

Maximizing the Value of Network Performance Data Beyond Basic KPIs



Contents

1. Introduction

1.1 End-user definitions and challenges

2. Performance monitoring with Cisco Crosswork Assurance

3. Use cases

3.1 Utilization and capacity

3.2 Network changes

3.3 Events

3.4 Control plane

4. Cisco Crosswork Assurance: flexible and open

5. Summary

1. Introduction

This guide describes how service providers can leverage network performance data beyond the KPIs that are currently collected.

Because network data is often generated and stored in many separate systems, it can be difficult to get a real-time view of what's happening and to gain actionable insight. Given the dynamic nature of networks and the challenge for operations, service providers must have an equally dynamic and real-time network performance monitoring solution.

Use this guide to learn how raw siloed network performance data can be enriched to bring value and efficiency to an existing analytics environment. This includes correlating data from multiple sources that can be used to add more value. You'll also see how to use Cisco Crosswork Assurance to generate actionable events and insight that can be presented and used flexibly by multiple teams. This ability to use the same data and meet the needs of multiple users translates to operational and capital savings.

You can either continue to work with raw data and wait for the enrichment to happen in the back office, or you can apply data enrichment early in the process for a more real-time and dynamic approach to network performance management.

1.1 End-user definitions and challenges

Different teams have different needs regarding how they view and use network performance data. Everyone should be able to get what they need from a single tool. A key requirement for such a tool is the ability to take network performance data and enrich it to provide valuable insight for multiple user groups. User groups and their challenges are listed below.

Big Data analytics:

- Can I stream “clean” performance data and enriched KPIs into other systems, like Splunk?
- Can I get visibility of network, application, and service impact issues relating to customer experience?
- Can I correlate network operational intelligence with other machine data to improve business processes?

Contents

1. Introduction

1.1 End-user definitions and challenges

2. Performance monitoring with Cisco Crosswork Assurance

3. Use cases

3.1 Utilization and capacity

3.2 Network changes

3.3 Events

3.4 Control plane

4. Cisco Crosswork Assurance: flexible and open

5. Summary

Engineering and planning:

- Is my network performance improving or degrading?
- Can I speed up troubleshooting and detect hidden anomalies?
- How can I use predictive analytics for capacity planning?
- Can I start to automate fixes for known recurring issues?

Operations:

- How can I quickly determine the origin of network and service issues and best address them?
- Can I reduce mean time to identify and resolve?
- How many hours can I save on manual investigations and reporting?
- Is there a way to validate the “sea of green” I get from traditional or legacy visualization tools?
- Can I dig into issues, or are they hidden (leading to “no trouble found”)?

Product:

- Can I test and monitor how services will perform on the network prior to launch?
- How can I find issues before my customers do?
- Is there a way to visualize service performance KPIs, usage behavior, and customer experience?

Customer experience (CX):

- Can I stream “clean” network/service performance data and KPIs directly into end-customer portals?
- Is it possible to get real-time reporting to proactively inform customers and reduce churn?
- Can I correlate network and service performance data with customer data?

Contents

- 1. Introduction
 - 1.1 End-user definitions and challenges
- 2. Performance monitoring with Cisco Crosswork Assurance
- 3. Use cases
 - 3.1 Utilization and capacity
 - 3.2 Network changes
 - 3.3 Events
 - 3.4 Control plane
- 4. Cisco Crosswork Assurance: flexible and open
- 5. Summary

2. Performance monitoring with Cisco Crosswork Assurance

To meet the needs of multiple groups, you can customize Crosswork Assurance with open APIs. It is an open platform with APIs that easily integrate with both northbound and southbound systems. This allows you to take advantage of multivendor data beyond the performance KPIs collected by the solution with minimal integration cost.

The northbound interface decouples the interface from the many interfaces and eliminates hard integration by providing RESTful APIs using OpenAPI. It also offers support for both ingesting and exporting data to other higher level systems or platforms.

