



The bridge to possible

# Improving SP Network Performance with Cloud-based Analytics

Crosswork Cloud - Operational Intelligence as-a-Service

Cisco Knowledge Webinar

2021-05-04

# Today's Presenters



*John Malzahn*  
Senior Manager, Service  
Provider Solutions  
Marketing



*Dan Backman*  
Principal Engineer  
Crosswork Cloud



# Agenda

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- Cloud as a new services platform
- Network Insights BGP monitoring
- Traffic Analysis as-a-Service
- Cloud-to-Ground: Data Gateway
- Trust Insights and XR Operational Intelligence
- Conclusion

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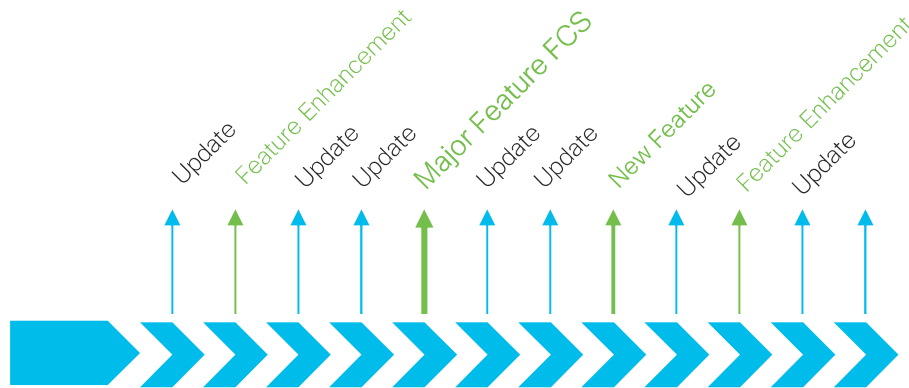
# Cloud-Delivered Operational Intelligence



- Immediate deployment and always up-to-date
- Minimal ongoing OpEx to support
- Continuous delivery of new features and updates
- Delivers scale-out model for large-scale visibility and reporting services



# A new way to consume software as a service

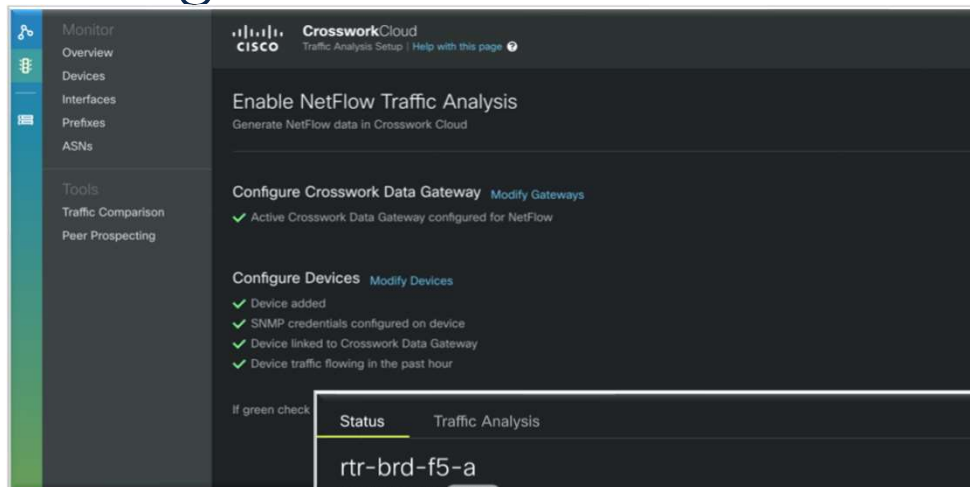


*Continuous delivery of new features and software updates to the production cloud service.*

*No user testing or software maintenance required.*

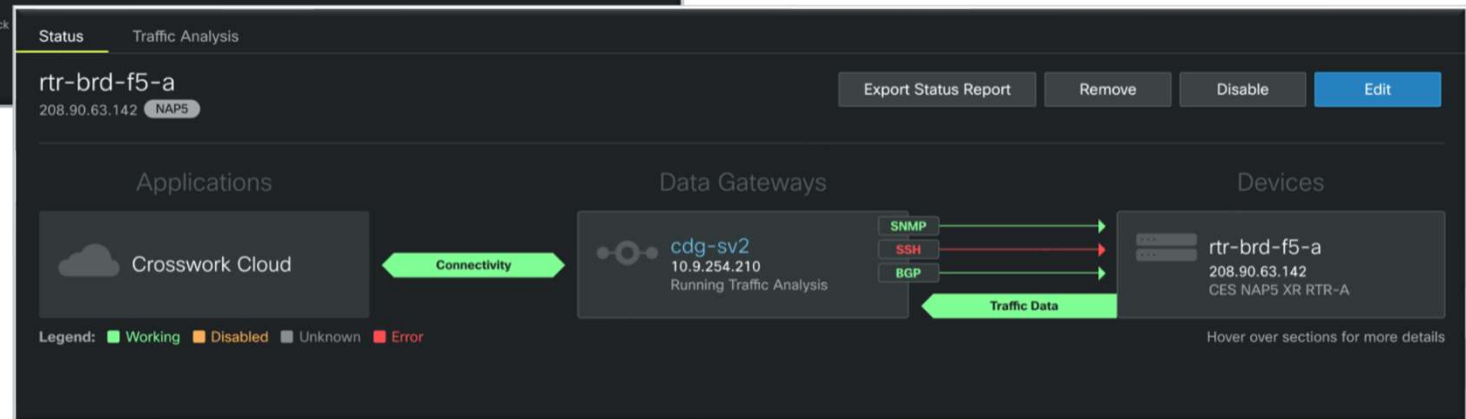
- Software delivered and maintained by Cisco
- Continuous (Weekly) delivery pipeline to production service
- Continuous pipeline for new features and fixes
- No customer action required for ongoing maintenance or upgrades

