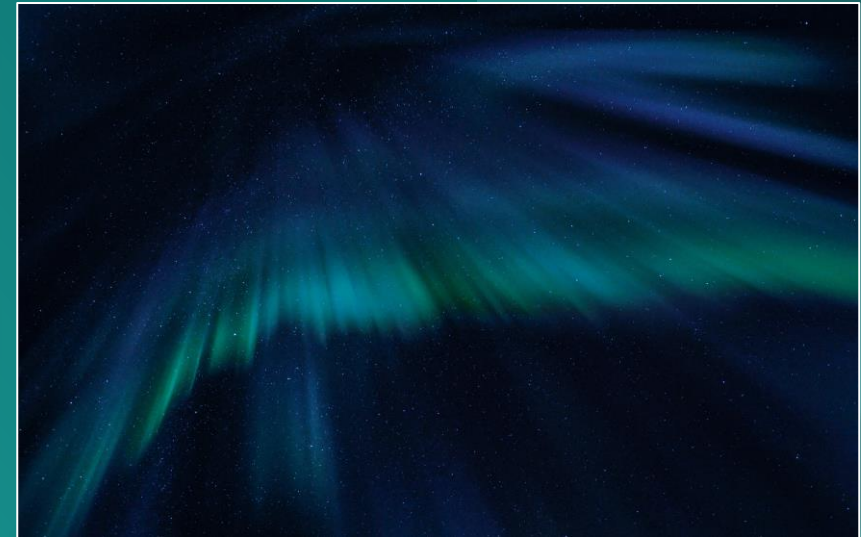


The JT-NM Tested network

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JT-NM Tested



- ⑩ Lead by AMWA, EBU, SMPTE & VSF
- ⑩ An opportunity to test ST 2110 / NMOS implementations in real-world scenarios
- ⑩ 45 vendors, 110 participants



JT-NM TESTED

The JT-NM Tested Program returns to IBC 2022 and will again offer documented insight into how vendor equipment conforms to specific SMPTE standards, AMWA NMOS specifications and selected real-world scenarios. As on previous occasions, the JT-NM is publishing the JT-NM Tested Catalog, which lists vendor results and also contains test plans executed by the JT-NM Tested Team in Wuppertal, Germany in

August of 2022 at Riedel.



Preparation....



A team of “Experts” is assembled:

⑩ Infrastructure

- 📖 The network; architecture, design, addressing, provisioning
- 📖 Services; DHCP, DNS, PTP, NTP
- 📖 Access; WiFi, Internet

⑩ Testing

- 📖 Test plan definition
- 📖 Documentation of results

- ⑩ Arista responsible for the architecture, design, and provisioning of the network
- ⑩ The EBU provided/configured the DHCP/DNS servers
- ⑩ Riedel (hosts) provided firewalling, Internet and WiFi

Network Objectives



The network objective was to provide a “real-world” scenario

- ⑩ Maximise applicability of results for customers
- ⑩ Highlight ST 2110 network design best practice
- ⑩ Resilience and Reliability through design
- ⑩ Devices manageable from wired or wireless + Internet access

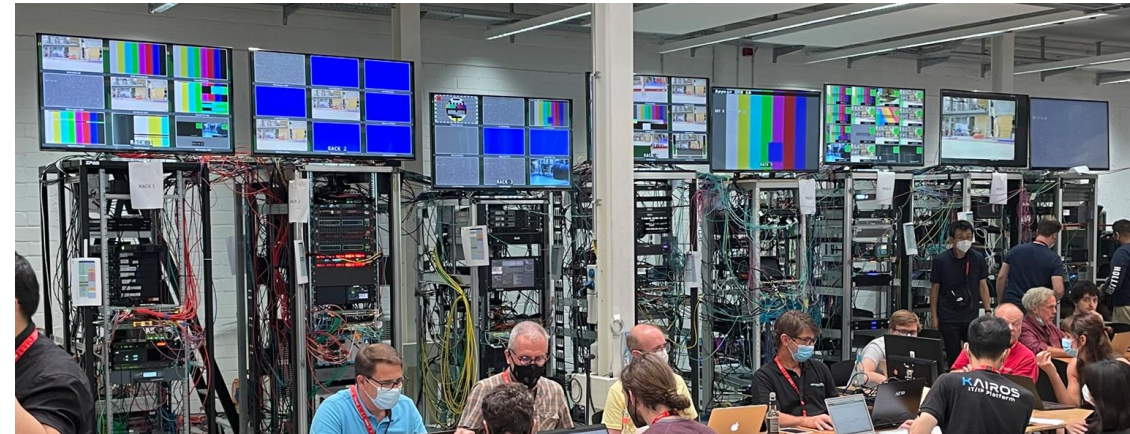
What did this mean?

