Crosswork Health Insights and Change Automation

Closing The Loop

Vikram Visweswaraiah
Sr. Product Manager, SP Automation

March 2019

Sriharsha Dhanekula
TME, Crosswork, SP Automation
“We’re spending over 100,000 labor hours annually on constant changes in our mobile backhaul network.”

- VP Operations, Maj T1 Service Provider

Crosswork Health Insights and Change Automation can help

Projected savings

- opex $7.8M
- labor 95K

Constant changes to Ethernet Virtual Circuit (EVC)

Manual → Automated
Ad-hoc → Programmable
Reactive → Proactive

Cell Site Router
Aggregation Router
Agenda

- Understand how Health Insights and Change Automation support closed-loop remediation
- Understand how Health Insights and Change Automation fit within the Cisco Crosswork portfolio
- Understand how to think about closed-loop automation with Crosswork
- Understand the developer ecosystem around Crosswork Health Insights and Change Automation
Cisco SP Automation Portfolio*

- Custom KPIs
  - Crosswork Health Insights
- Remediation Playbooks
  - Crosswork Change Automation
- Device and Service Configuration
  - NSO Network Services Orchestrator
- Noise Reduction AIOps
  - Crosswork Situation Manager
- Traffic Planning
  - WAN Automation Engine
- Real-time Traffic Engineering
  - Crosswork Optimization Engine
- Scalable and Distributed Collection
  - Crosswork Data Gateway

*Products and features remain in varying stages of consideration and development and will be offered on an if-and-when available basis. The contents of this presentation are non-binding and subject to change at the sole discretion of Cisco, and Cisco will have no liability for delay in the delivery or failure to deliver any of the products or features set forth in or relating to this presentation.

https://www.cisco.com/go/crosswork
What are Health Insights and Change Automation?*

To network operators, Crosswork Health Insights and Change Automation provide a **programmable remediation** system that supports **closed-loop operations** with configurable KPIs and **feedback-driven** workflows.

**Programmable Remediation**
- Tie anomalies to Ansible playbooks

**Closed-Loop**
- Observe, alert, remediate, observe

**Configurable**
- Create your own KPIs and custom alerts

**Feedback-driven**
- Ansible enhanced with telemetry

Built on the foundation of

*Health Insights and Change Automation can also be sold and used separately*
Change Automation and Health Insights in the Cisco SP Automation Portfolio*

*Products and features remain in varying stages of consideration and development and will be offered on an if-and-when available basis. The contents of this presentation are non-binding and subject to change at the sole discretion of Cisco, and Cisco will have no liability for delay in the delivery or failure to deliver any of the products or features set forth in or relating to this presentation.
A Framework for Closed Loop Automation

- What context do I analyze with?
- What alerts are relevant?
- How do I define them?
- What timeframe should I use?
- Should I remediate now?
- Do other systems need to know?
- What can I collect?
- What does my data look like?
- Should I remediate now?
- Do other systems need to know?
## Example Use-Cases*

<table>
<thead>
<tr>
<th>Use-Case</th>
<th>Observe</th>
<th>Analyze</th>
<th>Trigger</th>
<th>Remediate</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVC rebalancing</td>
<td>EVC bandwidth</td>
<td>Bandwidth only or rebalance required?</td>
<td>Bandwidth &lt; est. subscriber threshold b/w</td>
<td>Increase EVC bandwidth (w/ rebalance)</td>
</tr>
<tr>
<td>Queue-depth triggered traffic steering</td>
<td>QoS queue depth</td>
<td>Alternate path computation</td>
<td>Queue depth &gt; X</td>
<td>Steer traffic to alternate path</td>
</tr>
<tr>
<td>BNG address pool refresh</td>
<td>DHCP address pool</td>
<td>Ability to grow pool?</td>
<td>Pool &lt; Y</td>
<td>Increase address pool</td>
</tr>
<tr>
<td>Link flapping</td>
<td>Link Status</td>
<td>Redundancy exists</td>
<td>Flaps &gt; 30 times in a minute</td>
<td>Shut down port</td>
</tr>
<tr>
<td>Traffic blackhole alerts</td>
<td>PCR for device</td>
<td>Other alerts?</td>
<td>PCR out of bounds</td>
<td>Alert forwarding</td>
</tr>
<tr>
<td>LAG imbalance</td>
<td>LAG balance ratio</td>
<td>Policy warrants re-hash</td>
<td>LBR out of spec</td>
<td>Run alternate hashing</td>
</tr>
<tr>
<td>Management plane compliance checks</td>
<td>Monitor open port(s) - e.g. telnet</td>
<td>Policy dictates port access should be disabled</td>
<td>Ports remain open beyond stipulated window</td>
<td>Turn off port(s)</td>
</tr>
</tbody>
</table>

