

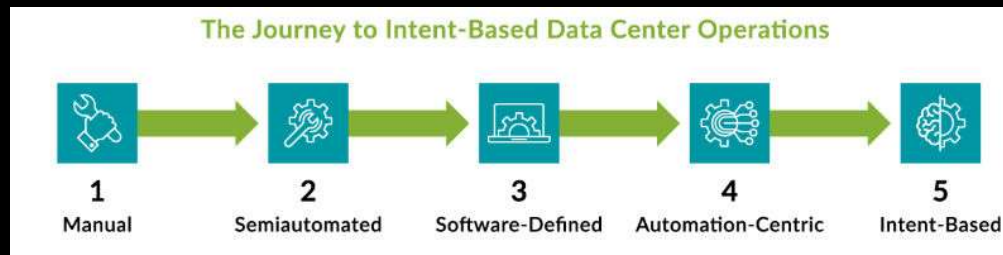
Intent-Based MPLS Router and WAN Provisioning

Matthew Deibel – Southern California Edison
IT Grid Automation Manager

AUTOCON 2

THE NETWORK AUTOMATION CONFERENCE

Intent Based Networking



Manual – CLI, SNMP, and basic and discrete tools

Semiautomated – Scripts and rules-based management

Software-defined – A software abstraction of the network infrastructure

Automation-centric – Automating provisioning, configuration, deployment, and orchestration

Intent-based – Automated actions that keep the network aligned with dynamic business intent

What and Why?

Goal: Have an efficient deployment model for new Nokia MPLS routers and MPLS services that would enable an aggressive refresh schedule without compromising configuration integrity.

Challenges:

- Legacy TDM Transport migrating to MPLS transport
- Aging infrastructure for critical Grid applications
- Brand new deployment model with new pain points

How did we overcome:

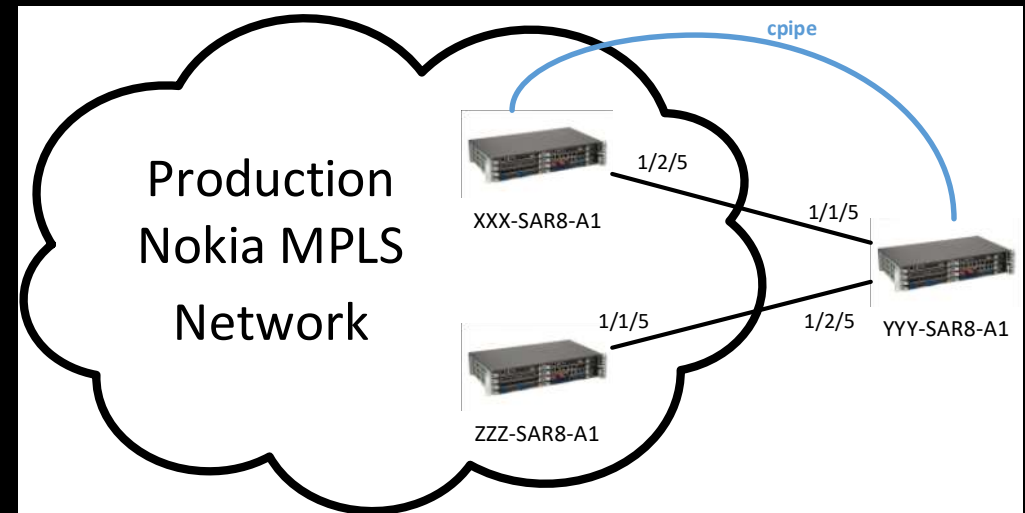
- Highly standardized HLD / LLD
- Internal automation capabilities



A simple use case

Add one router and one service into an existing production network. How would you accomplish this today?