# Designed for Ease of Use and Supportability



Designed for fast time-to-value

- Self-Guided Deployment
- Built-in connectivity diagnostics



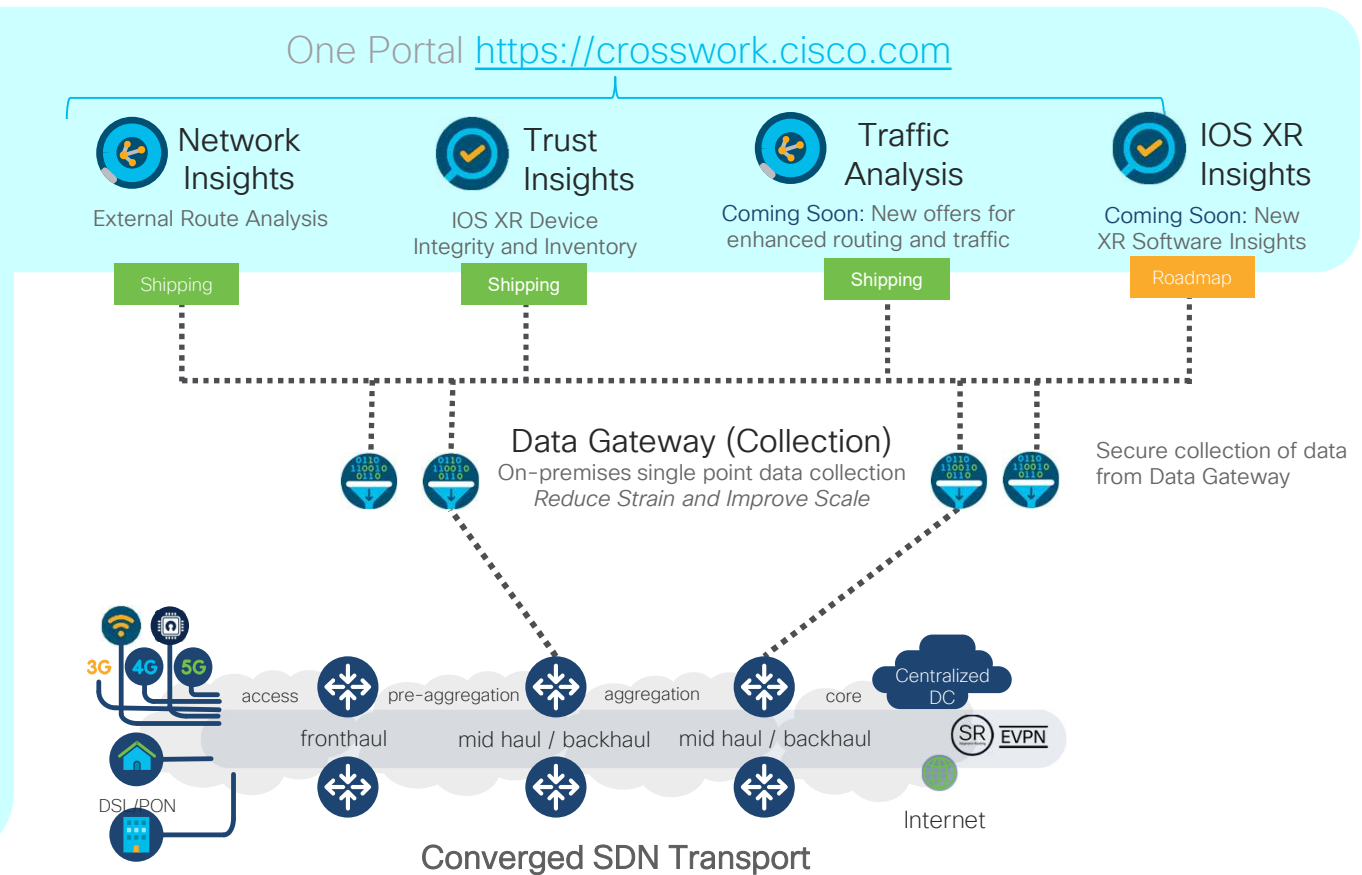
# Crosswork Cloud – Operational Intelligence Platform

## Key Points

- Many Services
- One User Experience
- Expert Systems
- Cisco Knowledge
- Dynamic Scalable Workloads
- Efficient Compute resources
- Focus on Analytics not Control or Automation
- Create Answers not Questions

## Operational Intelligence

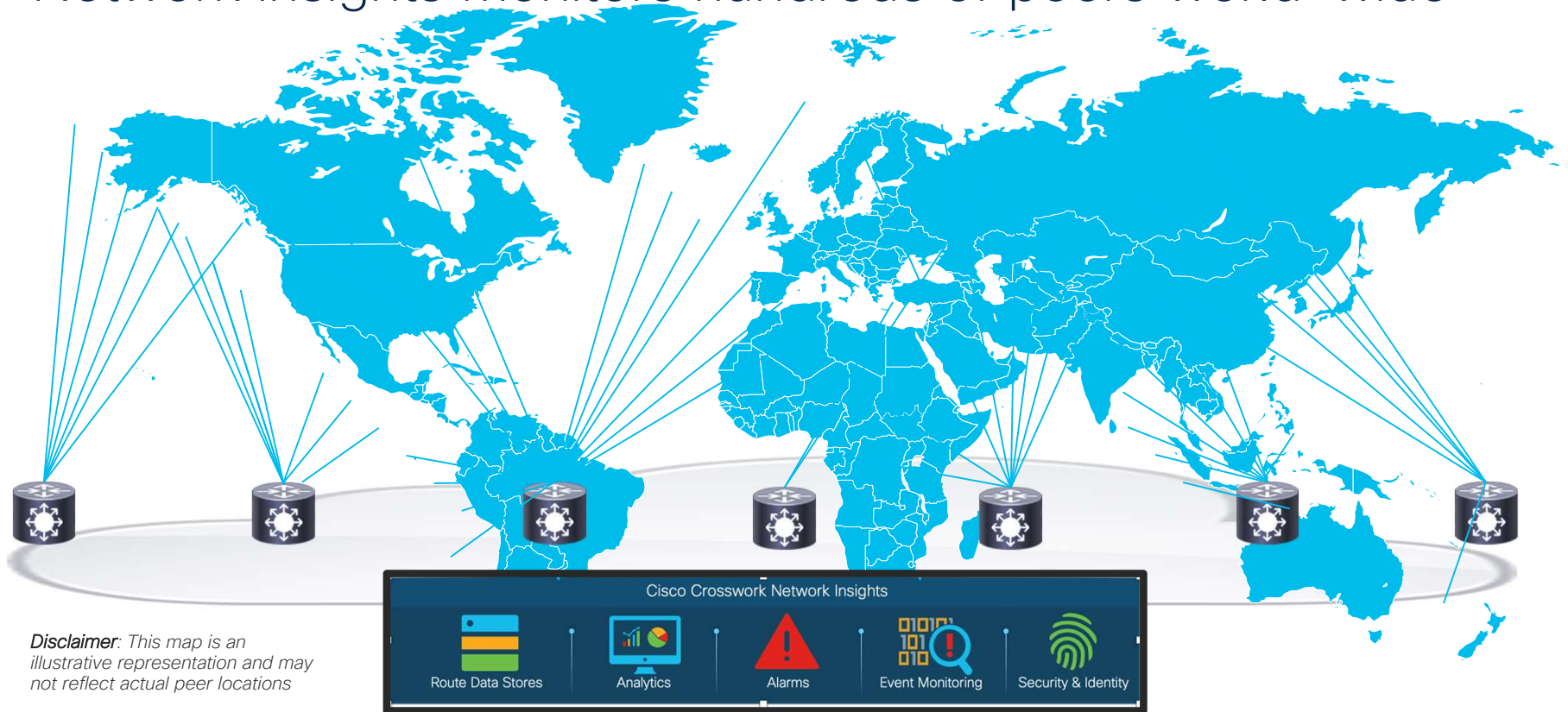
- Multiplatform Routing and Traffic Analytics
- IOS XR Device Insights and Analytics



# Network Insights External BGP Analysis



# Network insights monitors hundreds of peers world-wide



*Disclaimer: This map is an illustrative representation and may not reflect actual peer locations*

# Crosswork Network Insights – Route Analysis

- A cloud-based SaaS offer that provides routing analysis and edge BGP event detection

## Customer Challenges:

Know what changed and when?

Know what routes your Routers are advertising and receiving

What is happening to my routes outside my network?

