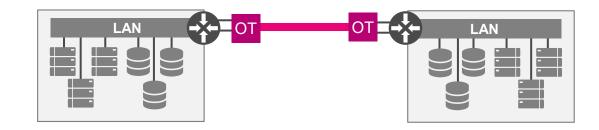




DCI Options for Ethernet Connectivity Only

- Data Center Border Routers (DCBRs) communicate with each other using integrated coherent optics (IPoDWDM)
- Each DCBR interface connection requires its own wavelength
- DCBRs communicate with each other using Optical Transport
- Multiple DCBR ports can be consolidated on a single wavelength

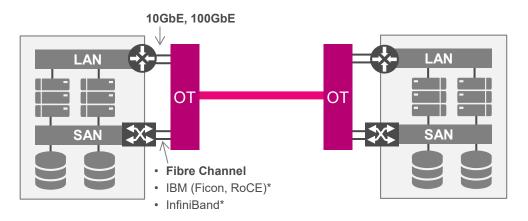






Typical Approach for Enterprise DCI with SAN

- SAN interconnect requires
 Optical Transport
- The typical approach is to consolidate all Ethernet and SAN connectivity on consolidated OT



*Supported by Apollo but not certified



Reasons to Consider Optical Transport

Coherent Routing (IPoDWDM)



Optical Transport (muxponders)



*An OLS is needed for amplification for links above 100km, and for ROADMs in multi-node solutions where wavelength routing flexibility is desired

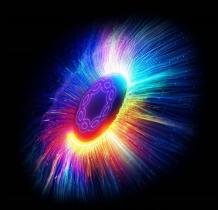
- Optical aggregation of multiple high-speed ports onto a single wavelength, with full throughput and zero latency
- Substantial **OAM** over the optical path, which is particularly important when the path traverses multiple ROADM nodes
- Support for SAN services such as Fibre Channel
- Layer 1 optical encryption

in its **totality** to determine the **optimal** economics, performance, and functionality



Use Cases

ribbon INSIGHTS



TelehouseCloud DCI

Customer Challenge

- Paris TH2 hub is one of the world's most connected data centers.
- Wanted to enable business customers to host IT infrastructures in its cost-effective suburban data center with high speed, reliable, low latency connectivity to TH2.

Why Ribbon

- Easy-to-provision high-performance transport for 100GbE and 400GbE clients
- Redundancy that enables Telehouse to guarantee its customers 99.999% service availability.
- Turnkey "white glove" solution and installation, tailored to Telehouse's needs.





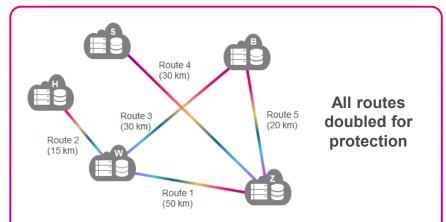
German Auto Manufacturer Enterprise DCI Application

Customer and Challenge

- Secure and resilient data center storage networking over dark fibers
 - Low latency for synchronous data replication
 - Redundancy for protection against failures
- Multiservice (Ethernet, Fibre Channel)
- Economical

Why Ribbon

- Multiservice for 1/10/100 GbE & FC16/32 clients
- Optical encryption for Fibre Channel links
- Superior optical performance and fiber health (OTDR) monitoring
- Close cooperation with channel partner and SP who supplied dark fiber



Services		Routes						
		#1	#2	#3	#4	#5		
SAN	32G FC	4						
SAN	16G FC	24						
	100 GbE	5						
LAN	10 Gb	5	1	1	1	1		
	1 GbE	6	1	1	1	1		



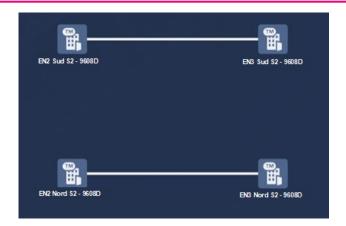
VA Telecom SP Delivering Enterprise DCI

Customer and Challenge

 Provide 400G DCI for Ethernet and FC services to an Enterprise customer

Why Ribbon

- Provided 400G connectivity between two DC sites through two fiber paths.
- Our compact and flexible solution with all embedded services was considered superior to competitor solutions (Adtran, Ekinops)
- Strong customer relationship, working with customer from project start.



South path

9608D per site carrying:

- 1x100GbE, 2x40GbE, 5x10GbE
- 3xFC32, 3xFC16

North path

9608D per site carrying

• 3xFC32, 3xFC16



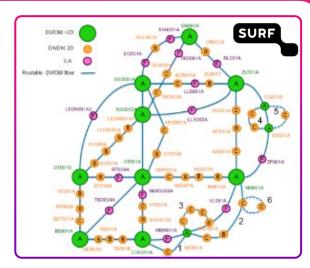
SURF NREN Enterprise DCI

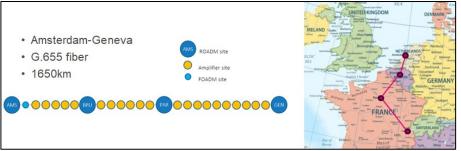
Customer and Challenge

- Serves over 190 Dutch education and research institutions over 11,000 km of dark fiber
- Needed flexible, high performance and high availability optical network for ICT innovation

Why Ribbon

- Technical and price merits on public tender, replacing incumbent Ciena
- Powerful flexible solution
 - National 200G backbone now upgrading to 400G
 - 2 x 400GbE link from Amsterdam to Geneva (25 hops with no regeneration)
 - Demonstrated 800G single-wavelength capability
 - Colorless-directionless multi-degree ROADMs with WSON dynamic restoration

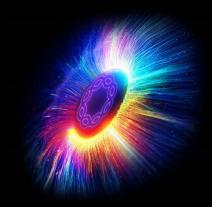






Ribbon Solutions and Bundles





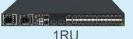
Ribbon DCI Solutions



Muse SDN Domain Controller with Low Code Automation

DCBR (MPLS)

100GZR/ZR+ and 400GZR/ZR+



0.8T capacity



2RU 4.8T capacity



6RU 14.4T capacity (2025)

Optical Transport (DWDM/OTN)

High Density 100GbE & 400GbE

Compact modular 2RU





Power-cost optimized 400GZR+ and 800GZR+



Capacity-reach optimized

- 1.2T/100km
- 800G/1200km
- 400G/3500km

Modular Applications: Ethernet, SAN, OLS

Multipurpose 2RU and 5RU (not shown)



Ethernet

2 x 400G

• 100GbE &

400GbE

Multi-service

- 1 x 400G
- Ethernet + SAN
- L1 Encryption

Other transport and OLS cards

Economical CPE

1RU



1GbE and 10GbE clients over 2 x 10G



NPT DCI Solution

	<u>Height</u>	<u>Capacity</u>	<u>NPU</u>	<u>Ports / Slots</u>			
NPT 2100	1RU	800G	Q2A	24x 10G/25G	2x 100G + 2x 400G		
NPT 2300	3RU	3T	J2C	7-Slot Chassis All NPT-1300 Cards 1x 400G; 2x 100G Cards	Packet-Switch Card: - 2x 100/200/400 QSFP-DD - 4x 100G QSFP28 - 8x 1/10/25 SFP28		Services: 2/L3 VPN EVPN 6VPE
NPT 2400	2RU	4.8T	J2	24x 100G	6x 400G	S	Jnderlay: SR-MPLS SR-TE IGP/BGP
NPT 2714	6RU	14.4T	J2C+	9 Slot Chassis 1.6T per card Red. Processor/ Fabric	F2B air-flow Multi-Speed Card MS w/ FlexE SFP/QSFP Card mix	P N I	Program: PCEP JETCONF BGP-LS TE FlexAlgo



Apollo DCI Platforms and Main Blades

Apollo 9408High Density Applications

Apollo 9600 SeriesModular Applications





Data Center 600mm deep F2B airflow



Telco 300mm deep R2L airflow (9608D F2B airflow)



Main solutions

Power-Cost Optimized Cards for up to 500Km



MPQ_8

- 8 x 400G
- 8 x 800G Ready

12.8T to 25.6T in 2RU!

