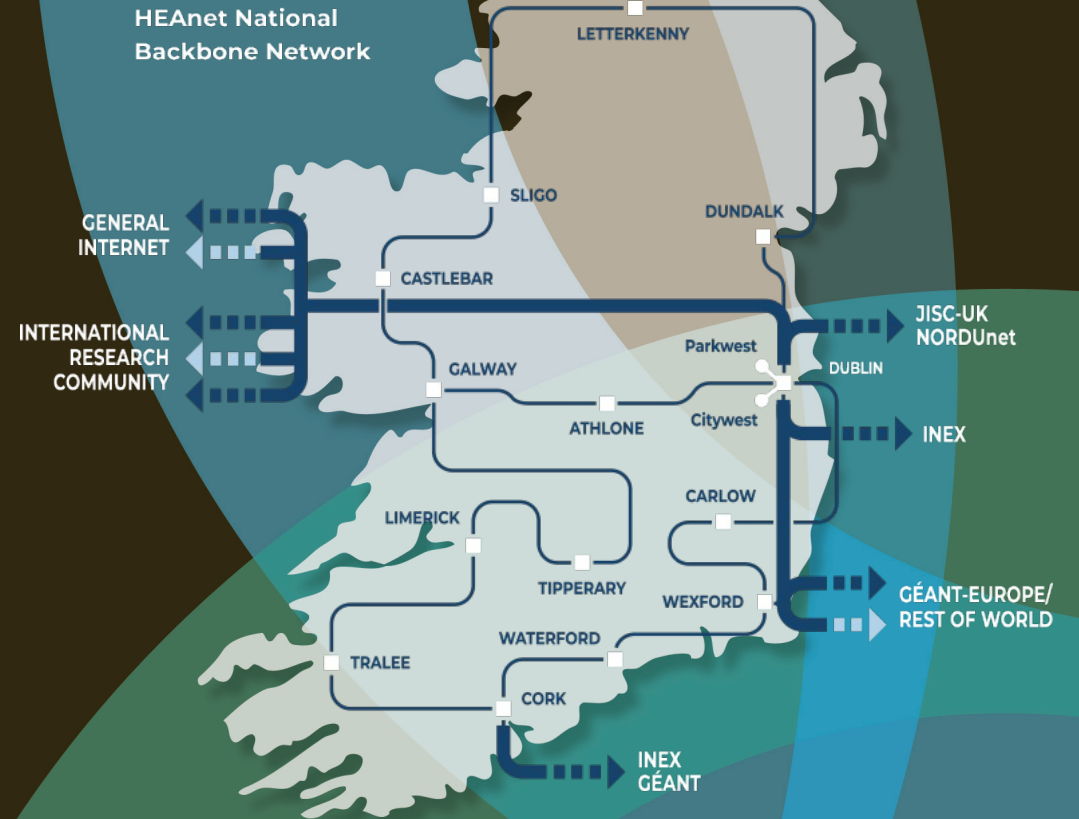




Using WFO with LSO and Ansible



Workflow Orchestrator



Agenda

Where we've come from

Where we are

Demo

Who?

IR&D:

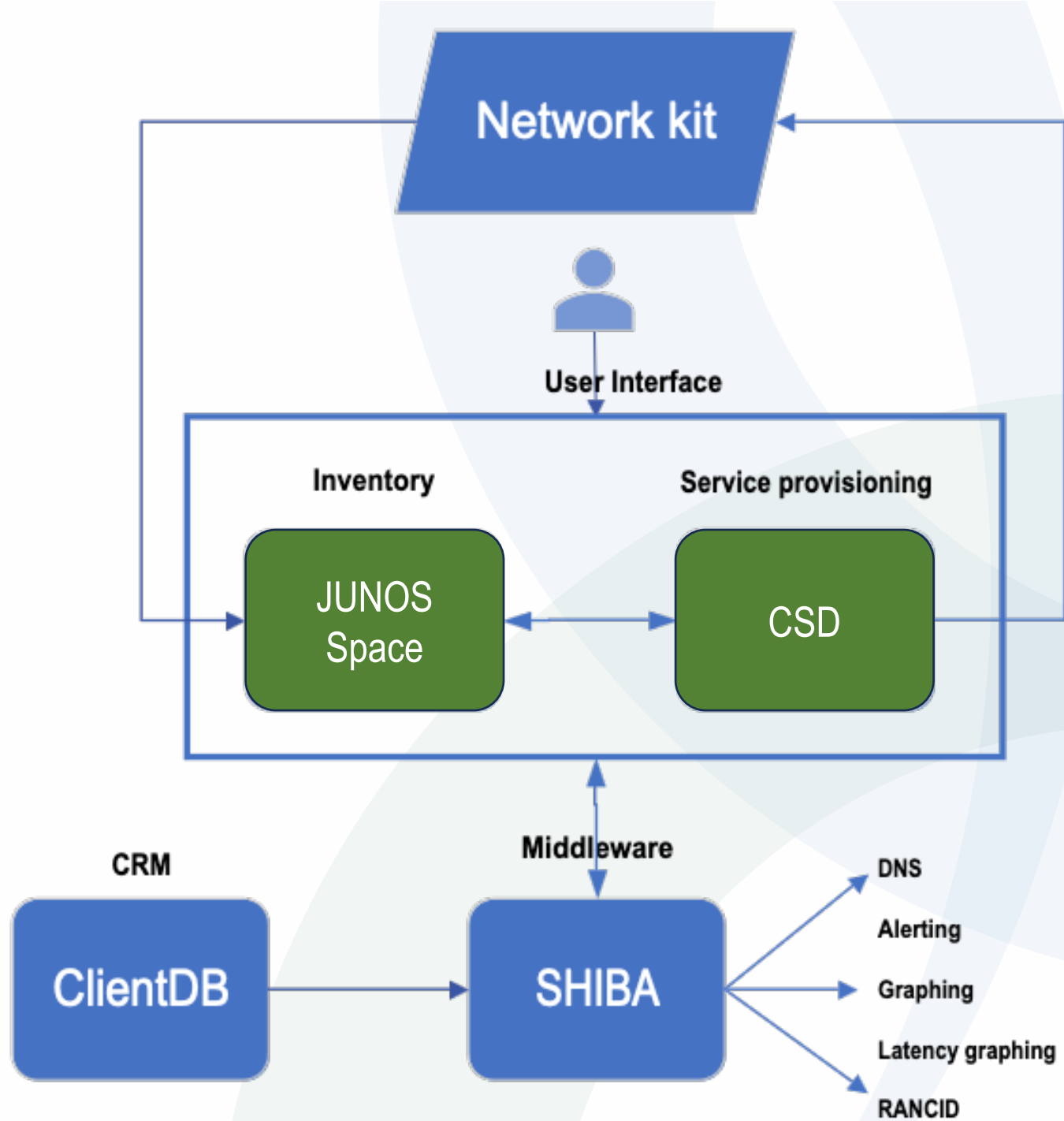
Andy Byrne (PM)
Donal Cunningham

Networks:

Garwin Liu
Mick O'Donovan

Architecture:

Anna Wilson
Brian McArdle
Erick Lopez



Where it all went wrong...

Junos Space Connectivity Services Director Dates & Milestones

Support

Downloads

Knowledge Base

Juniper Support Portal

Community

The following Junos Space Connectivity Services Director hardware products have all been announced as End of Life (EOL). The End of Support (EOS) milestone dates for the five (5) year support model are published below.

quired).

6connect ProVision – © 2024 v6.1.1 – (HEAnet)



IPAM Admin ▾

VLAN Admin ▾

Data Import

Users

This product is licensed to **noc@heanet.ie** and expires in 660 days.

A new version is available: 8.1.0. [Upgrade now.](#)