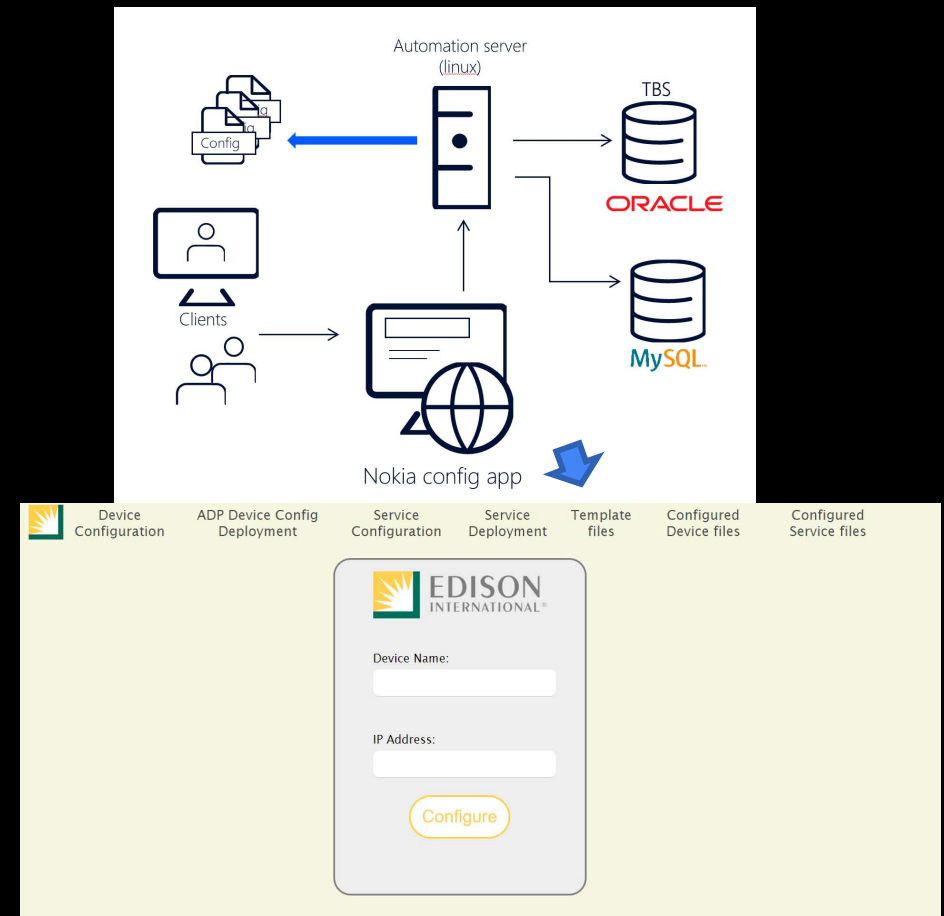
- Who creates the configuration file?
- How do they create it?
- What standards are they following?
- How do you load the configuration onto the device?
- How do you discover the device once in the field?



Device Configuration Automation

How was it built:

- Linux / docker container
- Web app developed using React/Python
- Oracle Metasolv (TBS) – Planning tool database for configuration data
- MySQL – Application database



Step 1: Equipment Info

*** READ ONLY *** Equipment - NOKIA, 3HE06791BA, 0 (Issue 1) - 7705 SAR-8 (CONF COA) (ACCESS ROUTER 7705) (ELL... ? X

Equipment Configuration Mounting Positions Port Addresses Options Software Links Custom Attributes

Type: SHELF-MPLS

Spec: NOKIA, 3HE06791BA, 0 (Issue 1) - 7705 SAR-8 (CONF COA) (ACCESS ROUTER 7705)

Net Loc (Bldg / Room): CLL#### SUBSTATION ABC

Net Loc (Equipment):

Network Element Name: XXX-SAR8-A1 Unit Number: Unit Extension:

Name Alias: Status: Installed

Node Address: Mainframe Location:

31 XXX-SAR8-A1 7705 SAR-8 (CONF COA) NOKIA 3HE06791BA

- CSM SLOT A-3101 CSM V2 NOKIA 3HE02774AB
- CSM SLOT B-3102 CSM V2 NOKIA 3HE02774AB
- MDA SLOT 1-3103 6X ETH 10G NOKIA 3HE07943AA
 - SFP-MDA01 SFP 1G EX NOKIA 3HE00867CA To (Under Construction 2/21/2023)
 - SFP-MDA02 SFP 1G EX NOKIA 3HE00867CA To (Under Construction 2/21/2023)
 - SFP-MDA03 SFP 1G EX NOKIA 3HE00867CA To (Under Construction 2/21/2023)
 - SFP-MDA04 <1Gb>
 - SFP+MDA05 SFP+10G ER NOKIA 3HE09328AA
 - SLOT 1-PORT 5 (10GB-In Service), 101 /ETH10G/ (In Service)
 - SFP+MDA06 SFP+10G SR NOKIA 3HE09326AA
 - SLOT 1-PORT 6 (10GB-In Service), 101 /ETH10G/ (In Service)
- MDA SLOT 2-3104 6X ETH 10G NOKIA 3HE07943AA
 - SFP-MDA01 <1Gb>
 - SFP-MDA02 <1Gb>
 - SFP-MDA03 <1Gb>
 - SFP-MDA04 <1Gb>
 - SFP+MDA05 SFP+10G ZR NOKIA 3HE09329AA (Under Construction 4/30/2023)
 - SLOT 2-PORT 5 (10GB-In Service), 101 /ETH10G/ (In Service)
 - SFP+MDA06 <10Gb>
- MDA SLOT 3-3105 <Adapter Module>
- MDA SLOT 4-3106 6X E&M NOKIA 3HE03126AA
- MDA SLOT 5-3107 8X V&T NOKIA 3HE06006AA
- MDA SLOT 6-3108 8X C37.94 NOKIA 3HE12504AA
- 3109 FAN/ALARM NOKIA 3HE06792EA
- 30 <occupied>

