NETWORK AUTOMATION FORUM

AI Driven Network Observability

Does AI Enable:
"Better microscopes or better doctors" ?

Jeremy Schulman, Senior Director, Major League Baseball

AUTOCON 2

THE NETWORK AUTOMATION CONFERENCE

AI Driven Network Observability

- Natural Language Processing (NLP)
- Named Entity Recognition (NER)
- Retrieval Augmented Generation (RAG)
- ChatOps for the Network
- Really cool dashboards

Our Approach to Network Observability

Buy - commercial

Borrow - open source

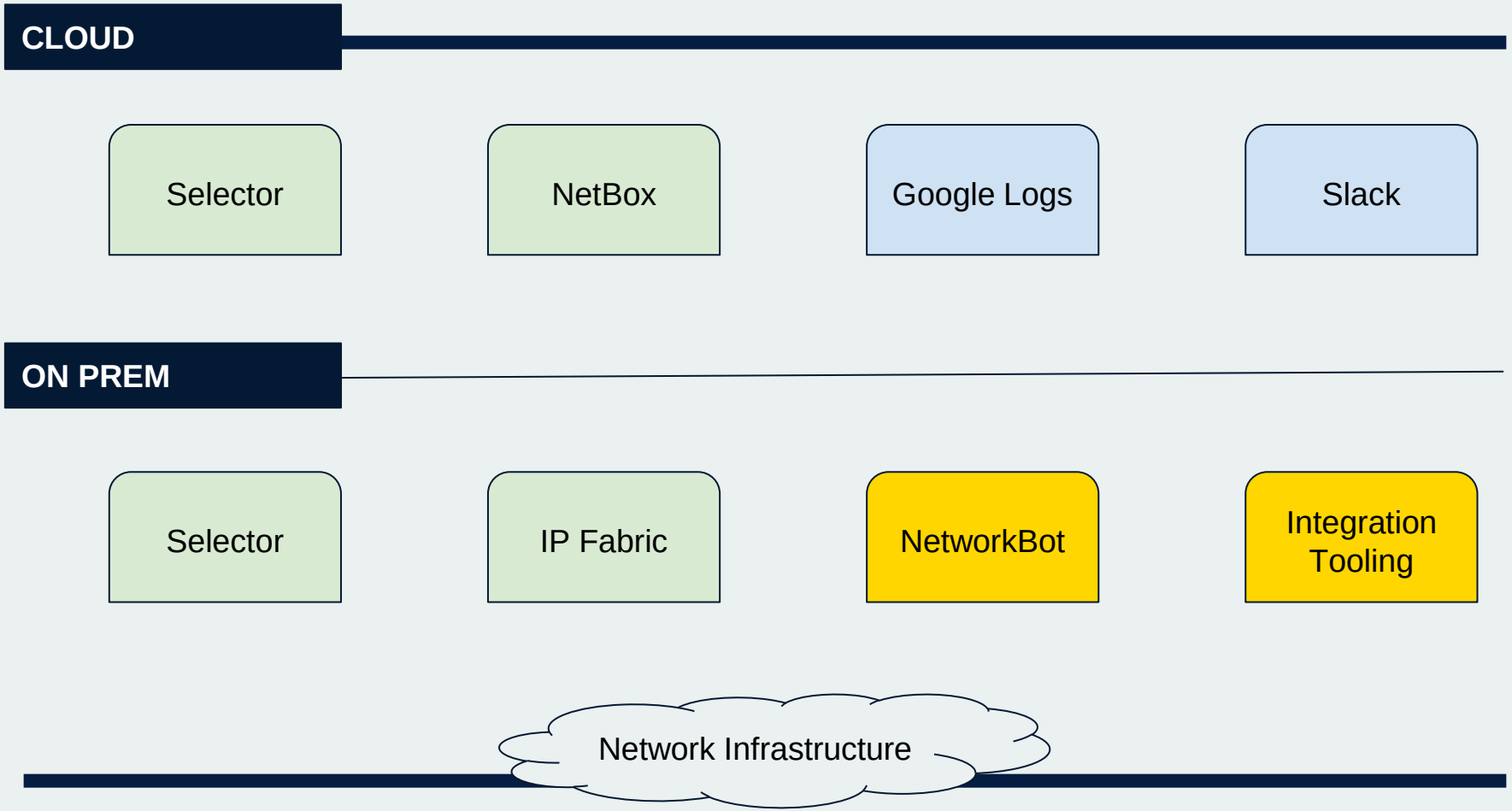
Build - DIY

Our Approach to Network Observability

Buy - Selector.ai
IP Fabric

Borrow - NetBox

Build - ChatOps


CLOUD
Selector
NetBox
Google Logs
Slack
ON PREM
Selector
IP Fabric
NetworkBot
Integration Tooling
Network Infrastructure

We Need Better Microscopes **AND** Better Doctors

#selector Selector Copilot Conversational AI 239

John Doe

Are we having uplink issues at our properties in the US?

SelectorAIOps

Here are the results for `/Are we having uplink issues at our properties in the US`

Click for details [S2AP Portal]

SelectorAIOps APP 1:26 PM

Alert Notification

Critical Alert

A configuration change at device **craa.aaa** by **Joe** caused a lot of network events. Different protocols were affected across the network and caused traffic losses

Alert Details

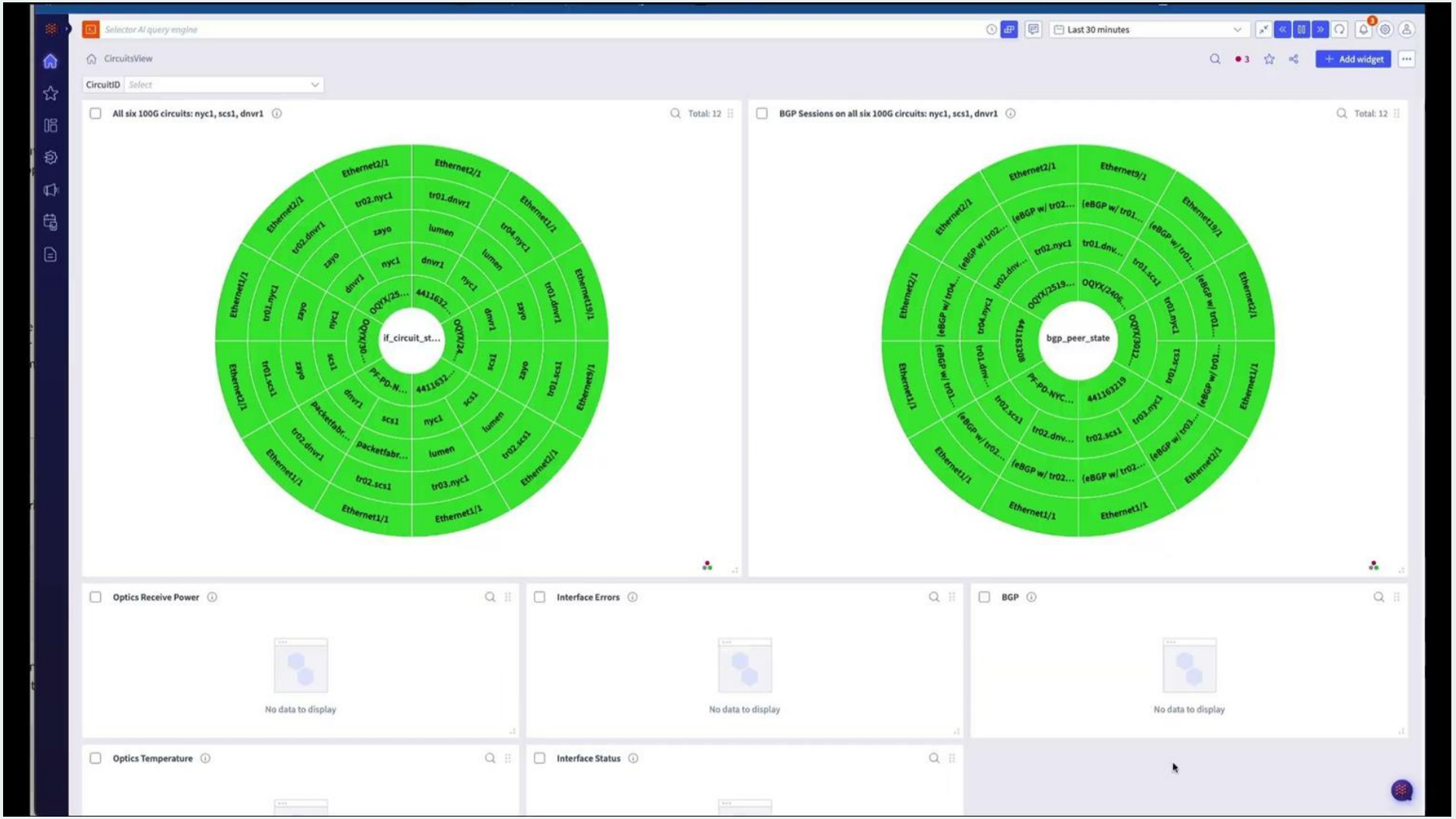
[S2AP Portal]