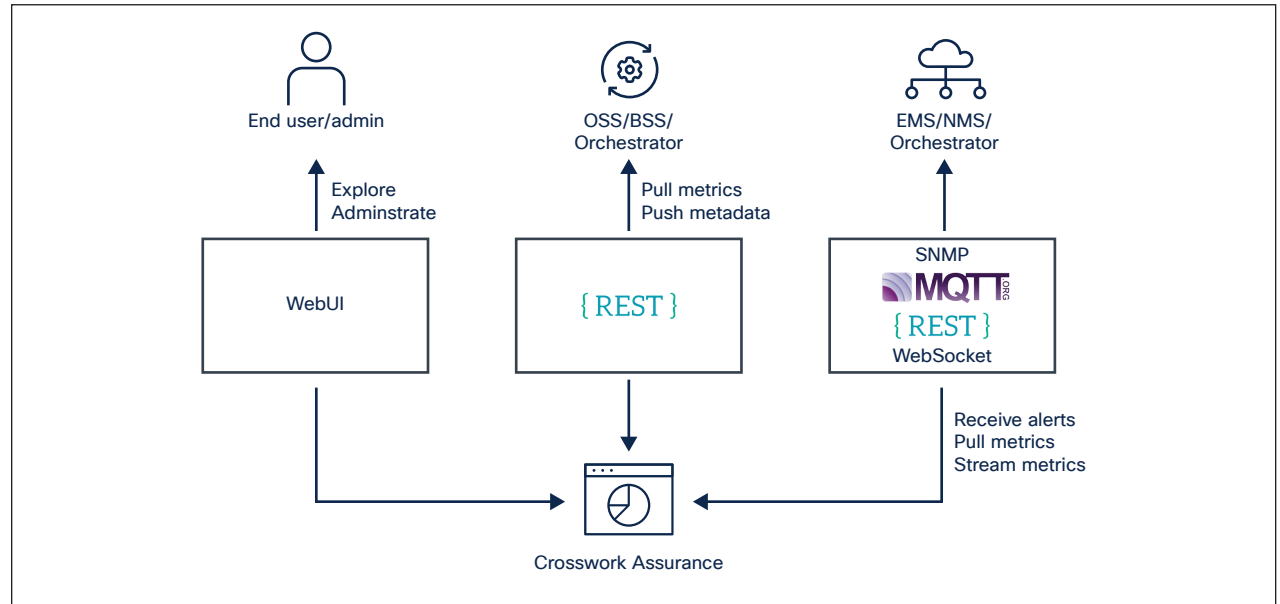


Figure 1. Crosswork Assurance open APIs to northbound systems

The southbound interface decouples data ingestion, eliminating the need for hard integration. It offers a flexible mechanism to ingest data that uses a microservice approach to push or pull data from multiple sources, including third-party sources, and it supports multiple technologies, including SNMP, CSV, API, and gNMI.

Contents

- 1. Introduction
 - 1.1 End-user definitions and challenges
- 2. Performance monitoring with Cisco Crosswork Assurance
- 3. Use cases
 - 3.1 Utilization and capacity
 - 3.2 Network changes
 - 3.3 Events
 - 3.4 Control plane
- 4. Cisco Crosswork Assurance: flexible and open
- 5. Summary