Interim solution

SHIBA

Ansible CLI / AWX
YAML

JunOS SPACE

6connect IPAM

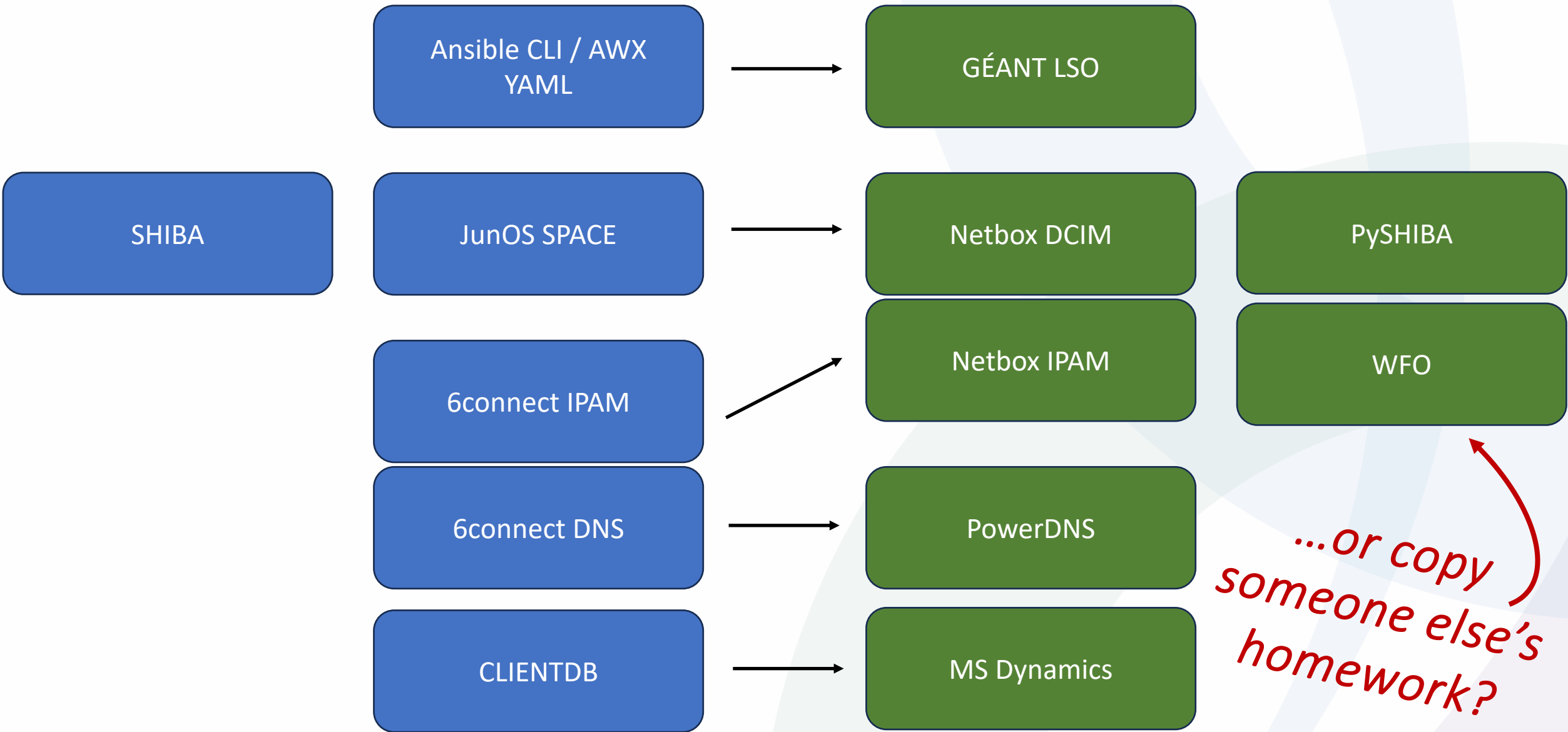
6connect DNS

Provision services

Still working... sorta?



Future solution





Workflow Orchestrator


```

@create_workflow("Create L2vpnPP", initial_input_form=initial_input_form_generator)
def create_l2vpn_pp() -> StepList:
    return (
        begin
        >> construct_l2vpn_model
        >> store_process_subscription(Target.CREATE)
        >> ims_create_l2vpn
        >> ims_create_l2vpn
        # >> ims_up
        >> ims_create_l2vpn
        >> lso.indicator
        >> lso.indicator
        >> create_interface
        >> create_subscription
        >> set_status
    )

```

```

@step("Create L2VPN terminations in Netbox")
def ims_create_l2vpn_terminations(subscription: L2vpnPPPProvisioning) -> State:
    payloads = []
    l2vpn = netbox.get_l2vpn(id=subscription.virtual_circuit.ims_id)
    for sap in subscription.virtual_circuit.saps:
        subint_ims_id = netbox.get_interface(
            name=f"{sap.port.port_name}.0", device=sap.port.node.node_name