Devices Affected: mr01.abc, mr02.ddd, co1.aaa, bkb2.aaa, bkb1.eee
Products: Cloud OnRamp, Co-Distribution

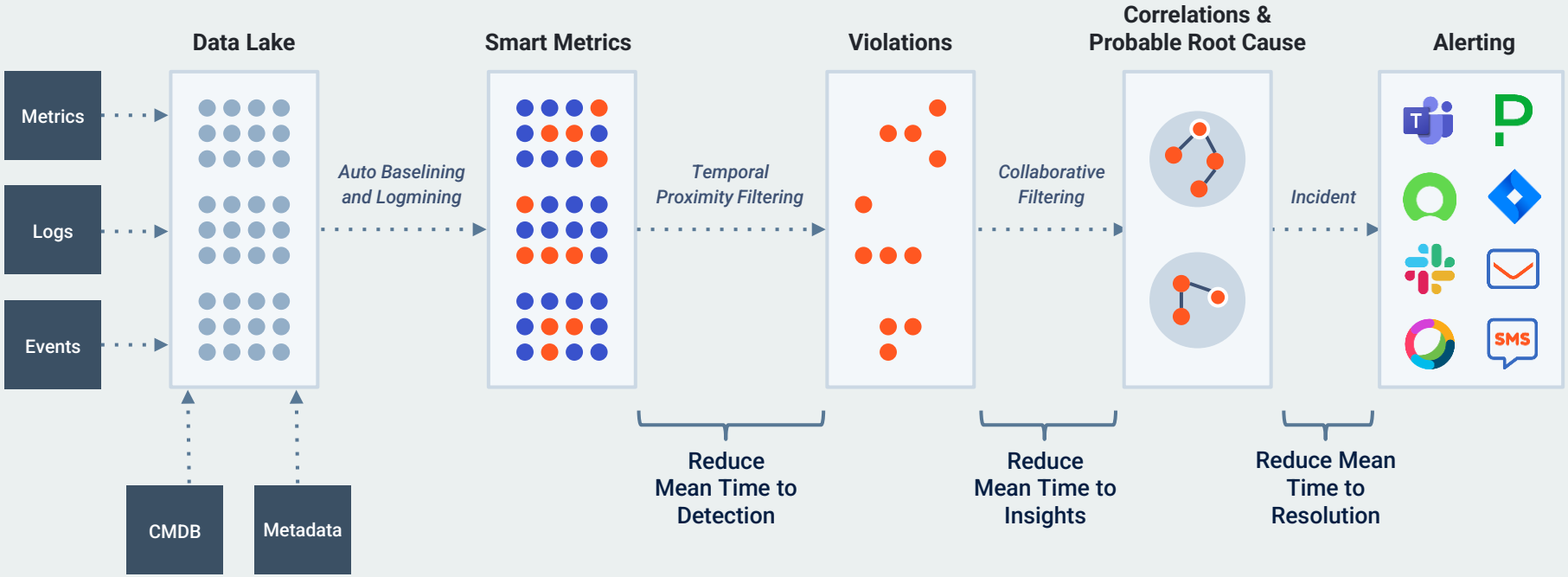
43 Correlated Events:
- 12 LDP session down events
- 10 LACP state change events
- 10 Interface flap events
- 8 ISIS down events
- 1 Config change event
- 1 Optical power low event
- 1 High ping loss event

Metros: Dallas, Chicago
Region: Americas
See less

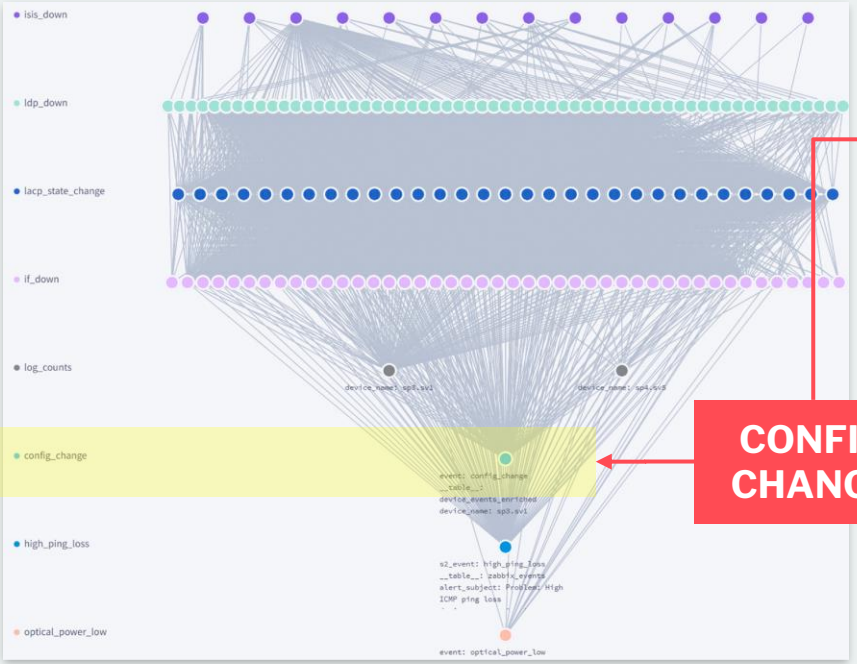
Preview | Mute | Acknowledge | Incident

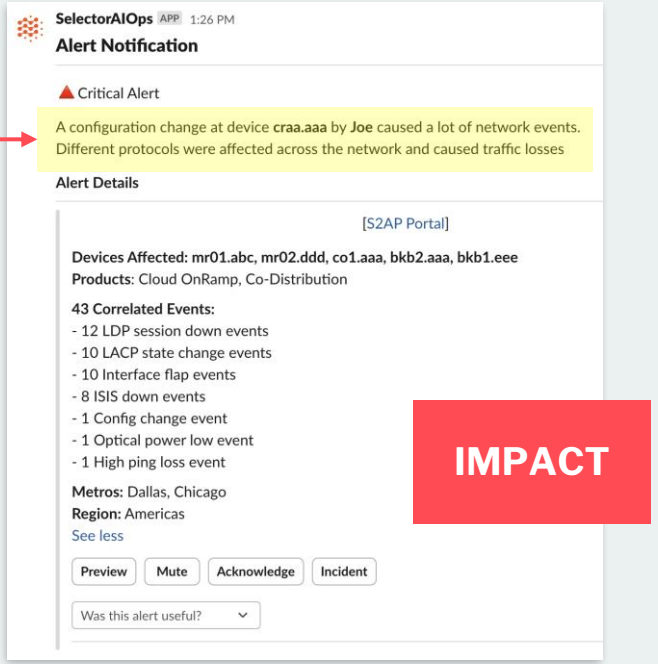

Selector AI query engine
Last 30 minutes
CircuitsView
Add widget
CircuitID
Select
All six 100G circuits: nyc1, scs1, dnvr1
Total: 12
BGP Sessions on all six 100G circuits: nyc1, scs1, dnvr1
Total: 12
if_circuit_st...
bgp_peer_state
Optics Receive Power
No data to display
Interface Errors
No data to display
BGP
No data to display
Optics Temperature
Interface Status