Config template

```
/configure system
name "XXX-SAR8-A1"
location "SUBSTATION ABC"
cli "CLL####"
load-balancing
  lsr-load-balancing lbl-ip
  system-ip-load-balancing
exit
.....

/configure
card 1
card-type iom-sar
no shutdown
exit

/configure card 1
mda 1
mda-type a6-eth-10G
fabric-stats-enabled
network
  ingress
    fabric-policy 100 #10G Policy
specific to this mda-type
queue-policy "SCE:High-Speed" # See
QOS Section.
exit
exit
access
  ingress
    fabric-policy 100
exit
exit
no shutdown
exit
.....
```

Step 2: WAN Provisioning

Port/Interface/ISIS/MPLS/RSVP Configuration Template

ONLY *** View Connection Design 101 /ETH10G/CLLI1111 /CLLI2222 Issue 5 (Order: N183799)

Equip	N LOCN	EQPT TYPE/ FACDESG	RELAY RACK/	UNIT/	SV Z-A	A-Z	INC MI	MISC
Equip	CLLI11111	7705 SAR-8 (CONF COA)	3HE06791BA	B3	31			XXX-SAR8-A1
		6X ETH 10G	3HE07943AA	B3	03			
		SFP+10G ER	3HE09329AA	B3	05			SLOT 1-PORT 5
Equip	CLLI11111							
Pair								
Pair								
Pair								
Pair								
Pair								
Pair								
Equip	CLLI22222	7705 SAR-8 (CONF COA)	3HE06791BA	A2	15			YYY-SAR8-A1
		6X ETH 10G	3HE07943AA	A2	03			
		SFP+10G ER	3HE09329AA	A2	05			SLOT 1-PORT 5
Equip	CLLI22222							

```
#Gbe network ports (ethernet ports)

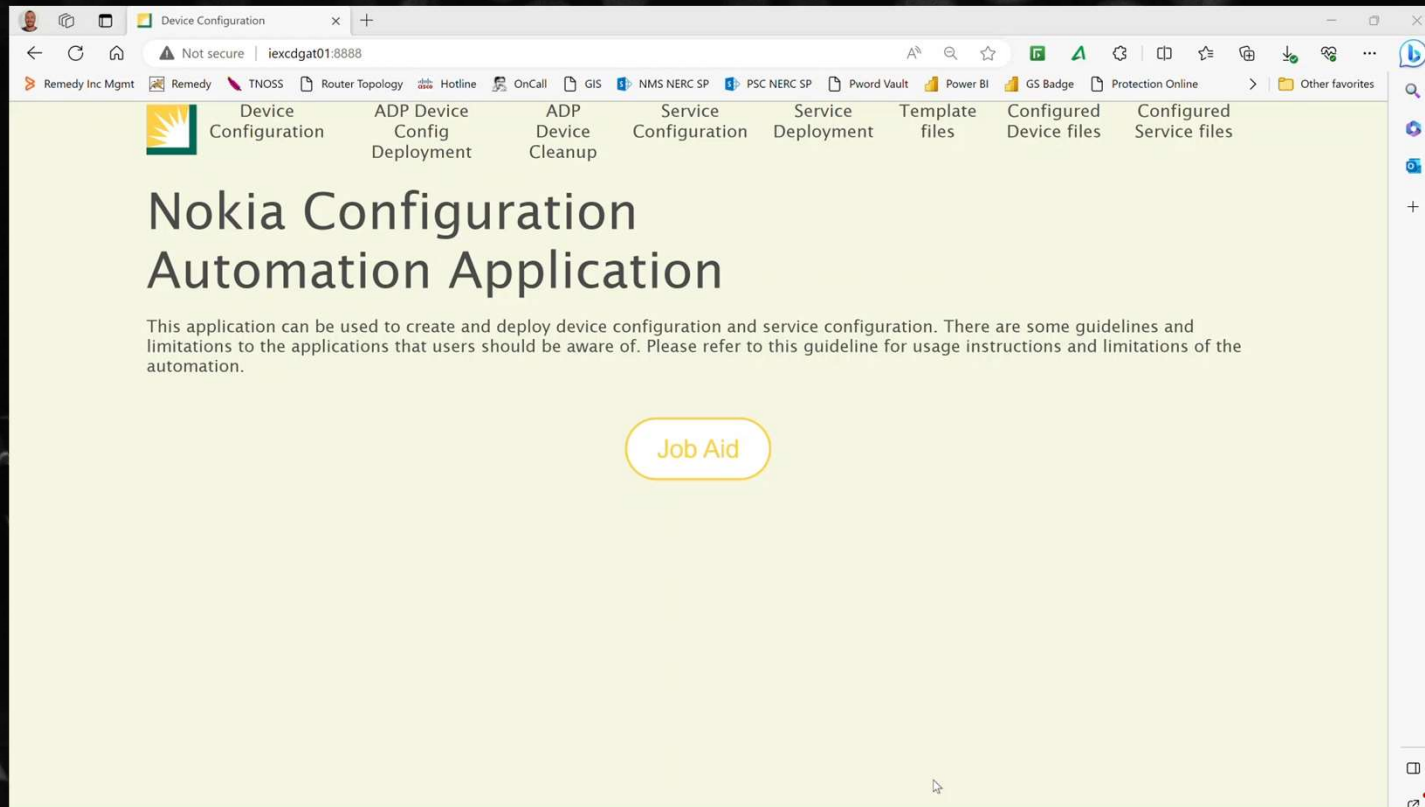
/configure port 1/1/5
shutdown
description "101 /ETH10G/CLLI1111 /CLLI2222"
ethernet
mode network
.....

/configure router interface "XXX-SAR8-A-1/1/5"
description "10G-To: "XXX-SAR8-A-1/1/5"
address <###.###.###.###>/30
gos 2
bfd 30 receive 30 multiplier 3 type np
no shutdown
exit all

/configure router if-attribute
srlg-group "YYY-to-XXX" value "168001001"

/configure router
isis
interface "XXX-SAR8-A-1/1/5"
