



The bridge to possible

Real time Saving on Network Fault incidents using Power of Automation

Automated Fault Management (AFM)

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Cisco Webex App

Questions?

Use Cisco Webex App to chat with the speaker after the session

How

- 1 Find this session in the Cisco Live Mobile App
- 2 Click “Join the Discussion”
- 3 Install the Webex App or go directly to the Webex space
- 4 Enter messages/questions in the Webex space

Webex spaces will be moderated until February 24, 2023.



Agenda

- Business Challenges and Outcomes
- Solution Architecture
- Dashboard Snapshots
- Video Demo
- Case Study
- Value Realization
- Roadmap
- Conclusion

Business Challenges and Outcomes

Fault Detection – Why does it matter?

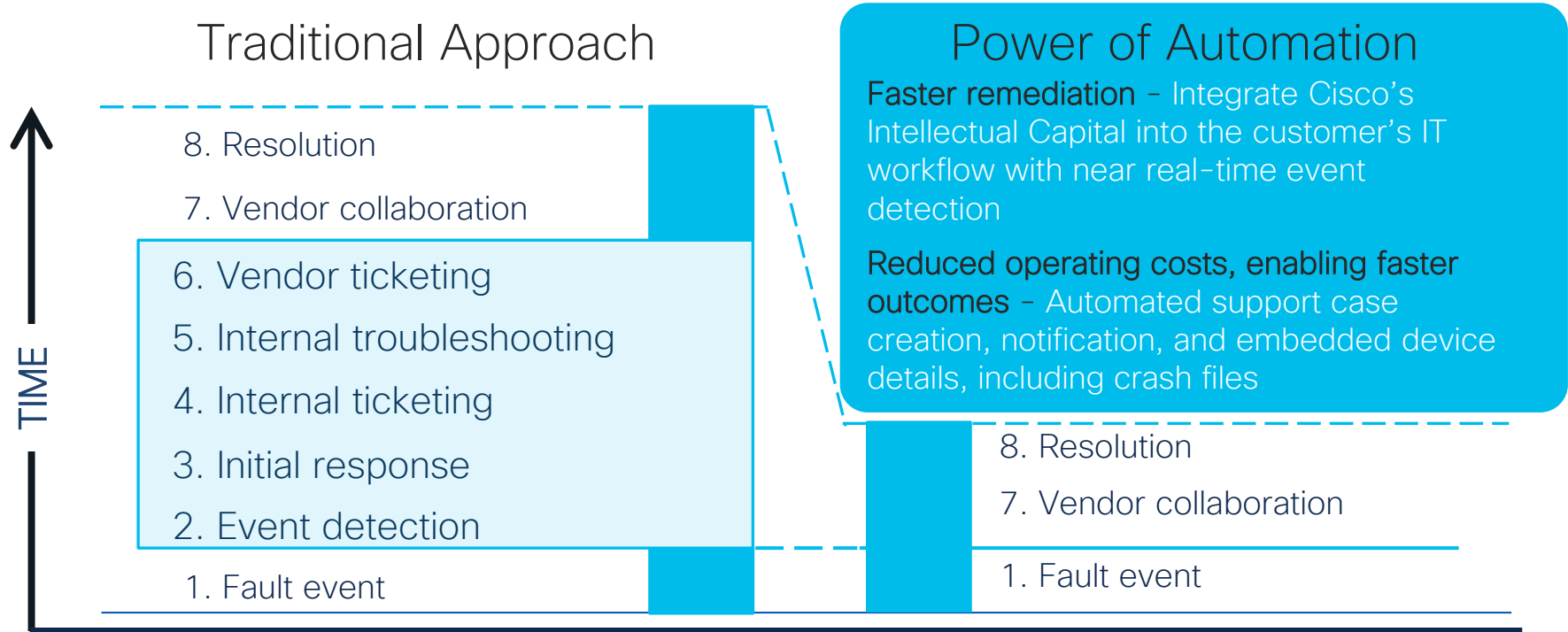
Challenges

- Detect and track
- Categorize and prioritize
- Investigate and resolve
- Document and closure
- “Fix it forever”

Outcomes

- Improve time to resolution
- Provide potential for prevention
- Jump start troubleshooting
- Provide Remediation notifications
- Automate collection of specific data
- Communicate via ticket updates