Correlation: Microscopes → Doctors



Correlation at Scale → More, Smarter Doctors





Event Correlations

Consolidated Alert

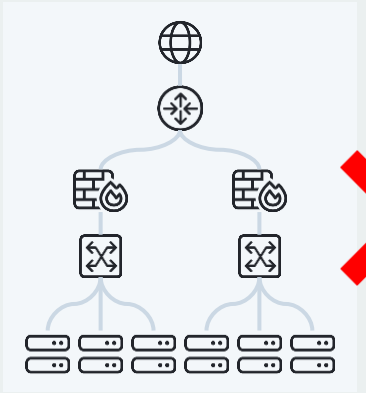
Natural Language Processing → Talk with your Doctor

Requirements

MUST use Large Language Model ("LLM") trained with customer specific context-aware private metadata

MUST NOT use Internet during LLM Processing

Challenge



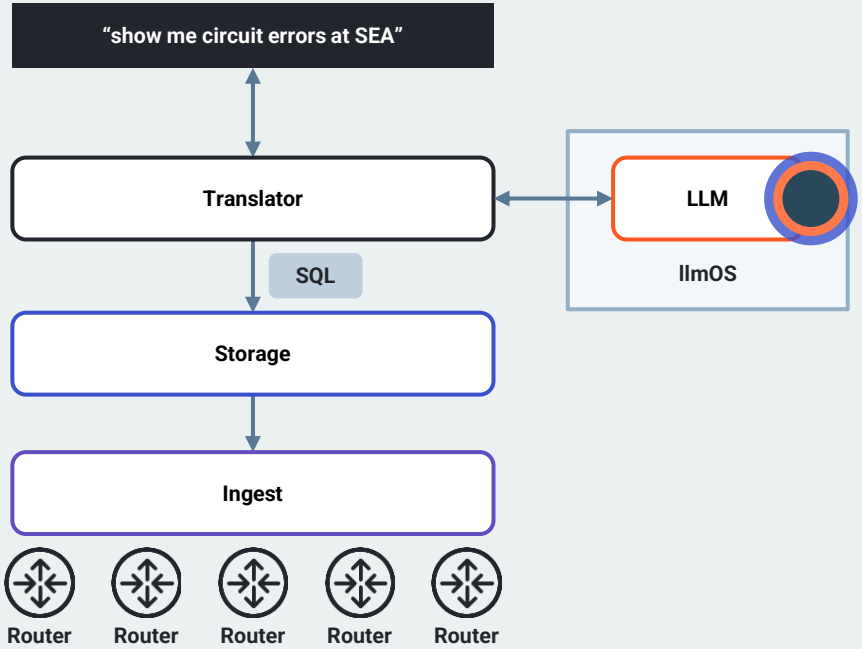
On Premises Metrics, Logs, Tacacs, NetBox, SNMP

ChatGPT

Microsoft Copilot

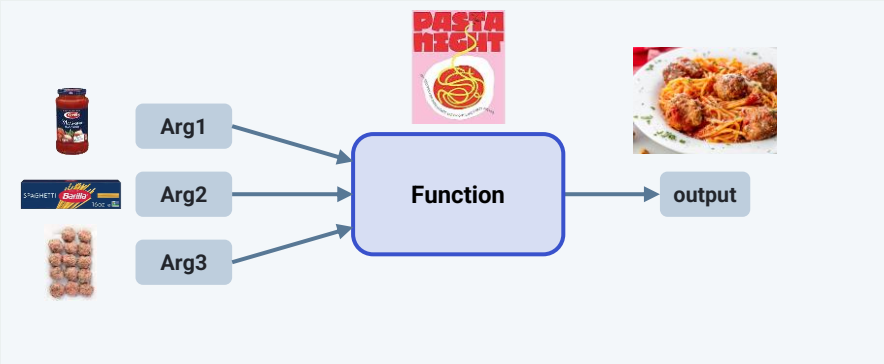
Google Gemini

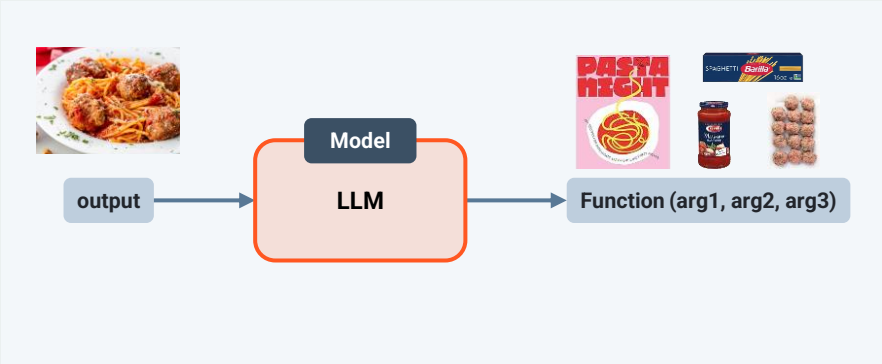
LLM Deployment with MLB Training



- Base model is open source
- Trained with English data that enables it to understand english phrases
- Fine Tune with examples that teach it to convert from english to SQL query interface.
- Fine Tune further to our specific entities. **This happens in MLB instance.**

What does an LLM Actually Do?





Given a set of input parameters, a function **computes** an output

Given an output, an LLM **imputes** the function and its arguments

F1(A, B, C) → output1 ⟷ *LLM(output1) → F1(A, B, C)*

F2(X, Y) → output2 ⟷ *LLM(output2) → F2(X, Y)*

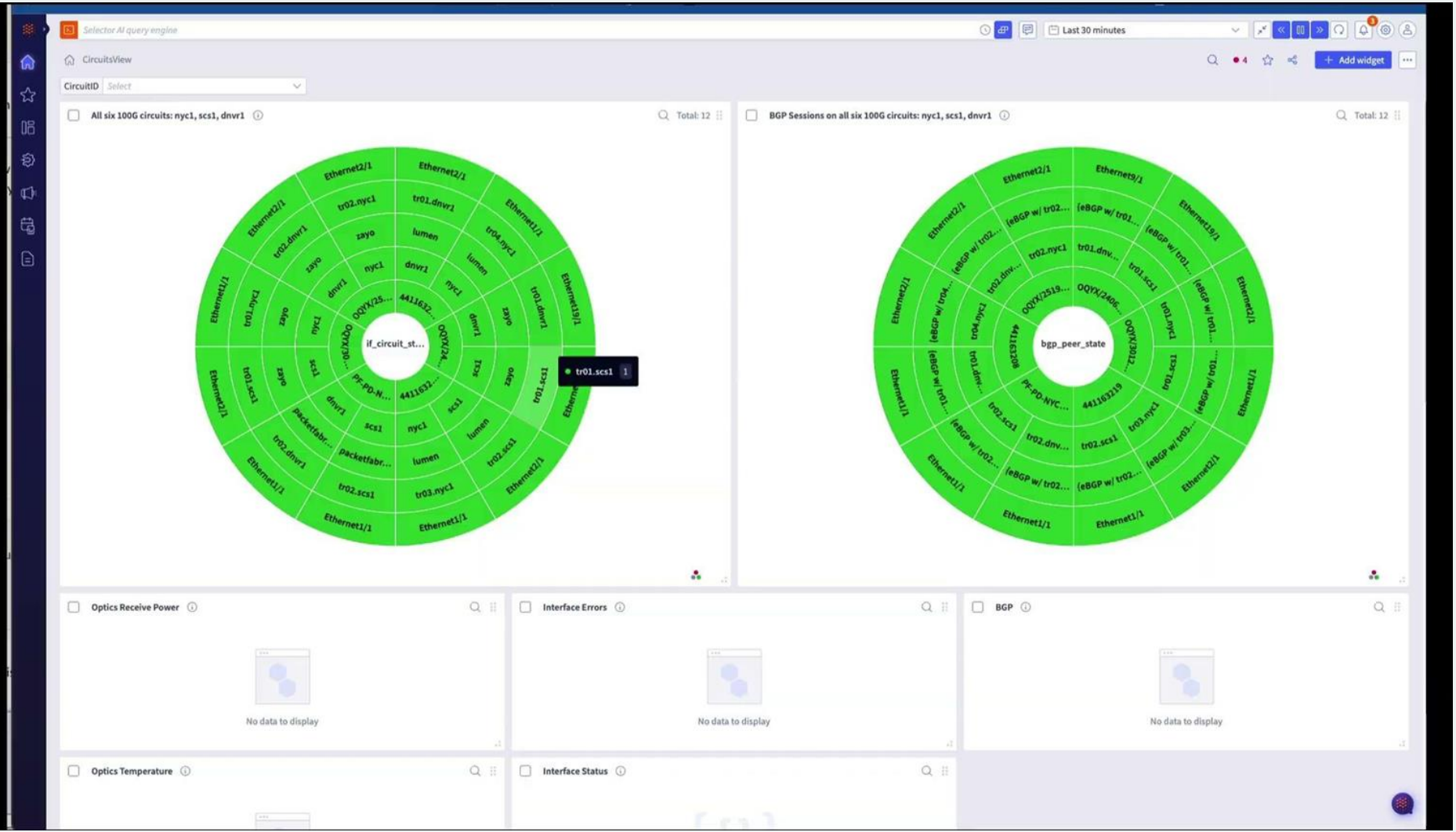
Example

Output

LLM("show me the circuit errors at sea in the last 2 days") →

Function: Select-Table

Arguments: Table = Circuit-Errors
Site = SEA
Time_window = ($NOW - 48 hours) to $NOW