level-capability level-1
no shutdown
exit
no shutdown
exit

/configure router
mpls
resignal-timer 30
interface "XXX-SAR8-A-1/1/5"
no shutdown
exit
no shutdown
exit
```

The screenshot shows a web browser window with the title "Device Configuration". The address bar shows "Not secure | iexcdgat01:8888". The browser's toolbar includes various icons for navigation and extensions. Below the toolbar, there is a navigation menu with the following items: "Device Configuration", "ADP Device Config Deployment", "ADP Device Cleanup", "Service Configuration", "Service Deployment", "Template files", "Configured Device files", and "Configured Service files". The main content area has a yellow background and features the title "Nokia Configuration Automation Application". Below the title, there is a paragraph of text: "This application can be used to create and deploy device configuration and service configuration. There are some guidelines and limitations to the applications that users should be aware of. Please refer to this guideline for usage instructions and limitations of the automation." At the bottom center of the main content area, there is a yellow button labeled "Job Aid".

Device Configuration

ADP Device Config Deployment

ADP Device Cleanup

Service Configuration

Service Deployment

Template files

Configured Device files

Configured Service files

Nokia Configuration Automation Application

This application can be used to create and deploy device configuration and service configuration. There are some guidelines and limitations to the applications that users should be aware of. Please refer to this guideline for usage instructions and limitations of the automation.