*In varying stages of development*
Health Insights
Make Your Data Actionable
Health Insights: Make Your Data Actionable

- Recommendation Engine
  - List of KPIs Monitored
  - KPIs
  - Smart Monitoring
    - Zero-touch Telemetry
    - Operational + Config Data

- Alert and Correlation Engine
  - Smart Baselining
  - Telemetry

- Remediation (Change Automation)
  - Smart Remediation
  - Remediation Play
  - Alert Forwarding
Health Insights - Augmenting “Closed-loop”

Flexible triggers with context agnostic filtering

Dampening and Hysteresis

Alert-time

Clear-time

Custom Remediation Workflow

Select Sensor Paths

Filter Modules

Module

Cisco-IOS-XR-controller-otu-oper
Cisco-IOS-XR-crypto-macsec-mka-oper
Cisco-IOS-XR-crypto-macsec-secy-oper
Cisco-IOS-XR-crypto-sam-oper
Cisco-IOS-XR-crypto-ssh-oper
Cisco-IOS-XR-dnx-driver-oper
Cisco-IOS-XR-dnx-netflow-oper
Cisco-IOS-XR-dnx-port-mapper-oper
Cisco-IOS-XR-drivers-media-eth-oper
Cisco-IOS-XR-dwdm-ui-oper

201 to 210 of 701  <<  <  Page 21 of 71  >  >>

/ Change Automation Home / Playbook List

Playbooks

- Name
- Delete bgp neighbors on a router
- IGP Interface Cost in out
- Install an optional package or a SMU
- Interface State change
- Modify TE Tunnel Configuration
- Node Cost Out/In
- Node State Snapshot
- Prefix Set ADD
- Prefix Set Delete
- Prefix Set Rename
- Remove interface from Bundle Ether and delete bundle-ether
- Run arbitrary show command(s) on IOS XR/XE device(s)
- TE Tunnel Configuration
- Uninstall an optional package or a SMU
Change Automation

Codify Your Workflows
Change Automation: Codify Your Workflows

- **Network Automation Alerting Service**: Real-time tracking of network state.
- **Continuous Checks Engine**: APIs for network configuration changes (e.g., NETCONF/YANG, SSH/CLI).
- **Common Collector**: Connected to the Continuous Checks Engine.
- **Configuration Deployment**: Coordinate Playbook Execution, Verify, Execute, Pre-check, Rollback, and Post-check

- **Playbook Execution**: Green path for successful execution.
- **Verify**: Check configuration deployment.
- **Execute**: Deploy changes.
- **Pre-check**: Validate configuration.
- **Rollback**: Failures revert changes.
- **Post-check**: Confirm deployment success.

© 2018 Cisco and/or its affiliates. All rights reserved.
Change Automation = Ansible++

Ansible Plays

- Task-1
- Task-2
- Task-3

Run in order

Dry-run
Check-mode
Rollback
Ansible native

Change Automation Task

Verb
Telemetry integrated

Change Automation Plays

Continuous and Pre-check

- Task-1
- Task-2
- Task-3

Run in parallel

Schedule-A

Single-step

Maintenance and Post-check

- Task-1
- Task-2
- Task-3

Run in order

Schedule-B

Dry-run
Check-mode
NSO dry-run

Rollback
NSO based

Check-mode
Dry-run
Rollback
NSO based

Check
config
oper
Developer Ecosystem
What Is Cisco Crosswork?

Cisco Crosswork is a microservices platform that brings together streaming telemetry, big data, and model-driven application programming interfaces (APIs) to redefine service provider network operations. Cisco Crosswork offers a platform for customers and partners to collaborate and build an application ecosystem around on-box innovation.

The Cisco Crosswork product suite is a highly scalable and efficient operations automation framework. It enables service providers to quickly deploy intent-driven, closed-loop operations.

Transforming Mass Scale Network Operations

Plan, implement, operate, monitor and optimize your Service Provider Network Automation and gain the mass awareness, augmented intelligence and proactive control for data driven, outcome based network automation. Transform your network with:
Putting It Together
Demo Workflow

1. Select KPI
2. Set Alert Thresholds
3. Link Playbook
4. Force exception (link flap)
5. Exception Detected
6. Health Insights determines proper response and associated playbook
7. Playbook could be fully automated or also have manual steps
8. NSO pushes changes back to network
Additional Information
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.

▶ Watch the transformation (2 min)

▶ See the value of closed-loop network automation (60 sec)