```

```

def _call_ansible_playbook(
    subscription: L2vpnPPPProvisioning,
    callback_route: str,
    *,
    dry_run: bool,
    commit_changes: bool,
) -> None:
    port_A = subscription.virtual_circuit.saps[0].port
    port_B = subscription.virtual_circuit.saps[1].port

    inventory = f"{port_A.node.node_name}.nn.he.net\n{port_B.node.node_name}.nn.he.net"
    extra_vars = {
        "vc_id": subscription.virtual_circuit.vc_id,
        "interface_description": f"(UN) {title(subscription)} vpn/l2vpns/{subscription.virtual_circuit.ims_id}",
        "SiteA": f"{port_A.node.node_name}.nn.he.net",
        "interfaceA": port_A.port_name,
        "p2p_endpointB": f"{port_A.node.node_name}.nn.he.net",
        "SiteB": f"{port_B.node.node_name}.nn.he.net",
        "interfaceB": port_B.port_name,
        "p2p_endpointA": f"{port_B.node.node_name}.nn.he.net",
        "ansible_ssh_user": "{{ lookup('env', 'ANSIBLE_SSH_USER') }}",
        "ansible_ssh_pass": "{{ lookup('env', 'ANSIBLE_SSH_PASS') }}",
        "ansible_network_os": "junos",
        "host_key_checking": False,
        "dry_run": dry_run,
        "commit_changes": commit_changes,
        "verb": "deploy",
    }

```

loads}



Lightweight service orchestrator (LSO)

Lightweight service orchestrator

This page describes the inner workings of the Lightweight Service Orchestrator ([LSO](#)), that handles the interaction between [GSO](#) and Ansible.

Motivation

For the deployment of new services in the GÉANT network, Ansible playbooks are used to deploy configuration statements onto remote devices. To make this interaction possible, [LSO](#) exposes an API that allows for the remote execution of playbooks.

The need to externalise this interaction comes from the fact that the Python library used to execute playbooks, introduces a potential situation where dependency versions could be conflicting. To prevent this from happening, [GSO](#) and [LSO](#) each are their own Python package, with each their own, independent library dependencies.

Inner workings

[LSO](#) uses `ansible-runner` for the execution of Ansible playbooks. This package fully dictates the way in which [GAP](#) interacts with Ansible itself. [LSO](#) only introduces an API with a single REST endpoint that exposes its functionality.

In the case of [GAP](#), all Ansible playbooks operate without an inventory that contains all relevant `group_vars` and `host_vars`. The inventory is passed to the API endpoint for executing a playbook, which contains all required `host_vars`. For the other information relevant to the playbook, this is passed through the API by making use of `extra_vars`. In virtually all cases, the `extra_vars` will at least consist of the subscription object that is being deployed, and assisting variables, such as 'verb' used to express an operation.



GitLab

A home for



ANSIBLE

Orchestrator / LSO Ansible

main iso-ansible / ansible / +

MOD - all changes needed to split out vlan to vlan with swapping and...
Mick O'Donovan authored 3 weeks ago

Code owners Assign users and groups as approvers for specific file changes. [Learn more.](#)

Name	Last commit
..	
group_vars	updating branch variable for dev
library	basic gitlab API error checking
roles	MOD - all changes needed to sp
check-bgp-peers.yml	Setting hosts to all
demo_inventory.yml	updates to bring in line with hos
fake-playbook.yml	assemble parts & make a single
ful_dynamic_inventory.yml	Removing api_endpoint setting t
grab_show_version.yml	updates to bring in line with hos
l2vpn-deprovision.yml	Setting hosts to all