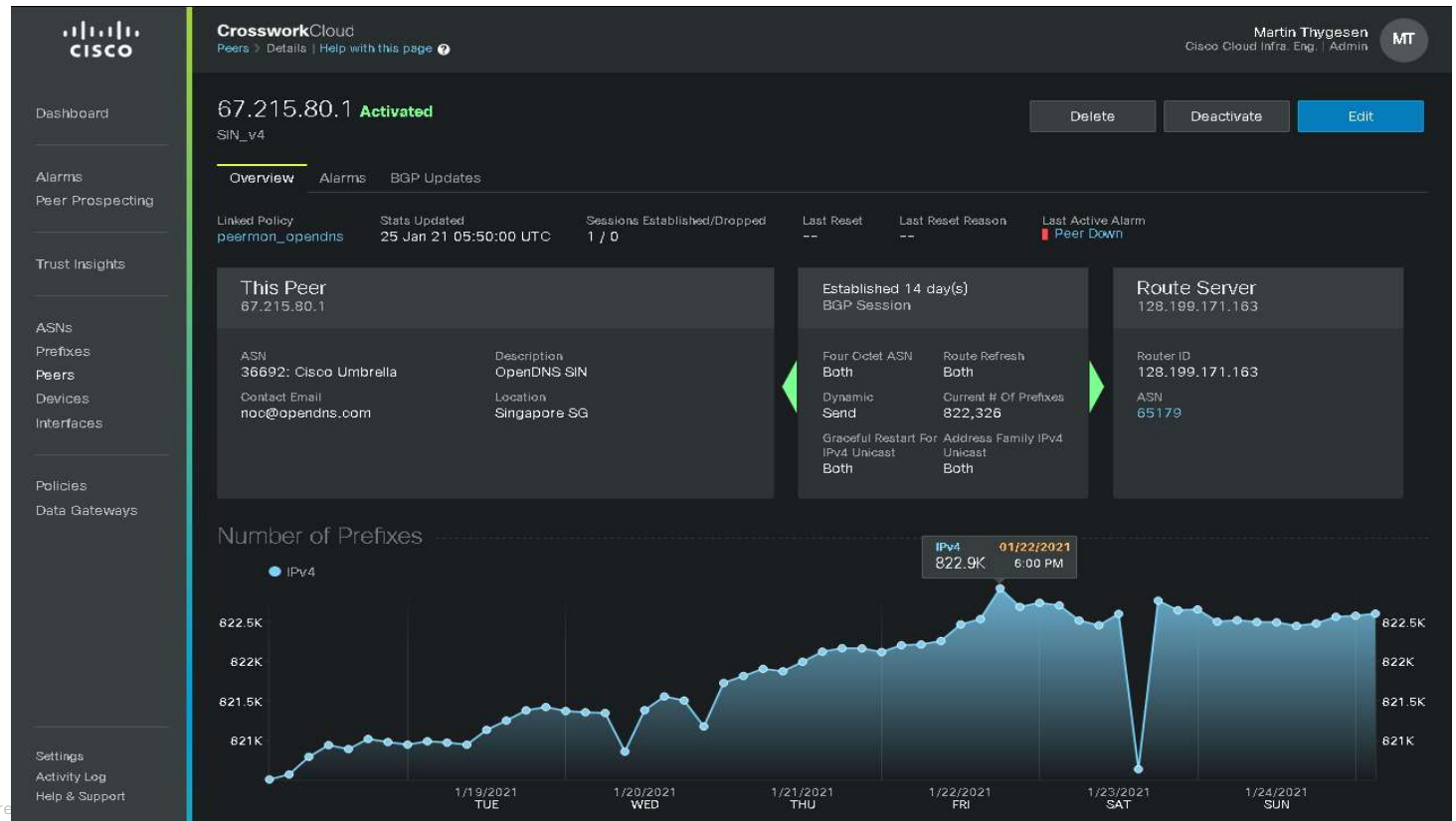
Check your Route Registration Data is up to date

How do I know when key customer content networks are impacted and why



# Crosswork Network Insights – Route Analysis

- Unlimited Peer Route Tracking
- Peer Alarms
- A large routing sensor network
- Correlate BGP with other events
- Free Access
- Paid monitoring options



# Crosswork Network Insights – Route Analysis

- 3 months of Route Updates history
- Peer ID Information kept private
- No cost views of what your routers are advertising

**CrossworkCloud**  
Peers > Details | Help with this page

Martin Thygesen  
Cisco Cloud Infra. Eng. | Admin

67.215.80.1 **Activated**  
SIN\_v4

Overview Alarms **BGP Updates**

Time Range  
25 Jan 21 05:03 UTC - 25 Jan 21 06:03 UTC

Peer AS	Prefix	AS Path	Communities	Update Type	Last Updated
36692	185.175.100.0/24	36692 ◀ 4637 ◀ 47562	4637:500 4637:30024 4637:303i	Add	25 Jan 21 06:00:00 UTC
36692	103.94.12.0/22	36692 ◀ 2914 ◀ 6453 ◀ 4538 ◀ 131576	2914:420 2914:1405 2914:2406	Add	25 Jan 21 06:00:00 UTC
36692	99.194.200.0/22	36692 ◀ 2914 ◀ 3356 ◀ 209 ◀ 22561	2914:420 2914:1405 2914:2406	Add	25 Jan 21 05:59:58 UTC
36692	41.202.229.0/24	36692 ◀ 3257 ◀ 174 ◀ 16637 ◀ 20294 ◀ 36991	3257:8029 3257:8856 3257:304i	Add	25 Jan 21 05:59:57 UTC
36692	177.124.99.0/24	36692 ◀ 3257 ◀ 3356 ◀ 267469 ◀ 28642 ◀ 2...	3257:8784 3257:30147 3257:50i	Add	25 Jan 21 05:59:55 UTC
36692	192.206.204.0/24	36692 ◀ 2914 ◀ 3356 ◀ 209 ◀ 53653	2914:420 2914:1005 2914:2000	Add	25 Jan 21 05:59:47 UTC
36692	185.137.56.0/22	36692 ◀ 2914 ◀ 29119	2914:410 2914:1204 2914:2205	Add	25 Jan 21 05:59:45 UTC
36692	45.251.48.0/22	--	--	Delete	25 Jan 21 05:59:44 UTC
36692	67.201.98.0/24	36692 ◀ 2914 ◀ 701	2914:420 2914:1005 2914:2000	Add	25 Jan 21 05:59:42 UTC
36692	62.201.195.0/24	36692 ◀ 2914 ◀ 3356 ◀ 44217	2914:420 2914:1405 2914:2406	Add	25 Jan 21 05:59:41 UTC
36692	130.137.81.0/24	36692 ◀ 2914 ◀ 174 ◀ 16509	2914:420 2914:1005 2914:2000	Add	25 Jan 21 05:59:40 UTC
36692	103.161.104.0/24	36692 ◀ 4637 ◀ 6461 ◀ 2914 ◀ 10075 ◀ 137...	4637:33052 4637:33314 4637:3i	Add	25 Jan 21 05:59:40 UTC
36692	68.142.0.0/19	36692 ◀ 2914 ◀ 174 ◀ 11280	2914:420 2914:1005 2914:2000	Add	25 Jan 21 05:59:39 UTC

Viewing 1 - 14 of 114 Records

Demo

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Network Insights  
External BGP Monitoring

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BDK1

# Traffic Analysis

## Netflow Analytics as a Service

# Crosswork Traffic Analysis



**CrossworkCloud**  
Traffic Analysis | Help with this page

Dan Backman  
HPS-CIE | Read Write DB

Time: Last Week | Updated: 7:08 PM

### Cloud-Delivered NetFlow Traffic Analytics

- Q. Can we quickly manage congestion at network edge?
- Q. Are we proactive in identifying network edge congestion?
- Q. How do IP Routing tables relate to traffic flow in congested devices?
- Q. Where and Who should we be peering with?
- Q. What small changes could help improve network edge congestion?
- Q. What is the impact of moving traffic between edge devices?
- Q. What happens if we start peering deeper in our Access networks?

