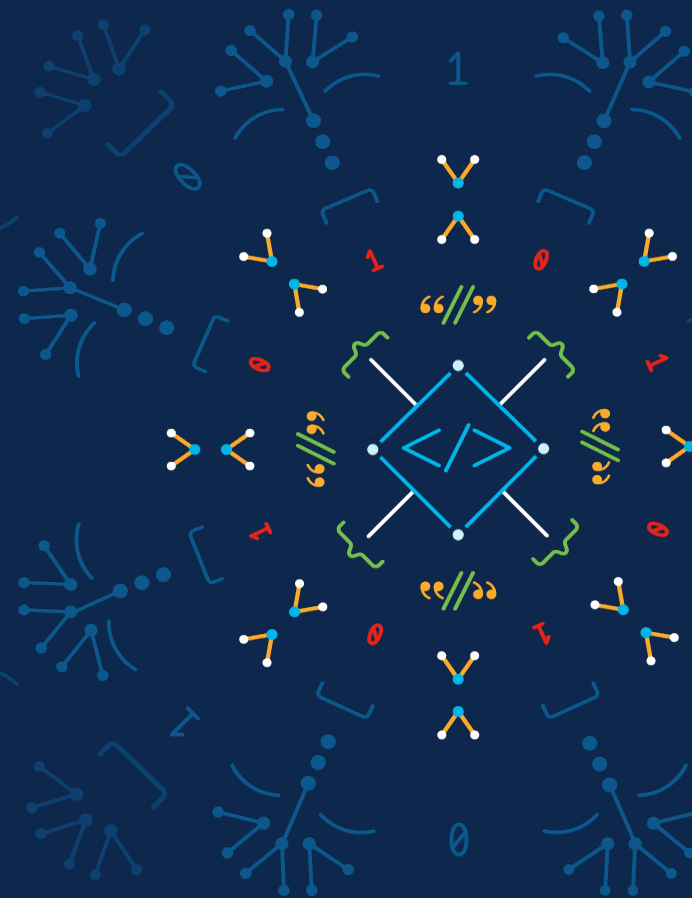


# CNC – Support Brownfield Services

Custom Services Visualization

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MIG A Crosswork TME  
05/11/2022