l2vpn-port-to-port.j2 1.05 KIB

Blame Edit Lock Replace Delete

```

1  {% for l2circuit in l2circuits %}
2
3  {% if inventory_hostname == l2circuit.config.nodeA.name %}
4  {% set local= l2circuit.config.nodeA %}
5  {% set remote= l2circuit.config.nodeB %}
6  {% set common= l2circuit.config.common %}
7  {% endif %}
8  {% if inventory_hostname == l2circuit.config.nodeB.name %}
9  {% set local= l2circuit.config.nodeB %}
10  {% set remote= l2circuit.config.nodeA %}
11  {% set common= l2circuit.config.common %}
12  {% endif %}
13
14  set interfaces {{ local.interface }} encapsulation ethernet-ccc
15  set interfaces {{ local.interface }} mtu {{ common.mtu }}
16  set interfaces {{ local.interface }} unit 0 description "{{ common.int_desc }}"
17  set protocols l2circuit neighbor {{ remote.p2p_endpoint }} interface {{ local.interface }} mtu 9192
18  set protocols l2circuit neighbor {{ remote.p2p_endpoint }} interface {{ local.interface }} pseudowire-status-tlv
19  set protocols l2circuit neighbor {{ remote.p2p_endpoint }} interface {{ local.interface }} virtual-circuit-id {{ common.vc_id }}
20
21  {% endfor %}
22
23

```

```


def _call_ansible_playbook(
    subscription: L2vpnPPPProvisioning,
    callback_route: str,
    *,
    dry_run: bool,
    commit_changes: bool,
) -> None:

    port_A = subscription.virtual_circuit.saps[0].port
    port_B = subscription.virtual_circuit.saps[1].port

    inventory = f'{{port_A.node.node_name}}.nn.he.net\n{{port_B.node.node_name}}.nn.he.net'
    extra_vars = {
        "vc_id": subscription.virtual_circuit.vc_id,
        "interface_description": f'(UN) {title(subscription)} vpn/l2vpns/{subscription.virtual_circuit.ims_id}',
        "SiteA": f'{{port_A.node.node_name}}.nn.he.net',
        "interfaceA": port_A.port_name,
        "p2p_endpointB": f'{{port_A.node.node_name}}.nn.he.net',
        "SiteB": f'{{port_B.node.node_name}}.nn.he.net',
        "interfaceB": port_B.port_name,
        "p2p_endpointA": f'{{port_B.node.node_name}}.nn.he.net',
        "ansible_ssh_user": "{{ lookup('env', 'ANSIBLE_SSH_USER') }}",
        "ansible_ssh_pass": "{{ lookup('env', 'ANSIBLE_SSH_PASS') }}",
        "ansible_network_os": "junos",
        "host_key_checking": False,
        "dry_run": dry_run,
        "commit_changes": commit_changes,
        "verb": "deploy",
    }

```

Orchestrator

 **Orchestrator**






Recent activity
Last 30 days

Merge requests created
54

Issues created
47

Members added
0

Subgroups and projects | Shared projects | Inactive

-  LSO Ansible
-  Workflow Orchestrator
-  Orchestrator UI
-  Netbox
-  Device configs

```


gitlab_api.py 2 x
ansible > library > gitlab_api.py > ...
9  DOCUMENTATION = r'''
10  ---
11  module: gitlab_api
12
13  short_description: Interactions with GitLab API endpoints
14
15  version_added: "0.0.1"
16
17  description: Performs operations using the GitLab REST API, providing
18  | pagination where necessary.
19
20  options:
21  | uri:
22  |   description: GitLab base URL (e.g. https://gitlab.example.ie)
23  |   required: true
24  |   type: str
25  | action:
26  |   description: Which endpoint action to perform (e.g. repository_tree)
27  |   required: true
28  |   type: str
29  | token:
30  |   description: API token for GitLab
31  |   required: true
32  |   type: str
33  | project:
34  |   description: ID or full path of the project (e.g. gitlab/gitlab)
35  | ref:
36  |   description: Which ref (e.g. branch name) to perform the operation on
37  |   required: true
38  |   type: str
39
40  author:
41  |   - Anna Wilson (anna.wilson@heanet.ie)
42  |   ''
43
44  EXAMPLES = r'''
45  # Fetch the repository tree
46  - name: Fetch the list of files in the repository
47  | gitlab_api:
48  |   uri: https://gitlab.example.com
49  |   action: repo_tree
50  |   token: glpat-ABCDEF1234567890
51  |   project: "gitlab/gitlab"
52  |   ref: dev
53
54  '''


```

Orchestrator / Device configs / Repository

dev | device-configs / edge2-servprov-testlab.nn.heanet / +

Lock Compare History Find file

 iso-ansible via gitlab api
iso-config-committer authored 3 weeks ago

 Code owners Assign users and groups as approvers for specific file changes. [Learn more.](#)