Selector AI query engine
Last 30 minutes
CircuitsView
Add widget
CircuitID
Select
All six 100G circuits: nyc1, scs1, dnvr1
Total: 12
if_circuit_st...
tr01.scs1 1
BGP Sessions on all six 100G circuits: nyc1, scs1, dnvr1
Total: 12
bgp_peer_state
Optics Receive Power
No data to display
Interface Errors
No data to display
BGP
No data to display
Optics Temperature
Interface Status

Selector AI query engine

Last 30 minutes

CircuitsView

Add widget

CircuitID Select

All six 100G circuits: nyc1, scs1, dnvr1

Total: 12

BGP Sessions on all six 100G circuits: nyc1, scs1, dnvr1

Total: 12

Optics Receive Power

Select CircuitID for data

Interface Errors

Select CircuitID for data

BGP

Select CircuitID for data

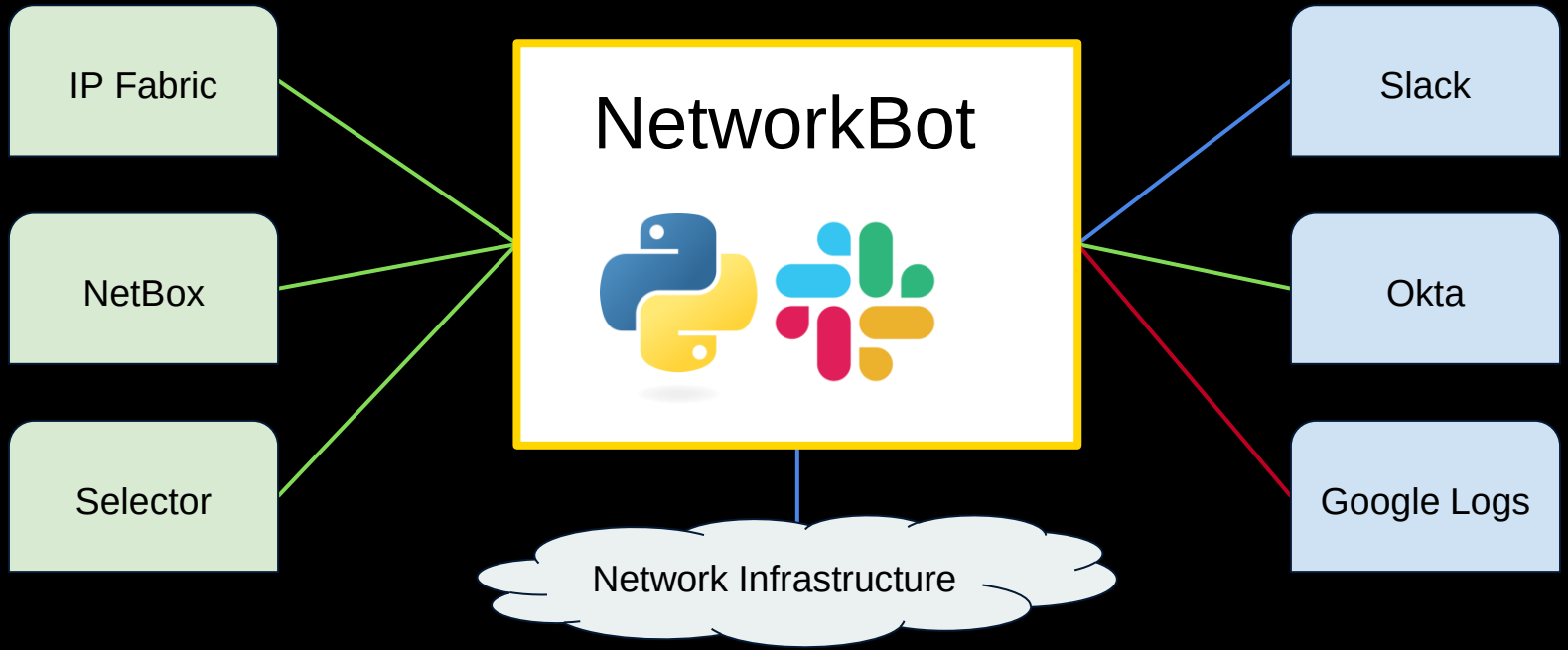
Optics Temperature

Interface Status

ChatOps

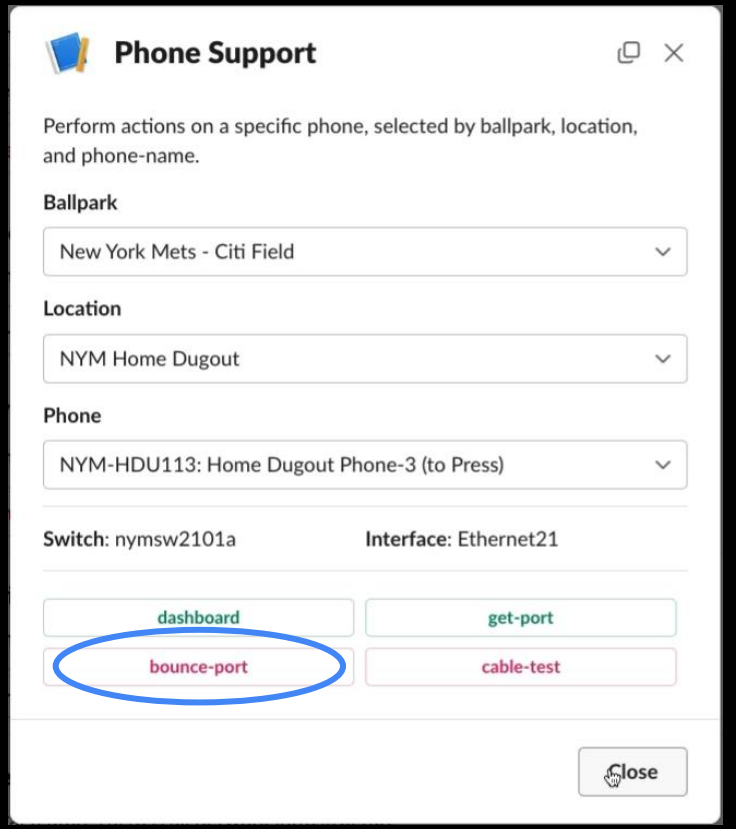
Self-Service network operations through Slack

