Cisco Crosswork Assurance Software Sensors

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Assurance Sensors form a physical or virtual instrumentation layer for Crosswork Assurance, a proactive service assurance solution that provides granular, real-time, and service-centric visibility to communications service providers, enterprises, and public sector organizations, enabling them to monitor and assure their owned or leased network infrastructure, services, and connectivity.

Product overview

Assurance Sensors are used to gain granular and precise insights into network connectivity and performance by either injecting synthetic test traffic (active testing) or sampling existing traffic (passive testing). Depending on the sensor type, services ranging from Layer 2 to Layer 7 can be monitored 24/7/365 to prove compliance with Service-Level Agreements (SLAs) or to detect deviations from baseline results. The sensors feed Key Performance Indicators (KPIs) to the Crosswork Assurance analytics engine, which scales to billions of KPIs per day.

To instrument various types of networks, the Assurance Sensors come in different form factors, both software and hardware. This data sheet describes the software-based sensor options:

- **Sensor Agents:** Containerized (Cloud-native Network Function [CNF]) test agents are lightweight, software-based active test points. Agents include Actuate, Throughput, Trace, and Transfer.
- **Sensor Control:** Virtual machine (Virtual Network Function [VNF]) high-performance test system for large-scale, software-based active testing.
- **User Experience Sensor:** Container or application traffic processor capable of analyzing live traffic in real time, providing metrics relating to the quality of end-user experience for network services.
- **Assurance SFPs and Modules:** Physical (Physical Network Function [PNF]) high-accuracy and wire-speed pluggable test points for large-scale and high-bandwidth tests.

Any combination of sensors can be used, depending on the use case, network topology, and scaling requirements of the user. For automated provisioning, test functions are available via APIs and can be integrated into an existing workflow system or with the Cisco Crosswork® Network Automation platform (Cisco Crosswork Network Controller and Network Services Orchestrator (NSO)).

Pluggable hardware sensor options can serve as an optional physical instrumentation layer for the Sensor Control software. The hardware sensors leveraging the Sensor Control software are the Assurance SFPs and Modules. More information about these sensors can be found in their respective data sheets.

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Features and benefits

Table 1. Features and benefits of Crosswork Assurance Software Sensors: Agents, Control

Feature	Benefit
Service-centric visibility	Real-time visibility of end-to-end network and service performance to quickly identify and resolve issues, minimizing the impact of downtime on the end-customer experience.
Standards-based test and measurement support	Scalable and proven industry standards-based test and measurement. Standards-based test support of IETF RFC5357, ITU-T Y.1731, and IEEE 802.1 to leverage built-in responders in already deployed infrastructure.
400+ metrics and 50+ performance KPIs monitored	Large set of monitored and tested performance KPIs addressing connectivity, quality, and performance.
Granular accuracy and reporting	Microsecond KPI accuracy and millisecond reporting granularity offer best-in-class visibility detail of service quality.
Open APIs	Open APIs for sensor and test configuration supporting both REST and RESTCONF/YANG (integrated with Cisco Crosswork Network Controller and NSO).
Automated assurance	Real-time metrics feeds and alerts, enabling fully automated and closed-loop assurance use cases.

Prominent feature

Assured connectivity, everywhere

Instrumenting the “point of interest” is vital for accurate network and service assurance. The sensors should be deployed at the precise location and layer, physically or virtually, where the visibility is desired, and the back-end metrics collection and analytics can scale with the size of the deployment to maintain real-time dashboards and alerting functions.

Cisco Crosswork Assurance is built to scale, providing multiple options for sensor deployment, and can be fully automated and integrated with Cisco or third-party workflow engines.