[Job Aid](#)



Device
Configuration

ADP Device
Config
Deployment

ADP
Device
Cleanup

Service
Configuration

Service
Deployment

Template
files

Configured
Device files

Configured
Service files

Q ELL-SAR8-A1

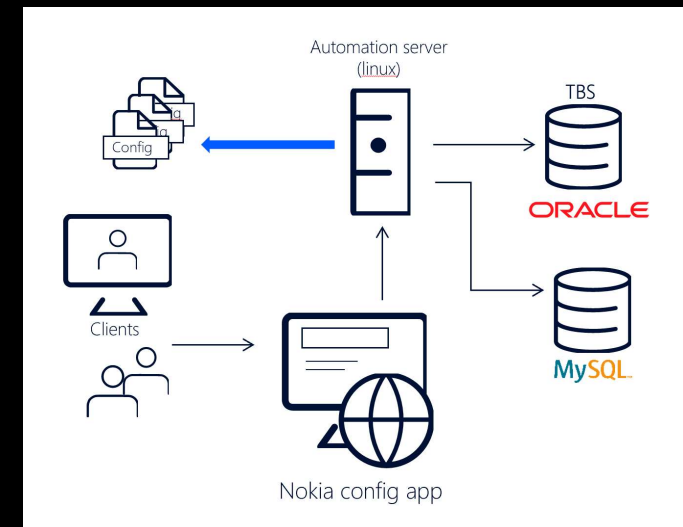
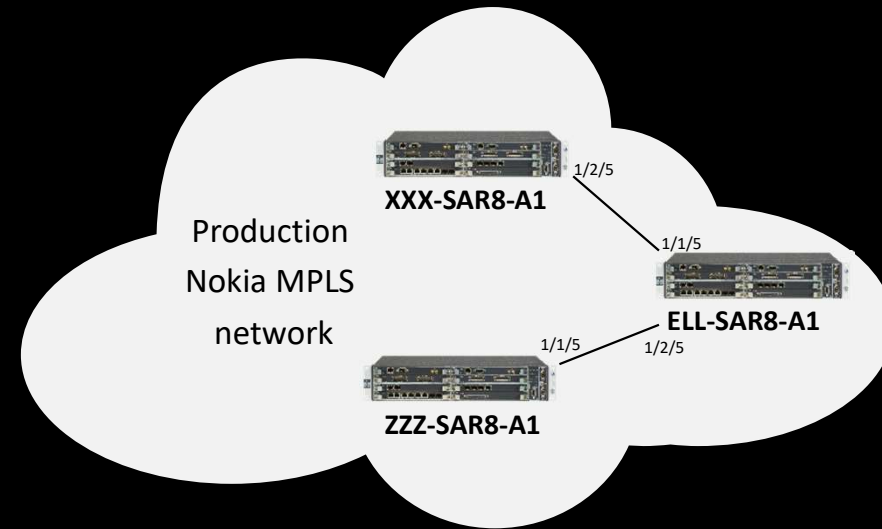
File Name	Created date	Download
XXX-SAR8-A1_FarEnd_Ports_to_ELL-SAR8-A1	08/14/2023 09:27PM	↓
ZZZ-SAR8-A1_FarEnd_Ports_to_ELL-SAR8-A1	08/14/2023 09:27PM	↓
ELL-SAR8-A1	08/14/2023 09:27PM	↓

Process Improvements

The screenshot shows a web interface for Edison International. At the top, there are seven tabs: 'Device Configuration', 'ADP Device Config Deployment', 'Service Configuration', 'Service Deployment', 'Template files', 'Configured Device files', and 'Configured Service files'. The 'Device Configuration' tab is active. Below the tabs, there is a form with the Edison International logo. The form contains the following fields and elements:

- Device Name:** A text input field containing 'ELL-SAR8-A1'.
- IP Address:** An empty text input field.
- Configure:** A yellow button with the text 'Configure'.