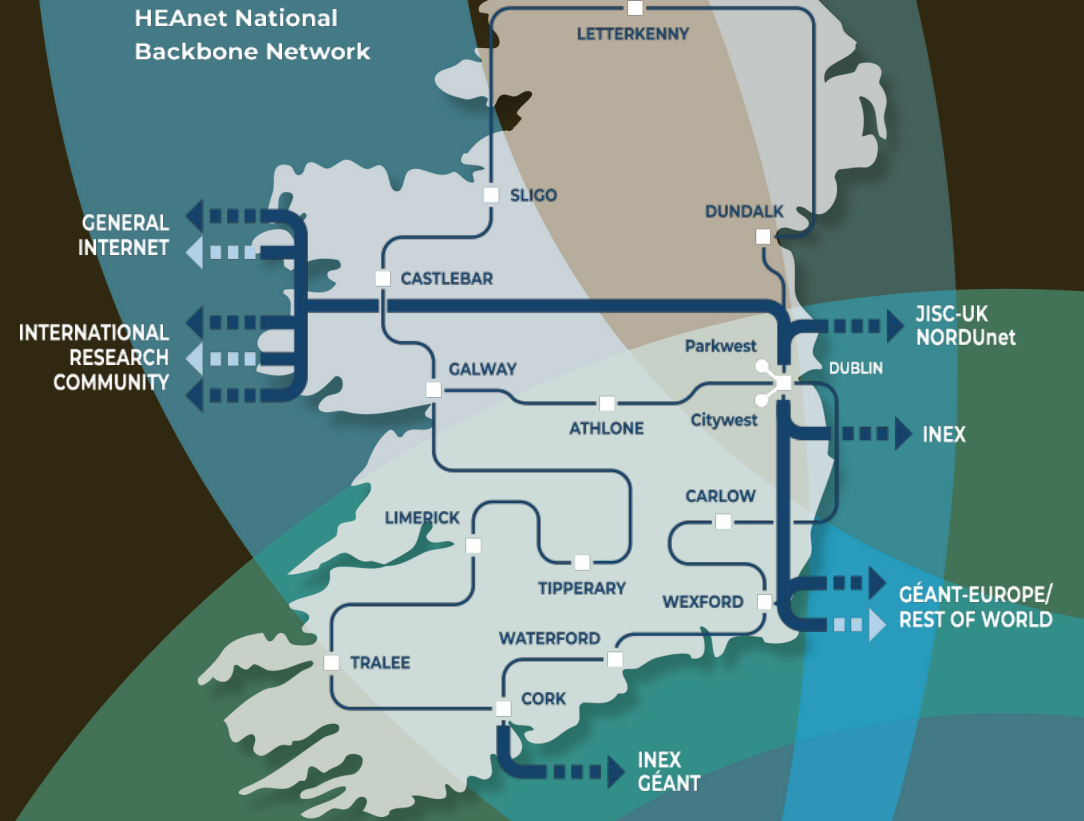
Name	Last commit
..	
diffs	iso-ansible via gitlab api
parts	iso-ansible via gitlab api