Flexible deployment options:

- Pure software sensors for x86/ARM architectures supporting automated deployment with Docker tools or Kubernetes Helm charts
- Software (VM) plus Network Interface Card (NIC) hardware assist for high-accuracy timestamping
- Horizontally scalable for large hub-and-spoke and mesh-type assurance scenarios
- Option to use pluggable hardware (Assurance SFPs or Modules) to instrument existing infrastructure, either in-line with the service or out-of-line on a spare port
- Option to use larger form-factor hardware sensors

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Real-time visibility:

- Users can create custom dashboards with custom widgets for the presentation of real-time service performance insights and reporting.
- Leverage Role-Based Access Control (RBAC) to help ensure that the right user groups see the data they are supposed to see.

Platform support

Table 2. Assurance Sensor deployment support and high-level feature set

Assurance Sensor	Platforms supported	Feature sets supported
Agents	Docker, Kubernetes x86, and ARM	Layer 3 Two-Way Active Measurement Protocol (TWAMP), ECHO, Traceroute, TCP throughput, HTTP(s)
User Experience	NCS540 docker environment or standalone docker application on Redhat/Rock Linux or VM	Layer 4 to Layer 7 AI/ML real-time pattern-based flow analysis, flow optimization and Mobile RAN energy reduction
Control	VMware, KVM	Layer 2 to Layer 4 Ethernet operations, administration
SFP (hardware with Sensor Control)	SFP 1G / 10G	Layer 2 to Layer 4 ETH-OAM, TWAMP, ECHO, wire speed Y.1564, passive metering
Modules (hardware with Sensor Control)	Standalone 1G/10G 2-port	L2-L4 ETH-OAM, TWAMP, ECHO, wire speed Y.1564, passive metering

Licensing

Software sensors do not require any licenses. The sensors are included in the following Crosswork Assurance RTU licenses.

Table 3. Crosswork Assurance licenses

Description	PID
Essentials RTU License	SKY-ESS-RTU
Advantage RTU License	SKY-ADV-RTU

In addition to the RTU, licenses are needed per test session.

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Table 4. Crosswork Assurance test session and flow licenses

Description	PID	Comments
Essentials Test Sessions Software License	SKY-ESS-TEST	Test session if you are using a Essentials RTU license for active testing
Advantage Test Sessions Software License	SKY-ADV-TEST	Test session if you are using a Advantage RTU license for active testing
User Experience License	SKY-ADV-UE-NI SKY-ADV-UE-NO * SKY-ADV-UE-ER *	Network Intelligence monitoring, per cell sector or 50 user IPs Network Optimization, per cell sector or 50 user IPs RAN Energy Reduction, per cell sector or 50 user IPs
Advantage Telemetry software license	SKY-ADV-TELEM	License for telemetry ingestion

* SKY-ADV-UE-NO and SKY-ADV-UE-ER do not require the SKY-ADV-RTU license, these two use cases for the User Experience sensor are standalone without an on-prem or cloud Crosswork Assurance instance.

Product specifications

Table 5. Assurance Sensor characteristics and capabilities

Sensor type and feature	Capacity
Sensor Agent Actuate – RFC5357 TWAMP Light/TWAMP Control	500 sessions – 5000 pps per agent
Sensor Agent Actuate – RFC862 UDP/ICMP Echo	500 sessions – 5000 pps per agent
Sensor Agent Throughput – RFC6349	1 test actively running, scheduling capability for sequence of tests
Sensor Agent Transfer – TCP L7 – HTTPS/FTP/TCP	250 sequentially executed, or scheduled
Sensor Agent Trace – Traceroute layer 3	1 test actively running, scheduling capability for sequence of tests
User Experience Sensor – Traffic Processor	Capacity up to 2Gbps as container on NCS540 Router hardware Capacity 25 – 320Gbps as application on VM / Linux server
Sensor Control – RFC5357 TWAMP Light/TWAMP Control	4,000 sessions – 80,000 pps per instance
Sensor Control – RFC862 UDP/ICMP Echo	4,000 sessions – 80,000 pps per instance
Sensor Control – ITU-T Y.1731, IEEE 802.1ag ETH-DM, ETH-LB, ETH-VS	4,000 sessions – 80,000 pps per instance

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Key active performance test types using Assurance Sensors