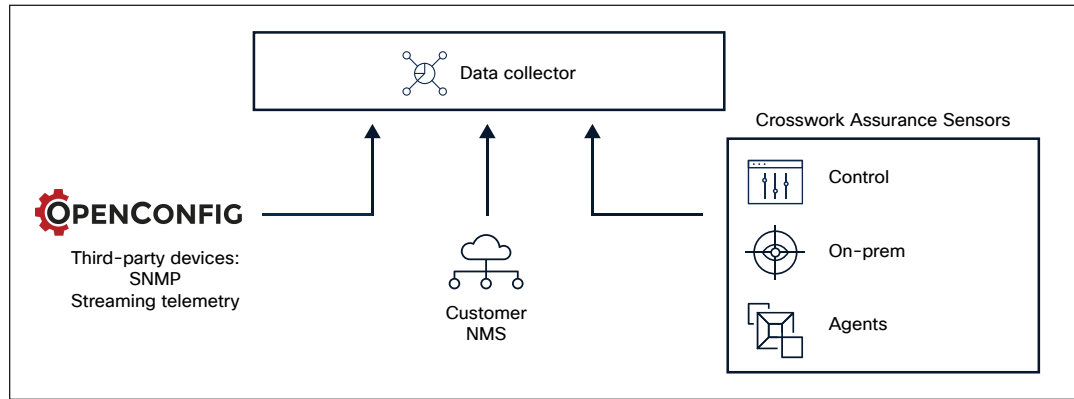


Figure 2. Crosswork Assurance open APIs to southbound systems

As shown in Figure 3, Crosswork Assurance can be integrated into data architectures, including via open APIs and databus.

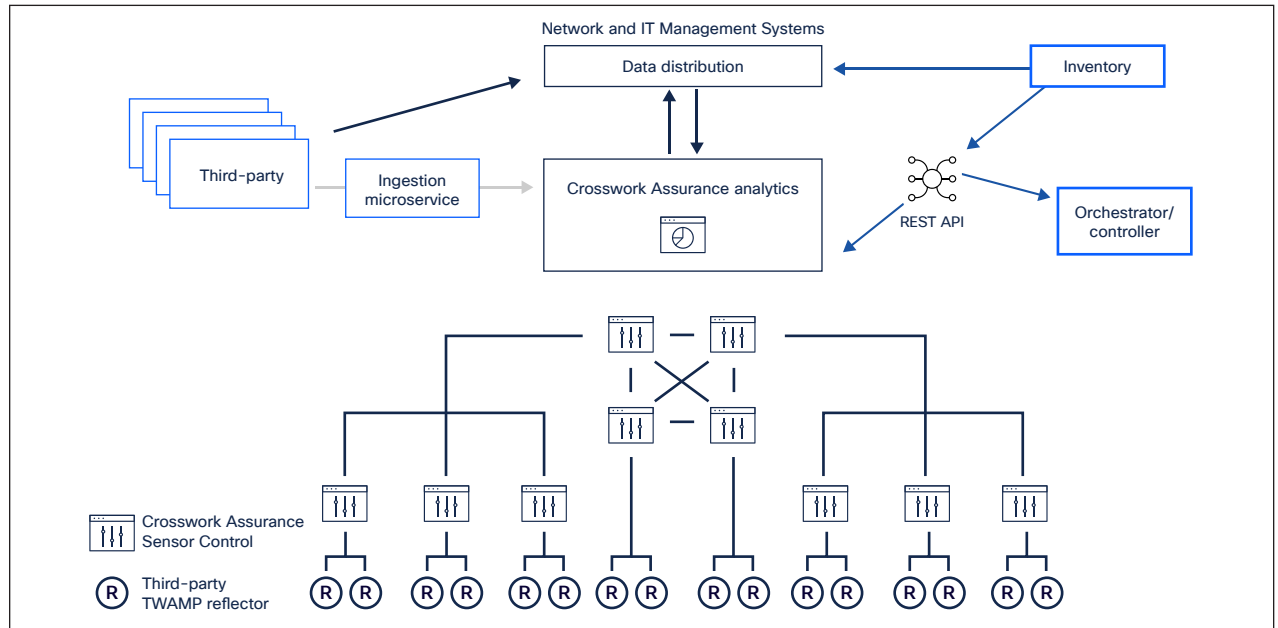


Figure 3. Crosswork Assurance enables easy integration with existing network and IT services and solutions

Contents

1. Introduction

1.1 End-user definitions and challenges

2. Performance monitoring with Cisco Crosswork Assurance

3. Use cases

3.1 Utilization and capacity

3.2 Network changes

3.3 Events

3.4 Control plane

4. Cisco Crosswork Assurance: flexible and open

5. Summary

3. Use cases

In each of the examples presented in this section, you'll see how enriching network performance data can create actionable events. Crosswork Assurance can detect these events with signatures, and the events can then be pushed to other systems. In the following use cases, the performance data graphs are from Crosswork Assurance, but the solution can work with any third-party visualization tool capable of accepting open API feeds.