Device Overview

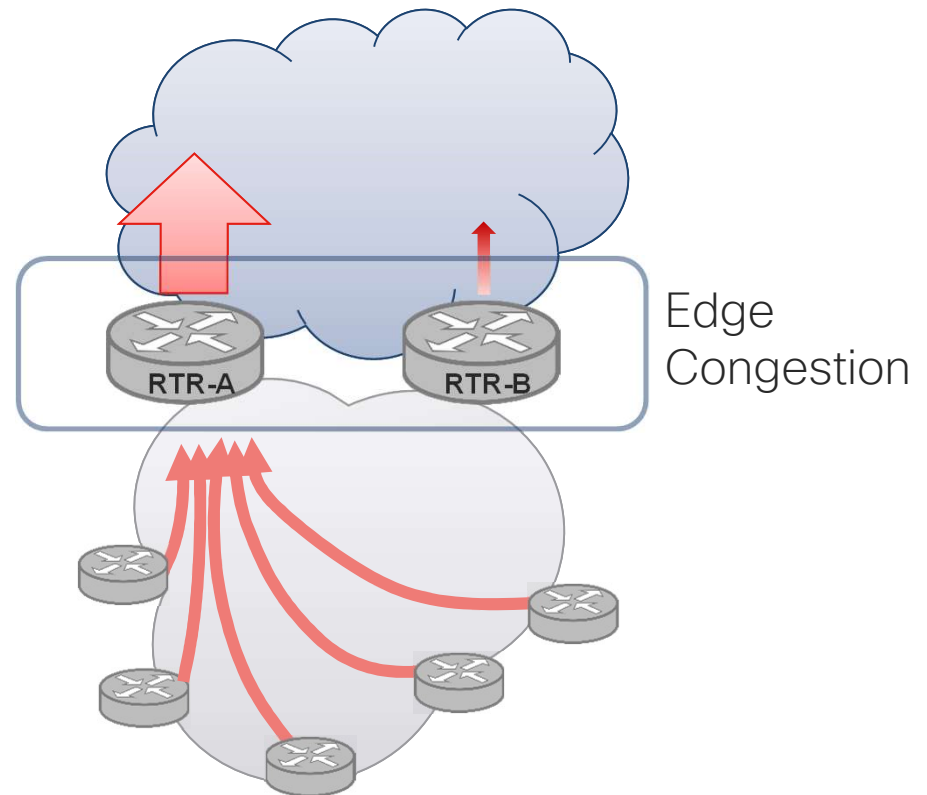
Device	Throughput	Capacity
rtr-brd-f5-a	1.1 Gbps	594.8 Mbps
rtr-brd-f5-b	12.8 bps	583.3 Mbps
rtr-peer-f4-1	236.6 Mbps	211.5 Mbps
rtr-brd-f4-a	21.7 Mbps	15 Mbps

# Where is Traffic Analysis needed



Network Edge Congestion occurs where two or more different networks interact

- Most network protocols will seek a common transit point
- This leads to under used assets and accelerated congestion
- This problem applies to Enterprise, Service Provider and Overlay Networks



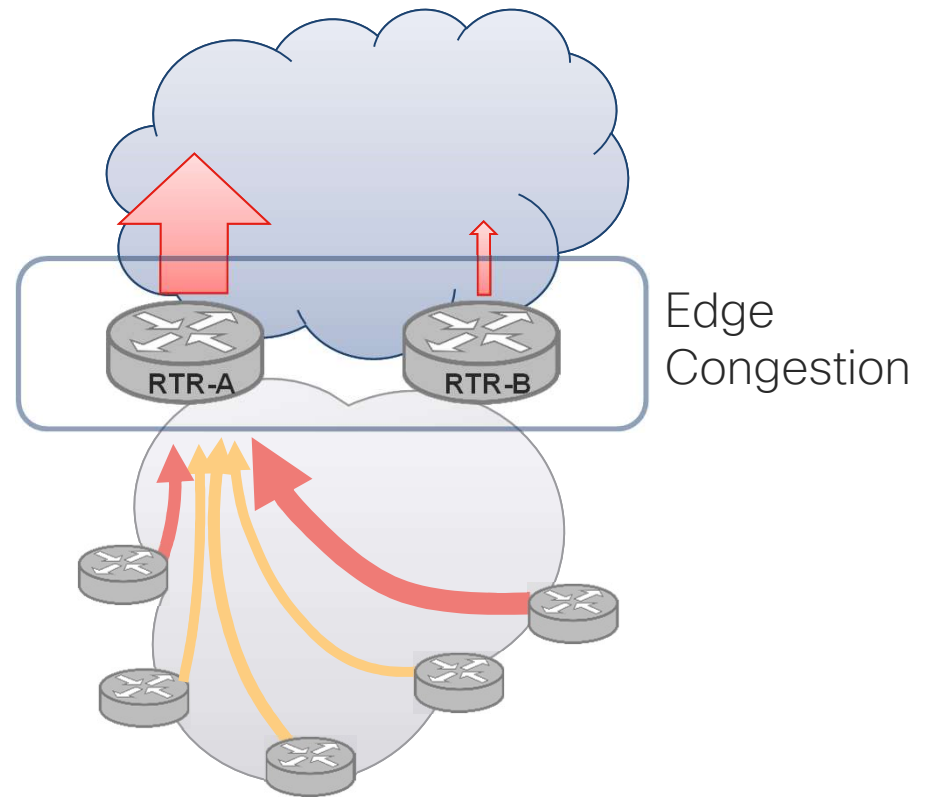


# Where is Traffic Analysis needed

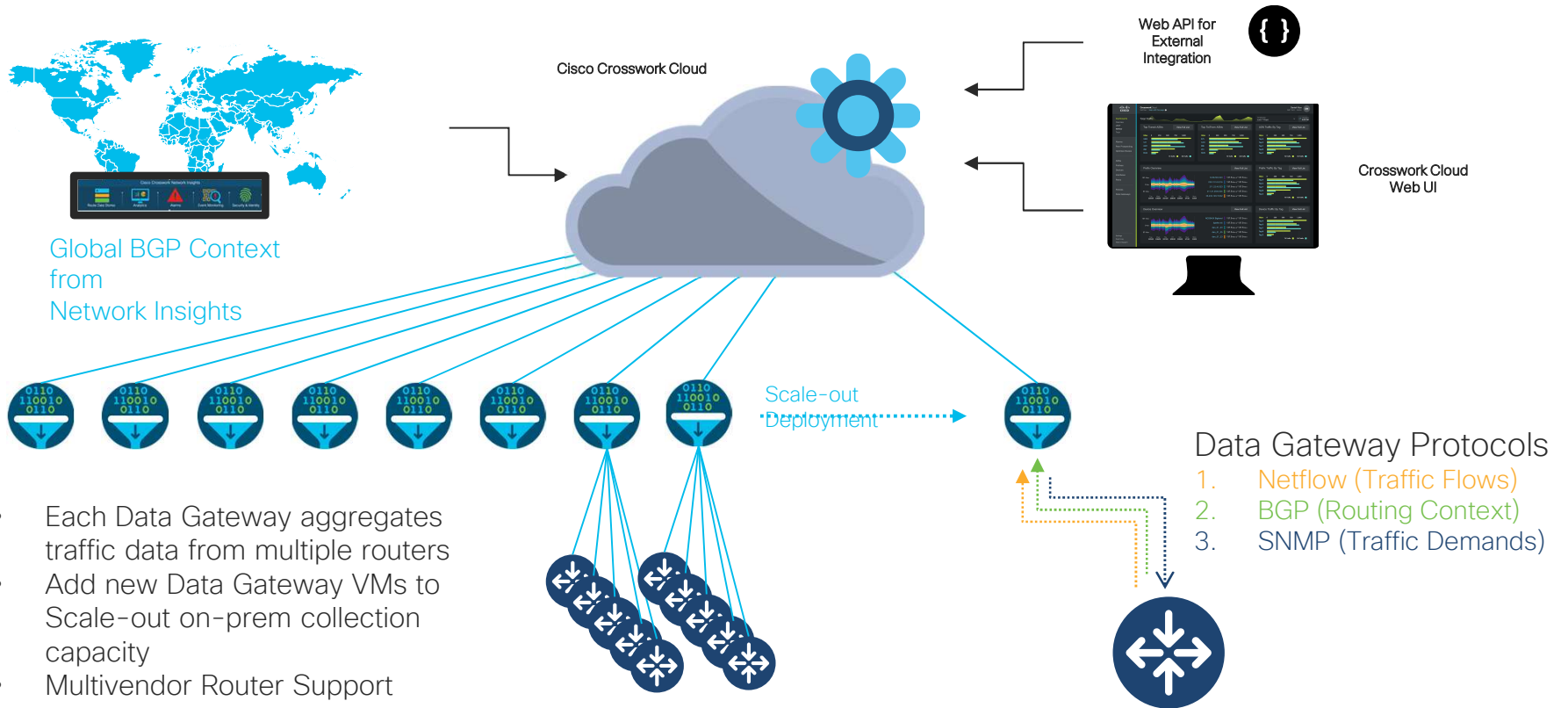


When Edge Congestion occurs, Operators need to understand the root cause and what actions they can take.