Fault Management Timeline



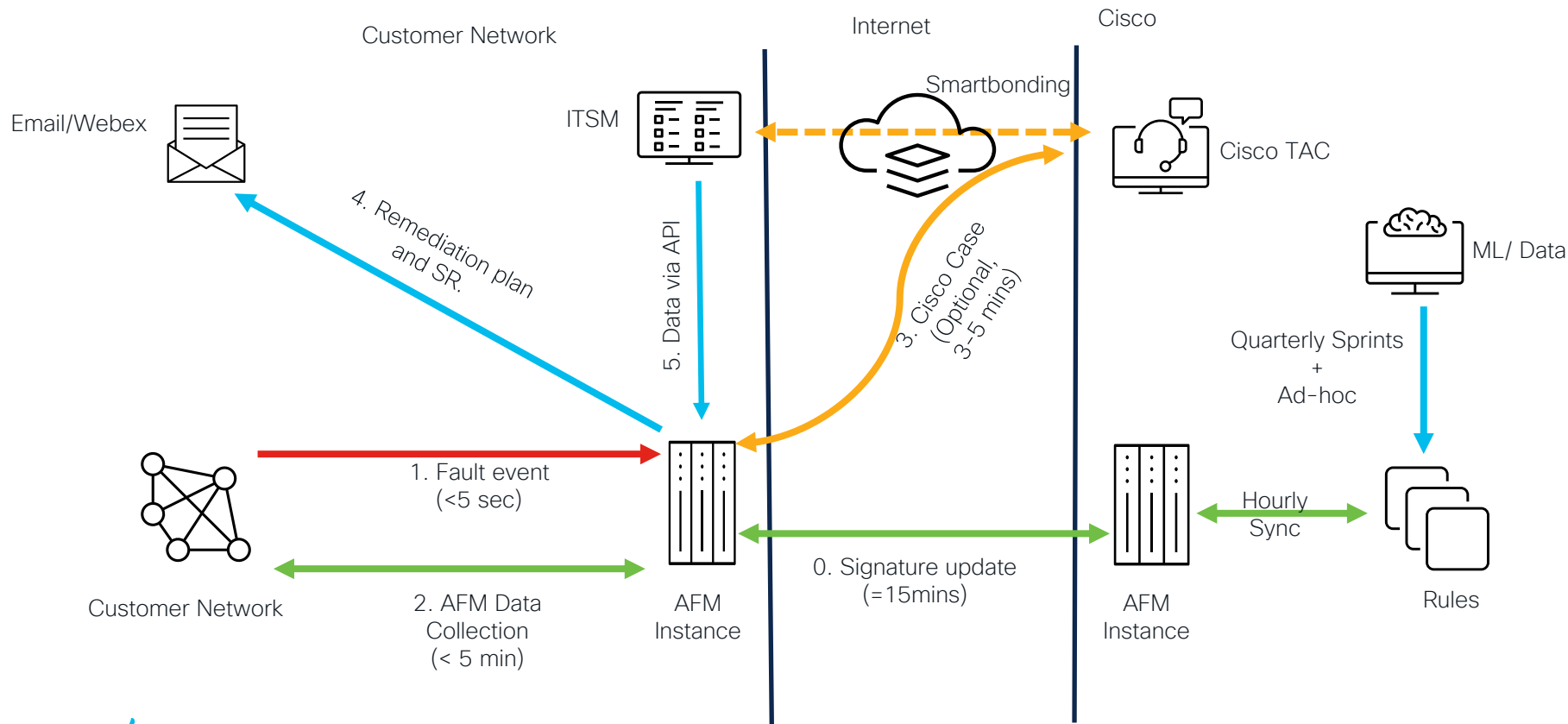
What is Automated Fault Management?



Combines automation detection and machine learning, powered by Cisco intellectual capital to speed fault detection, troubleshooting and resolution times