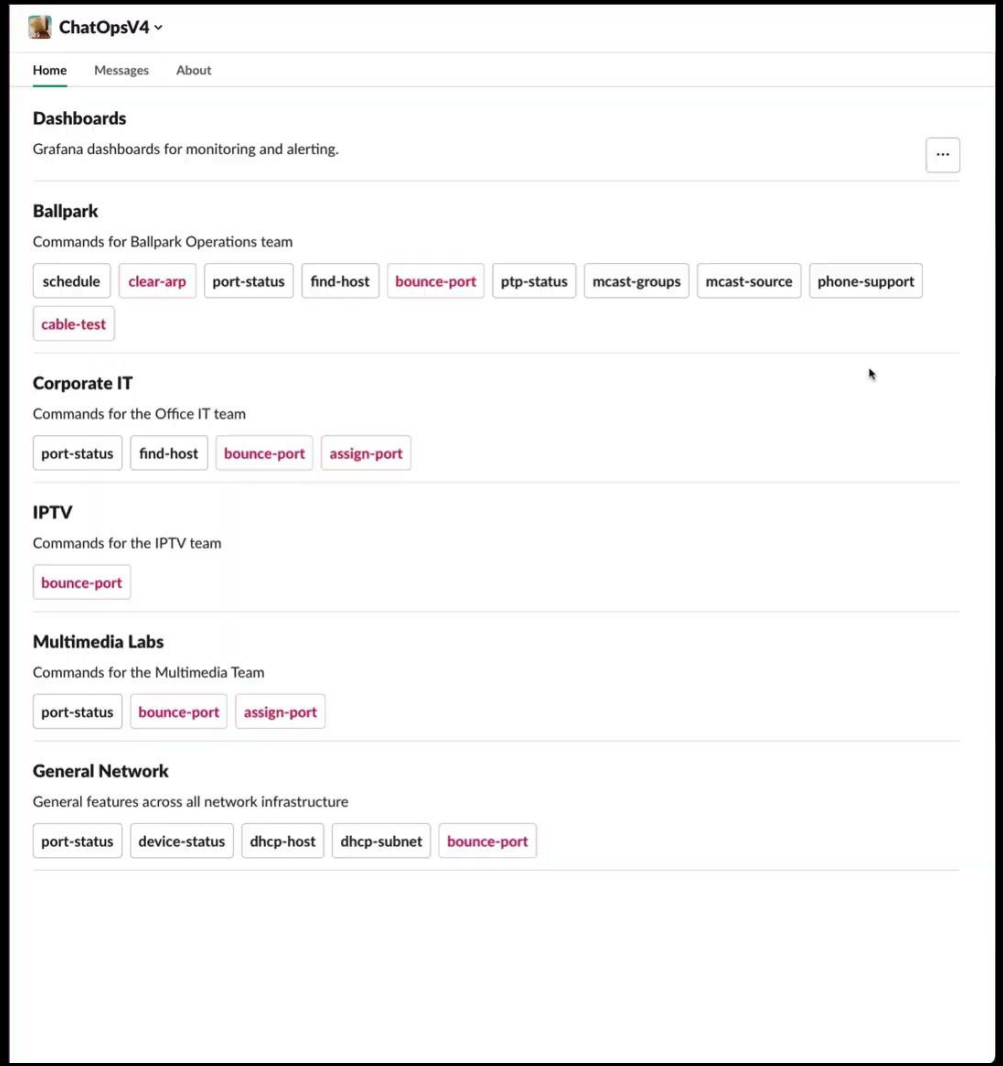
Solution Overview

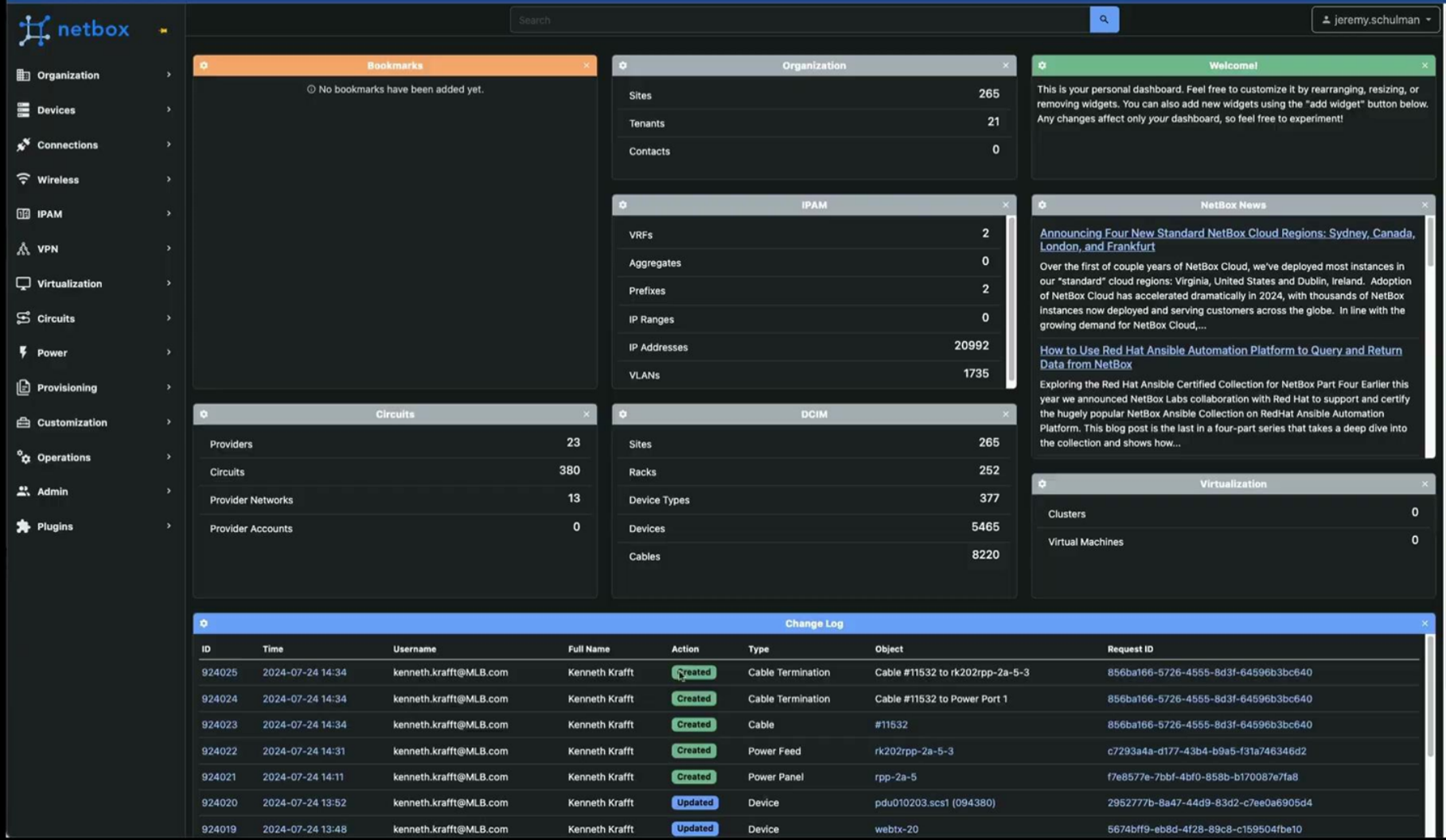


Example: Automating "Bounce Port"