TM400_2 2 x 400G



TM400ENB

1 x 400G

Ethernet + SAN services

Encryption

Capacity-Reach
Optimized Cards for
Long Haul or
Maximum Short Haul
(\$\$)



MPJ1200_22 x
1.2T 100km
800G 1000km

400G 3000km

TM800_22 x
800G 1000km
400G 3000km





Apollo 9408 w/ MPQ_8 Highest Density and Lowest Power 100GbE/400GbE DCI

- **Unique "Investment Protection" Value Proposition:** 400G today with upgradability to 800G on the same blade
- Highest 2RU density:

• 400G 12.8T • 800G 25.6T

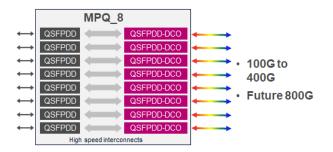
- Lowest power consumption
 - 400G 0.09W/G 800G 0.07W/G

Competition Killer for High Density **Cloud DCI**



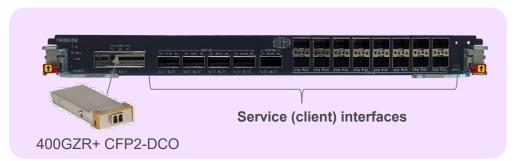
	C ribbon	cisco.	ciena	NOKIA	% Infinera
800G Ready	Yes	No	No	No	No
2RU Density 400G	12.8T	12.8T	4.8T	3.2T	3.2T
2RU Density 800G	25.6T	N/A	N/A	N/A	N/A

- 100GbE 400GbE Future
- 800GbE

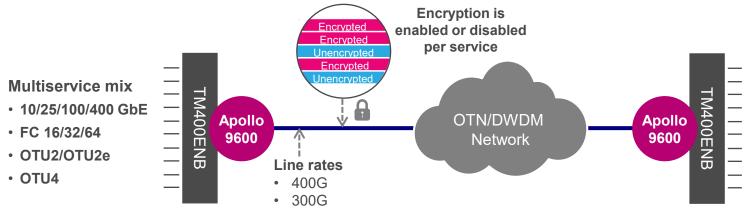




TM400ENB: 400G Multiservice Encryption Muxponder



- Supports 400G capacity multiservice encryption within Apollo's Layer 1 Optical Encryption Solution Framework
 - Including Diffie-Hellman, QKD, and PQC (V13) key exchange options
- Provides FIPS 140-3 compliancy against physical tampering

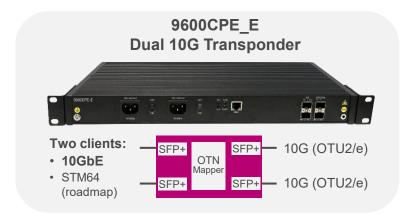


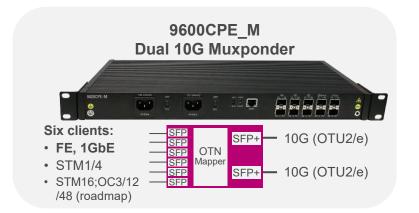


Apollo 9600CPE

Two compact **10G platforms** to extend OTN economically to customer premises

- 1RU for 19"/21"/23" rack, or wall/desktop installation
- Power consumption: ~27W,
- Temperature range: -5 to 50°C with fanless design
- Dual AC/(DC roadmap) power with 1+1 protection

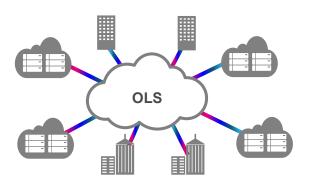






Flexible Optical Line System

- Complete sophisticated OLS to support any optical networking needs
- Includes lightweight economical options that can add flexibility to point-to-point DCI solutions



Ultra-compact 4-degree ROADMs with integrated amplifiers



Pluggable amplifiers and optical line protection





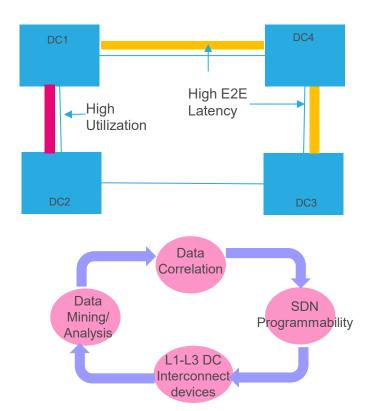
Automation & AlOpps

Data Center Traffic Engineering

- Compute/App communication inter/intra DC
 - Requires TE for dealing with network events
- Need for Automation of device and infrastructure
- Life Cycle Management of network infrastructure

Ribbon Tooling

- Muse Orchestrator- Available Now
 - SDN Programmability
 - Workflow Engine
- AlOpps Future Evolution
 - Data Mining and Analysis
 - Custom Apps based on business/operations intent



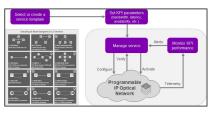


Muse – Advanced Software Wrapper

Network Automation

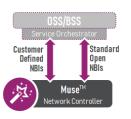


Workflow Engine

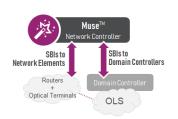


Closed Loop Automation

Multi-Vendor and OSS Integration



Flexible NBI

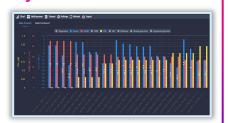


Flexible SBI

Advanced Analytics



Network Insights



Network Health

Cloud Native Architecture



Microservices Architecture



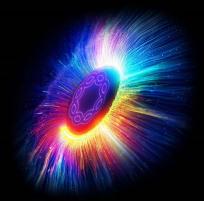
K8S Infrastructure



DCI Bundles

- Facilitate selling Ribbon solutions for simple configurations
- Can be the whole solution (single part number) or the starting point for further discussions

ribbon'
INSIGHTS



Bundles Comparison: Essential Elements



These bundles cover popular basic configurations.

Please discuss tailored configurations with your Ribbon representative.



Why Ribbon



RIBBON MAKES DCI EASY



Complete Solution Set

- MPLS, DWDM, OLS
- Multilayer automation
- Ecosystem integration
- Get started bundles

Superior Technology

- Unique 400GZR+ upgradeable to 800GZR+
- Wavelengths to 1.2T
- Highest density
- Lowest power

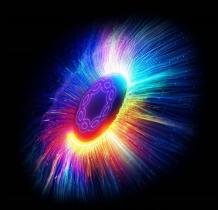
Preferred Partner

- Tailored configurations
- White glove installation
- Tiered field support



How to Sell DCI





Getting Started Questions



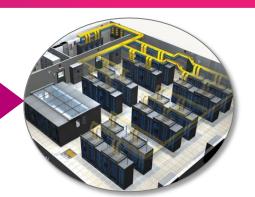
Data Center Interconnect (DCI)



- Cloud service provider
- Colocation provider
- Enterprise end user
- Service provider selling DCI solutions

What is the Application?

What business needs does it fulfill?





Next Questions

Who provides the **dark fiber** over which the DCI solution will be lit?

What is your current **DCI architecture**, how do you see it evolving?

Who is the **system integrator** to architect and install the DCI solution?

Do you see the DCBR as part of the DC fabric or as part of the transport infrastructure?

How do you **operate** the DCl solution?





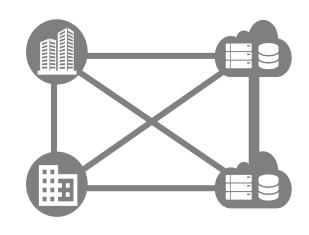


Enterprise Customers Using Leased Connectivity Services

Did you know that a private optical DCI solution has a typical payback of 18 to 30 months when compared to leased connectivity fees?

Can we perform an analysis for you?















