



# Gain Operational Visibility, Increase Customer Confidence and Differentiate Your Network with Cisco Crosswork Cloud

Cisco Knowledge Webinar

January 12, 2021

# Today's Presenters



*John Malzahn*  
Senior Manager, Service  
Provider Solutions  
Marketing

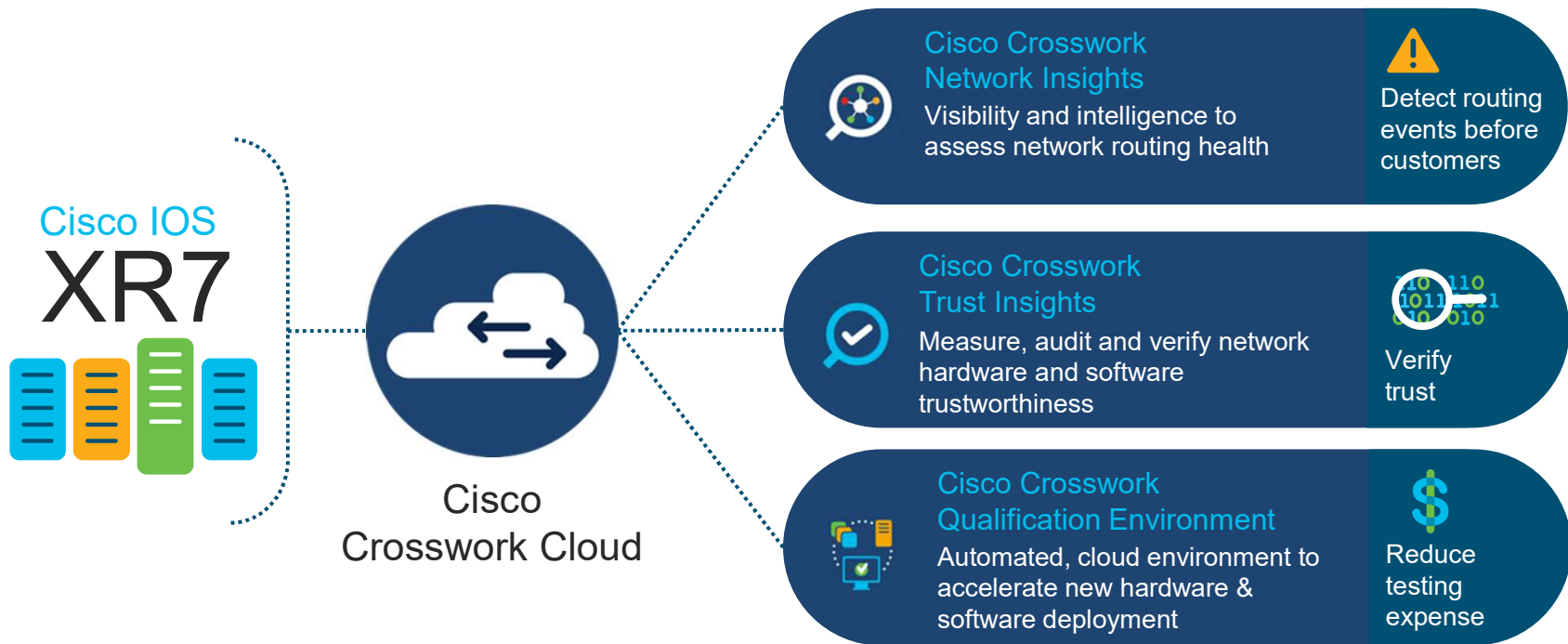


*Dan Backman*  
Product Management  
Leader  
MIG / Crosswork Cloud