NetworkBot is used by many departments outside of Network Operations

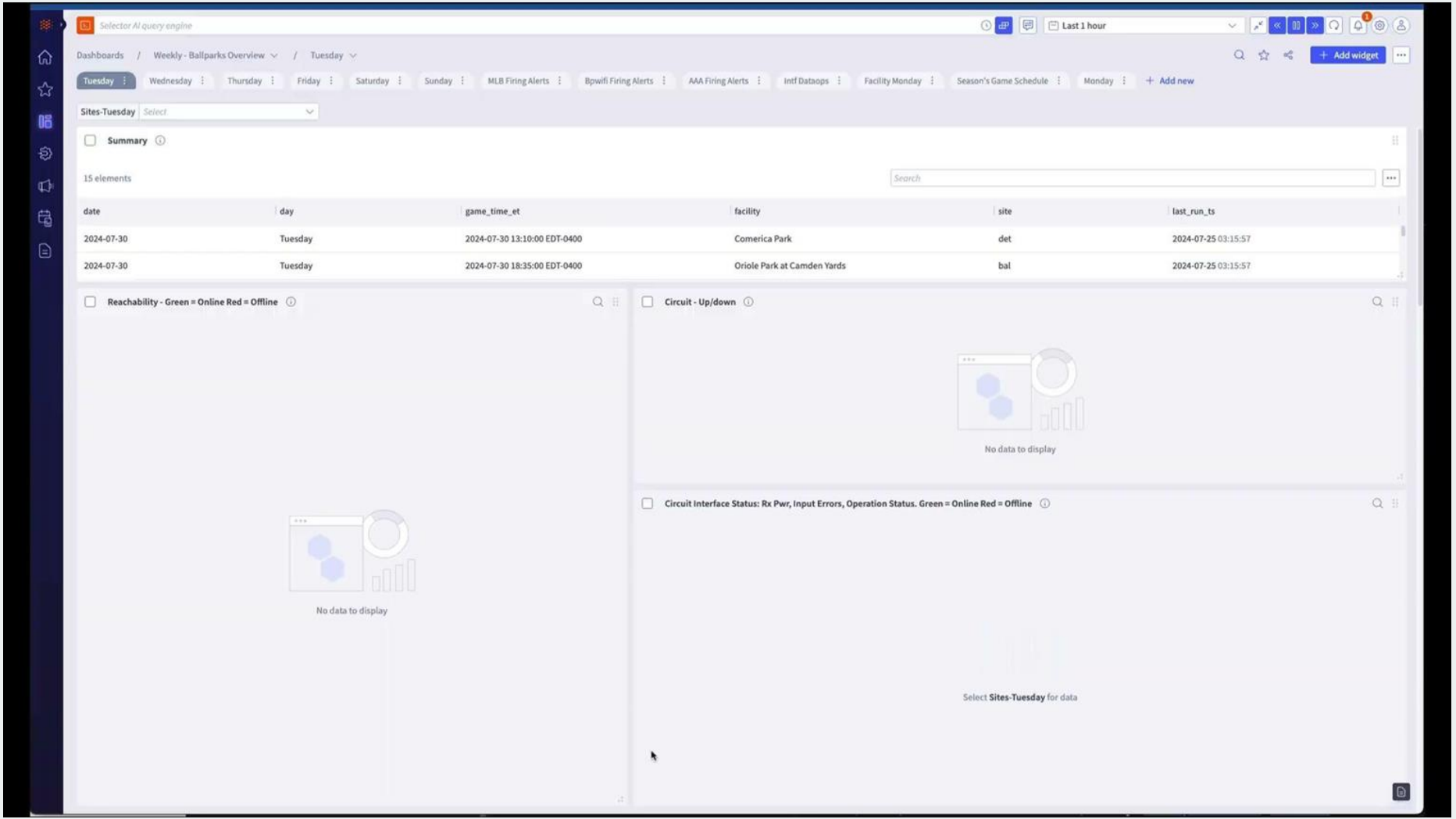


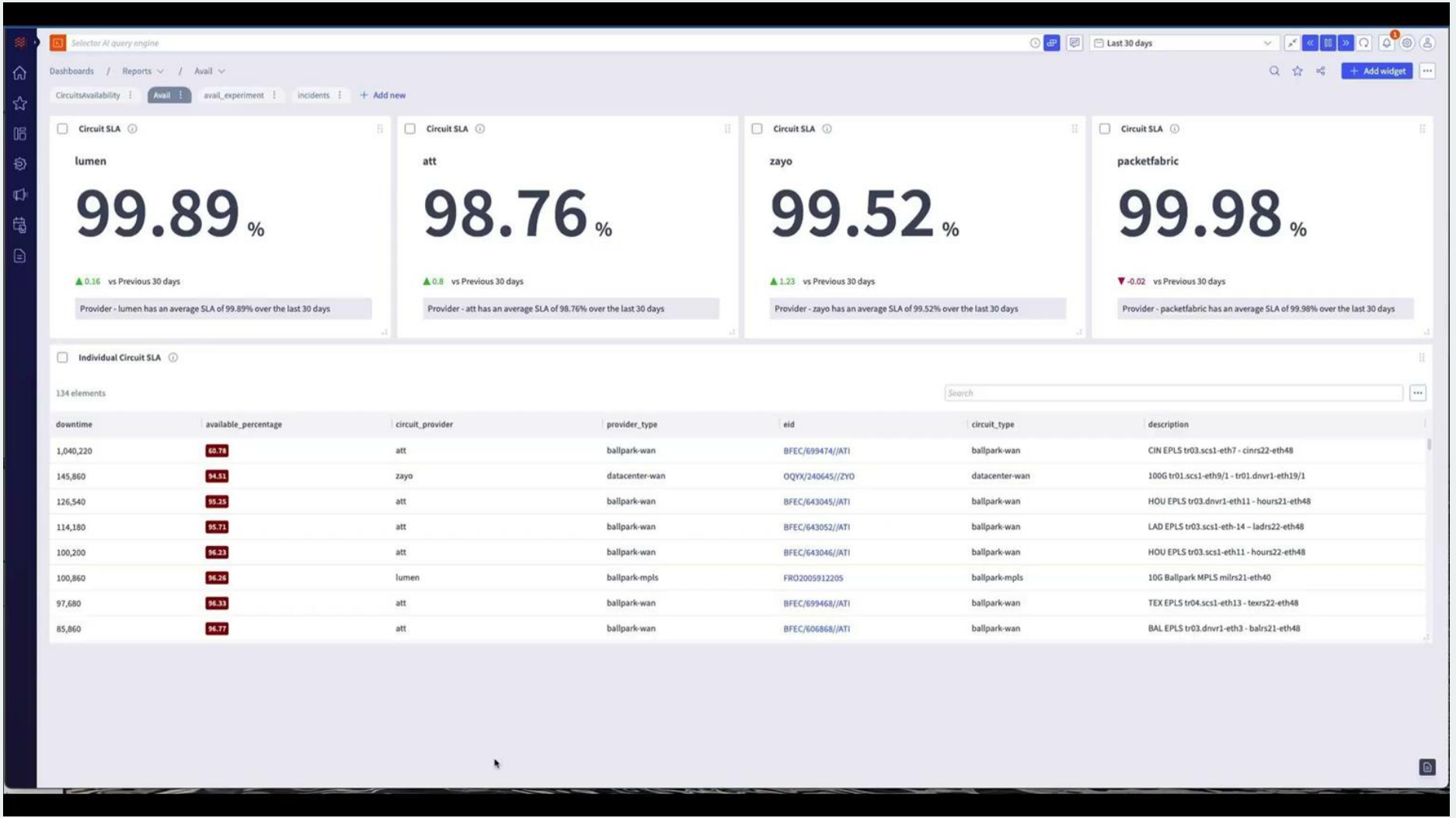

ChatOpsV4
Home
Messages
About
Dashboards
Grafana dashboards for monitoring and alerting.
...
Ballpark
Commands for Ballpark Operations team
schedule
clear-arp
port-status
find-host
bounce-port
ptp-status
mcast-groups
mcast-source
phone-support
cable-test
Corporate IT
Commands for the Office IT team
port-status
find-host
bounce-port
assign-port
IPTV
Commands for the IPTV team
bounce-port
Multimedia Labs
Commands for the Multimedia Team
port-status
bounce-port
assign-port
General Network
General features across all network infrastructure
port-status
device-status
dhcp-host
dhcp-subnet
bounce-port