Smart city



Utilities





More Detailed Questions

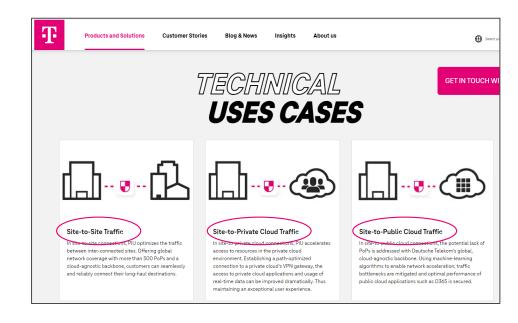
- 1. Where are your data centers?
- 2. How do you perform DCI today?
- 3. What is your experience with current suppliers?
- 4. How important is power consumption?
- 5. Do you perform encryption, and where?
- 6. Do you need OTDR to monitor fiber health?
- 7. Capacity/density needs
- 8. View on High Availability (at transport or IP layer)
- 9. View on DCI automation and Traffic Engineering
- 10. Any need for Traffic Analysis tools





Questions to Ask Service Providers

- Do you have an Enterprise sales group?
- 2. Do you own your own data centers or partner with Co-Lo companies?
- 3. How do you sell Enterprise DCI connectivity today?
- 4. How important is encryption for your customers?



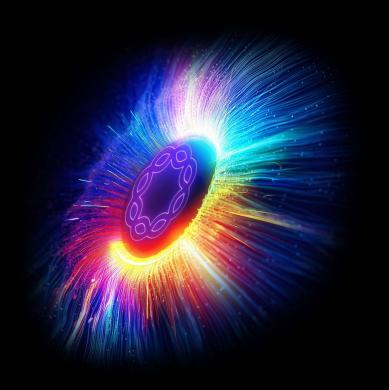


Thank You





ribbon INSIGHTS



C&E Securing your Network

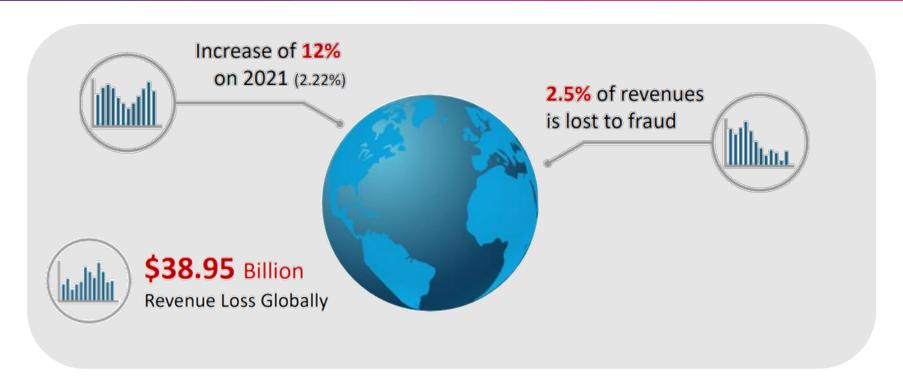
Rich Krizan

Director Product Management

Analytics, Automation, Management



Global Telephony Fraud Landscape - 2023



https://cfca.org/wp-content/uploads/2023/11/Global-Fraud-Loss-Survey-2023.pdf Published November 9th 2023



Global Telephony Fraud Landscape - 2023

2021

Spoofing	6.6% \$2.63 B
Wangiri	5.6% \$2.23 B
SMS Phishing	5.1% \$2.03B
Subscription Fraud 5.1%\$2.03B	
IP PBX Hacking	4.6% \$1.82B

2023

Subscription (Application) Fraud	14% \$5.45 B
Subscription (Credit Mule) Fraud	13% \$5.06 B
PBX Fraud	11% \$4.28 B
Account Takeover 7% \$2.72 B	
Service/Equip Abuse 6% \$2.34 B	



https://cfca.org/wp-content/uploads/2023/11/Global-Fraud-Loss-Survey-2023.pdf Published November 9th 2023



Global Fraud Impact - 2024

Have You Felt the Sting of Fraud (Yet)?

\$38.95B

Revenue Loss Globally

2.5%

Revenue is Lost to Fraud for Telecom Providers

4.4B

Robocalls Received by U.S. Consumers in April 2024

Source: CFCA 2023 Global Telecom Fraud Survey and YouMail Robocall Index May 9, 2024

2024





The New Hork Times . 12d

Fallout From Cyberattack at Ascension Hospitals Persists, Causing Delays in Patient Care

For two weeks at the 140-hospital system, doctors and nurses have had little access to digital records for patient histories, ...



2023

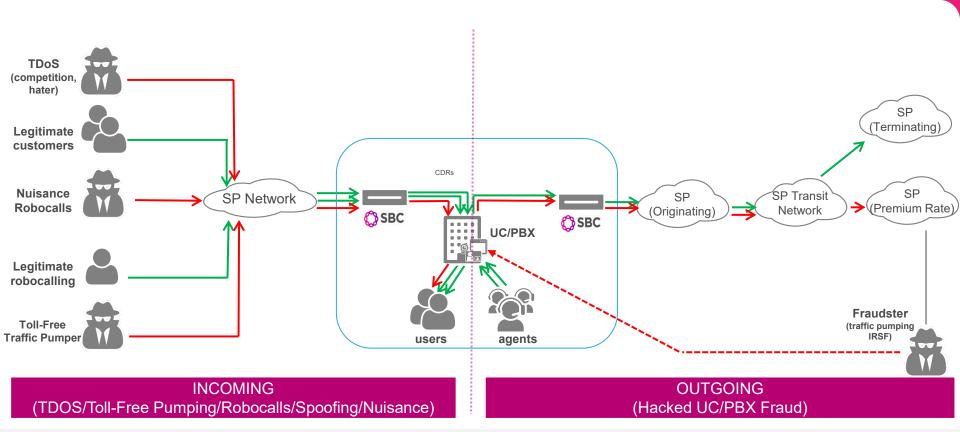






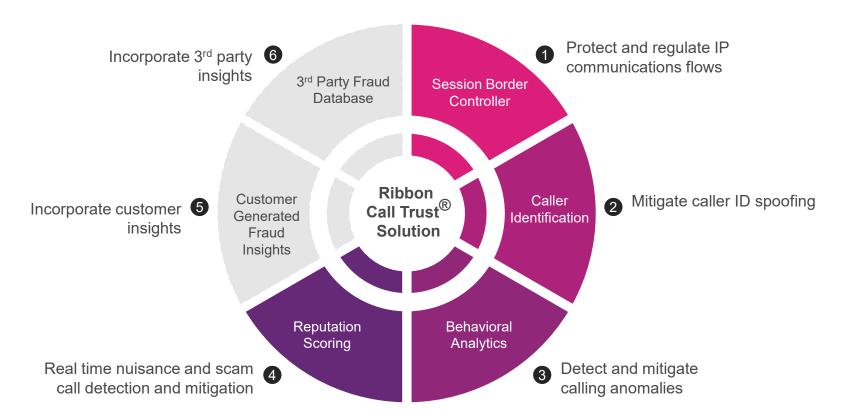


Enterprise Voice Fraud Landscape



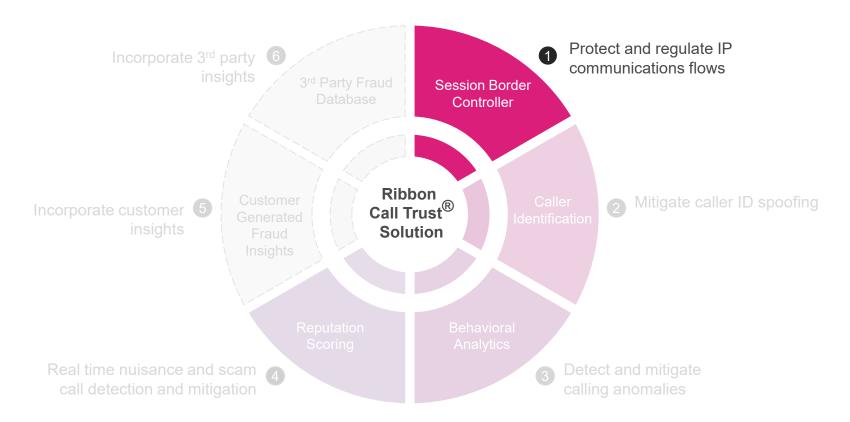


Ribbon Call Trust® - A Complete Identity Assurance Solution





Ribbon Call Trust® - A Complete Identity Assurance Solution





Ribbon Session Border Controller (SBC)