# Cloud-enhanced Automated Operations

## Crosswork Cloud and IOS XR7

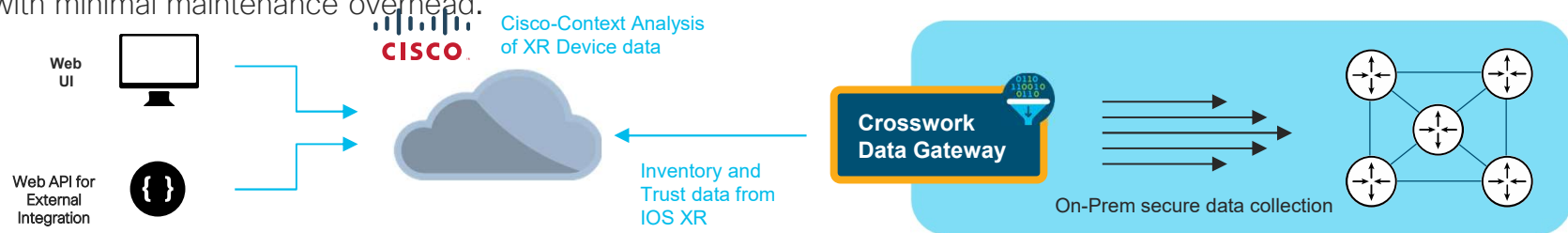


# Cloud SaaS-delivered Operational Analytics

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

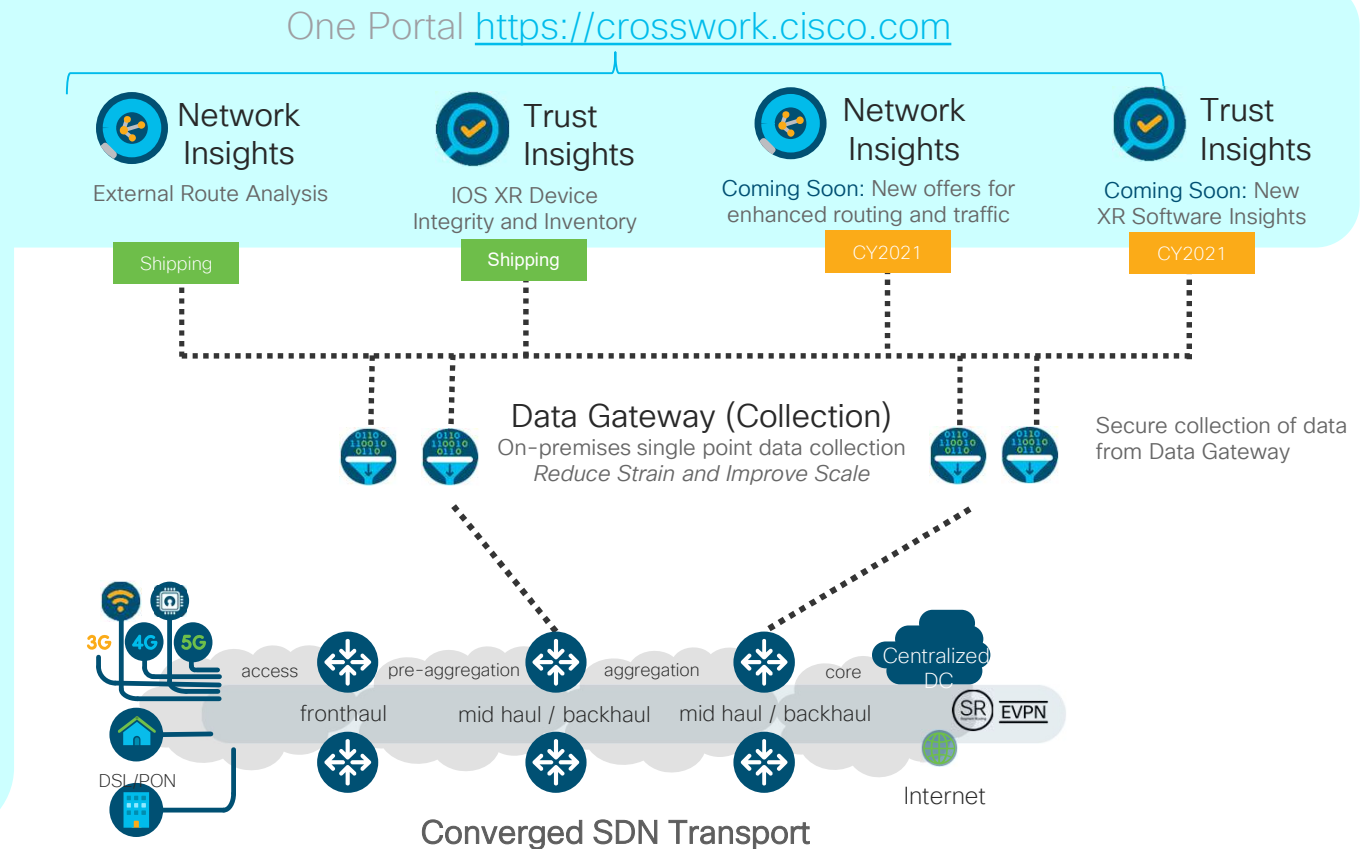
- **Cloud-based delivery**

- 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

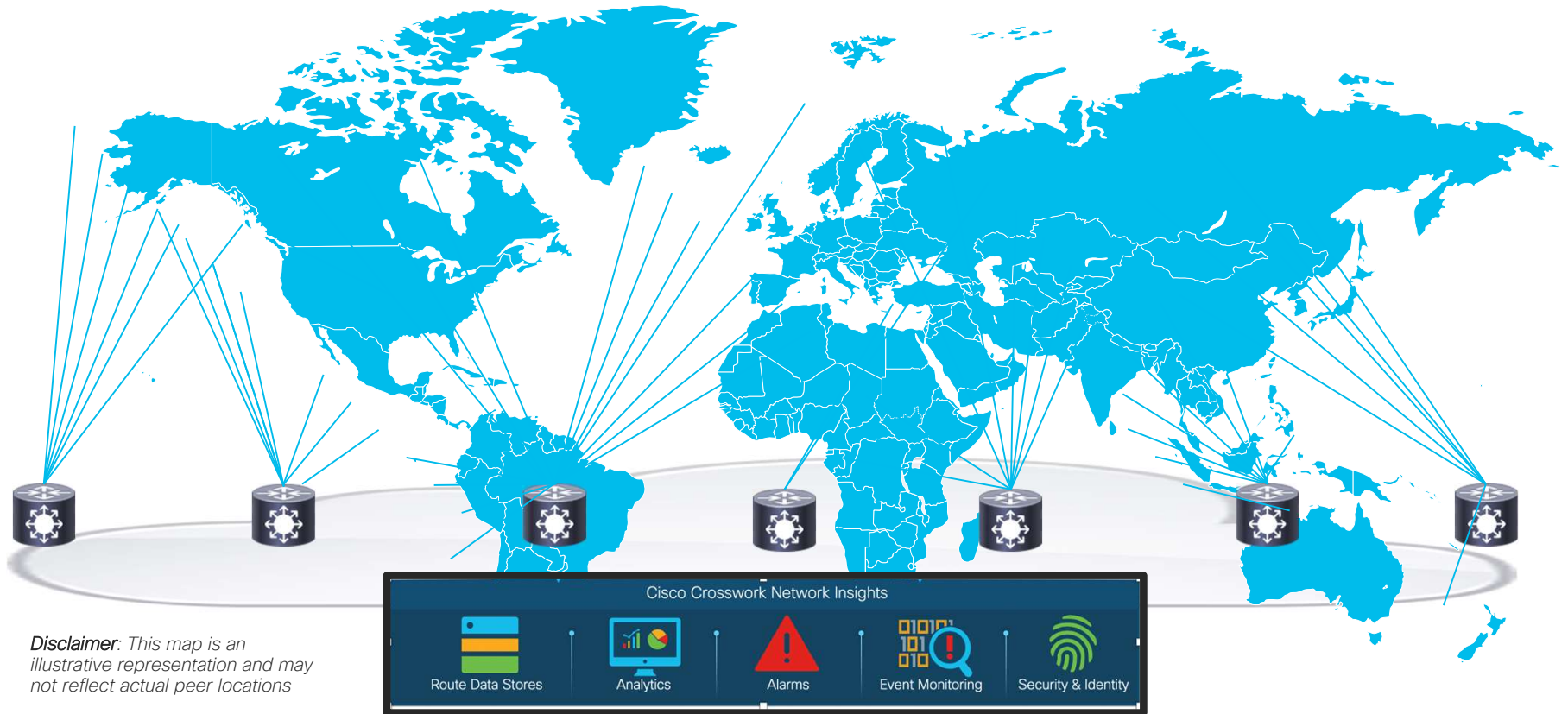
# Crosswork Cloud – Operational Intelligence Platform

## 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



# Network insights monitors hundreds of peers world-wide



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



- Dashboard
- Alarms
- Trust Insights
- ASNs
- Prefixes
- Peers
- Devices
- Interfaces
- Policies
- Data Gateways
- Settings
- Activity Log
- Help & Support

### Active Alarms

Policy violations occurring now

[Manage Alarms](#)