Demo

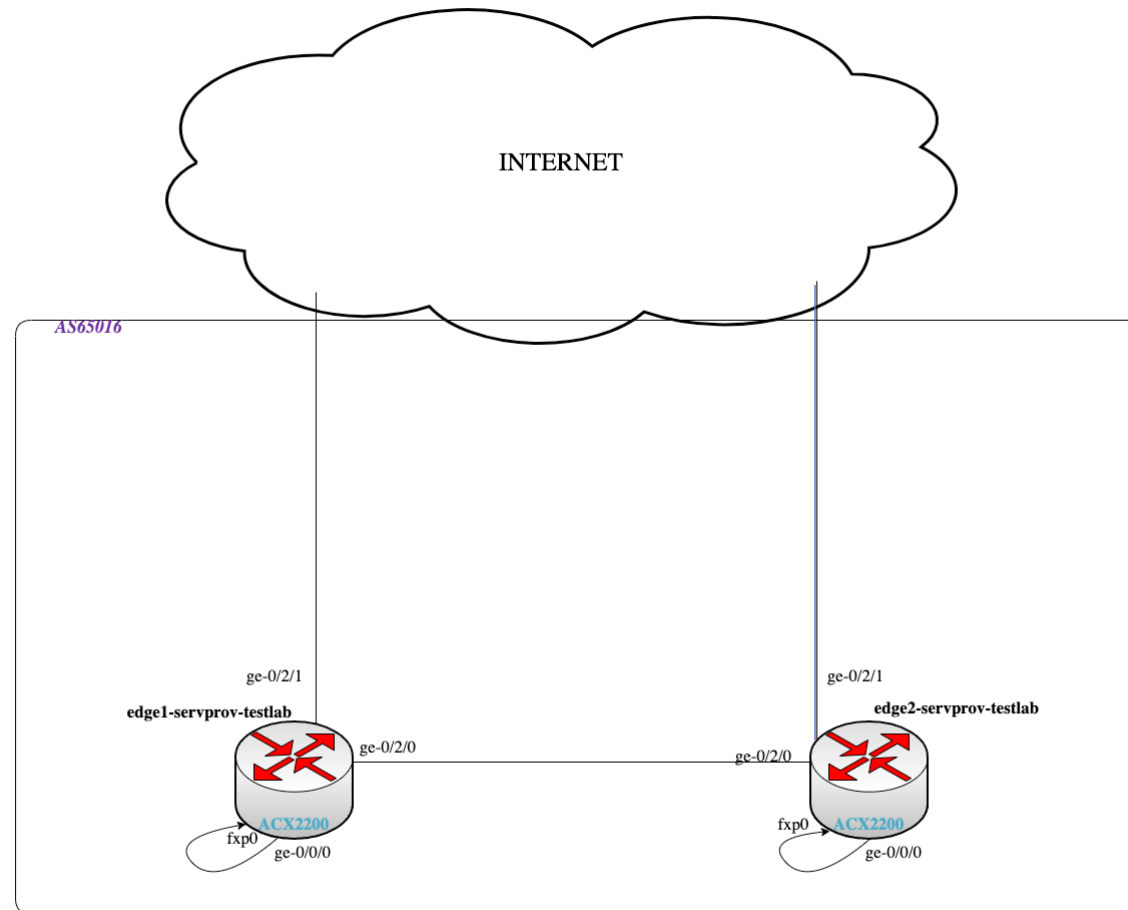


Workflow Orchestrator



The Demo Network

- 2x ACX2200 Routers
- Both have running MPLS
- Both within TESTLAB ASN
- Both have ge-0/0/0 interface patched back to the fxp0 interface