- ⑩ Pushing TR-1001-1 expectations - DHCP, DNS etc
- ⑩ Layer 3 routed design (BGP Dynamic routing)
 - 📖 IGMP / PIM
 - 📖 Full unicast routing globally
 - 📖 DHCP, DNS, IS-04 RDS, NTP all universally reachable
- ⑩ Amber and Blue media networks (M/C air-gapped)
 - 📖 Full multicast routing within Amber and Blue (IGMP / PIM)
 - 📖 L3 (/31) attached media hosts
- ⑩ Routable C&M network(s)
 - 📖 Multiple M&C vlans provided for Main, and NMOS-X workflows
- ⑩ Dual resilient PTP GMs
- ⑩ Routable OOB network for switch management

The physical network

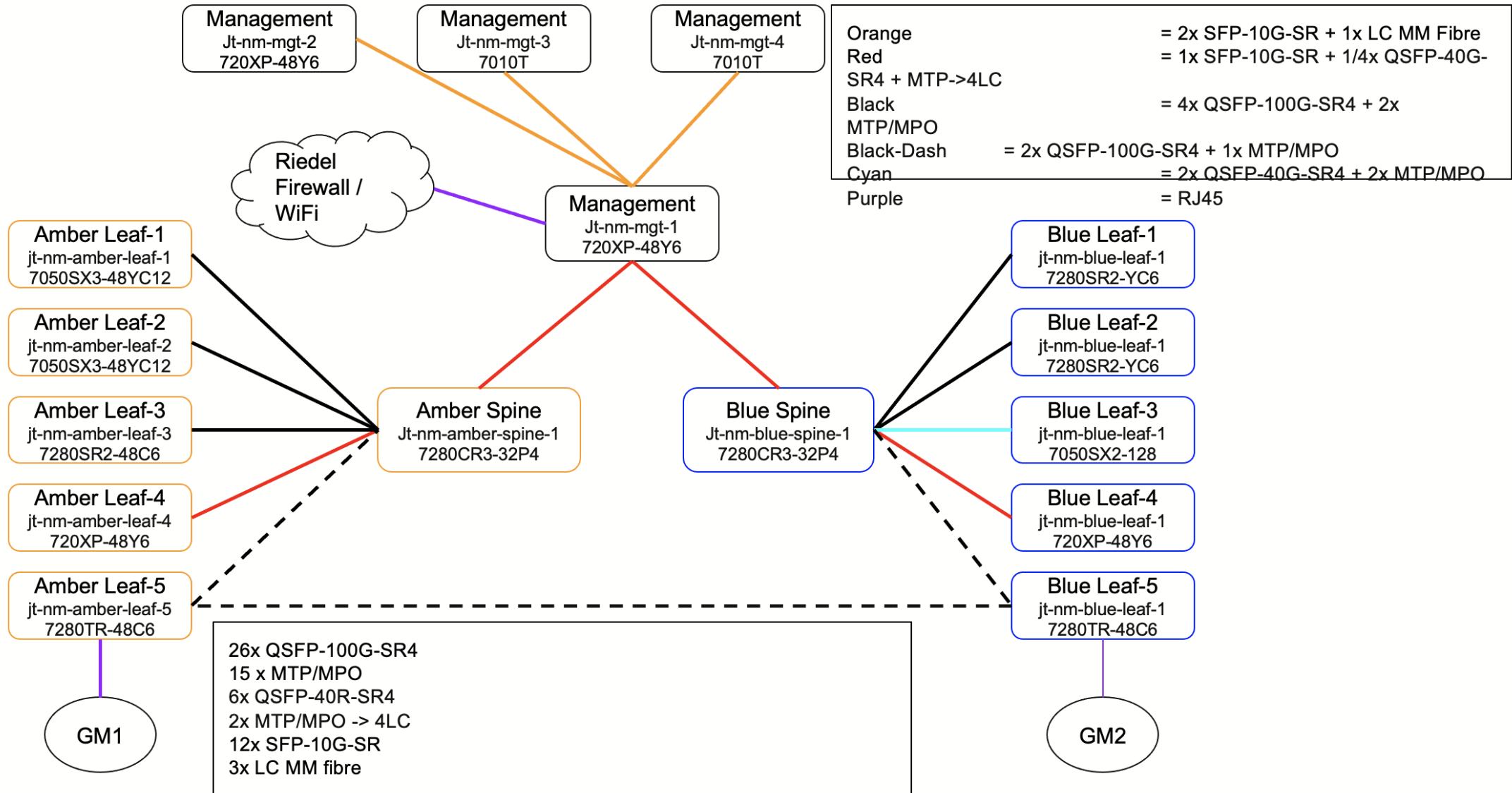


- ⑩ 8 Racks for equipment
- ⑩ Spine + 5 leafs in Amber and Blue
 - 83x 1G Media
 - 75x 10G Media
 - 116x 25G Media
 - 8x 40G Media
 - 48x 100G
- ⑩ 4x1G C&M network
 - 📖 132x 1 C&M connections

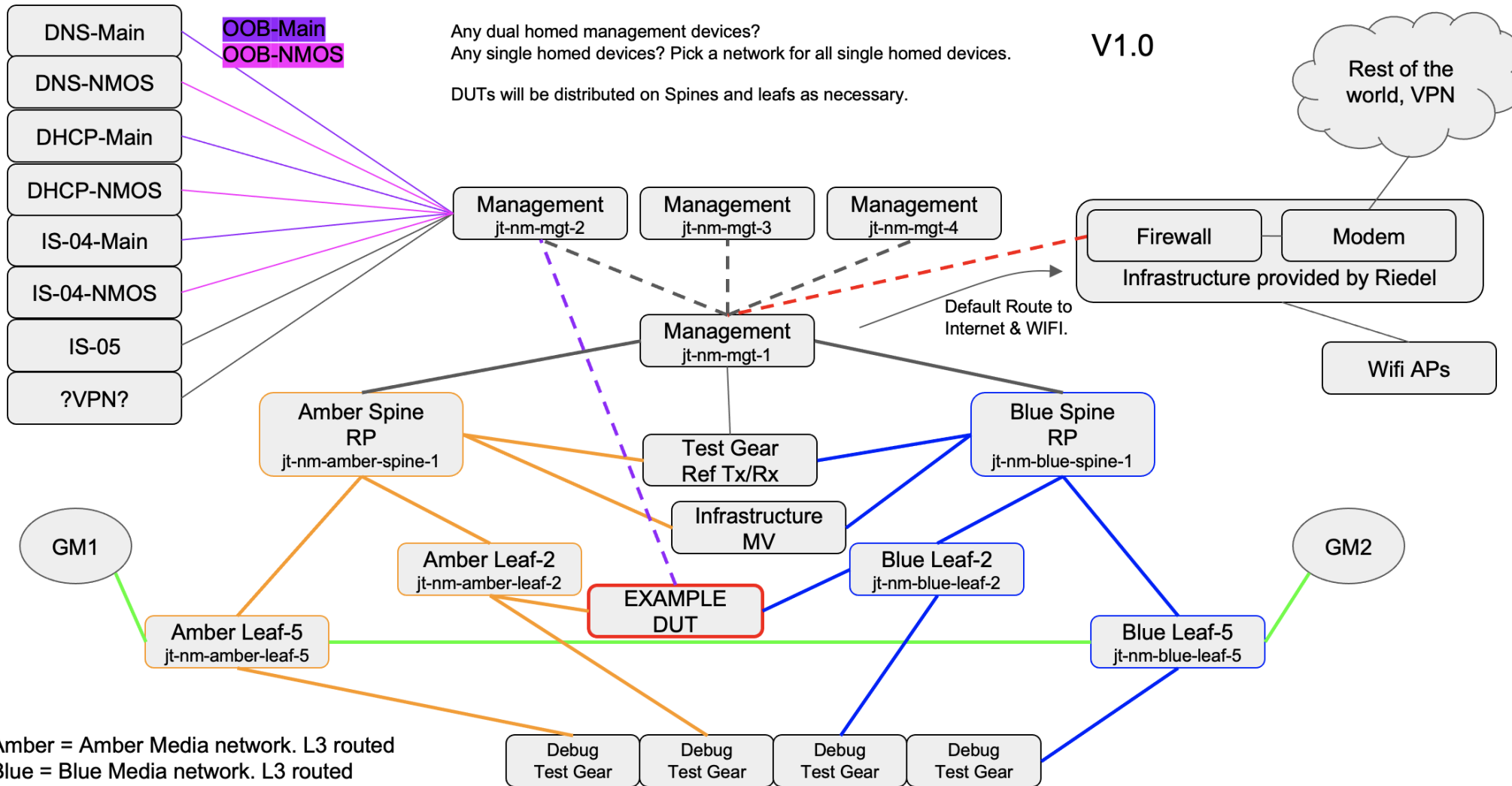


More interfaces than last JT-NM Tested event
Overall, a strong move from 10->25, and 40->100G