View	Trigger	Policy	Rule	# Peers	Severity	Activated	
<a href="#">View</a>	103.60.32.0/22	Express_109_PREFIX_1	ROA Not Found	133	High <span style="color:red">■</span>	1/11/2021 9:54:19 PM	1
<a href="#">View</a>	169.196.128.0/18	Express_20249_PREFIX	Upstream AS Change	14	Med <span style="color:orange">■</span>	1/11/2021 9:47:26 PM	2
<a href="#">View</a>	169.196.224.0/19	Express_20249_PREFIX	Upstream AS Change	14	Med <span style="color:orange">■</span>	1/11/2021 9:47:26 PM	3
<a href="#">View</a>	103.60.32.0/22	Express_109_PREFIX_1	Upstream AS Change	133	High <span style="color:red">■</span>	1/11/2021 9:47:07 PM	4
<a href="#">View</a>	111.223.8.0/22	Express_109_PREFIX_1	Upstream AS Change	135	High <span style="color:red">■</span>	1/11/2021 9:46:23 PM	5
<a href="#">View</a>	111.223.8.0/22	Express_109_PREFIX_1	ROA Not Found	135	High <span style="color:red">■</span>	1/11/2021 8:41:32 PM	6
<a href="#">View</a>	1221: Telstra Corporation Ltd	BUG-Test-OCT-4605	Unexpected AS Prefix	63	High <span style="color:red">■</span>	1/11/2021 6:41:30 PM	7

Viewing 1 - 7 of 31 Records

Page 1 of 5



Active Alarms By Rule

- 23 Upstream AS Change
- 4 Prefix Withdrawal
- 3 ROA Not Found
- 1 Unexpected AS Prefix



Prefix Usage

- 461 Available
- 39 Used

### Violation Peers



Country	Peer Count	
United States	48	1
Brazil	32	2
Canada	24	3

### Quick Jump

ASN, Prefix or IP

[Go](#)

Enter an ASN, prefix or IP to view associated details.

### Application Shortcuts

- [Configure Notification Endpoints](#)
- [Express Setup](#)

# 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



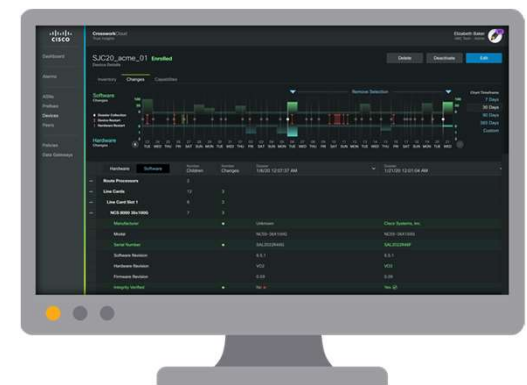
Trustworthiness Report and Audit



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



# Inventory Visualization and Reporting



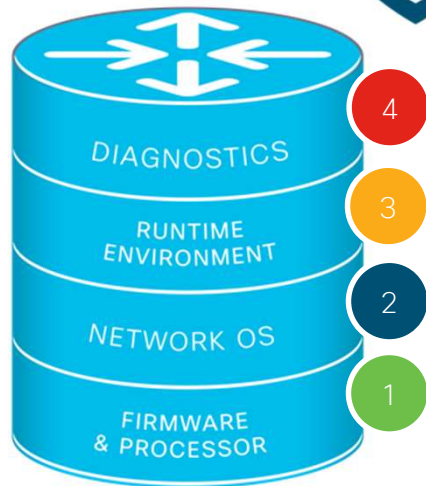
- Visualize trust and inventory data
- Analyze changes related to hardware and software integrity
- Maintain authoritative proof and evidence to support audits, compliance and forensic analysis
- Cloud-Delivered Assured Audit of IOS XR 7 Platforms