- Network Operators control Routing not Application Protocols
- Protocol Information tells us what the traffic is, but Routing is the key to making changes.
- Network Operators need to understand the source of flows and the size in order to quickly identify what actions can be taken



# How Traffic Analysis Works



- Each Data Gateway aggregates traffic data from multiple routers
- Add new Data Gateway VMs to Scale-out on-prem collection capacity
- Multivendor Router Support



# Traffic Analysis – Top-down Traffic Patterns

## Aggregate Traffic

- Provide a unified view of traffic flow into/out of and transit through your network
- Classify flows across routers by source/dest ASN and IP prefix
- Support for IPv4 and IPv6

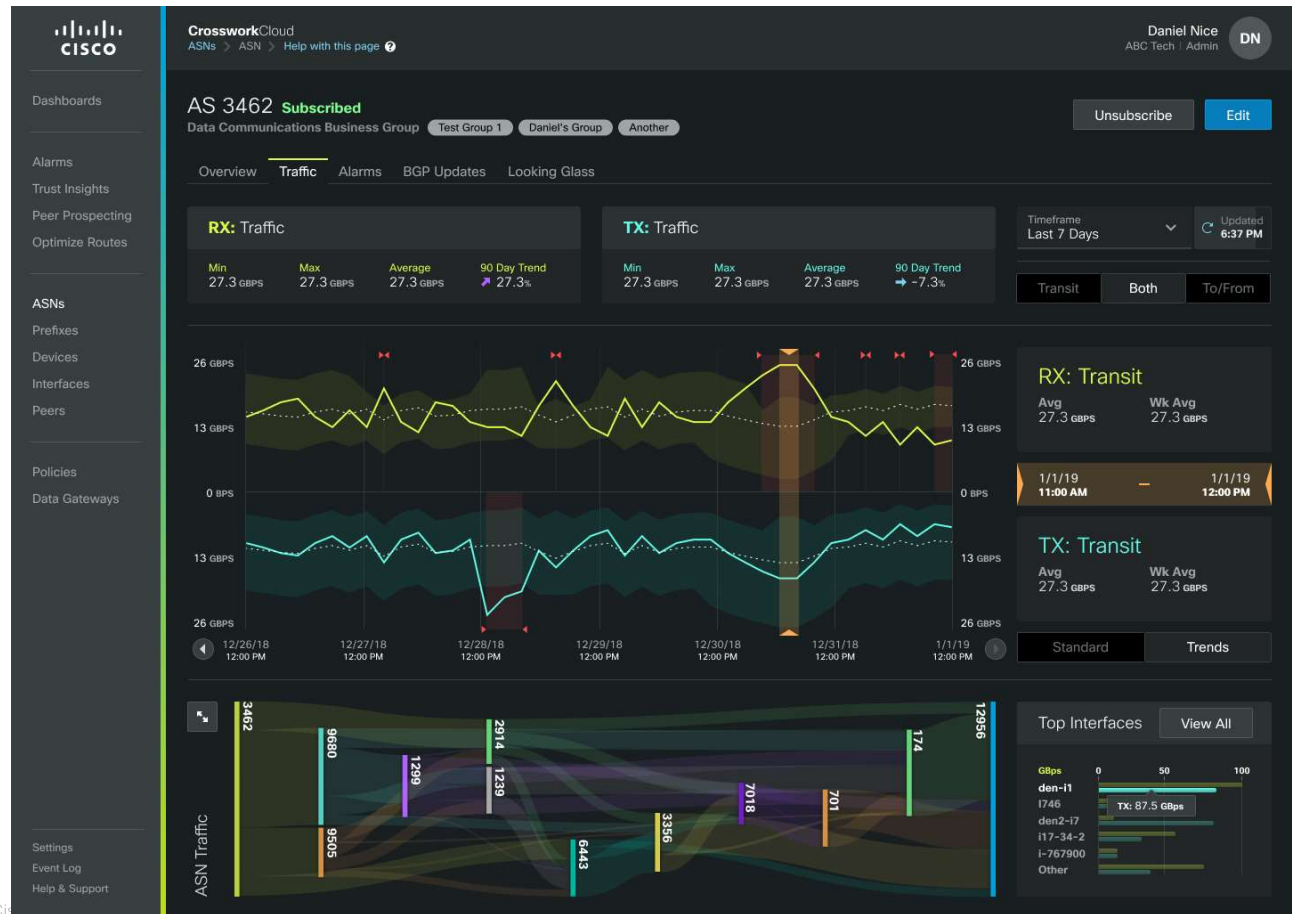




# Traffic Analysis - ASN and Prefix Analysis

## ASN and Prefix Traffic Analysis

Provide a view of sample based Traffic information to or from a specific ASN or IP Prefix (route)



# Traffic Analysis - Peering Prospects



## Peering Prospect Recommendation

Provide Analysis & Recommendation of Top Talkers that I should peer with to provide a better customer experience.

- 1 Transit ASN's have common paths vs just remote Top Talkers where the traffic is unique to the remote network. Here Top Talkers excludes connected ASN Peers.

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**CrossworkCloud**  
Dashboard | Help with this page

Martin Thygesen  
HPS-CIE | Admin MT

1

Recommendations Ignored

Optimization Method: Non-Peers, Optimize Peer

Filter By: Device Group, Device

Peer ASN: Device

Traffic Aggregation: Both, Transit, To/From

Timeframe: Last 90 Days

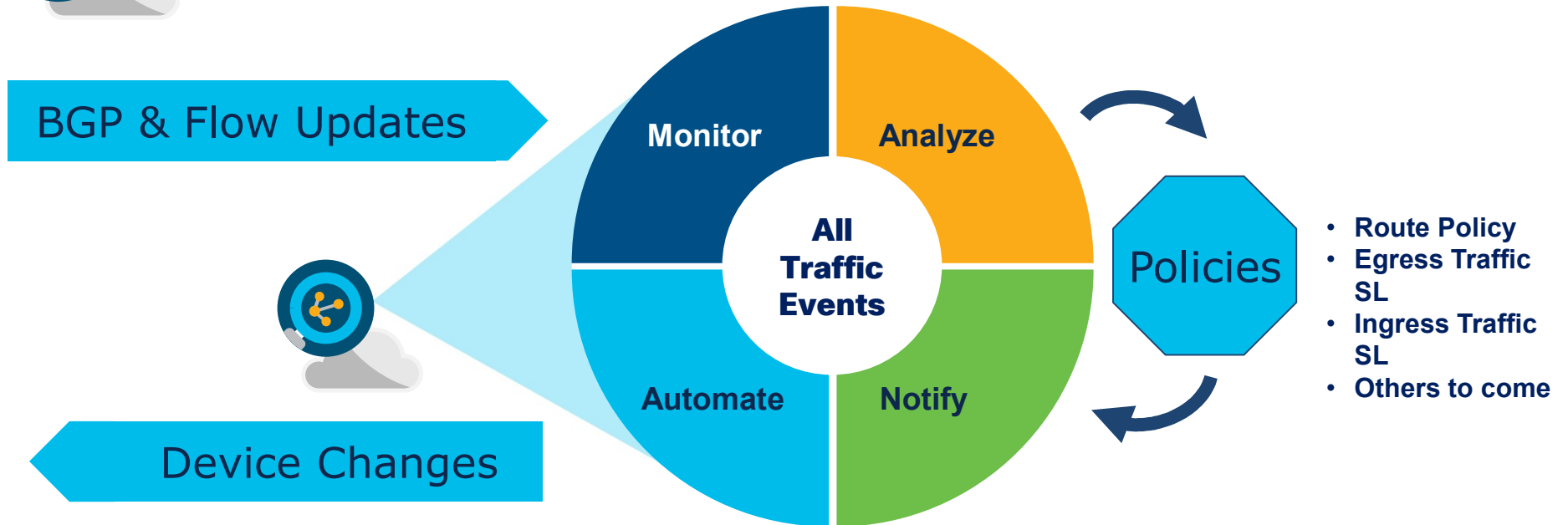
Pro...	Name	RX	TX	Total	Action	
8075	Microsoft	526.9 Mbps	210.9 Mbps	737.8 Mbps	IGNORE	1
701	Verizon	351.4 Mbps	253.7 Mbps	605.1 Mbps	IGNORE	2
3356	Lumen AS 3356	212.7 Mbps	252.3 Mbps	465 Mbps	IGNORE	3
7018	AT&T US - 7018	100.6 Mbps	53.6 Mbps	154.2 Mbps	IGNORE	4
16509	Amazon.com	69.7 Mbps	65.2 Mbps	134.9 Mbps	IGNORE	5
6461	Zayo (Abovenet Communications Inc.)	40.6 Mbps	51.5 Mbps	92.2 Mbps	IGNORE	6
2571	DHLNET	59.3 Mbps	26.4 Mbps	85.7 Mbps	IGNORE	7
14618	AMAZON-AES	32.2 Mbps	36.4 Mbps	68.6 Mbps	IGNORE	8
2914	NTT Global IP Network	26.2 Mbps	26.7 Mbps	52.9 Mbps	IGNORE	9
30337	DELOITTE-US-ASN	31.7 Mbps	8.5 Mbps	40.2 Mbps	IGNORE	10
6830	Liberty Global	27.2 Mbps	12.3 Mbps	39.5 Mbps	IGNORE	11
7029	Windstream Communications	12.6 Mbps	21.4 Mbps	34 Mbps	IGNORE	12
30031	MIMECAST-US	9.5 Mbps	21.6 Mbps	31.1 Mbps	IGNORE	13
3257	GTT Communications (AS3257)	11.1 Mbps	17.3 Mbps	28.3 Mbps	IGNORE	14