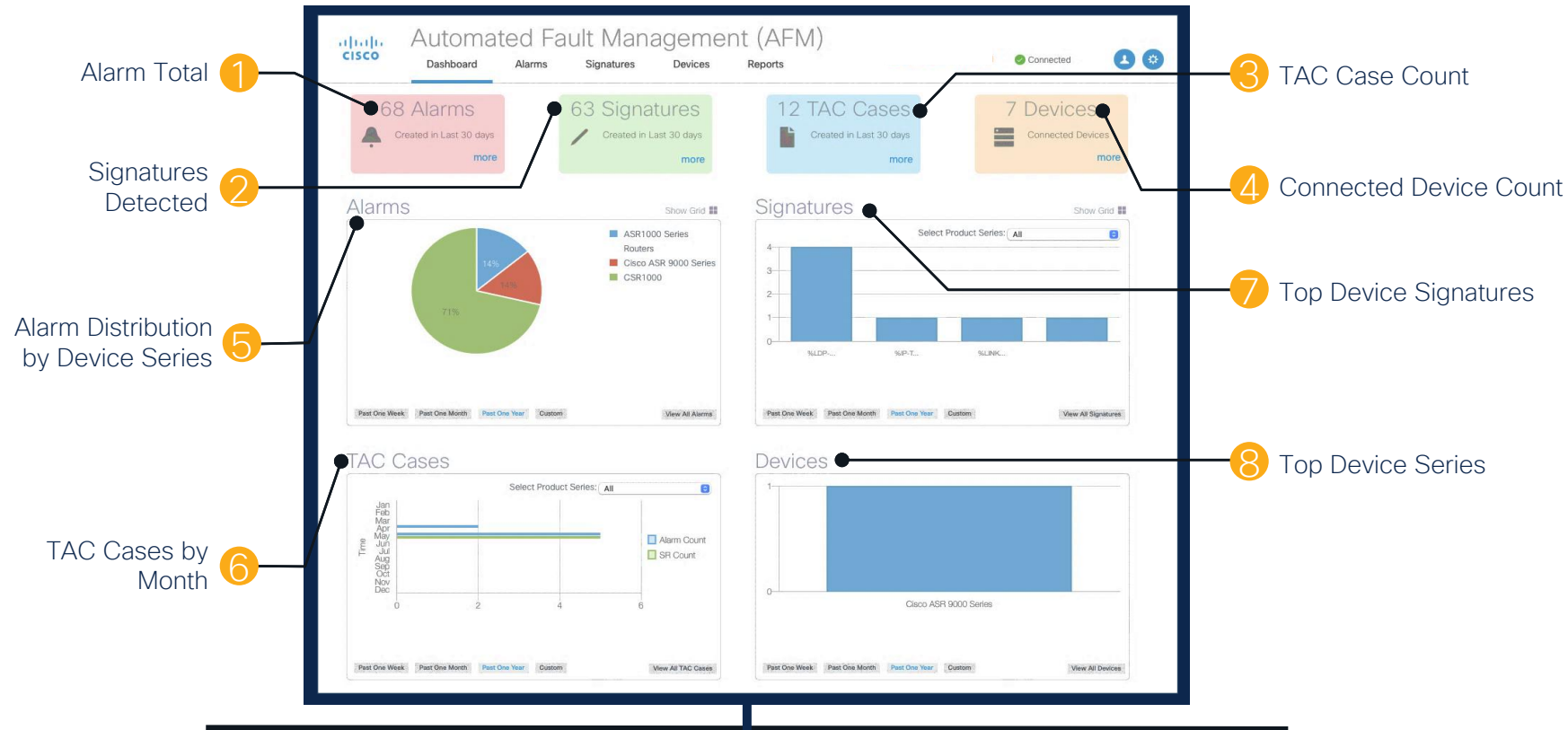
Solution Architecture

Automated Fault Management Architecture



Dashboard Snapshots

Summary View



Devices Tab



Automated Fault Management (AFM)

[Dashboard](#)[Alarms](#)[Signatures](#)[Devices](#)[Reports](#)Connected[Reload](#)

Devices(7)

[Get Device Exception ...](#)[Retry All](#)[Delete Alarm\(s\)](#)[Search](#)

| ✓ | IP Address | Host Name | Serial Number | Product ID | Product Series | Alarms ... | Contract Number ... | Operating System ... | Device Group | |
|---|------------------------|------------------------|------------------------|------------------------|------------------------|------------|------------------------|------------------------|------------------------|---|
| | Search | Search | Search | Search | Search | | Search | Search | Search | |
| ✓ | 10.82.140.196 | RP/0/RSP0/CPU0:F... | FOC1808NF4P | ASR-9001 | Cisco ASR 9000 Series | 0 | | IOSXR | DEFAULT | S |
| ✓ | 10.75.61.33 | 93108TC-FX1 | FDO24090GZ5 | N9K-C93108TC-EX | Nexus9000 | 0 | | NXOS | DEFAULT | S |
| ✓ | 10.75.49.102 | RP/0/RP0/CPU0:NC... | FOC2238R1ZY | NCS-5001 | Cisco NCS5000 Series | 1 | | IOSXR | DEFAULT | S |
| ✓ | 10.75.49.65 | RP/0/RSP1/CPU0:9... | FOX2250P6EC | ASR-9910 | Cisco ASR 9000 Series | 3 | | IOSXR | DEFAULT | S |
| ✓ | 172.16.1.73 | BCS-LAB1-RT2 | 9TNWM5WT5LF | L-CSR-1G-IPB-1... | CSR1000 | 87 | 203308677 | IOSXE | DEFAULT | S |
| ✓ | 172.16.1.77 | BCS-LAB1-RT7 | 96Y0ENM04VV2KOG... | ASR1000 | ASR1000 Series Routers | 432 | | IOSXE | DEFAULT | S |
| ✓ | 172.16.1.75 | BCS-LAB1-RT4 | 92ENF5RPAT2 | L-CSR-1G-IPB-1... | CSR1000 | 78 | 203308677 | IOSXE | DEFAULT | S |

✓ Devices being monitored by AFM can be seen in this tab.

Signature View

Signatures(1052)



Search Signature in IC Repository

| Signature Name | Signature Alias | Reque... | Raise... | Product Series | Sever... | IC |
|---------------------------------|---------------------------|----------|----------|-----------------------|----------|--------|
| Search | Search | Search | Search | Search | Search | Search |
| %GTPC47595ERROR-3-GTPC_ER... | 62580223a2695d881ff37bd2 | nsailaks | Yes | Cisco ASR 5000 Series | 3 | Global |
| %SESSMGR12861ERROR-3-SESS... | 6258025ecc7542f759b8a84a | namits | No | Cisco ASR 5000 Series | 3 | Global |
| %VPN5902ERROR-3-VPN_ERROR ... | 6258007ebab39b6f9ff3c8c0 | namits | No | Cisco ASR 5000 Series | 3 | Global |
| %SESSMGR10018ERROR-3-SESS... | 625504781db606084d25d8... | namits | No | Cisco ASR 5000 Series | 3 | Global |
| %MME_APP147036ERROR-3-MM... | 62550aac1db60633db25ee3e | nsailaks | Yes | Cisco ASR 5000 Series | 3 | Global |
| %GMM88101ERROR-3-GMM_ERR... | 62550b6f13d7f54bdd25cfd0 | nsailaks | Yes | Cisco ASR 5000 Series | 3 | Global |
| %HAT3083CRITICAL-2-HAT_CRITI... | 6255093513d7f5d34725c9aa | nsailaks | Yes | Cisco ASR 5000 Series | 3 | Global |

Edit Signature

| | | | |
|-----------------------|--|------------------------|---|
| Requestor Name* | nsailaks | Requestor Email* | |
| Signature/Mnemonic* ⓘ | %GTPC47595ERROR-3-GTPC_ERROR s*:*UPC.*Handoff fail | Signature/Alias* ⓘ | 62580223a2695d881ff37bd2 |
| Product Series* | ABC_PROD APIC-SERVER-M3 ASR1000 Series Routers ASR5000 ASR6000 | Severity | 3 ▾ |
| Description* ⓘ | This message occurs when the DBReq (Delete Bearer Request) for the default bearer is initiated by PGW (Packet Data Network Gateway) and simultaneously update PDP (Packet Data Protocol) request is received by PGW for GnP handoff (4G (Fourth Generation) to 3G (Third Generation)). | Commands to Support* ⓘ | show support details#show version verbose#show pgw-service all#show gtpc statistics verbose#show session disconnect-reasons verbose |
| Remediation Steps* ⓘ | Collect PCAP (Packet Capture) for the IMSI (International Mobile Subscriber Identity) mentioned in the syslog message for a specified timeframe to analyze further on failure cause and engage with the support engineer to resolve the issue. | Impact* ⓘ | Due to this issue, the subscriber session gets disconnected. This might affect the device services. |
| Sample Message* ⓘ | Nov 15 18:51:28 <<ipaddress>> evlogd: %GTPC47595ERROR-3-GTPC_ERROR: 4/2/11189 <sessmgr:627> p_fsm_handler.c:467] Recvd UPC Req from peer X.X.X.X for GP Handoff - Handoff failed GGSN svc(YYYY) - IMSI: NA. | Regular Expression ⓘ | |
| Raise SR* | <input checked="" type="radio"/> Yes <input type="radio"/> No | | |