# Cloud-Enhanced Trustworthy Systems

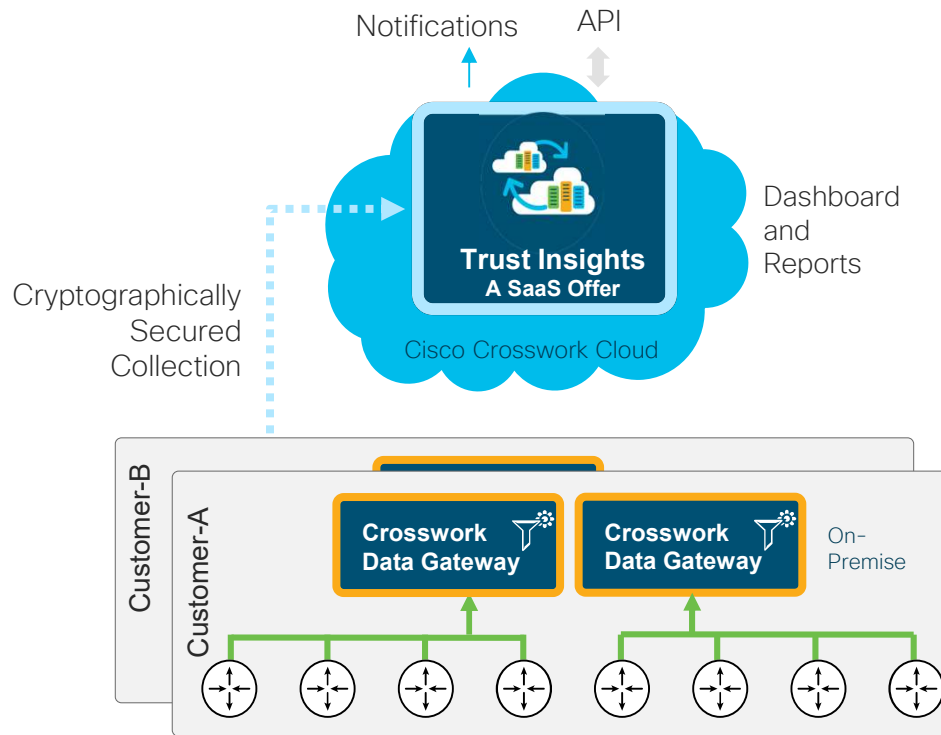
## Redefining Network Operations

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

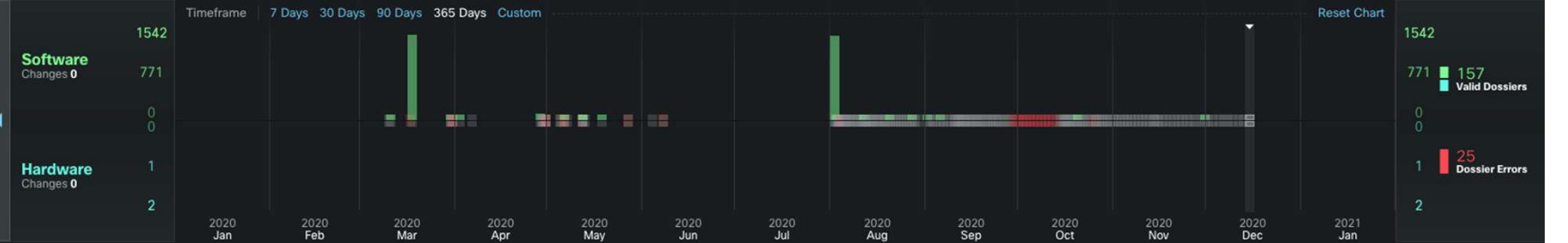
Disable

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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## Why Trust Attestation must be a Cloud 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



# Use-Cases



## Assured Audit

- Signed evidence collection & verification from enrolled devices
- Proof of hardware and software inventory with historical record



## Inventory Reporting for IOS XR Hardware / Software

- Track and report on observed hardware and software across enrolled devices
- Track changes to inventory over time, with proof of HW/SW in historical timeline



## Track and Validate IOS XR Software Packages

- Track IOS XR software packages, SMUs and software inventory
- Track 3<sup>rd</sup> party software observed on IOS XR platforms



## Visualize Trustworthiness of IOS XR Platforms

- Validate observed hardware and software integrity in IOS XR devices
- Observed SW signatures compared to known-good values from XR release process

# Unique Value for Network Operators



## Proof of Hardware and Software Integrity

- First-in-market solution to track and validate known-good hardware and software for network devices