Using the Assurance Sensors, Crosswork Assurance provides the following measurements and testing capability including:

- TWAMP: Two-Way Active Measurement Protocol
- ETH-DM: Ethernet Delay Measurement
- ETH-LB: Ethernet Loop Back
- ICMP Echo: Internet Control Message Protocol Echo
- UDP Echo: User Datagram Protocol Echo
- ETH-VS: Ethernet Vendor Specific
- TCP throughput (RFC 6349)
- Traceroute

KPIs include:

1. Continuous SLA-type monitoring (Sensor Agent Actuate and Sensor Control)

One-way delay, PDV, and IPDV (jitter)

- Min/max/average
- Median (p50)
- Percentile 25/75/95/96/98/99
- Standard deviation

One-way packet statistics

- Packets lost (number and %)
- Loss bursts min / max
- Reordered packets (number and %)
- Packets duplicated (number and %)

One-way packet field and QoS metrics

- IP TOS max (DSCP diffserv)
- IP TOS min
- TTL max/min
- MOS / R-value

2. User Experience, gathered through AI/ML analysis of packet patterns and content (User Experience Sensor)

Parsed protocols:

IP, GTP/IP, MPLS/MPLS/IP, MPLS/MPLS/GTP/IP, SRv6/IP, SRV6/GTP/IP

Traffic classification categories:

Video, Audio, Gaming, Browsing, Messaging, Social, Commerce, Conferencing, Cloud.

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KPIs include:

- Consumer Experience (CX score 0–5)
- User speed test bandwidth
- Traffic burst
- Service latency (RTT)
- Time to 500kB
- Retransmissions, flow throughput

3. Scheduled or one-shot active test KPIs (Sensor Agents Transfer, Throughput, and Trace)
    - DNS lookup time
    - HTTP(s) / FTP / TCP service response time
    - Asset download time
    - TCP throughput uplink / downlink
    - TCP window size variation
    - Path RTT (during TCP test)
    - Traceroute hop IP, DNS name
    - Traceroute hop count, path change

See more in Technical Documentation.

System requirements

Table 6. Sensor Agent minimum requirements

Feature	Description
Disk space	100 MB
CPU	0.05 CPU
Memory	200 MB
Software	Docker 22.05 or later on x86-64 or ARM64

The above are minimum requirements; see the release notes for the Sensor Agents for different scaling options.

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Table 7. User Experience Traffic Processor minimum requirements

Deployment option	Platform / type
NCS 540 series router deployment	N540-24Q2C2DD-SYS N540-24Q8L2DD-SYS N540(X)-ACC-SYS N540-24Z8Q2C-SYS N540X-16Z4G8Q2C-D/A N540-12Z20G-SYS-D/A N540X-16Z8Q2C-D N540-28Z4C-SYS-A/D N540X-12Z16G-SYS-D/A
Server or VM with Redhat / Rocky Linux 8.0	Sizing depending on capacity 25Gbps – 320Gbps, see documentation for full details

Table 8. Sensor Control minimum requirements

Feature	Description
Disk space	10 GB
CPU	1 core
Memory	4 GB
Software	KVM (libvirt) or VMware ESXi 6.5 or later

Above are minimum requirements, see release notes for Sensor Control for different scaling options.

Ordering information

To order Cisco Crosswork Assurance, please visit the Cisco Ordering homepage.

All software Assurance Sensors are included in the platform RTU licenses.

Table 9. Crosswork Assurance licenses

Description	PID
Essentials RTU License	SKY-ESS-RTU
Advantage RTU License	SKY-ADV-RTU

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Warranty information

Technical support plus software updates are included with subscription software.

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For more information

Do you have blind spots in your observability? Do you have critical applications and services you are managing and prefer a more proactive approach to management rather than a reactive one? Cisco Crosswork Assurance offers a range of Assurance Sensor options that can meet your needs, providing granular visibility and monitoring that will enhance your approach to assuring digital experiences. For additional information, visit cisco.com.

Document history

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