Viewing 1-14 of 50

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# How do we get from Traffic Analytics to Intent based Automation?



**Intent is expressed as “What should be ”**  
**Policies = Intent, they trigger notification actions**  
**Actions can be Manual or Automated based on business value**

Demo

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Traffic Analysis  
Netflow Analytics as a  
Service

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BDK2

# Data Gateway Cloud-to-Ground Connectivity



# Connecting Crosswork Cloud to your network

Cisco's Cloud is hosted by Cisco in a secure environment



You need a secure way to connect these two

You need an operationally simple and reliable method to deploy this secure layer

You need a **solution that can scale to whatever your network demands are today *and* tomorrow**

You have devices in your secure network



# Connecting Cisco's Cloud to your network

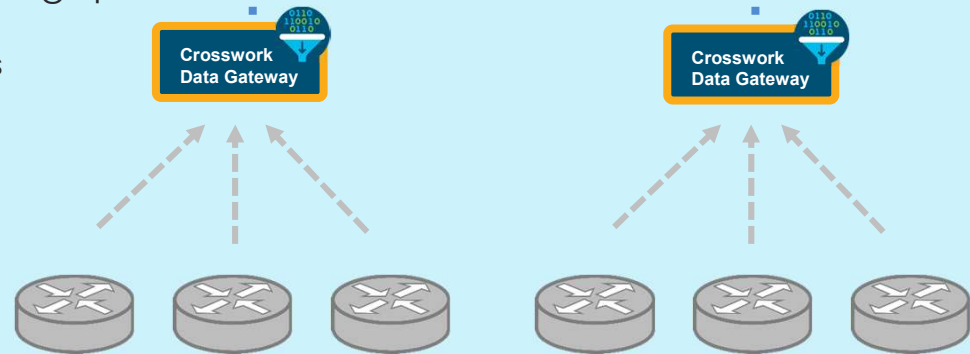
Cisco's Cloud is hosted by Cisco in a secure environment



Cryptographically Secured Collection

Crosswork Data Gateway bridges this gap.

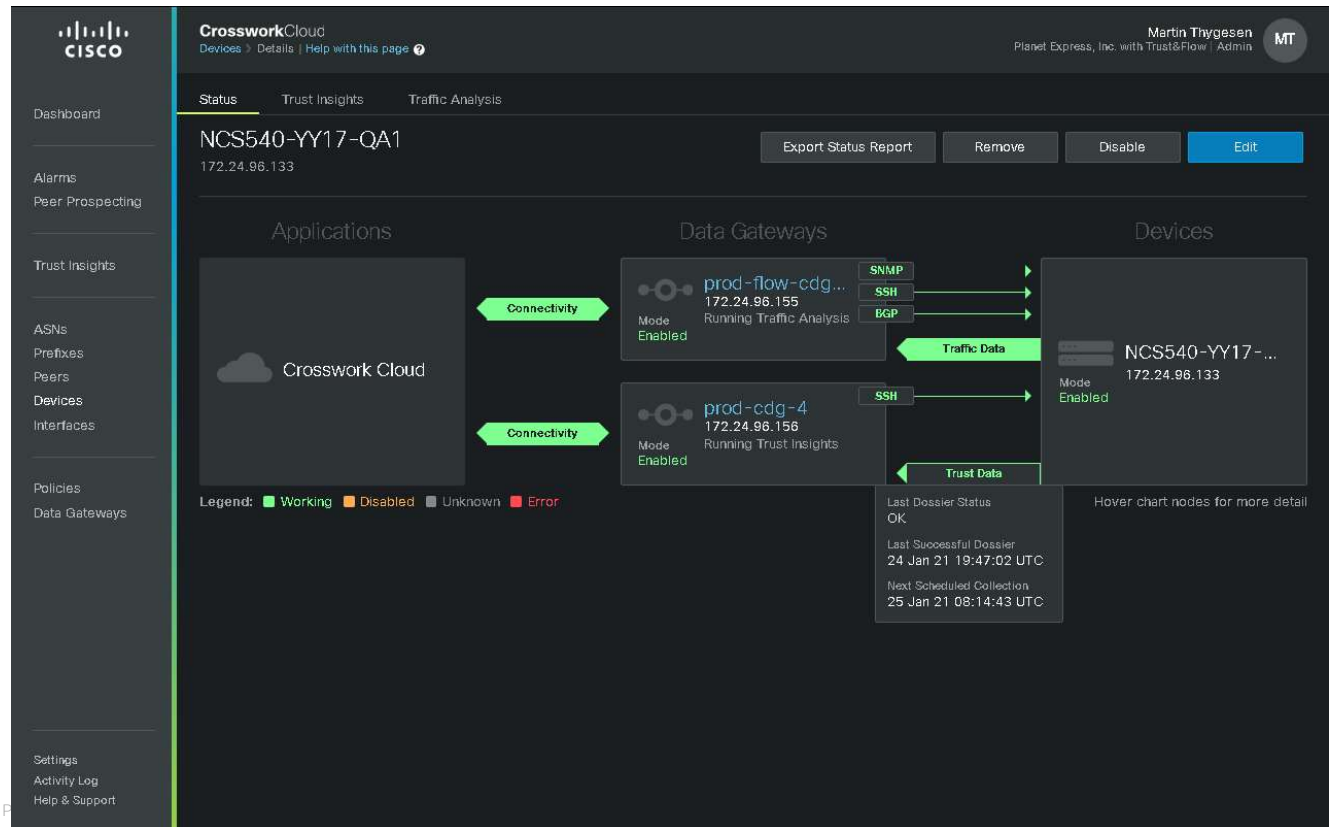
- **Secure connectivity** to Crosswork Cloud
- Simple and repeatable deployment model with VMs
- **Scales** as you grow with a horizontal design
- Deploys **on premise** in your secure network