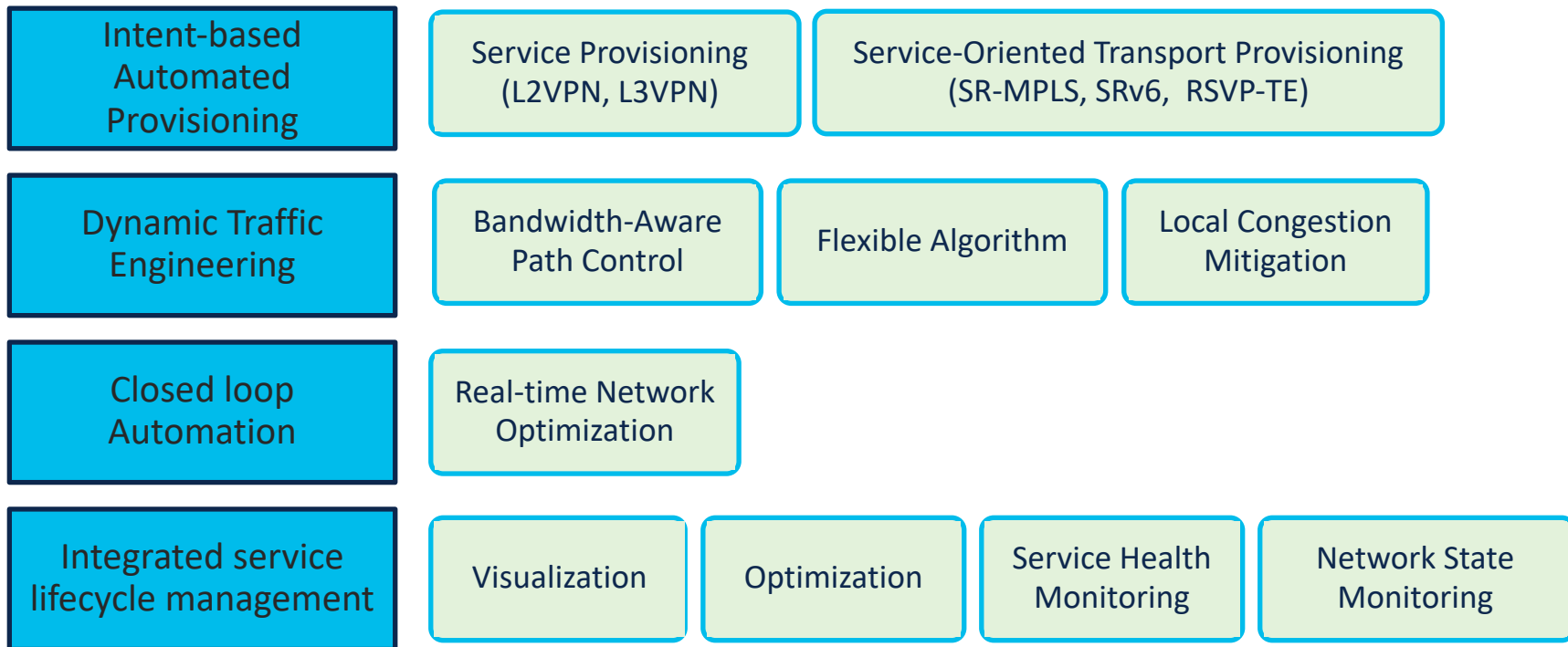


# Session Overview

- Overview of CNC & extension areas
- Greenfield vs Brownfield deployment
- What is needed for NSO to CNC integration
- Example L3VPN based walk through of integrating with CNC
  - NSO example MPLS L3vpn (Not the TSDN Example)
  - Adding NSO Plan and Notification to non-nano based services
  - Enhance CAT SDK for Visualizing VPN services on CNC .

# Crosswork Network Controller (CNC)

Automation solution for Deploying and Operating IP Transport networks



# CNC Core Functions

VPN Provisioning  
Traffic Engineering  
Telemetry Collection  
Visualization

## Configuration functionality

- TSDN CFP for SR-TE
- Example FP for L2/L3 VPN
- Example FP for RSVP-TE

Validated against recent combinations of IOS-XR/XE & specific hardware platforms

- Includes device collection / telemetry using SNMP
- SR-PCE validation on
  - XR versions for PCE
  - XR/XE versions for PCC

Support matrix published with release documentation.

# CNC Optional Packages

- Service health (Pre-release with CNC3.0)
  - Service Assurance for Example L2/L3VPN
- Change Automation
  - Maintenance automation
- Health Insights
  - KPI monitoring
- ZTP – Zero touch provisioning

# CNC VPN Provisioning and Service view

# CNC – Designed to be Easily Extensible



Service Model extensions to extend  
Example VPN functionality

includes NBI extensions (from I2/I3nm ietf drafts shipped)



Use of pre-existing VPN Service Model functionality and integrating with CNC (brownfield NSO package)



Adding new device types (multi-vendor)



Extending Service Health functionality

# A good understanding of the network is essential



Routing technologies, platforms, services and operations



Lab Validation of deployment the combination of hardware/software/features and integration with automation



Cisco professional services (CX) provides support and training.



# Deploying CNC Greenfield or Brownfield

**Greenfield CNC** – New CNC with New NSO. Extend examples shipped with CNC in the TSDN NSO package.

Note: **Greenfield network** – no services deployed.

**Introduce CNC + new NSO in existing network** – Network devices have service configurations. Follow NSO config reconciliation steps for NSO insertion to create the service state in NSO using TSDN Function Pack.

**Introduce CNC on top of existing NSO** – CNC being added on top of existing NSO deployment with services deployed.

CNC support for “brownfield or pre-existing” NSO packages requires that such existing NSO packages support plan and notifications that are needed for CNC to work. This is the focus of this session – we call this **Brownfield CNC**.