- Voice Firewall
- Back-to-Back User Agent (B2BUA)
- Network Address Translation (NAT)
- Transcoding
- Encryption

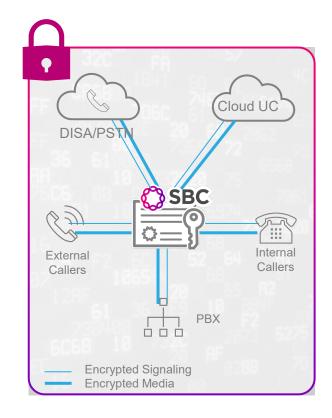




Encryption Everywhere

SBCs are encryption engines

- TLS, IPSec, SRTP
- Regardless of location, media & signaling are encrypted
- Devices can be old or new



Ribbon SBCs DO NOT lose capacity when encryption is enabled



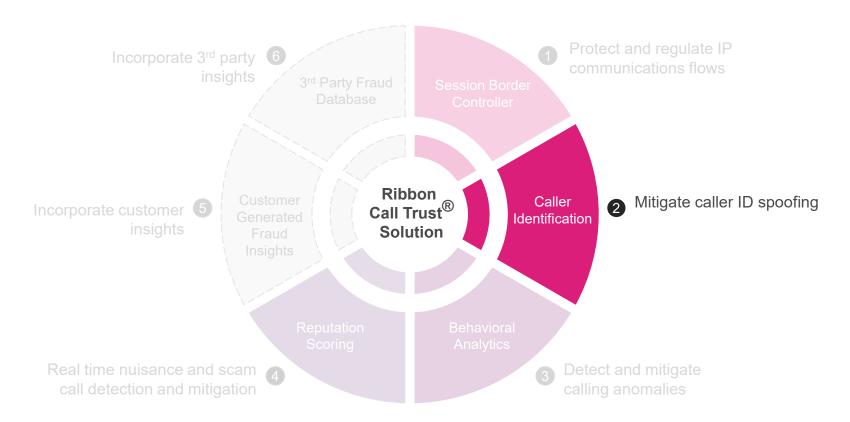
Ribbon PSX

- Calling Line ID screening
- Routing decisions static or dynamic
- Integrates Call query
- Integration with Ribbon Analytics
- Reduce Routing loops





Ribbon Call Trust® - A Complete Identity Assurance Solution





STIR/SHAKEN



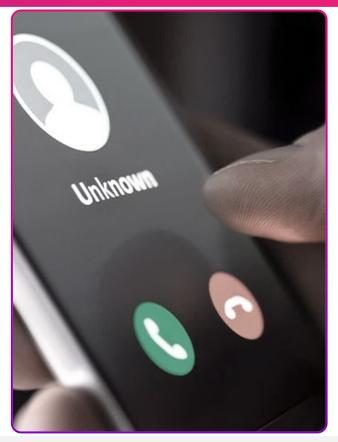
STIR (Secure Telephony Identity Revisited)



SHAKEN (Signature-based Handling of Asserted information using toKENs)



Caller Authentication





Secure Telephony Identity (STI)

- Targeted at interconnect between Service Providers.
- Based on STIR/SHAKEN standards
- Framework adopted by US, Canada and France to authenticate calls

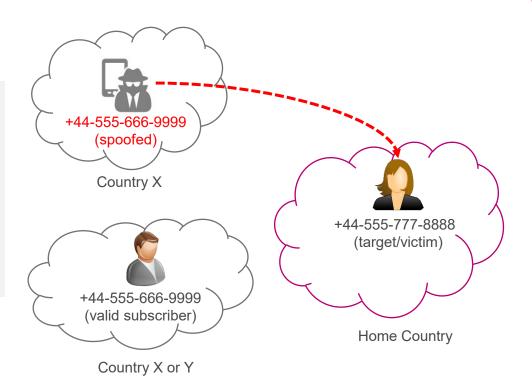
The idea behind STIR/SHAKEN:

Apply security and digital certificate technologies to phone calls, similar to web transactions, and combat spoofing to increase the chances of a consumer answering the call



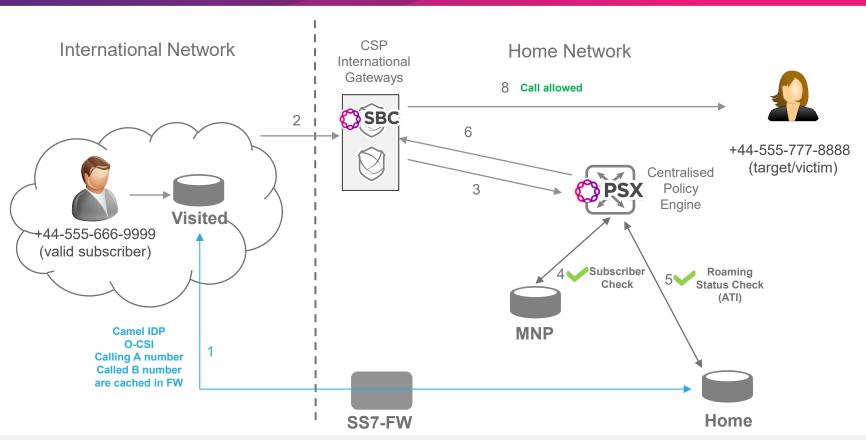
Example of anti spoofing roaming using the PSX

- Subscriber is roaming
- But their phone number is being spoofed to make calls from another operator network also abroad
- To target other subscribers in the home network