## Track validated HW/SW state for Incident Analysis

- Prove what hardware and software components were present during past incidents



## Validate Software Patching for IOS XR Devices

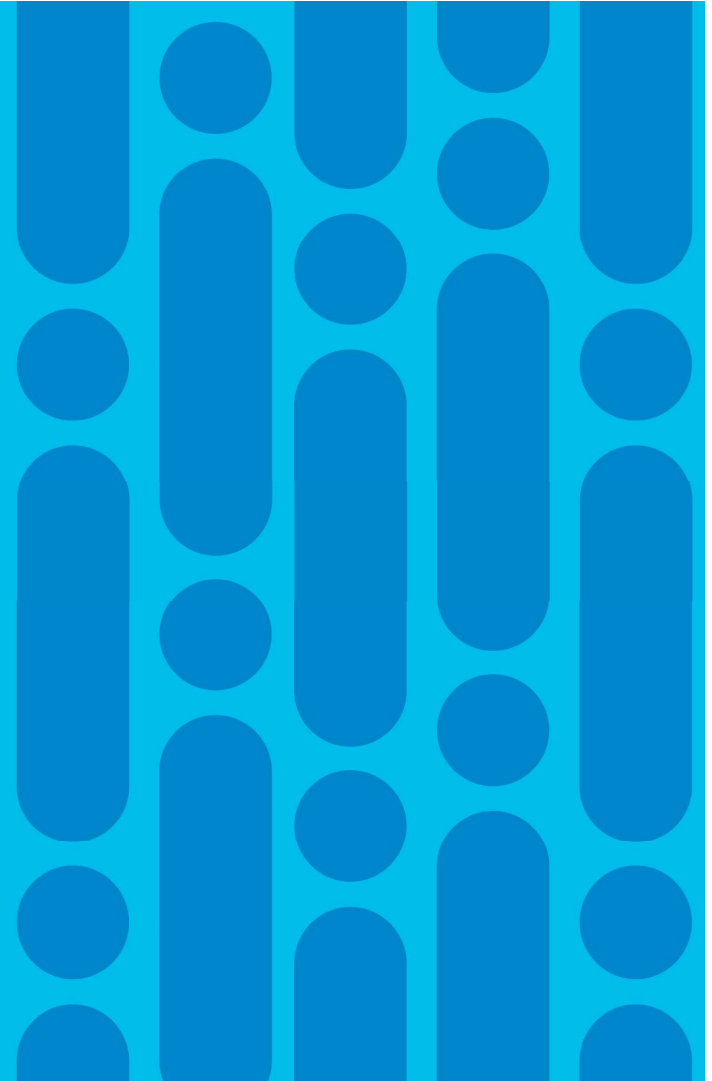
- Operational proof that software patching procedures are completed successfully
- Proof that updated code has been observed running (proof of patching compliance)



## Track compliance against validated software

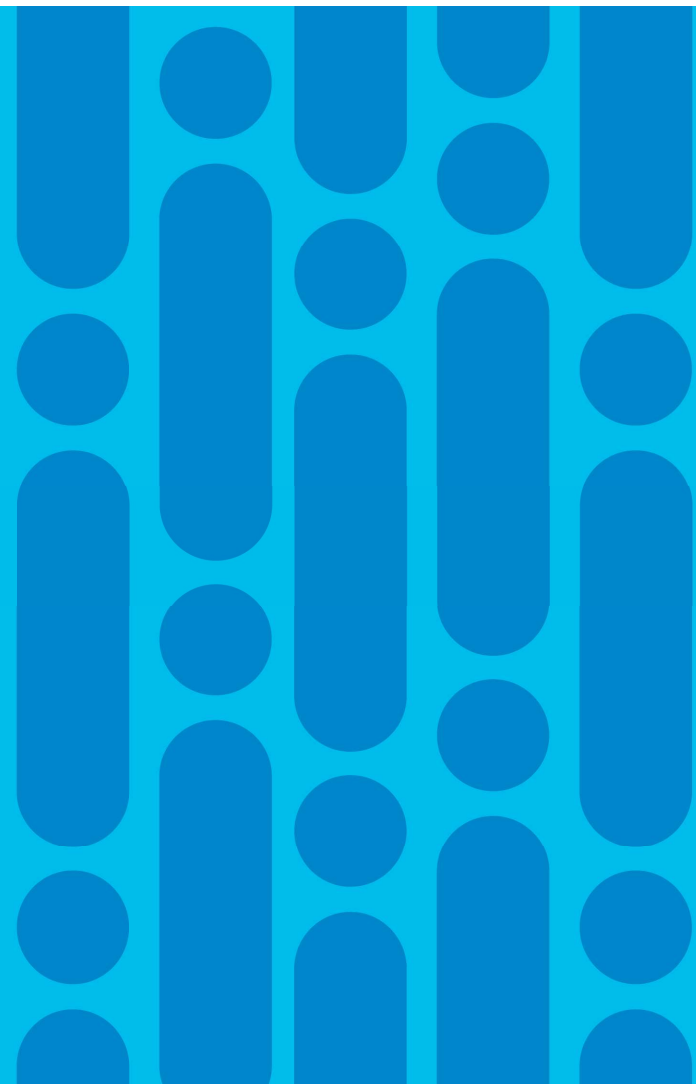
- Track observed deviation from standard configuration with suggested remediation steps per device