Signatures are created/modified and mapped to a product series in this tab.

IC Customization

[Signatures](#) / [Edit Signature](#)

Edit Signature

| | | | |
|-----------------------|---|------------------------|--|
| Requestor Name* | amrjayar | Requestor Email* | |
| Signature/Mnemonic* ⓘ | %HA-HA_WD-3-DISK_ALARM_ALERT)s:.* | Signature/Alias* ⓘ | 60feef5f29c86b31bc0e62db |
| Product Series* | <div>Cisco 3900 Series Routers Cisco 5500 Series Wireless Controllers Cisco 7200 Series Routers Cisco 7301 Series Routers Cisco 8000 Series Routers</div> | Severity | <div>3</div> |
| Description* ⓘ | This is a memory utilization alert on RP as the harddisk usage has passed the threshold value | Commands to Support* ⓘ | show version#show install active summary#show install inactive summary#admin show install active summary#admin show install inactive summary#show install superseded#admin show install superseded#show platform#admin show platform#show platform summary |
| Remediation Steps* ⓘ | The following actions can be taken to fix this issue: 1. Please try to remove unnecessary files from hard disk and clear some old configuration commits :clear configuration commits oldest ? <0-35> Number of rollback points to delete. | Impact* ⓘ | These logs do not have any impact on the operation of the device. However it indicates that the device storage has reached a limit. |
| Sample Message* ⓘ | 2020 Apr 21 13:34:58.926 <<ipaddress>> %HA-HA_WD-3-DISK_ALARM_ALERT: A monitored device (rootfs) is above xx% utilization. Current utilization = xy. Please remove unwanted user files and configuration rollback points. | Regular Expression ⓘ | |
| Raise SR* | <input type="radio"/> Yes <input checked="" type="radio"/> No | | |

[Signatures](#) / [Edit Signature](#)

Edit Signature

| | | | |
|-----------------------|--|------------------------|--|
| Requestor Name* | jasingha | Requestor Email* | |
| Signature/Mnemonic* ⓘ | %HA-HA_WD-3-DISK_ALARM_ALERT)s:.* | Signature/Alias* ⓘ | 60feef2d29c86bd4ec0e6efc |
| Product Series* | <div>Cisco ASR 43000 Cisco ASR 9000 Series Cisco ASR 900 Series Aggregation Services Routers Cisco ASR 920 Series Aggregation Services Router Cisco Carrier Routing System Series</div> | Severity | <div>3</div> |
| Description* ⓘ | This error indicates that system is running low on disk space availability | Commands to Support* ⓘ | show version#show inventory#show logging last 500 |
| Remediation Steps* ⓘ | Operator should delete the logs or user created files from the directory /misc/disk1 to clean up the space and clear the alarm | Impact* ⓘ | Low Memory availability will hamper system performance. And may lead to reboot of the RP card. |
| Sample Message* ⓘ | 2019 Dec 9 13:09:57 <<ipaddress>> %HA-HA_WD-3-DISK_ALARM_ALERT : A monitored device /var/log (log/) is above 80% utilization. Current utilization = 80. Please remove unwanted user files and configuration rollback points. | Regular Expression ⓘ | |
| Raise SR* | <input type="radio"/> Yes <input checked="" type="radio"/> No | | |

Alarms View

Alarms(453)



Select Duration

Select Product Series

| ID | Message | Device IP | Host Name | Remediati... | SR No | CLI Output |
|--------|--|-------------|--------------|---------------------------|---------------------------|---------------------------|
| Search | Search | Search | Search | Search | Search | Search |
| 3755 | <189>May 14 11:17:58 172.16.1.75 88: *May 14 03:34:31.847: %LDP-5-N... | 172.16.1.75 | BCS-LAB1-RT4 | Available | 693524797 | Available |
| 3754 | <189>May 14 11:17:58 172.16.1.73 78: *May 14 03:34:32.520: %LDP-5-N... | 172.16.1.73 | BCS-LAB1-RT2 | Available | 693577318 | Available |
| 3753 | <189>May 14 11:11:56 172.16.1.75 86: *May 14 03:28:29.962: %LDP-5-N... | 172.16.1.75 | BCS-LAB1-RT4 | Available | 693524797 | Available |
| 3752 | <189>May 14 11:11:40 172.16.1.75 85: *May 14 03:28:13.286: %LDP-5-N... | 172.16.1.75 | BCS-LAB1-RT4 | Available | 693524797 | Available |
| 3751 | <189>May 14 11:11:40 172.16.1.73 76: *May 14 03:28:13.968: %LDP-5-N... | 172.16.1.73 | BCS-LAB1-RT2 | Available | 693577318 | Available |
| 3750 | <189>May 14 11:11:17 172.16.1.75 84: *May 14 03:27:50.214: %LDP-5-N... | 172.16.1.75 | BCS-LAB1-RT4 | Available | 693524797 | Available |
| 3749 | <189>May 14 11:11:17 172.16.1.73 75: *May 14 03:27:50.905: %LDP-5-N... | 172.16.1.73 | BCS-LAB1-RT2 | Available | 693577318 | Available |
| 3748 | <187>May 14 11:10:28 172.16.1.73 59: *May 14 03:26:55.768: %LINK-3-... | 172.16.1.73 | BCS-LAB1-RT2 | Available | 693577318 | Available |

show ip route summary

Load for five secs: 0%/0%; one minute: 0%; five minutes: 0%
No time source, *11:44:00.443 GMT Wed Dec 16 2020