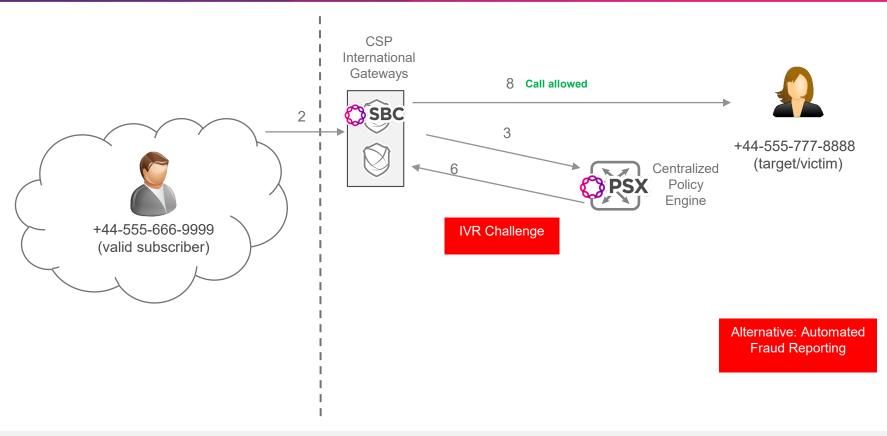


Example Of Anti Spoofing Roaming Using The PSX



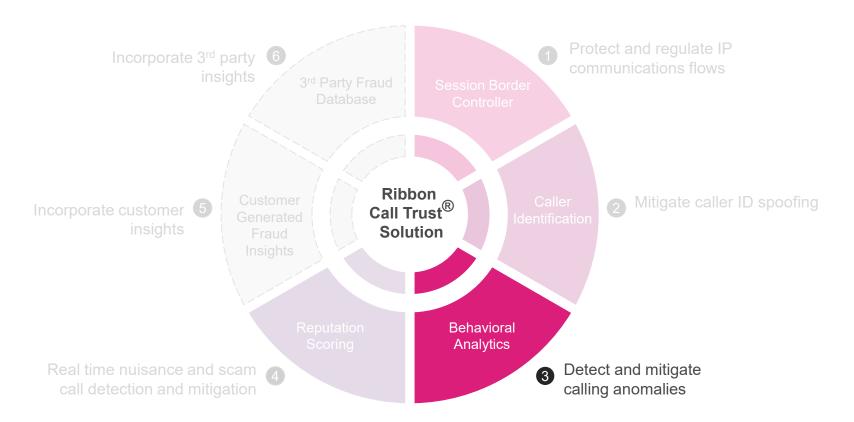


Call Verification Treatment



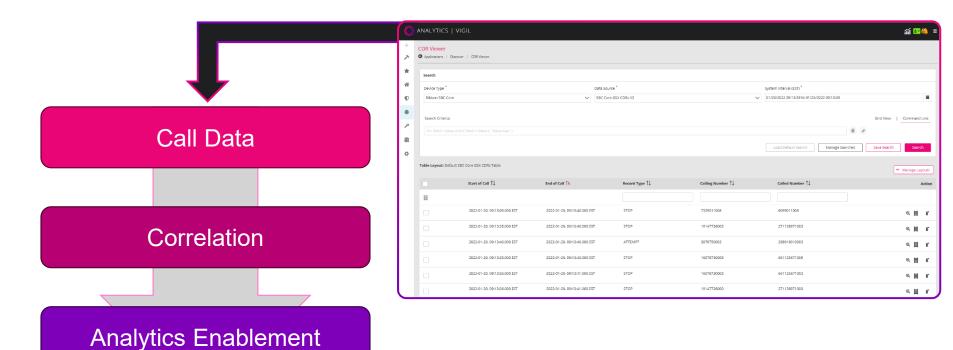


Ribbon Call Trust® - A Complete Identity Assurance Solution



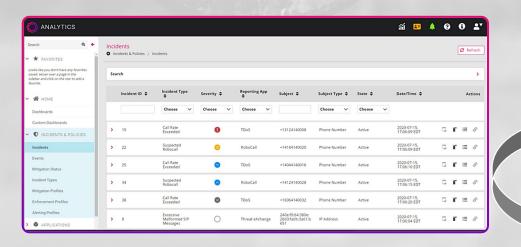


Data Analysis





Analytics



Training & Baseline

Flag anomalies

Trigger mitigation



Incident Detectors







Rule Based Incident Detectors Calls policed through traffic monitoring and configured limits



- Automatic alerts when identified (SNMP, email, SMS, Ribbon Call Trust)
- Manual or automatic mitigation options

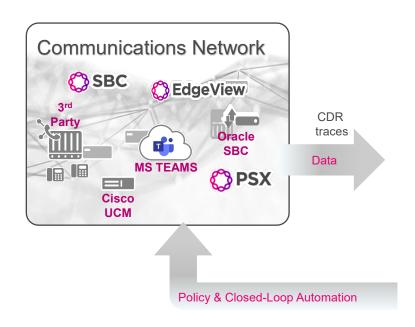


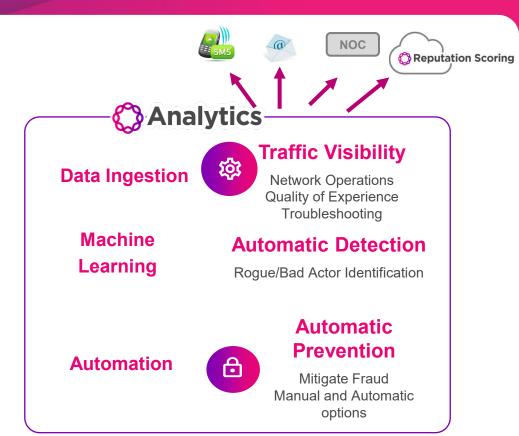
Machine Learning
Based Incident Detectors
Calls policed through traffic
monitoring and historical
trends

- Model is created and maintained over time
- Automatic Discovery of "Normal"
- Automatic Alerts on calls outside the normal



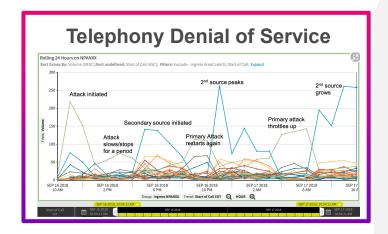
Ribbon Analytics Features







Fraud Analytics - Rule Based Incident Detectors

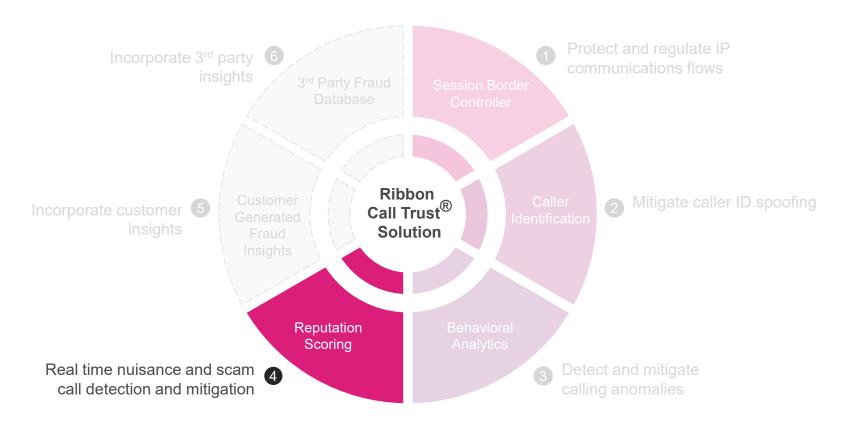


Calls policed through traffic monitoring and configured limits

- Full Incident Detection flexibility
- Minimum detection period of 5 minutes
- Automatic alerts when identified (SNMP, email, SMS)
- Send regular reports to Call Trust
- Manual or automatic mitigation options



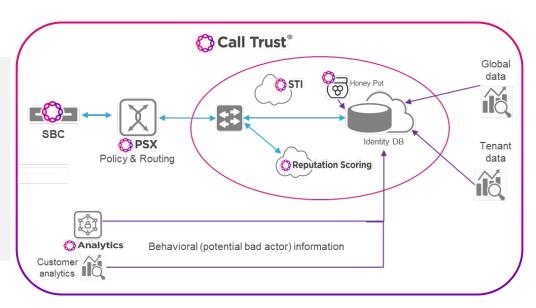
Ribbon Call Trust® - A Complete Identity Assurance Solution





Ribbon Call Trust® - Complete Identity Assurance Solution

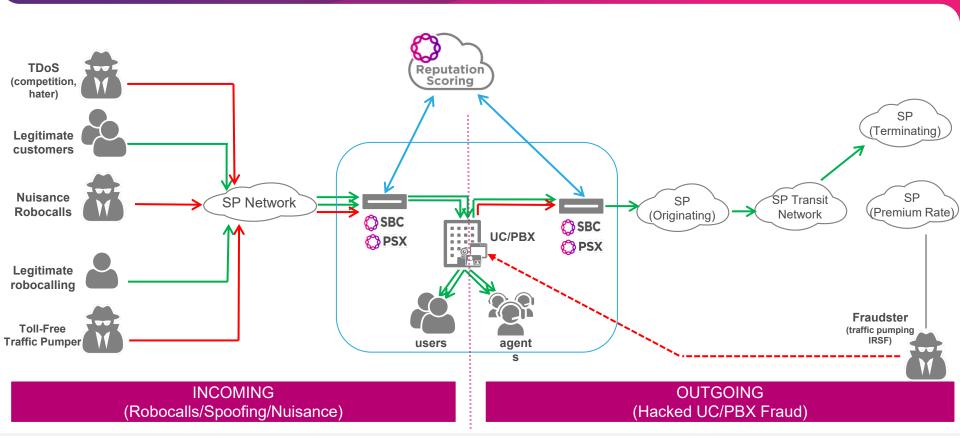
- · Ribbon Managed Service in the cloud
- Real-Time reputation/fraud scoring
 - A call is given a score (e.g. 80% chance the call is fraudulent) before the call is established
- Interfaces with several data sources, including with 3rd party databases