Demo



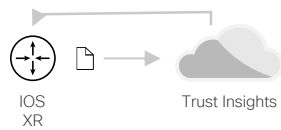


# How Trust Insights Works



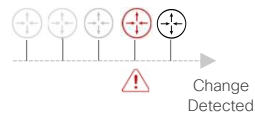
# How Trust Insights Works

1



Trust Insights securely requests and collects signed evidence dossier from IOS XR devices

2



Dossier evidence verified and added to timeline of running hardware and software

3



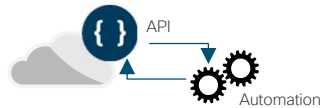
Trust data verified against Known-Good-Values (KGV) for hardware and software from Cisco

4



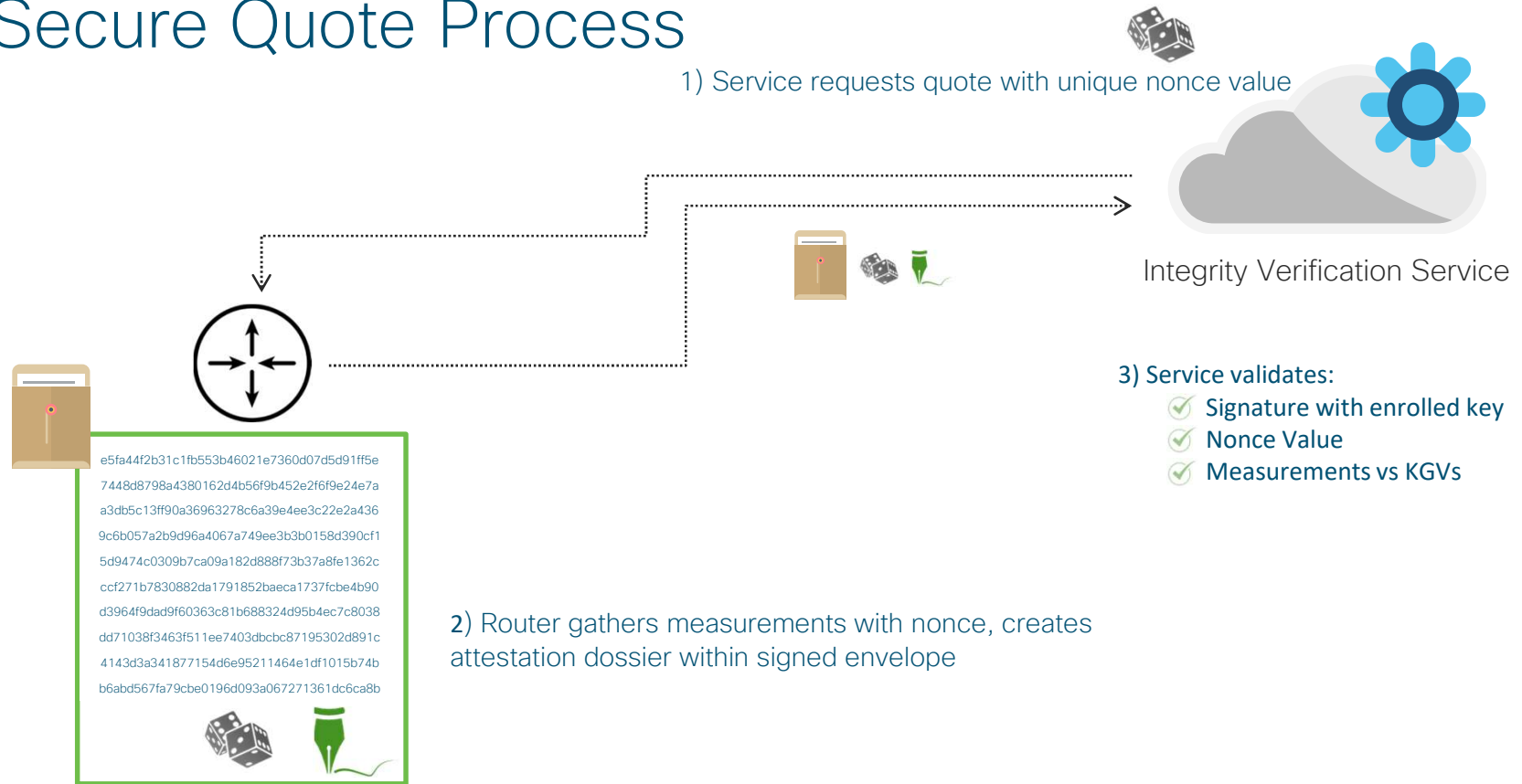
Trust Insights delivers assured inventory reporting with history, and trust visibility for IOS XR systems