You have devices in your secure network

# Crosswork Data Gateway

- Visibility of connection state
- Clear linkage between protocol collection and devices
- Platform health, resource management & reporting



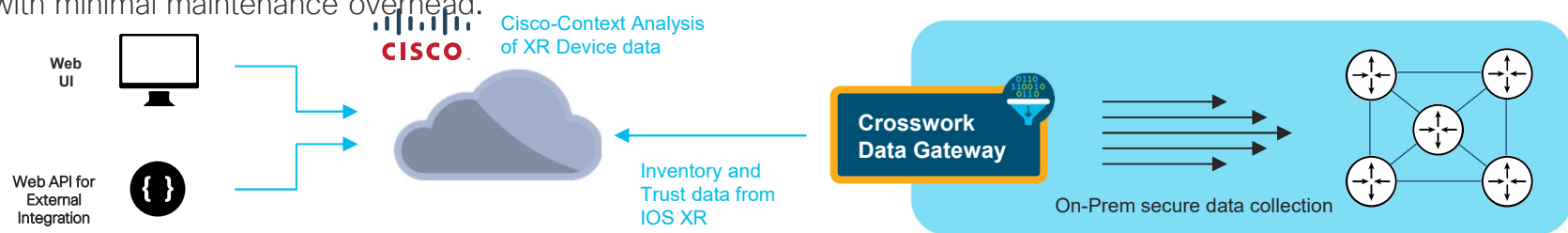
# Trust Insights XR Inventory and Integrity

# Cloud SaaS-delivered Operational Analytics

Our goal is to enable advanced analytics solutions to enable **Operational Intelligence**

- Advanced Insights for IOS XR Platforms
- Device-independent routing analytics

Delivered through new cloud-based services to provide easy-to-deploy services with minimal maintenance overhead.



- **Operational Intelligence for Cisco SP Solutions**

- Visibility into the network, that allows you to automate your network automations and enhance the customer experience
- Operational insights into IOS XR devices

- **Cloud-based delivery**

- No complex on-prem software to test, deploy, and maintain
- Immediate deployment – no lengthy qualification deployment, upgrades
- Always up-to-date, no ongoing maintenance required
- Demonstrate immediate value

# Crosswork Trust Insights

- Cloud-enabled IOS XR 7



Security Capabilities and Software Reporting



Trust in the network operating system with image signing and secure boot infrastructure



Trust at runtime with run time defense, encrypted transport, DDoS protection



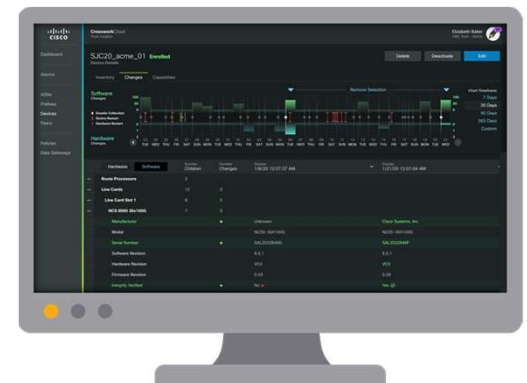
Trustworthiness Report and Audit



Visualize and report on the trustworthiness of network infrastructure



Operation simplicity that provides a source of truth with your infrastructure (hardware, software, runtime)



Forensic Analysis



Track changes in infrastructure over time

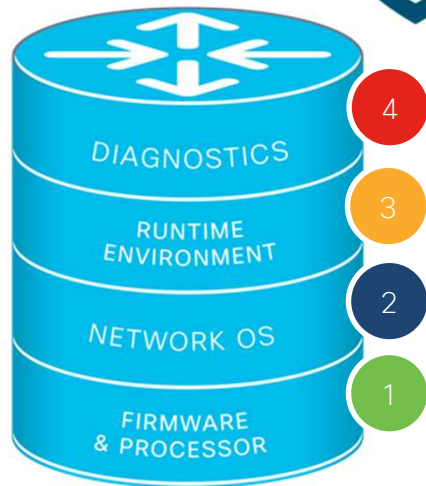


Cryptographic and verifiable proof of what happened in the past

# Cloud-Enhanced Trustworthy Systems

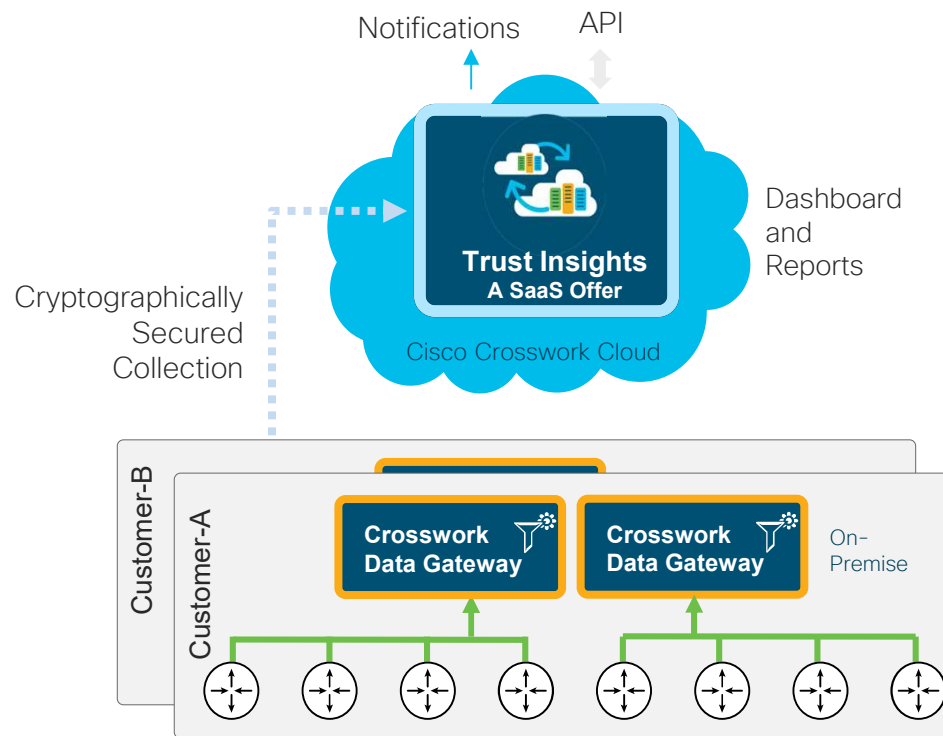
- Redefining Network Operations

8+ years of devotion  
to Secure Development  
30+ years of leadership



- 1** Trust Begins in Hardware  
Tamper-proof Trust Anchor as Root of Trust  
**NEW: Cisco Chip Protection and Secure Storage**
- 2** Verifying Trust in the Network OS  
Image signing and Secure Boot infrastructure  
**NEW: Secure Boot with Cisco Chip Protection & Image & Package Signing**
- 3** Maintaining Trust at Run time  
Run-time defense & integrity measurements  
**NEW: Fingerprinting and integrity enforcement of running processes**
- 4** Visualize and Report on Trust  
Audit production network with cryptographically secured data collection  
**NEW: Cisco Crosswork Trust Insights / Data Gateway**

# Crosswork Trust Insights Architecture



- On-Premises Data Gateway collects signed trust dossier from IOS XR Routers
- Dossier is human-readable
- Utilizes up-to-date feed of Known-Good-Values (KGV) from IOS XR Build and Regression
- Constantly evolving analytics of hardware and software fingerprints in Cloud Service