Workflow Orchestrator

HEAnet Service Provision Tool

+ New subscription

Start

Workflows

Subscriptions

Metadata

Tasks

Settings

Example form

```

ssh edge1-servprov-testlab
edge1-servprov-testlab (ssh)
ge-0/0/3 up up (UN) edge1-servprov-testlab ge-0/0/3 to yivo.heanet.ie via Dell Switch G1/13
ge-0/0/3.0 up up (UN) MGMT IP Transit Link to yivo
ge-0/1/1 up up [NN] rr1-servprov-testlab ge-0/0/0 via local RJ45 patch
ge-0/1/1.0 up up [NN] rr1-servprov-testlab ge-0/0/0 via local RJ45 patch
ge-0/2/0 up up [NN] edge2-servprov-testlab ge-0/2/0 Direct via LOCAL PATCH
ge-0/2/0.0 up up [NN] edge2-servprov-testlab ge-0/2/0 Direct via LOCAL PATCH
ge-0/2/1 up up [NN] edge1-heanet-nd2 et-0/0/7 Direct via RACK5 Patching port 3
ge-0/2/1.0 up up [NN] edge1-heanet-nd2 et-0/0/7 Direct via RACK5 Patching port 3
xe-0/3/0 up up (UN) P2P test to edge3-servprov-testlab ACX5448
xe-0/3/0.0 up up (UN) P2P test to edge3-servprov-testlab ACX5448
xe-0/3/1 up up [NN] dist1-servprov-testlab et-0/0/4
xe-0/3/1.0 up up [NN] dist1-servprov-testlab et-0/0/4
ae1.2 (UN) testlab.testlab.4a3e2698 vpn/l2vpns/6
fxp0 up up TechTalk DEMO HOST 1
lo0.0 up up Management Loopback

heanet@edge1-servprov-testlab> show interfaces descriptions
Interface Admin Link Description
ge-0/0/0 up up (UN) edge1-servprov-testlab ge-0/0/0 to fxp0 on this router
ge-0/0/2 up down (UN) edge1-servprov-testlab ge-0/0/2 to IP Transit Direct test
ge-0/0/3 up up (UN) MGMT IP Transit Link to yivo
ge-0/0/3.0 up up (UN) MGMT IP Transit Link to yivo
ge-0/1/1 up up [NN] rr1-servprov-testlab ge-0/0/0 via local RJ45 patch
ge-0/1/1.0 up up [NN] rr1-servprov-testlab ge-0/0/0 via local RJ45 patch
ge-0/2/0 up up [NN] edge2-servprov-testlab ge-0/2/0 Direct via LOCAL PATCH
ge-0/2/0.0 up up [NN] edge2-servprov-testlab ge-0/2/0 Direct via LOCAL PATCH
ge-0/2/1 up up [NN] edge1-heanet-nd2 et-0/0/7 Direct via RACK5 Patching port 3
ge-0/2/1.0 up up [NN] edge1-heanet-nd2 et-0/0/7 Direct via RACK5 Patching port 3
xe-0/3/0 up up (UN) P2P test to edge3-servprov-testlab ACX5448
xe-0/3/0.0 up up (UN) P2P test to edge3-servprov-testlab ACX5448
xe-0/3/1 up up [NN] dist1-servprov-testlab et-0/0/4
xe-0/3/1.0 up up [NN] dist1-servprov-testlab et-0/0/4
ae1.2 (UN) testlab.testlab.4a3e2698 vpn/l2vpns/6
fxp0 up up TechTalk DEMO HOST 1
lo0.0 up up Management Loopback

heanet@edge1-servprov-testlab> show interfaces descriptions
Interface Admin Link Description
ge-0/0/0 up up (UN) edge1-servprov-testlab ge-0/0/0 to fxp0 on this router
ge-0/0/2 up down (UN) edge1-servprov-testlab ge-0/0/2 to IP Transit Direct test
ge-0/0/3 up up (UN) edge1-servprov-testlab ge-0/0/3 to yivo.heanet.ie via Dell Switch G1/13
ge-0/0/3.0 up up (UN) MGMT IP Transit Link to yivo
ge-0/1/1 up up [NN] rr1-servprov-testlab ge-0/0/0 via local RJ45 patch
ge-0/1/1.0 up up [NN] rr1-servprov-testlab ge-0/0/0 via local RJ45 patch
ge-0/2/0 up up [NN] edge2-servprov-testlab ge-0/2/0 Direct via LOCAL PATCH
ge-0/2/0.0 up up [NN] edge2-servprov-testlab ge-0/2/0 Direct via LOCAL PATCH
ge-0/2/1 up up [NN] edge1-heanet-nd2 et-0/0/7 Direct via RACK5 Patching port 3
ge-0/2/1.0 up up [NN] edge1-heanet-nd2 et-0/0/7 Direct via RACK5 Patching port 3
xe-0/3/0 up up (UN) P2P test to edge3-servprov-testlab ACX5448
xe-0/3/0.0 up up (UN) P2P test to edge3-servprov-testlab ACX5448
xe-0/3/1 up up [NN] dist1-servprov-testlab et-0/0/4
xe-0/3/1.0 up up [NN] dist1-servprov-testlab et-0/0/4
ae1.2 (UN) testlab.testlab.4a3e2698 vpn/l2vpns/6
fxp0 up up TechTalk DEMO HOST 1
lo0.0 up up Management Loopback

heanet@edge1-servprov-testlab>

```

port 10G dist1-tud-aungier1 et-0/0/4 (UN) TUD 10G LAN for TUD CC1
05/09/2024, 12:45:42

port 10G dist1-tud-aungier1 et-0/0/4 (UN) TUD 10G LAN for TUD Aungier1 IPT
05/09/2024, 12:45:33

L2VPN Port-to-VLAN	1
L2VPN VLAN-to-VLAN	1
core link 100G	0

Show all active out-of-sync subscriptions

Show all active subscriptions



Wrap up



Workflow Orchestrator