IP routing table name is default (0x0)
IP routing table maximum-paths is 32

| Route Source | Networks | Subnets | Replicates | Overhead | Memory (bytes) |
|--------------|----------|---------|------------|----------|----------------|
| application | 0 | 0 | 0 | 0 | 0 |
| connected | 0 | 13 | 0 | 1248 | 3952 |
| static | 1 | 0 | 192 | 608 | |

AFM Event Remediation

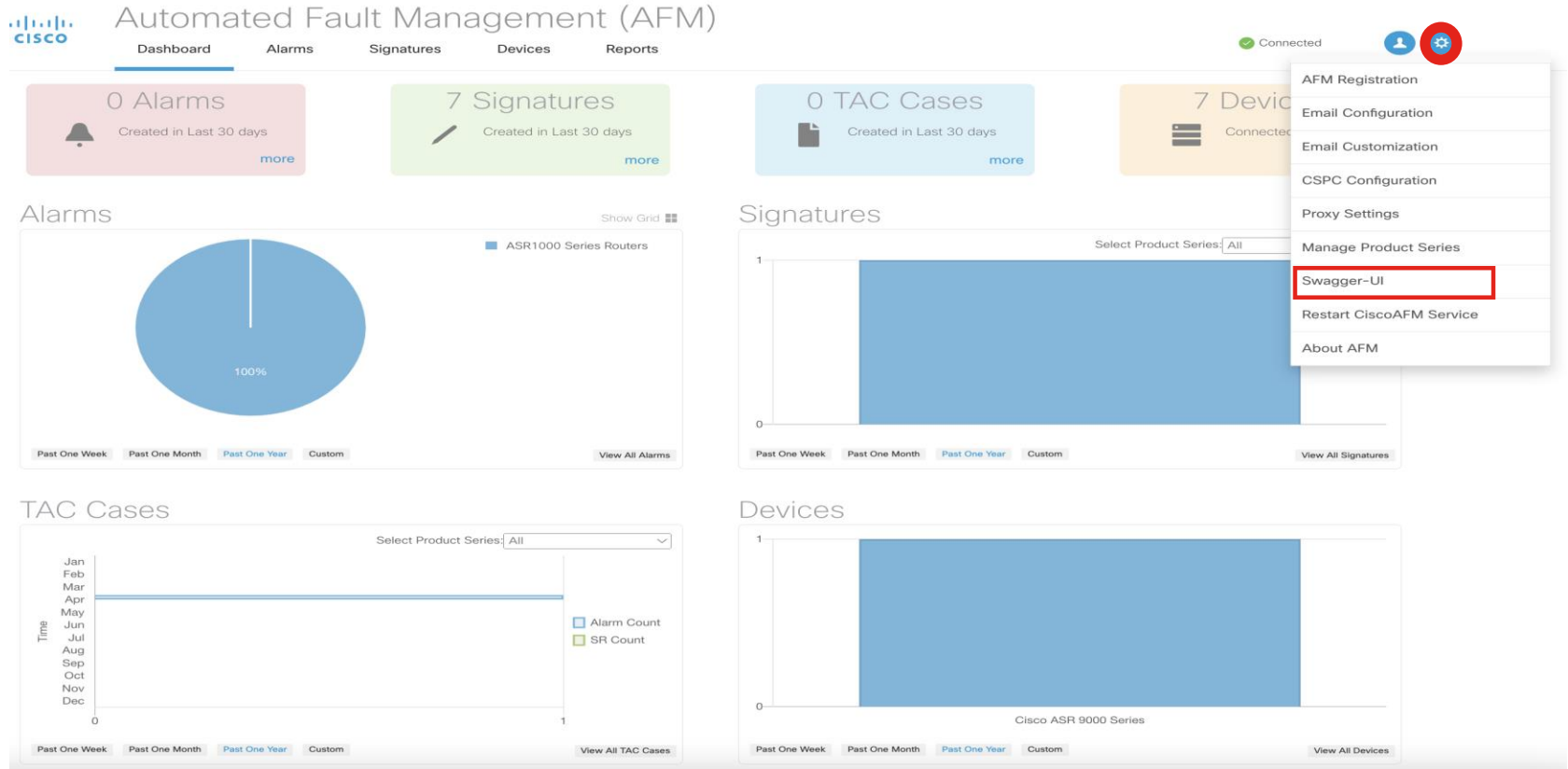
| | |
|----------------|---|
| Event | <189>May 10 12:25:14 172.16.1.75 267: *Dec 16 11:43:07.719: %LDP-5-NBRCHG: LDP Neighbor 2.2.2.2:0 (1) is UP |
| Impact | BACKBONE LDP NEIGHBORSHIP DOWN |
| Description | AFM CUSTOMER DEMO Service Request Number: 693524797 |
| Recommendation | NA Recommendation Description: AFM CUSTOMER DEMO |



If an event matches a signature on a device, then an alarm is created on this tab.