3.1 Utilization and capacity

In this example, packet loss is high and the customer is being impacted. This event caused a threshold to be crossed, but the event in itself does not give any indication of the potential cause. Leveraging a connection of utilization and loss metrics from two different sources, correlated using metadata, you can see a correlation between packet loss and high utilization. This points to configuration and capacity issues in the specified part of the network.



Figure 4. Utilization and packet loss events correlates into a single event

Contents

- 1. Introduction
 - 1.1 End-user definitions and challenges
- 2. Performance monitoring with Cisco Crosswork Assurance
- 3. Use cases
 - 3.1 Utilization and capacity
 - 3.2 Network changes
 - 3.3 Events
 - 3.4 Control plane
- 4. Cisco Crosswork Assurance: flexible and open
- 5. Summary

3.2 Network changes

Networks are increasingly dynamic and fluid. Even daily network operations, including network upgrades and route changes, impact network performance. Creating a baseline of network performance can help you understand the impact of these changes.

This example shows baselined routes and delay. By combining the baselines, you can easily detect the impact of a change in a network route.

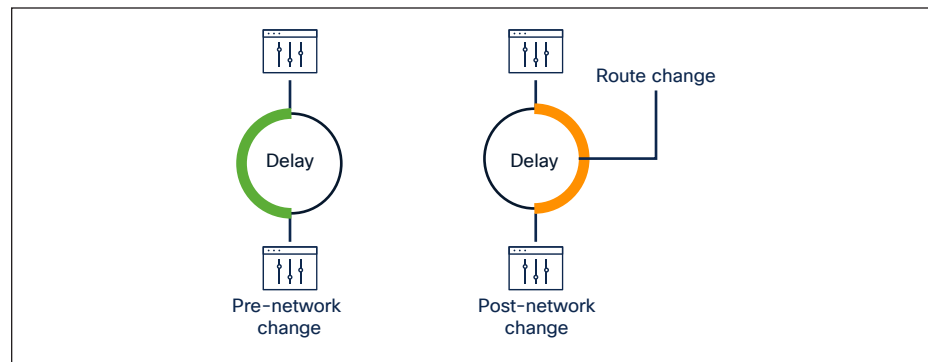


Figure 5. Benchmark network performance pre- and post-network changes

Now you can look at what’s causing the delay on the new route and, based on this data, decide what action—if any—should be taken.