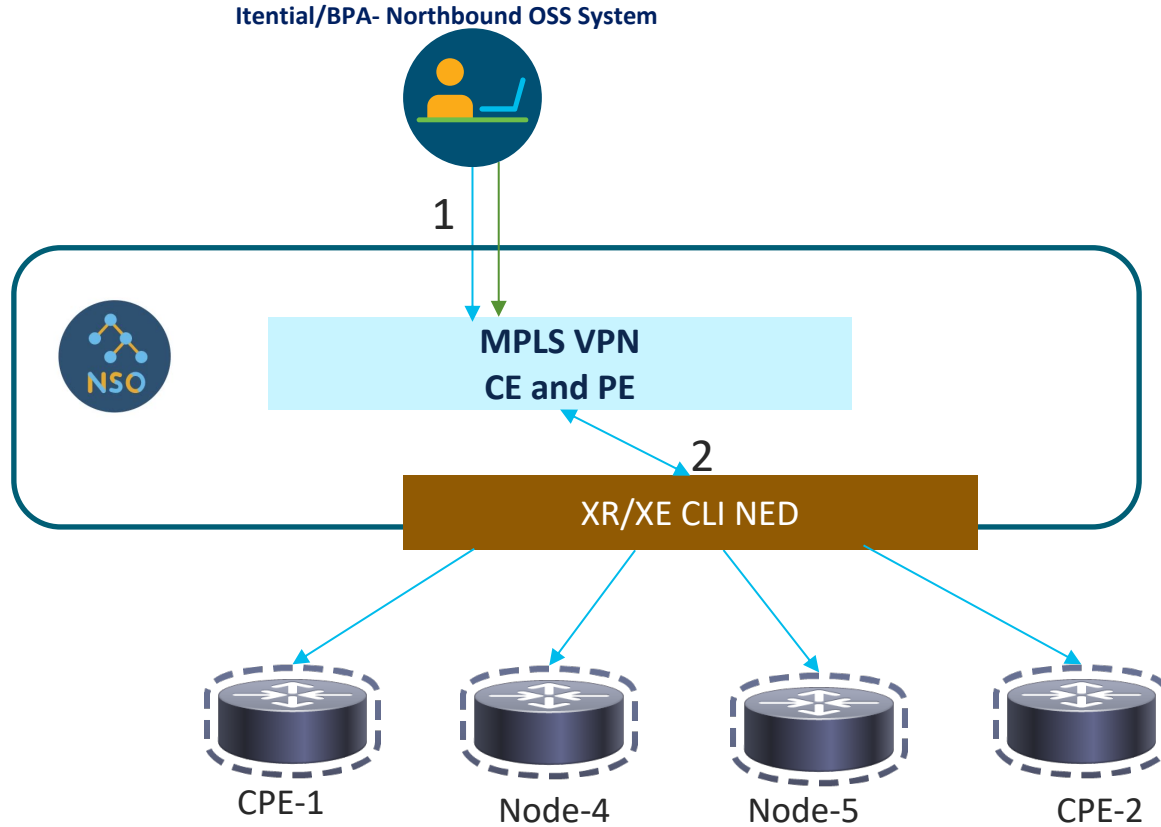
FOCUS

Helps current NSO users to migrate to integrated controller solution that provides visualization, Traffic Engineering support and additional capabilities such as service assurance.

# CNC Brownfield Service – Asks

- Provisioning VPN Services: Business as Usual ( CRUD )
- Visualize VPN Services
- Extend CNC Functionality

# NSO MPLS VPN Service



# CNC-NSO Brownfield Service

# What is needed for existing NSO VPN services to integrate with CNC

- Service Plan Data ( Life Cycle )
- Notifications ( State Change )

# NSO VPN Service

## Legacy VPN Service created on NSO without plan and notifications

```
admin@ncs(config)# show full-configuration vpn l3vpn
```

### **vpn l3vpn volvo**

```
route-distinguisher 888
```

```
vrf-export-policy SET_COLORv4_VPN-101-ROUTE-POLICY
```

#### endpoint main

```
ce-device cpe-2.cisco.com
```

```
pe-device Node-4
```

```
ce-interface GigabitEthernet0
```

```
ip-network 1.1.1.0/24
```

```
bandwidth 10000
```

```
as-number 65003
```

```
!
```

#### endpoint branch

```
ce-device cpe-1
```

```
pe-device Node-5
```

```
ce-interface GigabitEthernet0
```

```
ip-network 1.1.2.0/24
```

```
bandwidth 10000
```

```
as-number 65003
```

```
!
```

Plan and Notification not generated for VPN Service

# External Plan Package Overview

- Attach Plan to existing NSO Legacy services.
- No modifications needed on current NSO Service packages
- Define Plan Structure between plan and service config.
- *\*\*Note: Recommendation is to move towards nano based services*

# Boot Strap – Plan Outline with Path.

**external-plan plan-outline /l3vpn:vpn/l3vpn:l3vpn --> service xpath**

**service-keys [ name ]** → service keys refers to "kind": "key",

**plan-path /l3vpn:vpn/l3vpn:l3vpn-plan** → attach to legacy NSO VPN Service

## **component self**

name self  
state init  
!  
state ready  
!  
!