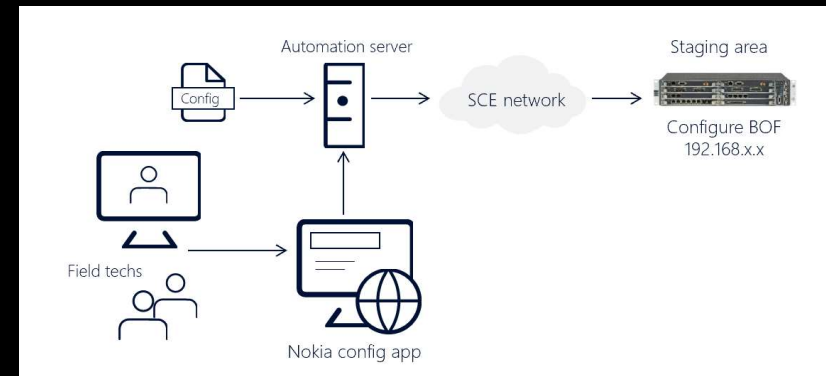
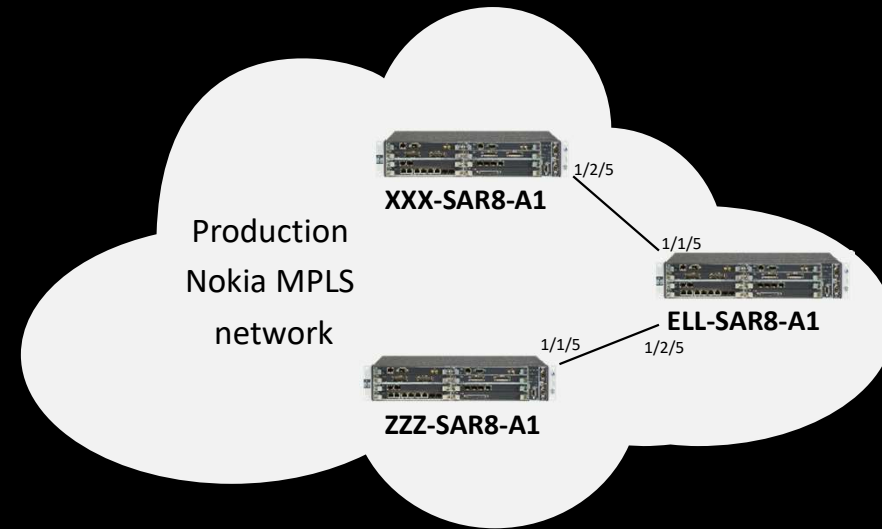
- Engineer completes planning and design in TBS
- Engineer goes to front-end web page
- Engineer enters device name, leaves IP blank, and selects configure
- Engineer receives device configuration file and reviews for issues before submitting installation job package



Process Improvements

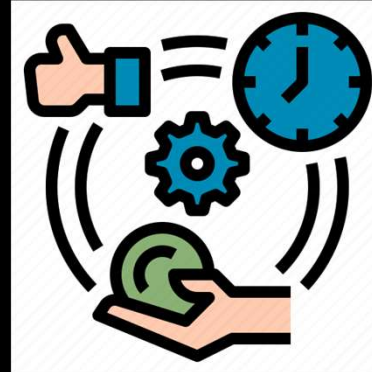
The screenshot shows a web-based configuration interface for Edison International. The top navigation bar includes tabs for Device Configuration, ADP Device Config Deployment, Service Configuration, Service Deployment, Template files, Configured Device files, and Configured Service files. The main content area displays the Edison International logo and a configuration form for a device named 'ELL-SAR8-A1'. The IP Address is set to '192.168.X.X'. A 'Configure' button is visible at the bottom of the form.

- Tech self-service staging and configuration deployment
- Tech performs physical installation of router in field
- Centralized configuration team (NOC) applies config to upstream routers and device comes online
- NOC uses NSP to complete operational readiness tasks