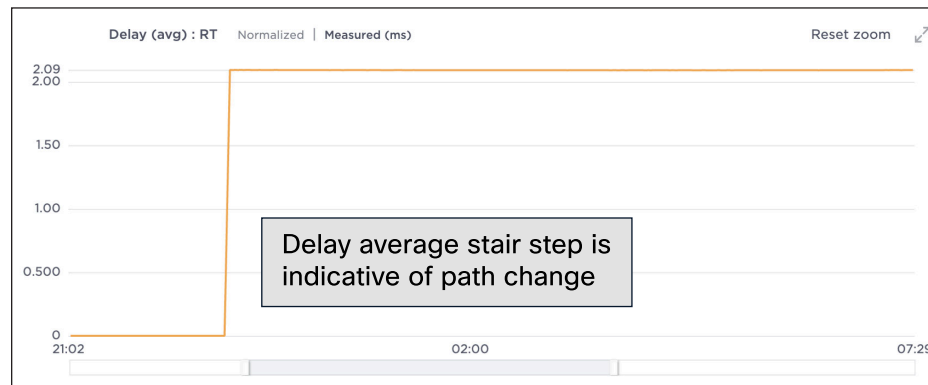


Figure 6. Relationship between a change in the network and performance

Contents

1. Introduction

1.1 End-user definitions and challenges

2. Performance monitoring with Cisco Crosswork Assurance

3. Use cases

3.1 Utilization and capacity

3.2 Network changes

3.3 Events

3.4 Control plane

4. Cisco Crosswork Assurance: flexible and open

5. Summary

3.3 Events

Events like network delays, congestion, and packet loss can impact the network and users. Crosswork Assurance uses metadata to understand the commonality of the event and how it impacts the network upstream and downstream. You can use the solution to pull in metadata from inventory systems or any IT or network system in several ways.

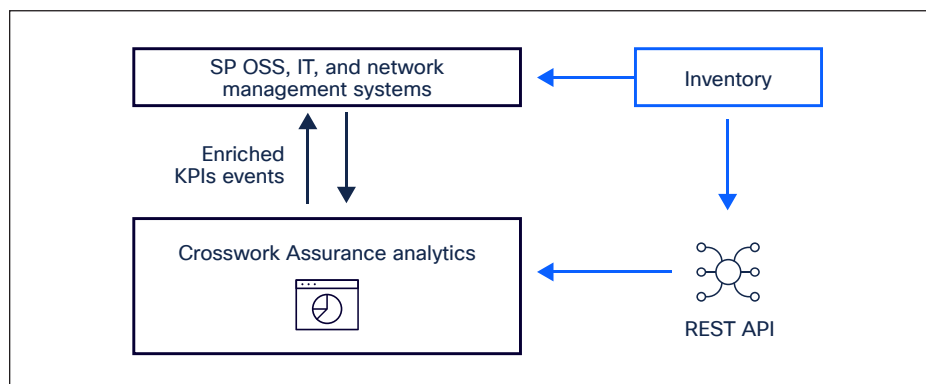


Figure 7. Crosswork Assurance pulls metadata from the inventory system to troubleshoot issues

In the next example, the network has multiple branches connecting to the core. Figure 8 shows that packet loss has crossed a threshold on an aggregate link towards the core. An initial assessment might conclude that multiple endpoints were having network issues. This could raise many trouble tickets and even potential truck rolls.

By using metadata, you can track back to one common point. Starting at this point can help you determine the cause of issues downstream, because an issue in the core has ripple effects on downstream performance. Metadata allows for correlation, determining the common place—or source—where one should look for issues.

This insight from enriched metadata eliminates the costs of unnecessary trouble tickets, truck rolls, and operating expense (time).

Contents

- 1. Introduction
 - 1.1 End-user definitions and challenges
- 2. Performance monitoring with Cisco Crosswork Assurance
- 3. Use cases
 - 3.1 Utilization and capacity
 - 3.2 Network changes
 - 3.3 Events
 - 3.4 Control plane
- 4. Cisco Crosswork Assurance: flexible and open
- 5. Summary