The physical network

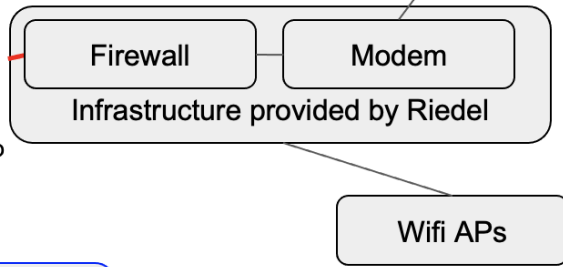


JT-NM Network



Any dual homed management devices?
 Any single homed devices? Pick a network for all single homed devices.
 DUTs will be distributed on Spines and leaves as necessary.

V1.0



Amber = Amber Media network. L3 routed
 Blue = Blue Media network. L3 routed
 Green = PTP distribution. PTP only.
 Black = Management. Hosts services, OOB management, WiFi and internet access
 Solid = Routed. Dashed = L2. Thin = host (routed, L2, Trunk etc)

Config Generation for 16 Switches?

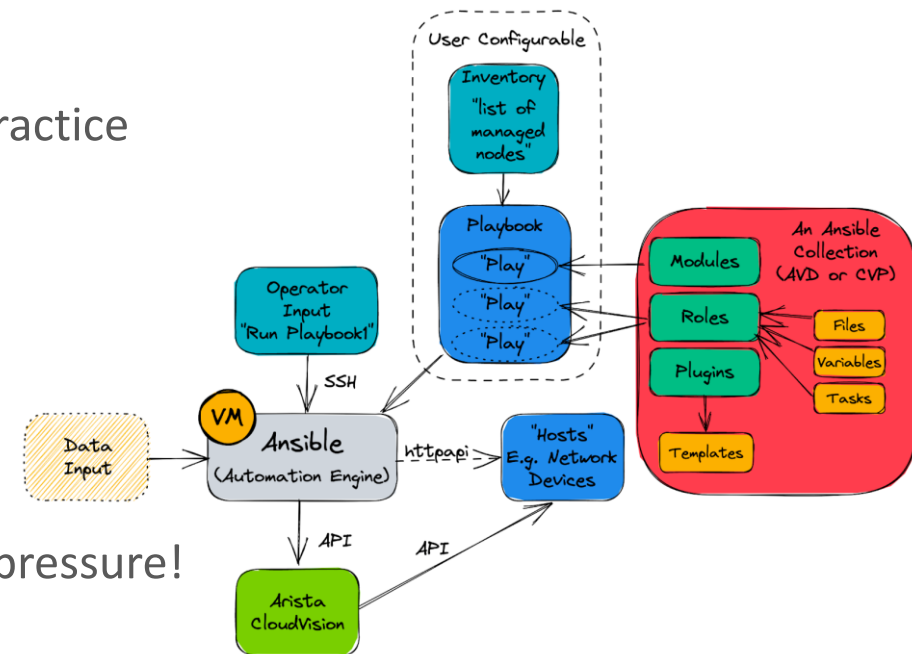


Traditional approach

- 10 Wait until you're on-site
- 10 Work 24 hours / day for the whole weekend
- 10 Expect errors and inconsistencies

Work Smart approach

- 10 Apply a "network as code" approach
- 10 Have a source of truth as yaml files, revision controlled
- 10 Use Red Hat's Ansible automation
- 10 AVD (Arista Validated Designs) Collection provide validated best practice
 - L3 Routed L&S
 - PIM / RP
 - PTP Boundary Clock
 - Common infrastructure
 - & DHCP, DNS, hostnames, management addresses,
- 10 Routed host port configs automated
 - CSV spreadsheet export + python -> yaml
- 10 Pretty much the only manual additions were...
 - FEC settings on 25/100G interfaces -> This was due to time pressure!
- 10 Then I went on holiday 😊