Video Demo

Swagger UI (Interactive API)



Swagger UI (Interactive API)

The screenshot shows the Swagger UI for Cisco AFM Rest Services. The top bar is green with the Swagger logo and a dropdown menu for selecting a specification, currently set to 'default'. Below the header, the title 'Cisco AFM Rest Services' is displayed with a version badge '1.0.0'. The base URL is provided as 'https://10.68.57.228:8445/ciscoafm/v2/api-docs'. A note states 'This is a Swagger UI for AFM APIs' with links to 'Terms of service' and 'Apache 2.0'. An 'Authorize' button is visible on the right. The main content area lists several API endpoints. The 'Login' endpoint, which is a POST request to '/v2/rest/validateLogin' for validating user credentials, is highlighted with a red rectangular box. Other endpoints include 'Health' (GET /v2/rest/health), 'Products', 'Events', 'Maintenance-Window', 'Devices', 'Alarm', 'cloudray-services', and 'Signature'.

swagger Select a spec default

Cisco AFM Rest Services 1.0.0

[Base URL: 10.68.57.228:8445/ciscoafm]
<https://10.68.57.228:8445/ciscoafm/v2/api-docs>

This is a Swagger UI for AFM APIs
[Terms of service](#)
[Apache 2.0](#)

Authorize

Health

GET /v2/rest/health Checks the health of the AFM

Login

POST /v2/rest/validateLogin Validates the User credentials

Products

Events

Maintenance-Window

Devices

Alarm

cloudray-services

Cloudray Services

Signature

Login API

(body)

Example Value | Model

```
{
  "username": "craadmin",
  "password": "sg1bad.8383k"
}
```

Cancel

Parameter content type
application/json

Execute Clear

Responses
Response content type application/json

Curl

```
curl -X POST "https://10.68.57.228:8445/ciscoafm/v2/rest/validateLogin" -H "accept: application/json" -H "Content-Type: application/json" -d "{ \"username\": \"craadmin\", \"password\": \"sg1bad.8383k\"}"
```

Request URL
https://10.68.57.228:8445/ciscoafm/v2/rest/validateLogin

Server response

| Code | Details |
|------|--|
| 200 | <p>Response body</p> <pre>{ "responseMessage": { "sessionID": "84809311-4cbd-4c5a-8e60-7dff4ba41811", "firstTimeLogin": false, "securityQuestions": null }, "responseErrorMessage": null, "responseStatus": "OK", "deviceFound": false }</pre> |

Available authorizations

Auth-Token (apiKey)

Name: Auth-Token

In: header

Value:

cbd-4c5a-8e60-7dff4ba41811

Authorize Close

Available authorizations

Auth-Token (apiKey)

Authorized

Name: Auth-Token

In: header

Value: *****

Logout Close

Events API

Events

GET

/v2/rest/GetLiveEvents Get all Live events



GET

/v2/rest/GetLiveEventsWithCLIOutput Get all Live events with CLI Output



GET

/v2/rest/GetLiveEvents Get all Live events



Parameters

Try it out

Response body

```
"hostName": null,
"ipAddress": "172.16.1.73",
"productId": null,
"osRunning": "IOSXE",
"eventmsg": "<189>Jan 25 17:29:05 172.16.1.73 577: Jan 25 15:20:39.575: %LDP-5-NBRCHG: LDP Neighbor 4.4.4.4:0 (3) is DOWN (Interface not operational)",
"timeStamp": "01/25/2023 02:59:30 IST",
"timemillis": "1674638970038",
"type": null,
"index": 0,
"updatedTimeStamp": "01/25/2023 03:05:04 IST",
"status": null,
"fixStatus": "N/A",
"uiStatus": null,
"srOpenStatus": null,
"srNumber": null,
"srHyperLink": null,
"alarmId": "3975",
"analysisAvailStatus": null,
"analysisResult": {
  "alarmMessage": null,
  "impact": "\nBACKBONE LDP NEIGHBORSHIP DOWN\n",
  "recommendation": "\nPlease shut and no shut the interface\n Recommendation Description:\nAFM CUSTOMER DEMO\n\n ",
  "schMessageId": null,
  "alarmId": null,
  "description": "\nAFM CUSTOMER DEMO\n\nService Request Number:\n694953078"
},
"problemFixInfo": null,
```

Download

Device API

Devices



| | | |
|------|--|--|
| POST | /v2/rest/addDeviceAPI Add Device | |
| POST | /v2/rest/bulkEditDeviceAPI Edit Device in Bulk | |
| POST | /v2/rest/bulkUploadAPI Bulk Upload Devices | |
| POST | /v2/rest/deleteDevicesAPI Delete Device | |
| GET | /v2/rest/deviceconnstatus Get All Device Connectivity Status | |
| POST | /v2/rest/editDeviceAPI Edit Device | |
| GET | /v2/rest/getDevicesManagedByAFM To Get Devices managed by AFM | |
| GET | /v2/rest/getSingleDeviceConnStatus Get Single Device Connectivity Status | |
| GET | /v2/rest/isDeviceExistsInAFM To Check and get whether device exists in AFM | |