Dashboard

Alarms

Trust Insights

ASNs

Prefixes

Peers

Devices

Policies

Data Gateways

Settings

Activity Log

Help & Support

Status Trust Insights

### NCS8001-Spitfire

172.27.150.118 SJC20

Collect Dossier

Remove

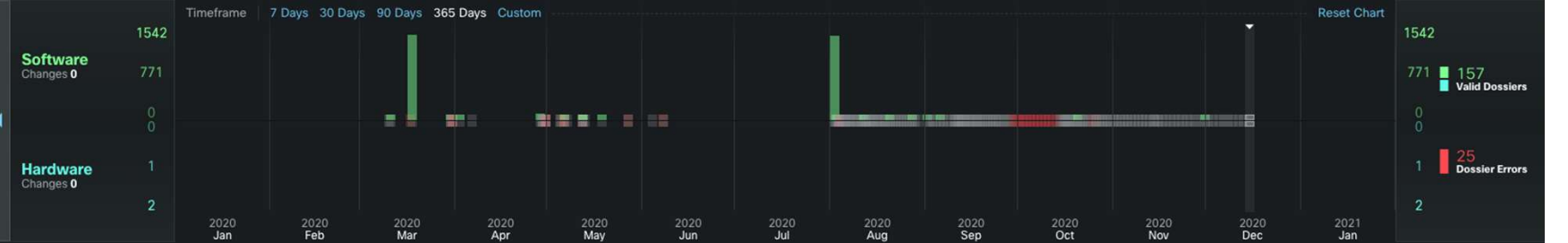
Disable

Edit

Platform Inventory Changes Capabilities

Model	Location	OS Version	Uptime	Last Successful Dossier	Last Dossier Status	Description
NCS_8000	SJC20	7.0.12	7 weeks, 1 day, 6 hours, 40 minutes	27 day(s) ago	OK	--

Use The Chart Below To Modify Select  
12/15/2020 12:20:58 F



Hardware Software

Quick Search

Package Name	Category	Known Cisco Release	Architecture	Release	Version	Built Time	Hashes Seen
cisco-grub	Os Base	RPM 7.0.12	corei7_64	0.29	1.0	3/9/2020 7:34:48 AM	<a href="#">Details</a>
base-files	Os Base	RPM 7.0.12	wrldsk_x86	89.7	3.0.14	3/9/2020 7:29:01 AM	<a href="#">Details</a>
kernel-image-bzimage-4.8.28-wr9	Os Base	RPM 7.0.12	wrldsk_x86	0.169	4.8.28	3/9/2020 7:29:01 AM	<a href="#">Details</a>
kernel-module-br-netfilter	Os Base	RPM 7.0.12	wrldsk_x86	0.169	4.8.28	3/9/2020 7:29:01 AM	<a href="#">Details</a>
kernel-module-bridge	Os Base	RPM 7.0.12	wrldsk_x86	0.169	4.8.28	3/9/2020 7:29:01 AM	<a href="#">Details</a>
kernel-module-cdc-eem	Os Base	RPM 7.0.12	wrldsk_x86	0.169	4.8.28	3/9/2020 7:29:01 AM	<a href="#">Details</a>
kernel-module-cisco-fpga-qspi	Os Base	RPM 7.0.12	wrldsk_x86	0.65	1.0	3/9/2020 7:29:01 AM	<a href="#">Details</a>

Viewing 1 - 7 of 1617 Records

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Monitor  
Overview  
Devices

Tools  
Device Comparison  
Find Package  
Find Hardware  
Find Files

## Find Files

Locate files by entering a hash, file and path, or search by device.

Find By Hash

Find By Device

Device Type  
ASR 9000v

Mismatch Include Exclude  
Runtime

Add Filter

Device Name	Path	Node	Device Model	OS Version	Tags	Mismatch Status	
XRv9K-003						Runtime	1
XRv9K-003						Runtime	2
XRv9K-003						Runtime	3
XRv9K-003						Runtime	4
XRv9K-003						Runtime	5
XRv9K-003						Runtime	6
XRv9K-003						Runtime	7
XRv9K-003						Runtime	8
XRv9K-003						Runtime	9
XRv9K-003						Runtime	10
XRv9K-003						Runtime	11
XRv9K-003						Runtime	12
XRv9K-003						Runtime	13
XRv9K-003						Runtime	14
XRv9K-003						Runtime	15
XRv9K-003	/bin/cp.coreutils	0/RP0/CPU0	ASR 9000v	7.2.1.311	SJC	Runtime	16

**File Signature Analysis : bash**  
Historical details and other devices where the file appears.

History | **Seen Elsewhere**

Path	Package Name	KGV Release	Package Version
/bin	host	7.2.1	--

Device	Node	KGV Hash	Ondisk Hash	Running Hash	Dossier Collec...	
XRv9K-003	0/0/CPU0	63330895728ee92eea	--	04eb5c647a20c5b0	1/12/2021 11:18:01...	1
XRv9K-003	0/RP0/CPU0	63330895728ee92eea	--	04eb5c647a20c5b0	1/12/2021 11:18:01...	2
XRv9K-004	0/0/CPU0	63330895728ee92eea	--	04eb5c647a20c5b0	1/12/2021 11:18:01...	3
XRv9K-004	0/RP0/CPU0	63330895728ee92eea	--	04eb5c647a20c5b0	1/12/2021 11:18:01...	4

Viewing 1-4 of 8

Close

Demo

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Trust Insights  
XR Inventory and Integrity

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RDK3

# Operational Intelligence as a Service

- ✓ Always-On, Automated KGV Feeds, Up-to-Date Analytics
- ✓ No software to deploy and maintain
- ✓ Instant Integration, Continuous Improvement
- ✓ Reduced Operational Cost and Seamless Scalability



# Cisco Crosswork Cloud

A SaaS solution that provides operational insight and validation of network health and security with the agility and scale of the cloud.

Launch

Request a Trial



## CrossworkCloud

### Trial Account Request

To activate your trial subscription please sign in with your existing Cisco Connection On-line (CCO) account or create a new one. Once signed in, please answer a few questions about your organization.

1. Use an existing CCO account or please create one by clicking [here](#)
2. If you run into any problems with this request a user guide can be found [here](#)
3. Please click next and answer a few questions about your organization

Next

Products Support Community



enriches routing data with additional data  
reducing the time it takes to identify malicious  
leverages these data to provide rich

analysis, visualization, and alerting on actionable network events, saving network operators time and increasing service availability.

<https://crosswork.cisco.com>

For more information on Cisco's Automation Portfolio please visit [cisco.com/go/crosswork](https://cisco.com/go/crosswork)


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## Cisco Crosswork Network Automation



**Modernize network operations**

Crosswork Network Automation increases visibility of your infrastructure, providing valuable insights so you can take proactive actions. The end result: simplified network operations, faster service delivery, and improved experiences for your end customers.

[Watch overview \(3:10\)](#)

[Benefits](#) | [Products](#) | [Partners](#) | [Customer Success Stories](#) | [Resources](#) | [Support](#) | [Contact Cisco](#)

### Simplify network automation

Crosswork Network Automation is a closed-loop, outcome-driven software suite used to deliver efficient mass-scale network operations across the services lifecycle. This is a scalable solution for operators of all-sized networks to accelerate mean-time-to-value by monetizing agile new services and minimizing mean-time-to-remediation to proactively prevent customer impacting issues.

#### Economic benefits from Crosswork Network Automation

Metric	Value
Faster time to service	85%
OpEx savings	55%
TCO savings	46%

### Cloud enhanced operations

Crosswork Cloud is a powerful addition to any network operations using always-on, always-up-to date, SaaS-based services to help improve routing health, increase network visibility, maintain trustworthy infrastructure, and generate network traffic insights.

[Why operate in the cloud? >](#) | [Try Network Insights for free >](#)

Icon	Section	Description
	Network Insights	Network routing analysis to maintain routing health by monitoring for route leaks and hijacks.
	Traffic Analysis	Visualize, analyze, and optimize network traffic at distributed peering points to improve
	Trust Insights	Gain operational visibility to preserve the trustworthiness of your network infrastructure.

# Questions?





The bridge to possible