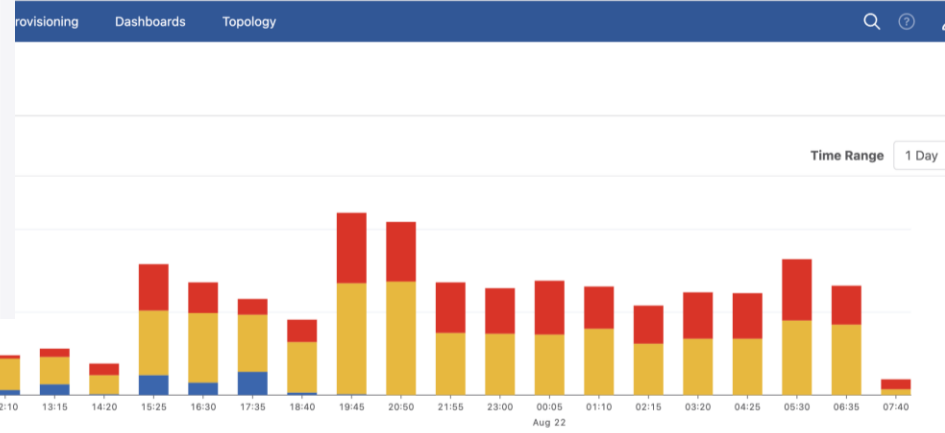


Health Monitoring?



PTP Metrics (All switches) - GP

22 Aug, 06:40:54 (1 hour) | Browse Dashboards | Edit



Most Active Devices	🔥	🔴	🟡	🟢
jt-nm-amber-leaf-1	—	169	203	9
jt-nm-amber-leaf-4	—	103	155	6
jt-nm-amber-leaf-5	—	83	147	9
jt-nm-blue-leaf-2	—	90	99	39
jt-nm-amber-leaf-3	—	95	93	22
jt-nm-blue-leaf-5	—	65	131	9
jt-nm-blue-leaf-4	—	61	111	9
jt-nm-blue-leaf-3	—	60	89	10
jt-nm-blue-spine-1	—	29	67	31
jt-nm-amber-spine-1	—	34	58	31

Export to CSV • Show next 6 rows | Showing 10 of 16 rows

Most Active Event Types	🔥	🔴	🟡
Abnormally High Streaming Latency	—	631	874
Interface Went Down Unexpectedly	—	—	419
Device Config Compliance	—	—	77
Custom Syslog Event	—	2	2
Input Errors Detected	—	56	—
Low Disk Partition Space Available	—	51	—
High Interface FCS Errors	—	34	—
High Interface Symbol Errors	—	32	—
Abnormally Small Frames	—	31	—
Change Control Created	—	—	—

Export to CSV • Show next 10 rows • Show all 24 rows | Showing 10 of 24 rows

🔍 Acknowledge | 🚫 Un-Acknowledge | Export Table to CSV

Source	Title	Duration	Start Time
🟡 Ethernet13 on jt-nm-mgt-4	Interface went down unexpectedly	Lasted 1m	Started 2w ago
🟡 Ethernet3 on jt-nm-blue-leaf-4	Interface went down unexpectedly	Lasted 27s	Started 2w ago
🟡 Ethernet4 on jt-nm-amber-leaf-4	Interface went down unexpectedly	Lasted 27s	Started 2w ago
🔴 Ethernet52/3 on jt-nm-blue-leaf-2	Runts detected	Lasted 23m	Started 2w ago
🔴 Ethernet52/3 on jt-nm-blue-leaf-2	Input errors detected	Lasted 23m	Started 2w ago
🔴 Ethernet52/4 on jt-nm-blue-leaf-2	Runts detected	Lasted 26m	Started 2w ago
🔴 Ethernet52/4 on jt-nm-blue-leaf-2	Input errors detected	Lasted 26m	Started 2w ago

Interface Ethernet13 on HSH15230398 is operationally down but administrative status is not shutdown

How did it all go?

⑩ Pre-staged the switches with minimal, but representative connectivity prior to on-site event, and pretty much everything seemed to work just fine. (Huge Kudos to Hugo@Riedel)

⑩ No network config / reliability issues

⑩ No impediment to testing from 9am Mon

⑩ Network free to assist with other tasks

⑩ Typical problems

- 📖 FEC mismatches on 25/100G
- 📖 IP addressing / DHCP
- 📖 TTL=0
- 📖 Bad IGMP joins
- 📖 IGMP Group Specific Queries being ignored
- 📖 Large unicast streams sent to public IP
- 📖 Large unicast streams to switch control plane



Any Questions?

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