## **component l3vpn-endpoint-ce**

depends-on l3vpn:endpoint/l3vpn:ce-device  
!  
state init  
!  
state ready  
!  
!  
!

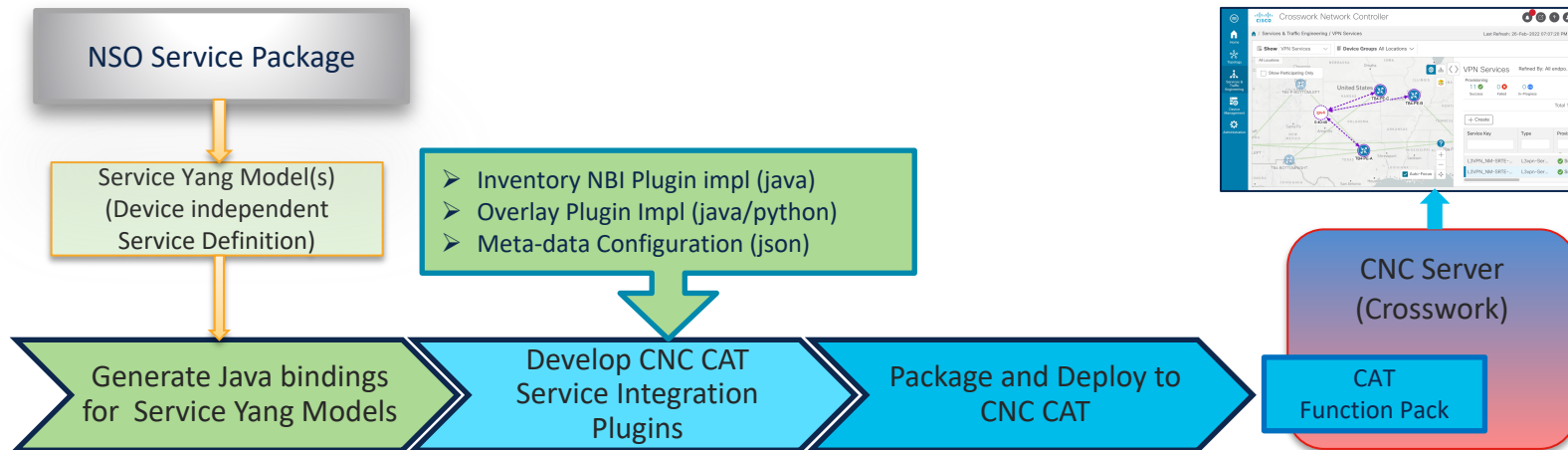
## **component l3vpn-endpoint-pe**

depends-on l3vpn:endpoint/l3vpn:pe-device  
!  
state init  
!  
state ready  
!  
!  
!