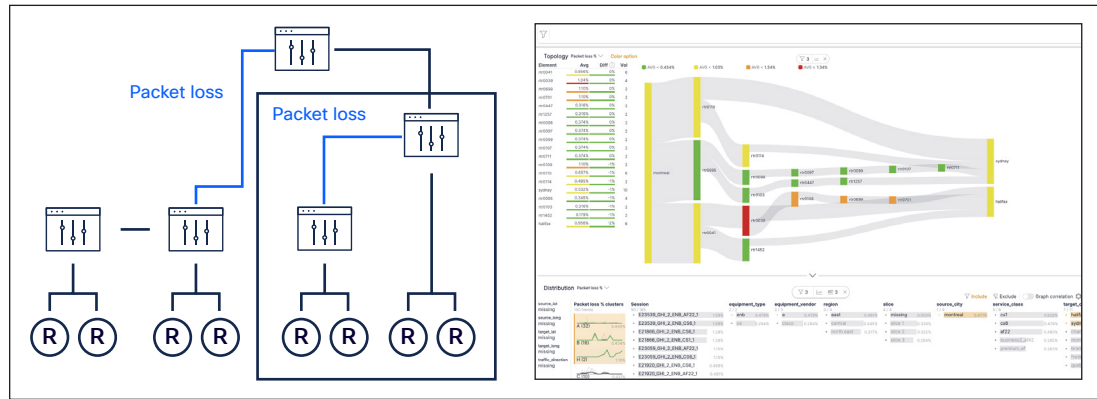


Figure 8. Metadata graph showing the relationship of the network

3.4 Control plane

This example reflects how to determine when an issue is caused by an event in the control plane. You can use Crosswork Assurance to baseline performance of services and links. The solution uses that baseline to do dynamic thresholding, which can be applied to high or low watermarks.

Figure 9 shows a layout of links or services that are being measured for delay and utilization. Each individual KPI on its own can indicate that the network is working fine.

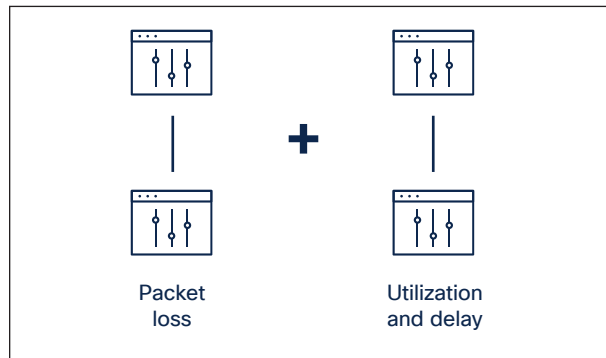


Figure 9. Layout of links and services to be measured for delay and use.

Contents

1. Introduction

1.1 End-user definitions and challenges

2. Performance monitoring with Cisco Crosswork Assurance

3. Use cases

3.1 Utilization and capacity

3.2 Network changes

3.3 Events

3.4 Control plane

4. Cisco Crosswork Assurance: flexible and open

5. Summary

Figure 10 shows that packet loss and delay seem fine, but utilization has dropped to an abnormal level.

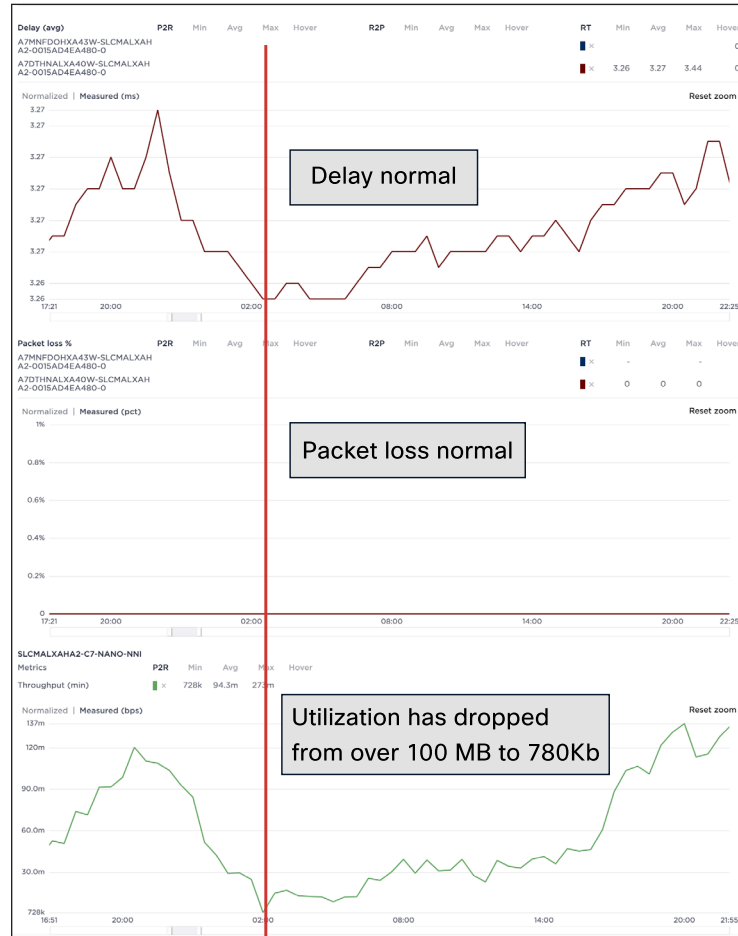


Figure 10. Layout of links and services to be measured for delay and use.