Enterprise Voice Fraud Prevention with Reputation Scoring



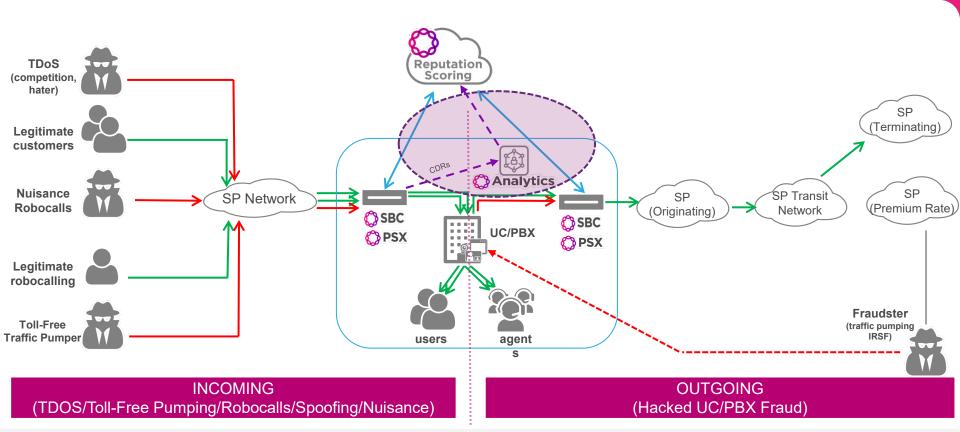


Reputation Scoring Inputs

Provider Data Source Name Global DNO List Assigned Number List Known Robocaller List Pre-Integrated from Ribbon Ribbon Honeypot List IRSF List **MSRN List** Tenant Allow Lists Provided by Customer Tenant Deny Lists Subscriber Allow Lists (Optional) Subscriber Deny Lists

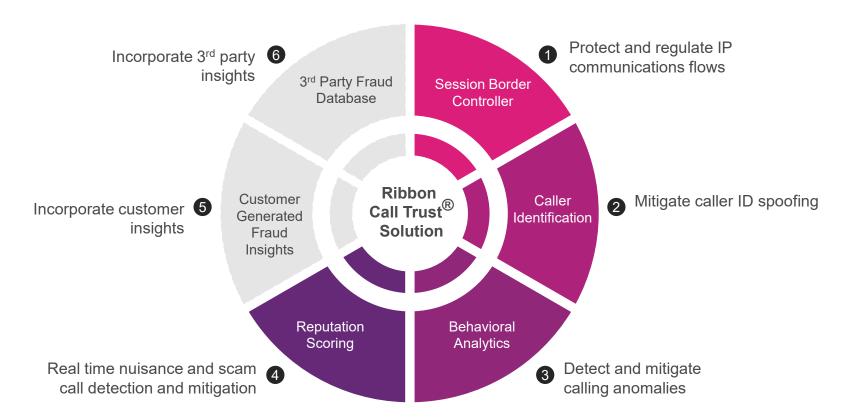


Enterprise Voice Fraud Prevention with Reputation Scoring and Analytics



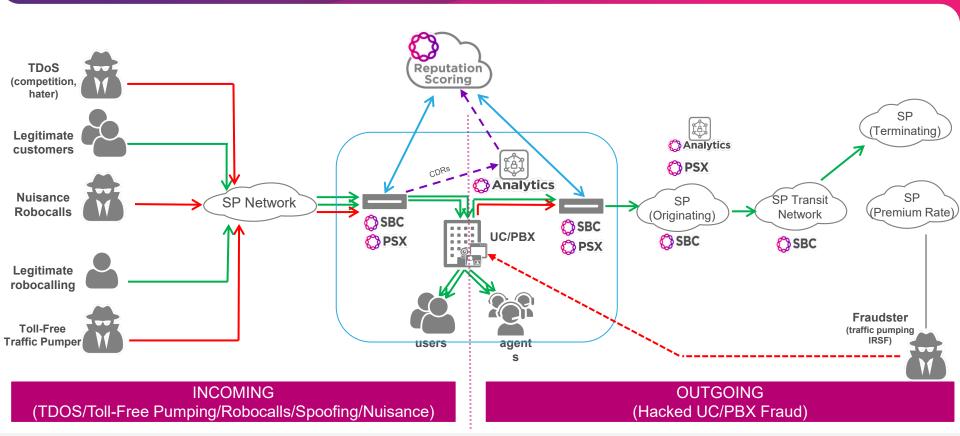


Ribbon Call Trust® - A Complete Identity Assurance Solution





SP and Enterprise Security coordination

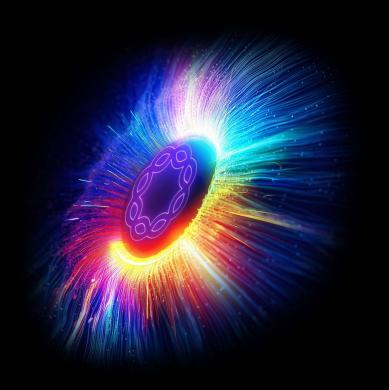




ribbon' INSIGHTS



ribbon INSIGHTS



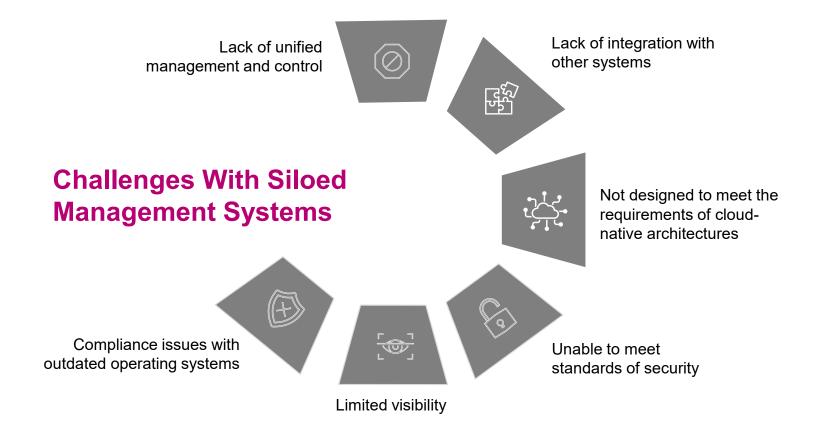
Network Insights with RAMP

Rich Krizan

Director Product Management

Analytics, Automation, Management







Not just another EMS!



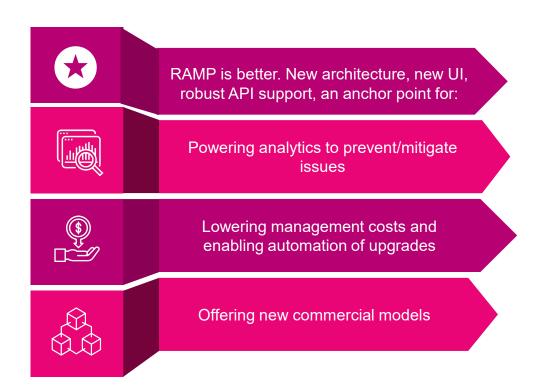
is not just another EMS – it's a **foundational** part of Ribbon's strategy to help customers reduce the cost & complexity of their networks.