5



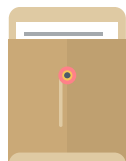
Trust and Assured Inventory data accessible via API to enable Closed-Loop Automation

# Secure Quote Process



# Cisco IOS XR Trust Dossier

Signed with Enrollment key (Not encrypted)



```
collection-end-time: 1562907541.896058
collection-start-time: 1562907518.52628
▶ license-udi: {}
model-name: "http://cisco.com/ns/yang/Cisco-IOS-XR-ama"
model-revision: "2019-08-05"
▶ packages: {}
▶ platform: {}
▶ reboot-history: {}
▶ rollback-history: {}
▶ running-config: {}
▼ system-integrity-snapshot:
  ▼ attestation-certificates:
    ▼ system-certificates:
      ▶ 0: {}
  ▼ hardware-integrity:
    ▶ hardware-integrity-measurements: [...]
  ▶ identity-certificates: {}
    model-name: "Cisco-IOS-XR-remote-attestation-act"
    model-revision: "2019-04-05"
  ▶ platform-config-registers: {}
    result-code: "Success"
  ▶ system-boot-integrity: {}
  ▼ system-ima:
    ▶ node-data: [...]
  ▶ system-inventory: {}
  ▶ version: {}
```

- Human-readable JSON encoding with signature envelope
- Secure, Cryptographically signed envelope and unique trusted platform measurements

# Cloud Data Gateway

# Connecting Cisco's 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* to**

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

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

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Products Support Network More

30-day trial

## Cisco Crosswork Network Automation

Transforming mass scale network operations

Plan, design, implement, operate, and optimize your service provider network with Cisco Crosswork Network Automation. Cisco Crosswork is designed to help service providers gain the mass awareness, augmented intelligence, and proactive control for a comprehensive data-driven, intent-based automated network.

Proactively manage end-to-end networks (3:10)

Benefits Product Family Resources Support Partner Help

### Why Cisco Crosswork Automation

Cisco Crosswork Network Automation enables service providers to proactively manage their end-to-end networks, with a suite of machine-learning, intent-based and closed-loop solutions to ensure faster innovation, extraordinary customer experiences, and operational excellence.

On-prem solutions provide actionable insights with automated network orchestration, accelerating mean-time-to-value by monetizing agile new services, as well as minimizing mean-time-to-remediation to avoid network degradation and customer issues. Cisco Crosswork Cloud provides multiple SaaS solutions that provide operational insights and validation of network health and security with the agility and scale of the cloud.

Cisco Crosswork Network Automation is ready for service providers of all sizes with broad or narrow use cases - any device, anytime, anywhere, any format - a truly scalable solution for a 5G world.

60%	150,000+	70%	99%
Reduction in time to revenue	Labor hours saved	Improvement in mean time to repair	Reduction in operational noise

### Telefonica automates multi-vendor networks

Learn how leading operator Telefonica is leveraging Cisco NSO and Crosswork Automation to reduce complexity and improve profitability.

Watch video (2:36) Read Heavy Reading report



# Questions?



# Trust Insights: Supported Platforms



Trust Insights requires new features in IOS XR

- Mainline support (Base OS Image): IOS XR 7.3.1
- Limited Availability Support via Prod SMU
  - XR 6.6.3
  - XR 7.0.x / 7.1.x / 7.2.x
- Platform Support
  - Cisco 8000 (Spitfire)
  - NCS 5500 (Fretta)
  - NCS 560 / NCS 540
  - NCS 540i (BigBend)
  - ASR 9000 (64bit eXR)