Devices in AFM

GET

/v2/rest/getDevicesManagedByAFM To Get Devices managed by AFM



Parameters

Try it out

Response body

```
{
  {
    "ipaddress": "172.16.1.73",
    "hostName": "BCS-LAB1-RT2",
    "serialNumber": "9TNWM5WT5LF",
    "productId": "L-CSR-1G-IPB-1Y=",
    "deviceSeries": "CSR1000",
    "registrationStatus": "Success"
  },
  {
    "ipaddress": "172.16.1.77",
    "hostName": "BCS-LAB1-RT7",
    "serialNumber": "96Y0ENM04VV2K0G02G70G",
    "productId": "ASR1000",
    "deviceSeries": "ASR1000 Series Routers",
    "registrationStatus": "Success"
  },
  {
    "ipaddress": "172.16.1.75",
    "hostName": "BCS-LAB1-RT4",
    "serialNumber": "92ENF5RPAT2",
    "productId": "L-CSR-1G-IPB-1Y=",
    "deviceSeries": "CSR1000",
    "registrationStatus": "Success"
  }
],
"responseErrorMessage": null,
```

Download

Case Study

Use Cases : Large Service Provider and Bank

High Operational Expense

- Time to detect
- Time to diagnose and remediate
- Technical Resource costs

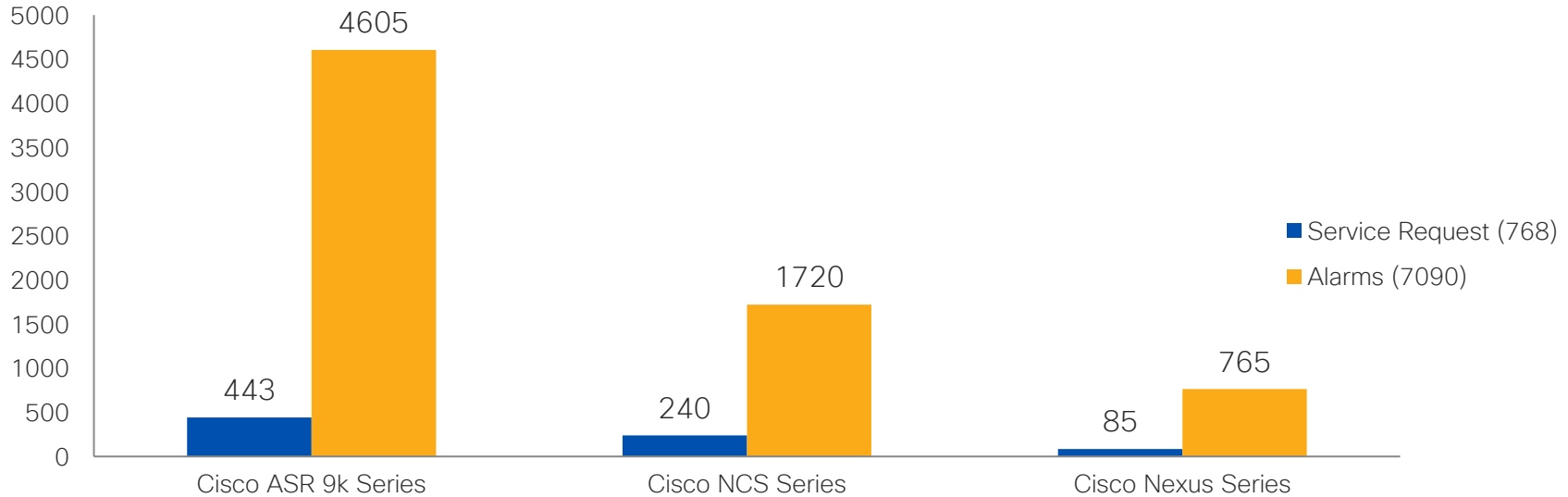
High Time To Resolution

- Time to detect
- Manual diagnosis and remediation
- Limited Technical Resources with deep work Queues

Solution

- Near real time automated outage detection
- Automated collection of detailed failure data
- Cisco Intellectual Capital supplied remediation steps
- Automated support case creation and problem notification

SP AFM Delivery over a period of 12 month



- 40%- 50% cases are currently being opened by AFM
- Average fault detection time reduced by 30-60 minutes
- Case opening and queuing time essentially eliminated saved approx. 45 mins
- Average remediation time reduced to less than 10 minutes



*“\$8 million outage reduction saving
over 12 months”*

*“Overall time to resolution
decreased by 25%.”*

Large Multinational Service Provider



“\$5 million projected savings in labor costs, over 12 month”

Problem resolution cut by 50% per incident.

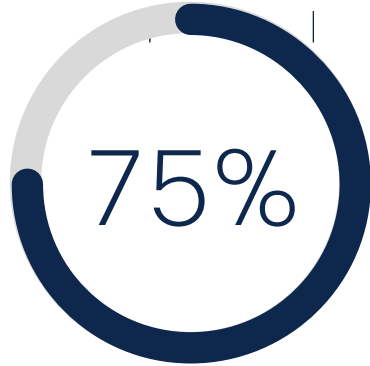
Large Multinational Bank

Value Realization

Value Realization



Significant savings in
outage and labour costs



Outage detection time
reduced by 75%



Resolution time
reduced by 50%



~+7.9k hours saved
compared to manual
case opening

Winner of TSIA 2021 Award

Innovation in Support Services Automation – AFM

<https://www.tsia.com/tsia.public.dev/media/pdf-file-storage/STAR-Application-Submissions-2021/2021-star-award-innovation-support-services-automation-cisco.pdf>

Innovation in Customer Success – CX Cloud

<https://www.tsia.com/tsia.public.dev/media/pdf-file-storage/STAR-Application-Submissions-2021/2021-star-award-innovation-customer-success-cisco.pdf>

Innovation in Customer Portals – CX Cloud

<https://www.tsia.com/tsia.public.dev/media/pdf-file-storage/STAR-Application-Submissions-2021/2021-star-award-innovation-customer-portals-cisco.pdf>