EMS end of product support

X EoL plan announced in Oct 2022 to give customers time to plan

X Multiple 3rd party software components in EMS, including the OS, are going EoL in 2024 –**not** be a secure element

X New software releases and new products are *not supported* in EMS





RAMP – A Foundation for Intelligent Automation

Step 1





Step 3



Upgrade EMS to RAMP

Add Analytics

Enable Automation

RAMP end to end mgmt. of physical, virtual and cloud native network elements



Analytics provides insights using RAMP Observability



LEAP builds on Ribbon Analytics
Al/ML Engine

RAMP Fault Management Module



RAMP Fault Mgmt Module integrates with Analytics Most Probable Cause to help with troubleshooting



LEAP generates and executes automated call flow tests

RAMP Performance Management Module



RAMP Perf Mgmt Module integrated with Analytics Planner to forecast growth in networks



LEAP simulates and tests traffic growth in networks



- 3 Years in Production
- Releases delivered 9
- 100's of devices supported per RAMP
- Sessions under management > 2,000,000
- 150+ Accounts
- 200+ Systems



RAMP by the numbers



Ribbon Device Management

EdgeMarc

SBC 1000

SBC 2000

SBC SWe Edge

SBC 5400

SBC 7000

SBC SWe

SBC CNe

PSX SWe

PSX CNe

MRFP

CDSI

GSX9000

C DSC

SGX

SP2000

C20

6 G6

65

AS

C3

69

C GMS





Creates a Strategic Wedge into SPs and Large Enterprises



Generic Carrier

- EMS to RAMP driven by SW lifecycle
- Planning for network consolidation
- Strategic transition to CNF
 RAMP bridges network operations
- GC's extensive use of Analytics in network operations + RAMP will drive to Automation opportunity



Generic Enterprise

- RAMP migration from EMS
- Planning cloud transition of SBC network
 - Using RAMP as 1st step
- Envisions path to Automation
 - "Whole Intelligent Automation Stack"
 - Automation(LEAP)/Analytics/Management





- Unify management
- Improve security
- Simplify operations
- Foundation for the future

- Don't be left behind on EMS





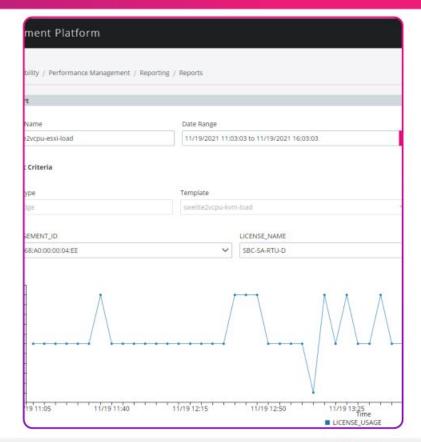


RAMP voice quality reports

· Live call quality stats

- Currently for SBC1000/2000
 - Q1 2025 also for Swe Edge

 VQ data ingestion into Analytics planned





RAMP secure comms with SBC Edge

- Secure communication between RAMP and Ribbon Edge devices
- RAMP can manage devices behind firewall

Used for:

- Customers with hybrid networks
- Partners delivering managed services to customers

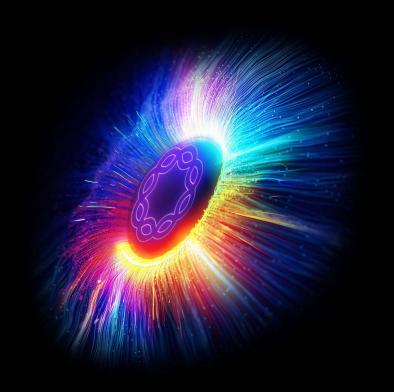




ribbon' INSIGHTS



ribbon INSIGHTS



Cloud and Edge Product Strategy and Roadmap

Gordon Eddy

Senior Director, Product Line Management Enterprise Strategy and SBC Edge **Matt Hurst**

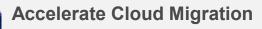
Senior Director, Ribbon Global XaaS Solutions



C&E Market Drivers and Strategy



Powering Enterprise Transformation





Move to aaS & Managed Services



Adopt UC for Enterprise, CC



Legacy Voice Transition



Consolidate Hardware, Automate





Reduce Cost



Improve Productivity



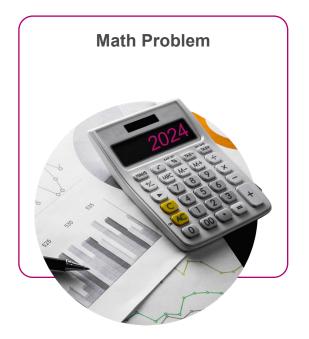
Boost Agility



Delivering to our

customers

Key Challenges







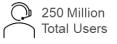


Cloud UC & Contact Center Gaining Momentum

























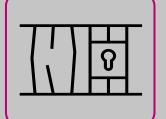


Enterprise License Agreement (ELA) - Opportunity











Simplified
License
Management
take
anywhere
flexibility

Predictable
Annual
Spend
Based on Per
User Pricing

Include
Multiple
Licenses in
ONE contract

No Penalty for Growth

Simple for CIOs to Buy, Budget & Manage Same as other Service Offerings



Common Edge Challenges

Need More Bandwidth for Cloud-based Apps



- Cloud-based business apps require more bandwidth
- · Storage is also in the cloud
- Employee productivity is tied to speed of access

Need to Secure Communications



- Firewalls don't protect voice well
- · DoS attacks are increasing
- Threat vectors are growing

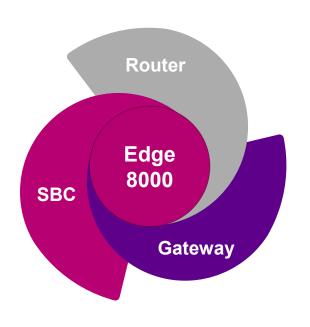
Need to Integrate Legacy Assets



- Business processes still tied to analog phones, etc.
- May need to keep legacy PBX or contact center running
- Globally, not all countries/ sites support SIP trunks



Modern Edge Platform



- Single integrated, one-box solution
- UC and Contact Center certified and ready
- Simplifies operations, streamlines training, and enhances efficiency in network edge implementations
- Addresses growing demand for bandwidth (10G support), secure connectivity in UC and cloud-based architectures and legacy architecture migration





The Realities of Your Software Deployments

Most organizations tell us:



Competing resource demands



Manual, time consuming, and limited testing



Complex, multi-step software upgrades



Slower rollout of new features

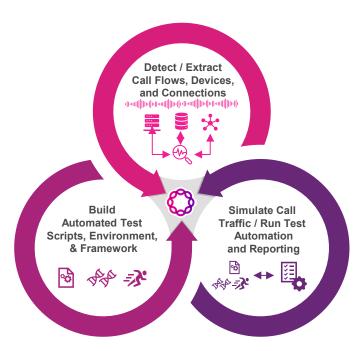


Security vulnerabilities and non-compliance



Learning Enabled Automation Program - LEAP

Automate Testing to Enable Faster Software Upgrades





Enabling an End-to-End Global Enterprise Network – Endless Possibilities

Ribbon Analytics

- **Network Operations efficiency**
- Security

Ribbon AS & WebRTC GW

- SIP Applications
- Web browser and Mobile App SDKs

PSX – Global Routing & Policy

- Common dial plan and policy across sites w/ Active Directory connection
- Simplified multisite & multi-carrier administration - from anywhere

Call Trust Solution

- Voice threat prevention
- Nuisance call mitigation

Ribbon LEAP UCaaS /

CCaaS

- Automation Framework
- Faster upgrades, reduced security vulnerabilities

zoom Ring Gentral'



ទី GENESYS

NICE CXmò



SBC SWe Edge

Local PSTN

Location / Country

CLEAP



RAMP

Centralized Routing Policy



- Call Trust
- High Availability

Local PSTN

Devices or SW

UCaaS certified

Carrier Grade Core

High-capacity

centralized trunking

SBC SWe

SBC 7000

3 SBC 5400

& local breakout

UCaaS or CCaaS

Ribbon Connect

Unified Communications

Intelligent Edge Devices or SW

- Local security & survivability options
- Local PSTN connection options
- High density analog gateway options
- Legacy device integration options
- Global management & visibility



RAMP – Centralized Management

- Global management & visibility
- Automated operations

License management

Operations Center

- 24x7 monitoring, support
- Event, incident, configuration and release management
- Ribbon Connect Support

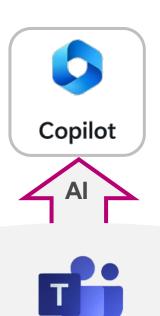


Ribbon aaS Solutions & The Partner



Accelerating Enterprise Cloud Transformation with Al

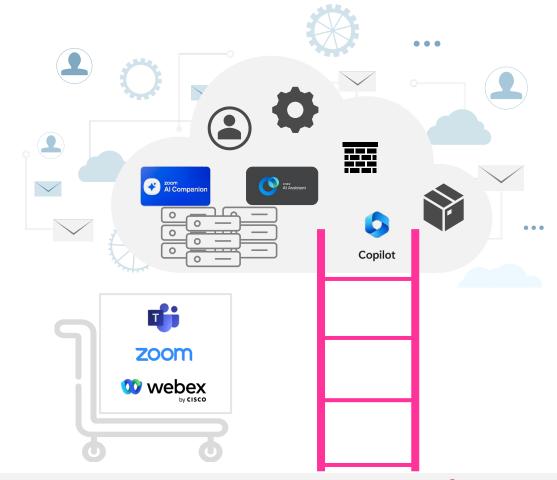








Is moving to the cloud really that easy?