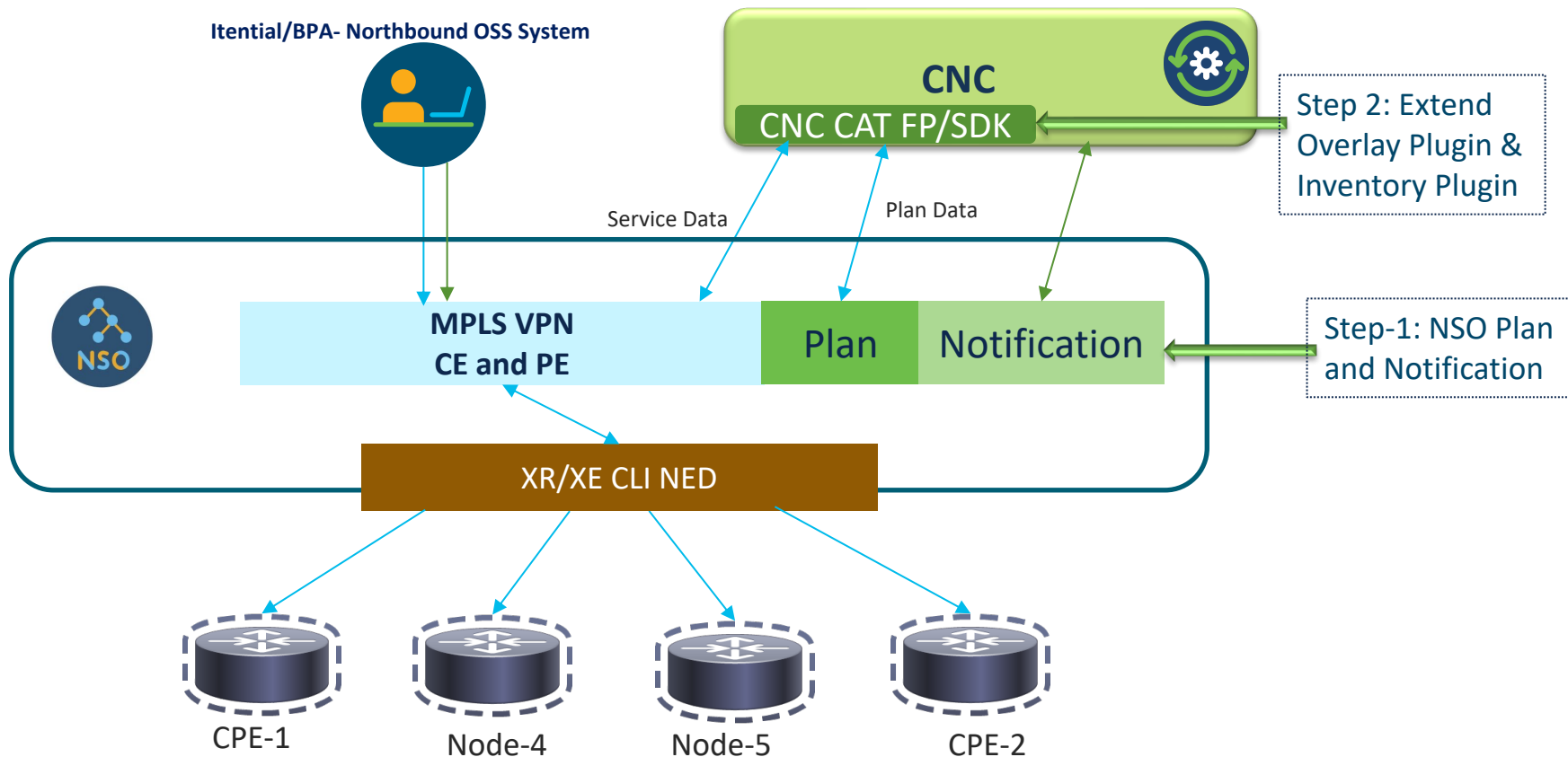
# Extending Visualization to work with NSO yang model changes

# CAT Function Pack Development Workflow – High level



1. Start with service definition yang models from NSO Service
2. Use SDK to create project and develop CAT function pack plugins for the service models
3. Deploy CAT function pack to CAT application

# CNC Brownfield Service – Visualization & Provisioning



# CNC Demo of Brownfield VPN package

# Demo Steps

- View NSO Service and CNC
- Bootstrap and Re-Deploy Service
- Visualize Service on CNC
- Update Service from existing NB –adding new Node

# Key Takeaways

- CNC VPN Services can be extended, work involved in components : NSO and CAT (Visualization)
- CNC can be integrated on top of an existing NSO (Brownfield)
- Cisco Professional Services (CX) can help you

# References

- NSO Packages

<https://github.com/sujmurth/CNC-TME/tree/main/3.0-NSO-VPN-SDK>

- Crosswork Network Controller Product Documentation

<https://www.cisco.com/c/en/us/support/cloud-systems-management/crosswork-network-controller/model.html>

- CAT SDK Customization:

- Please reach out to [cnc-request@cisco.com](mailto:cnc-request@cisco.com) for more details.



The bridge to possible