Annual
Savings:
\$1,800,000

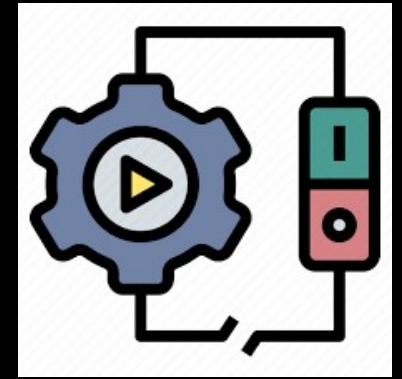
Process
Efficiency



Improved Employee
Morale and Engagement



Data Quality
No Misconfigurations

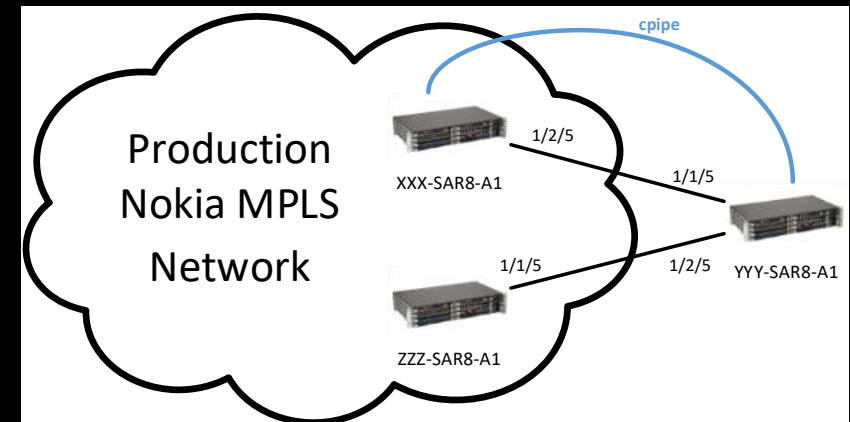
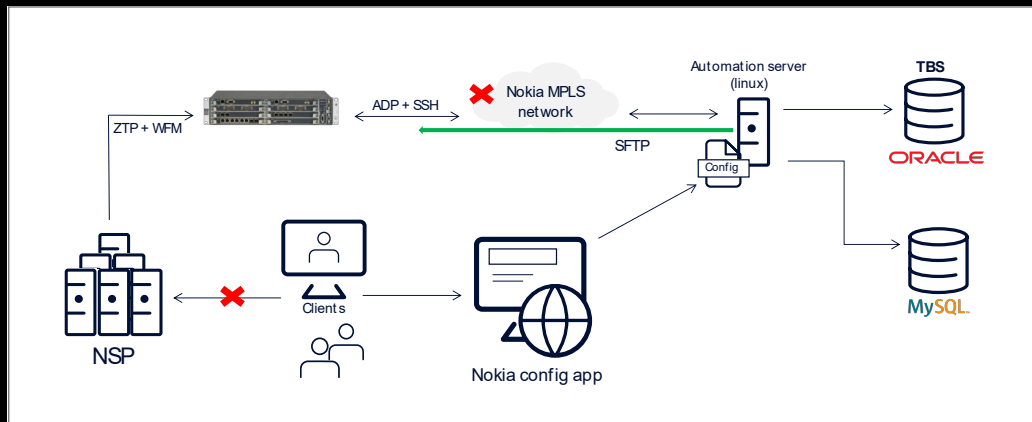


Organizational
Enablement



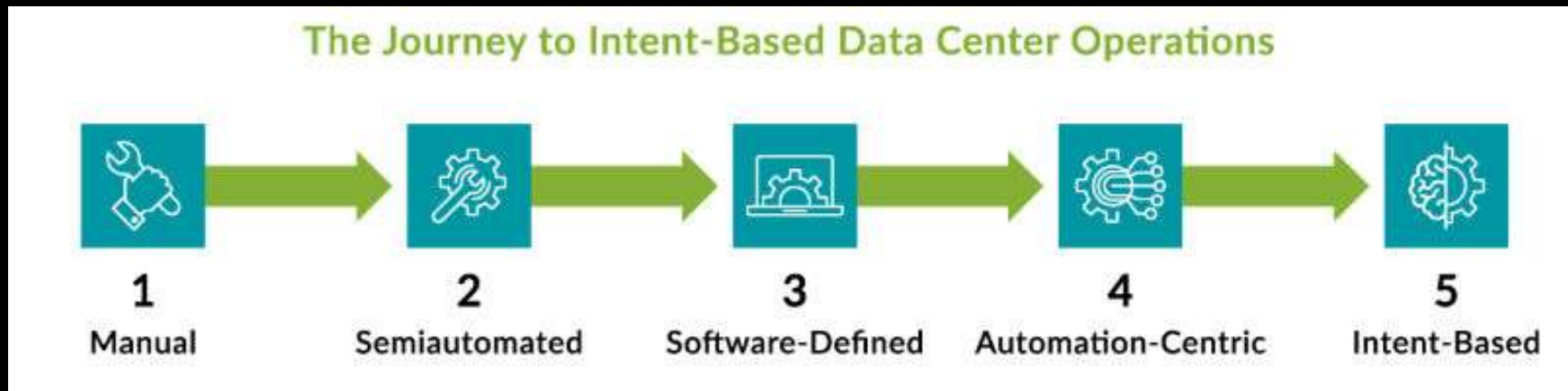
Additional Automation and Next Steps

- MPLS Service Configuration Automation
- Zero Touch Provisioning using ADP
- Test Automation
- Intential Workflow Orchestration
- AIOps / Observability + GenAI (Project Orca)



Key Takeaways

- Network Automation is a journey
- Invest in organizational competencies and culture





Questions?