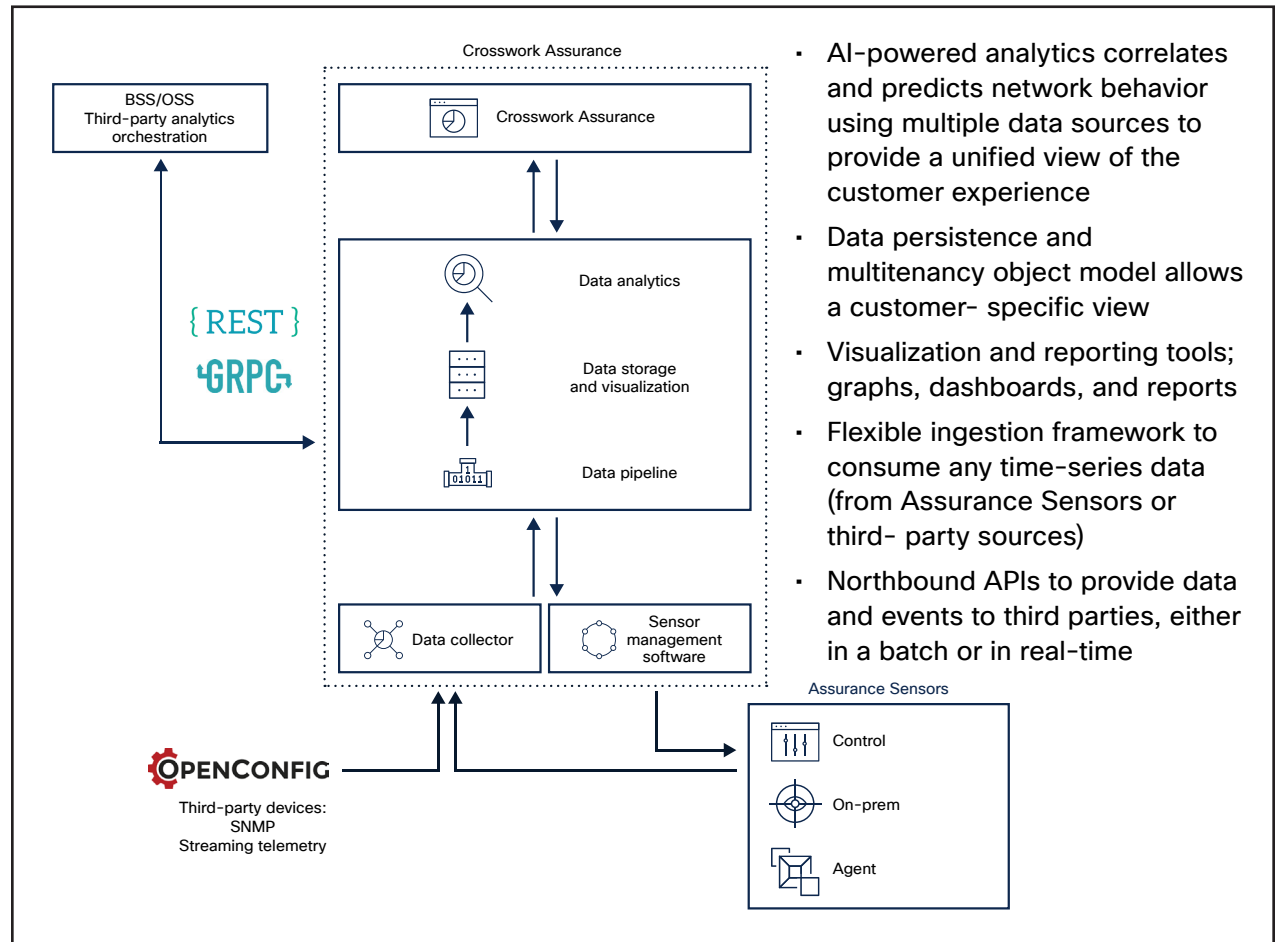
Analysis of the event indicates that the network is operating within normal bounds, but another event has occurred in the control plane that is impacting performance and, ultimately, the customer experience. Using the enriched data has reflected that network behavior was not normal, while also indicating that the network data plane was not the cause.