netbox
Search
jeremy.schulman
Organization
Devices
Connections
Wireless
IPAM
VPN
Virtualization
Circuits
Power
Provisioning
Customization
Operations
Admin
Plugins
Bookmarks
No bookmarks have been added yet.
Organization
Sites 265
Tenants 21
Contacts 0
Welcome!
This is your personal dashboard. Feel free to customize it by rearranging, resizing, or removing widgets. You can also add new widgets using the "add widget" button below. Any changes affect only your dashboard, so feel free to experiment!
IPAM
VRFs 2
Aggregates 0
Prefixes 2
IP Ranges 0
IP Addresses 20992
VLANs 1735
NetBox News
Announcing Four New Standard NetBox Cloud Regions: Sydney, Canada, London, and Frankfurt
Over the first of couple years of NetBox Cloud, we've deployed most instances in our "standard" cloud regions: Virginia, United States and Dublin, Ireland. Adoption of NetBox Cloud has accelerated dramatically in 2024, with thousands of NetBox instances now deployed and serving customers across the globe. In line with the growing demand for NetBox Cloud,...
How to Use Red Hat Ansible Automation Platform to Query and Return Data from NetBox
Exploring the Red Hat Ansible Certified Collection for NetBox Part Four Earlier this year we announced NetBox Labs collaboration with Red Hat to support and certify the hugely popular NetBox Ansible Collection on RedHat Ansible Automation Platform. This blog post is the last in a four-part series that takes a deep dive into the collection and shows how...
Circuits
Providers 23
Circuits 380
Provider Networks 13
Provider Accounts 0
DCIM
Sites 265
Racks 252
Device Types 377
Devices 5465
Cables 8220
Virtualization
Clusters 0
Virtual Machines 0
Change Log
ID Time Username Full Name Action Type Object Request ID
924025 2024-07-24 14:34 kenneth.krafft@MLB.com Kenneth Krafft Created Cable Termination Cable #11532 to rk202rpp-2a-5-3 856ba166-5726-4555-8d3f-64596b3bc640
924024 2024-07-24 14:34 kenneth.krafft@MLB.com Kenneth Krafft Created Cable Termination Cable #11532 to Power Port 1 856ba166-5726-4555-8d3f-64596b3bc640
924023 2024-07-24 14:34 kenneth.krafft@MLB.com Kenneth Krafft Created Cable #11532 856ba166-5726-4555-8d3f-64596b3bc640
924022 2024-07-24 14:31 kenneth.krafft@MLB.com Kenneth Krafft Created Power Feed rk202rpp-2a-5-3 c7293a4a-d177-43b4-b9a5-f31a746346d2
924021 2024-07-24 14:11 kenneth.krafft@MLB.com Kenneth Krafft Created Power Panel rpp-2a-5 f7e8577e-7bbf-4bf0-858b-b170087e7fa8
924020 2024-07-24 13:52 kenneth.krafft@MLB.com Kenneth Krafft Updated Device pdu010203.scs1 (094380) 2952777b-8a47-44d9-83d2-c7ee0a6905d4
924019 2024-07-24 13:48 kenneth.krafft@MLB.com Kenneth Krafft Updated Device webtx-20 5674bff9-eb8d-4f28-89c8-c159504fbe10

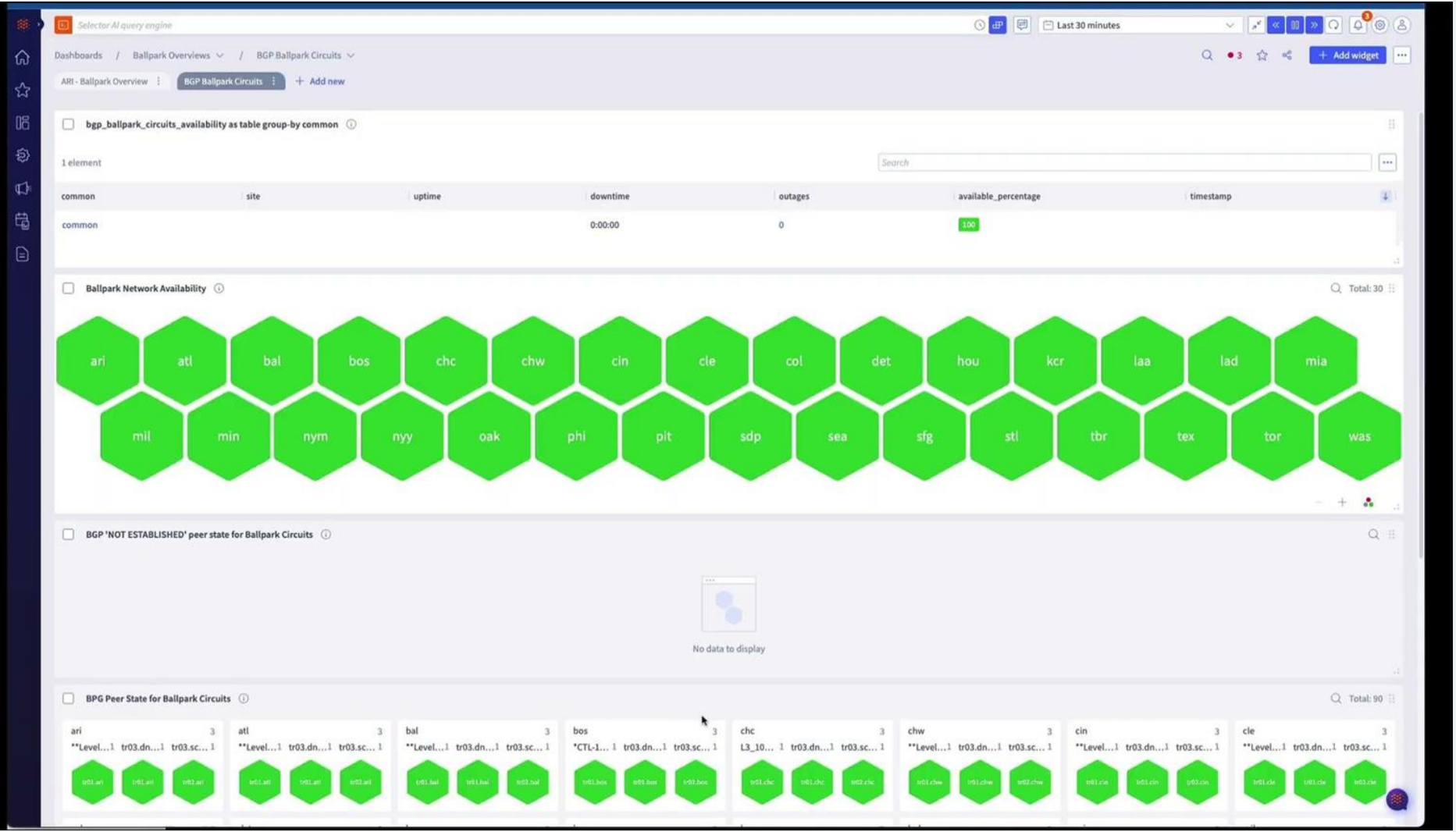
Game Changing Dashboards

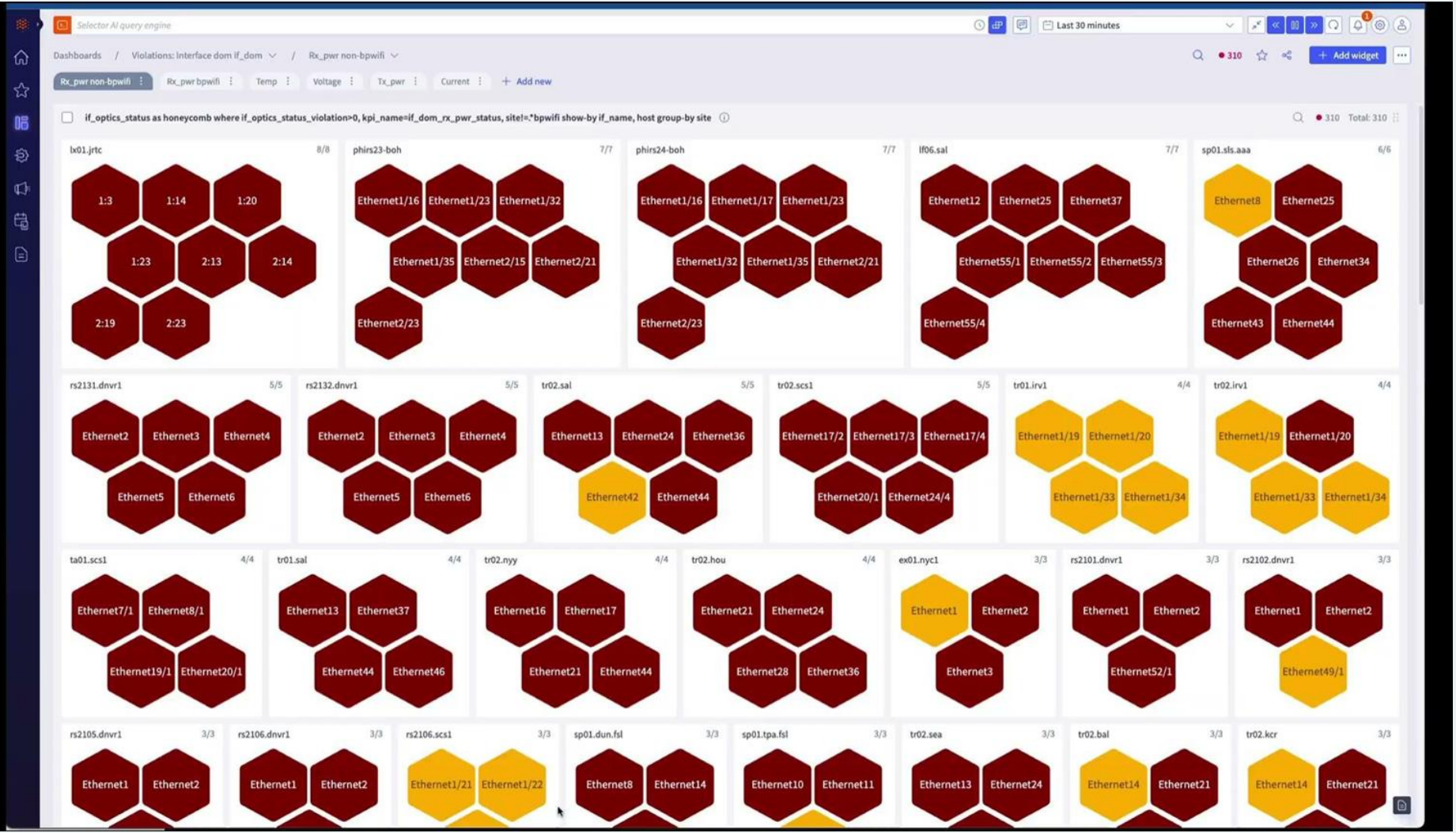
Driving MLB Innovation and Operational Excellence