Speed Bumps to Transformation



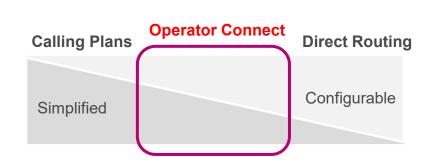


How Partners Can Help

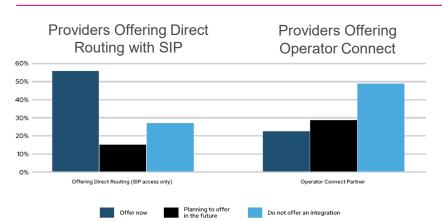


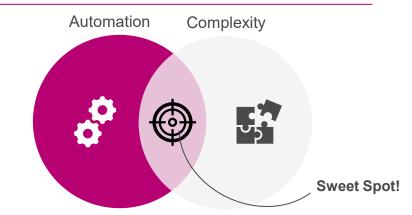


Isn't Operator Connect killing my business?









Source Cloud Communications Alliance: 2024 Survey

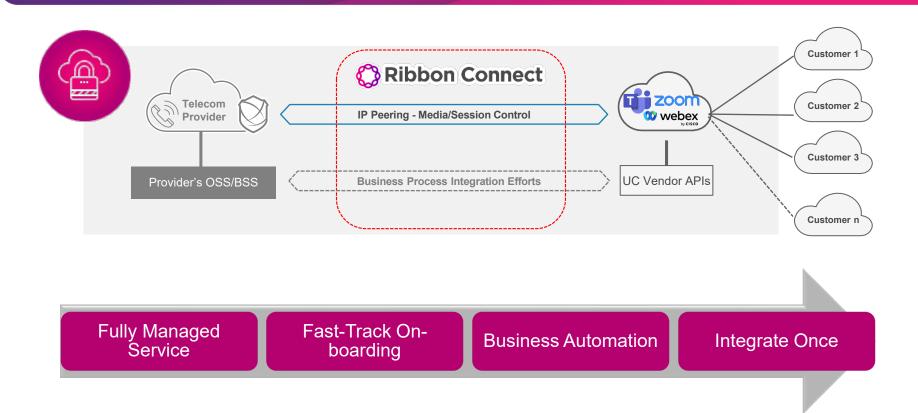


Ribbon Connect Plus – SBCaaS

Enabling Partner Automation



What is Ribbon Connect?





Ribbon Connect Plus

Ribbon Connect + plus

- Enhanced Multi-UC Teams DR/OC, Webex, Zoom
- SBCaaS Partner & Ribbon hosted
- Reseller Framework Channel Ready
- Automation, Security reporting, Customer Analytics

Focused on Increasing Partner value



SBCaaS – Partner Value



Not just a new way to monetise existing SBC software solutions



Allow Focus on Larger Enterprise opportunities



Operational activities improvement

Reduce costs



Open new revenue streams

Automated Delivery



Easier to do business with your Customer and Ribbon

More than just SBCaaS



Speed to Revenue























Value Proposition



Eliminates Capex sales objections (parallels UCaaS Opex sales model)



Creates a long-term revenue stream - total revenue is greater than Capex sale



Eliminates challenges/expense of selling annual service contracts



Upsell/ Cross sell --- not a "1 and done" sales process



Defining laaS & SaaS solutions



IaaS



laaS - Infrastructure as a Service

Standup only – Instantiate, license and hand keys over to Partner to build custom services

- 'Pay as you grow' with automated Licensing
- Customer Growth supporting <u>you</u> as the value-added partner to build revenue
- Reassurance Monitoring, Service healthcare and full Ribbon Support.



SaaS



SaaS – Software as a Service

Standup & Configure - Instantiate, License, Configure and Support

- Fully Ribbon Hosted, Configured and Managed in the public Cloud – no risk
- **Expertise** No Voice skills required Ribbon expertise on-tap as and when you need it.
- Multi UCaaS & PBX Not limited to one solution.



SBCaaS Development Strategy & Roadmap

October 2024

Q1 2025

2H 2025

Reseller Framework
Partner Multi-UC
Phase 1a SBCaaS

Phase 1b SBCaaS General Availability Ribbon Hosted Options
Enhanced Automation











Full portal Automation for SBCaaS Sales Process

Deployment Automation & Configuration



Dedicated SBCaaS

– Selected Partners

RAMP Options for Management

Additional UC/CCaaS Integrations

Full Distribution Integration

Additional Products - Analytics / H/W



C&E Solution Updates



RAMP – What's New?

Three Things You May Not Know

- RAMP can deploy in Public Cloud (AWS/Azure) as a container (CNF) or virtual (VNF)
- RAMP consolidates Ribbon C&E devices into a single management solution
 - Supports Core SBC and SBC Edge on the same deployment including SWe, HW, and CNe versions
- RAMP deployments and "migrations from EMS" are partner/customer capable
- Three Things on Their Way (Q4, 2024)
 - EdgeView feature parity on RAMP
 - NWDL (network wide licensing) support for Edge 8000
 - Support for VMWare ESXi v8





Analytics – What's New?

Three Things You May Not Know

- Ribbon Analytics enables network service assurance, data analysis, fraud detection and network policy/mitigation automation
- Dashboards can be securely published for end customers providing rich insight to enterprise metrics (QOS, SLA, Traffic details...)
- Machine Learning is embedded, enabling Fraud Detection, Most Probable Cause and Custom Anomaly Detection
- Three Things on Their Way
 - Support for SBC SIPREC CDRs, Q3 2024
 - Integration with LEAP Application, Q4 2024
 - Kubernetes containerized Ribbon Analytics, 1H 2025











PSX – What's New?

Three Things You May Not Know

- Industry's first cloud native centralized routing engine
- New enhanced High Availability (HA) architecture
- Flexible Active Directory to integrate with diverse PBX deployments

Two Things on Their Way

- Cloud native offer in AWS, 1H 2025
- Support for VMWare ESXi v8, Q4 2024









SBC Core – What's New?

Three Things You May Not Know

- SBC CNe SBC 5400
 SBC SWe SBC 7000
- Industry's first cloud native SBC unparalleled efficiencies for large enterprises available now
- Availability of a subscription licensing offer incentivizing capacity growth 1 year & 3years, simplified bundling of SBC+PSX+RAMP
- Highest capacity SBC with Webex certification

Three Things on Their Way

- Cloud native offer in AWS, 1H 2025 other public clouds to follow
- Reduced footprint cloud native SBC, 1H 2025
- SBC 7000 promotion program, Q3-Q4 2024
- FIPS 140-3 support for enterprise use cases & FEDRAMP, 2H 2024





Ribbon Edge – What's New?

Three Things You May Not Know

- Edge 8000 and SBC SWe Edge supports Open SSL v3.0 and TLS v1.3
- SBC 1000 2000 supports NWDL and Win2019 for ASM/SBA
- Edge 8000 supports SIP High Availability (HA) and Teams vSBA

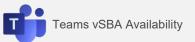
Three Things on Their Way

- Edge 8000 support for 25 cps and 1000 concurrent sessions, and enhanced UI, just released
- Edge 8000 NWDL support, Q1 2025
- Edge 8500: Higher Capacity Edge 8000 platform (up to 16T1/E1 & 96FXS), Q1 2025















Summary



Ribbon remains partner first, partner focused



Refreshing our existing portfolio



Automated business processes that improves time to revenue



FINISH

Creating flexible, innovative offers to drive partner growth



Thank You