Contents

- 1. Introduction
 - 1.1 End-user definitions and challenges
- 2. Performance monitoring with Cisco Crosswork Assurance
- 3. Use cases
 - 3.1 Utilization and capacity
 - 3.2 Network changes
 - 3.3 Events
 - 3.4 Control plane
- 4. Cisco Crosswork Assurance: flexible and open
- 5. Summary

4. Cisco Crosswork Assurance: flexible and open

Crosswork Assurance is a solution for service assurance and analysis of your network performance monitoring data. The platform components are fault tolerant because they are stateless, enabling high availability and easy maintenance.



- AI-powered analytics correlates and predicts network behavior using multiple data sources to provide a unified view of the customer experience
- Data persistence and multitenancy object model allows a customer-specific view
- Visualization and reporting tools; graphs, dashboards, and reports
- Flexible ingestion framework to consume any time-series data (from Assurance Sensors or third-party sources)
- Northbound APIs to provide data and events to third parties, either in a batch or in real-time

Figure 11. Cisco Crosswork Assurance solution

Contents

1. Introduction

1.1 End-user definitions and challenges

2. Performance monitoring with Cisco Crosswork Assurance

3. Use cases

3.1 Utilization and capacity

3.2 Network changes

3.3 Events

3.4 Control plane

4. Cisco Crosswork Assurance: flexible and open

5. Summary

Crosswork Assurance primary features

Ingestion

A data collector runs close to where the performance monitoring data is generated. It parses the data via the configured dictionary according to the reporting object type and then streams the results into Crosswork Assurance over a secure connection. This design allows for easy ingestion of third-party data.

Data pipeline

Streams from all the collectors through a load balancer before the analytics engine. Data is then distributed across multiple message busses, where it waits for ingestion tasks to run analytical algorithms that clean, enrich, stream out, and store data.

Data storage

Ingested data is stored in two locations:

- A time-series datastore that provides query response times for complicated aggregate queries across thousands of objects over variable periods. This avoids pre-aggregation in most cases and lets the user directly work with, slice, and view the data.
- On disk as a Parquet file (ideal for big data). The analytics engine uses these files for pattern matching, shape classification, and anomaly detection.

Advanced features

This component is where ingestion and post-ingestion algorithms run on the platform:

- Data cleaning removes records or metrics that are erroneous or that match customer-defined cleaning rules.
- Data aggregation rolls data up into preconfigured periods for faster query performance based on the granularity requested.
- Monitoring watches for threshold-crossing events.

Contents

1. Introduction

1.1 End-user definitions and challenges

2. Performance monitoring with Cisco Crosswork Assurance

3. Use cases

3.1 Utilization and capacity

3.2 Network changes

3.3 Events

3.4 Control plane

4. Cisco Crosswork Assurance: flexible and open

5. Summary

5. Summary

Network operations teams managing critical and high performance networks require actionable insight on next steps with performance monitoring data solutions.

A lightweight analytics engine like Crosswork Assurance, with support for open APIs, can integrate smoothly with current IT and network systems. This engine can refine raw KPI data by removing false positives and highlighting key areas for closer analysis.