Selector AI query engine
Last 1 hour
Dashboards / Weekly - Ballparks Overview / Tuesday
Add widget
Tuesday
Wednesday
Thursday
Friday
Saturday
Sunday
MLB Firing Alerts
Bpwifi Firing Alerts
AAA Firing Alerts
Intf Dataops
Facility Monday
Season's Game Schedule
Monday
Add new
Sites-Tuesday
Select
Summary
15 elements
Search
date
day
game_time_et
facility
site
last_run_ts
2024-07-30
Tuesday
2024-07-30 13:10:00 EDT-0400
Comerica Park
det
2024-07-25 03:15:57
2024-07-30
Tuesday
2024-07-30 18:35:00 EDT-0400
Oriole Park at Camden Yards
bal
2024-07-25 03:15:57
Reachability - Green = Online Red = Offline
No data to display
Circuit - Up/down
No data to display
Circuit Interface Status: Rx Pwr, Input Errors, Operation Status. Green = Online Red = Offline
Select Sites-Tuesday for data



downtime	available_percentage	circuit_provider	provider_type	eid	circuit_type	description
1,040,220	60.78	att	ballpark-wan	BFEC/699474//ATI	ballpark-wan	CIN EPLS tr03.scs1-eth7 - cinrs22-eth48
145,860	94.51	zayo	datacenter-wan	OQYX/240645//ZYO	datacenter-wan	100G tr01.scs1-eth9/1 - tr01.dnvr1-eth19/1
126,540	95.25	att	ballpark-wan	BFEC/643045//ATI	ballpark-wan	HOU EPLS tr03.dnvr1-eth11 - hours21-eth48
114,180	95.71	att	ballpark-wan	BFEC/643052//ATI	ballpark-wan	LAD EPLS tr03.scs1-eth-14 – ladrs22-eth48
100,200	96.23	att	ballpark-wan	BFEC/643046//ATI	ballpark-wan	HOU EPLS tr03.scs1-eth11 - hours22-eth48
100,860	96.26	lumen	ballpark-mpls	FRO2005912205	ballpark-mpls	10G Ballpark MPLS milrs21-eth40
97,680	96.33	att	ballpark-wan	BFEC/699468//ATI	ballpark-wan	TEX EPLS tr04.scs1-eth13 - texrs22-eth48
85,860	96.77	att	ballpark-wan	BFEC/606868//ATI	ballpark-wan	BAL EPLS tr03.dnvr1-eth3 - balrs21-eth48


Selector AI query engine
Last 30 minutes
Dashboards / Ballpark Overviews / BGP Ballpark Circuits
Add widget
ARI - Ballpark Overview
BGP Ballpark Circuits
Add new
bgp_ballpark_circuits_availability as table group-by common
1 element
Search
common
site
uptime
downtime
outages
available_percentage
timestamp
common
0:00:00
0
100
Ballpark Network Availability
Total: 30
ari
atl
bal
bos
chc
chw
cin
cle
col
det
hou
kcr
laa
lad
mia
mil
min
nym
nyy
oak
phi
pit
sdp
sea
sfg
stl
tbr
tex
tor
was
BGP 'NOT ESTABLISHED' peer state for Ballpark Circuits
No data to display
BPG Peer State for Ballpark Circuits
Total: 90


Selector AI query engine
Last 30 minutes
Dashboards / Violations: Interface dom if_dom / Rx_pwr non-bpwifi
310
Add widget
Rx_pwr non-bpwifi
Rx_pwr bpwifi
Temp
Voltage
Tx_pwr
Current
Add new
if_optics_status as honeycomb where if_optics_status_violation>0, kpi_name=if_dom_rx_pwr_status, site!=.*bpwifi show-by if_name, host group-by site
310 Total: 310
lx01.jrtc 8/8
1:3 1:14 1:20 1:23 2:13 2:14 2:19 2:23
phirs23-boh 7/7
Ethernet1/16 Ethernet1/23 Ethernet1/32 Ethernet1/35 Ethernet2/15 Ethernet2/21 Ethernet2/23
phirs24-boh 7/7
Ethernet1/16 Ethernet1/17 Ethernet1/23 Ethernet1/32 Ethernet1/35 Ethernet2/21 Ethernet2/23
lf06.sal 7/7
Ethernet12 Ethernet25 Ethernet37 Ethernet55/1 Ethernet55/2 Ethernet55/3 Ethernet55/4
sp01.sls.aaa 6/6
Ethernet8 Ethernet25 Ethernet26 Ethernet34 Ethernet43 Ethernet44
rs2131.dnvr1 5/5
Ethernet2 Ethernet3 Ethernet4 Ethernet5 Ethernet6
rs2132.dnvr1 5/5
Ethernet2 Ethernet3 Ethernet4 Ethernet5 Ethernet6
tr02.sal 5/5
Ethernet13 Ethernet24 Ethernet36 Ethernet42 Ethernet44
tr02.scs1 5/5
Ethernet17/2 Ethernet17/3 Ethernet17/4 Ethernet20/1 Ethernet24/4
tr01.irv1 4/4
Ethernet1/19 Ethernet1/20 Ethernet1/33 Ethernet1/34
tr02.irv1 4/4
Ethernet1/19 Ethernet1/20 Ethernet1/33 Ethernet1/34
ta01.scs1 4/4
Ethernet7/1 Ethernet8/1 Ethernet19/1 Ethernet20/1
tr01.sal 4/4
Ethernet13 Ethernet37 Ethernet44 Ethernet46
tr02.nyy 4/4
Ethernet16 Ethernet17 Ethernet21 Ethernet44
tr02.hou 4/4
Ethernet21 Ethernet24 Ethernet28 Ethernet36
ex01.nyc1 3/3
Ethernet1 Ethernet2 Ethernet3
rs2101.dnvr1 3/3
Ethernet1 Ethernet2 Ethernet52/1
rs2102.dnvr1 3/3
Ethernet1 Ethernet2 Ethernet49/1
rs2105.dnvr1 3/3
Ethernet1 Ethernet2
rs2106.dnvr1 3/3
Ethernet1 Ethernet2
rs2106.scs1 3/3
Ethernet1/21 Ethernet1/22
sp01.dun.fsl 3/3
Ethernet8 Ethernet14
sp01.tpa.fsl 3/3
Ethernet10 Ethernet11
tr02.sea 3/3
Ethernet13 Ethernet24
tr02.bal 3/3
Ethernet14 Ethernet21
tr02.kcr 3/3
Ethernet14 Ethernet21

On the Horizon

- Multicast Tree Observability
- Conversational ChatOps using Google DialogFlow
- Integrating Selector.ai CoPilot with ChatOps

Lessons Learned

- Building an Observability system is complex and requires customization
- Many commercial and open source options to choose from
- Some assembly is required