*TSIA Technology & Services Industry Association –

<https://www.tsia.com/certifications-and-awards/star-awards/tsia-star-award-winners>

Current Supported Platforms

Routing and Switching

- Cisco ASR 9K/8K/1K/900
- Cisco NCS 4K/5K/6K
- Cisco Catalyst 3k/4k/6k/7k/9k

IoT

- Cisco Industrial Ethernet 3k/4k/5k Series Switches
- Cisco 800 Series Industrial Integrated Services Routers

Security

- Cisco ASA 5500
- Cisco Firepower 1K/2100/4100/9300

DC and Cloud

- Nexus 4k/5k/7k
- ACI : APIC
- Compute : UCS-C,-B

Mobility

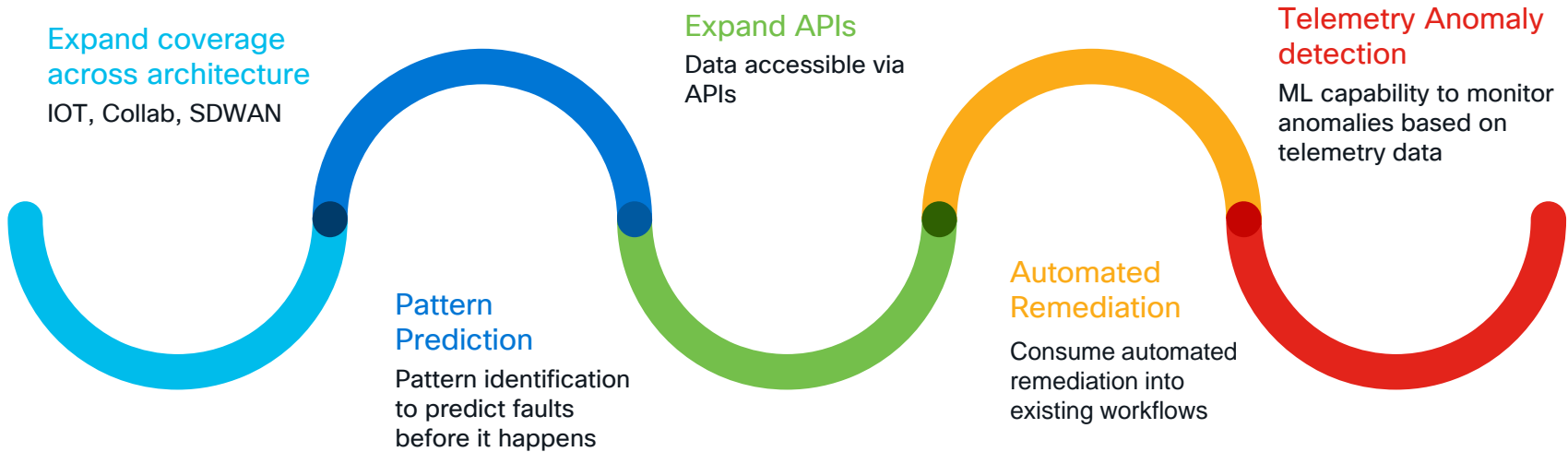
- SP Packet Core : StarOS

Collaboration


- Call manager
- Unity Connection

Roadmap

Roadmap



Customer Benefits

- 
- Access to Global library of signatures (1000+ ICs)
 - Automated data collection
 - Reduced troubleshooting time
 - Savings in OpEx
 - Improved Time To Resolve

What is Automated Fault Management?



Combines automation detection and machine learning, powered by Cisco intellectual capital to speed fault detection, troubleshooting and resolution times

Complete your Session Survey

- Please complete your session survey after each session. Your feedback is important.
- Complete a minimum of 4 session surveys and the Overall Conference survey (open from Thursday) to receive your Cisco Live t-shirt.
- All surveys can be taken in the Cisco Events Mobile App or by logging in to the Session Catalog and clicking the "Attendee Dashboard" at <https://www.ciscolive.com/emea/learn/sessions/session-catalog.html>



Cisco Learning and Certifications

From technology training and team development to Cisco certifications and learning plans, let us help you empower your business and career. www.cisco.com/go/certs

Pay for Learning with Cisco Learning Credits

(CLCs) are prepaid training vouchers redeemed directly with Cisco.



Learn

Cisco U.

IT learning hub that guides teams and learners toward their goals

Cisco Digital Learning

Subscription-based product, technology, and certification training

Cisco Modeling Labs

Network simulation platform for design, testing, and troubleshooting

Cisco Learning Network

Resource community portal for certifications and learning



Train

Cisco Training Bootcamps

Intensive team & individual automation and technology training programs

Cisco Learning Partner Program

Authorized training partners supporting Cisco technology and career certifications

Cisco Instructor-led and Virtual Instructor-led training

Accelerated curriculum of product, technology, and certification courses



Certify

Cisco Certifications and Specialist Certifications

Award-winning certification program empowers students and IT Professionals to advance their technical careers

Cisco Guided Study Groups

180-day certification prep program with learning and support

Cisco Continuing Education Program

Recertification training options for Cisco certified individuals

Here at the event? Visit us at **The Learning and Certifications lounge** at the World of Solutions

Continue Your Education



Visit the Cisco Showcase for related demos.



Book your one-on-one Meet the Engineer meeting.



Attend any of the related sessions at the DevNet, Capture the Flag, and Walk-in Labs zones.



Visit the On-Demand Library for more sessions at ciscolive.com/on-demand.



The bridge to possible

Thank you

CISCO *Live!*

CISCO *Live!*

ALL IN