ESnet
ENERGY SCIENCES NETWORK

# Intro to The Workflow Orchestrator

**Chris Cummings**
Network Automation Software Engineer

Energy Sciences Network (ESnet)
Lawrence Berkeley National Laboratory
U.S. Department of Energy

TechEx

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U.S. DEPARTMENT OF ENERGY
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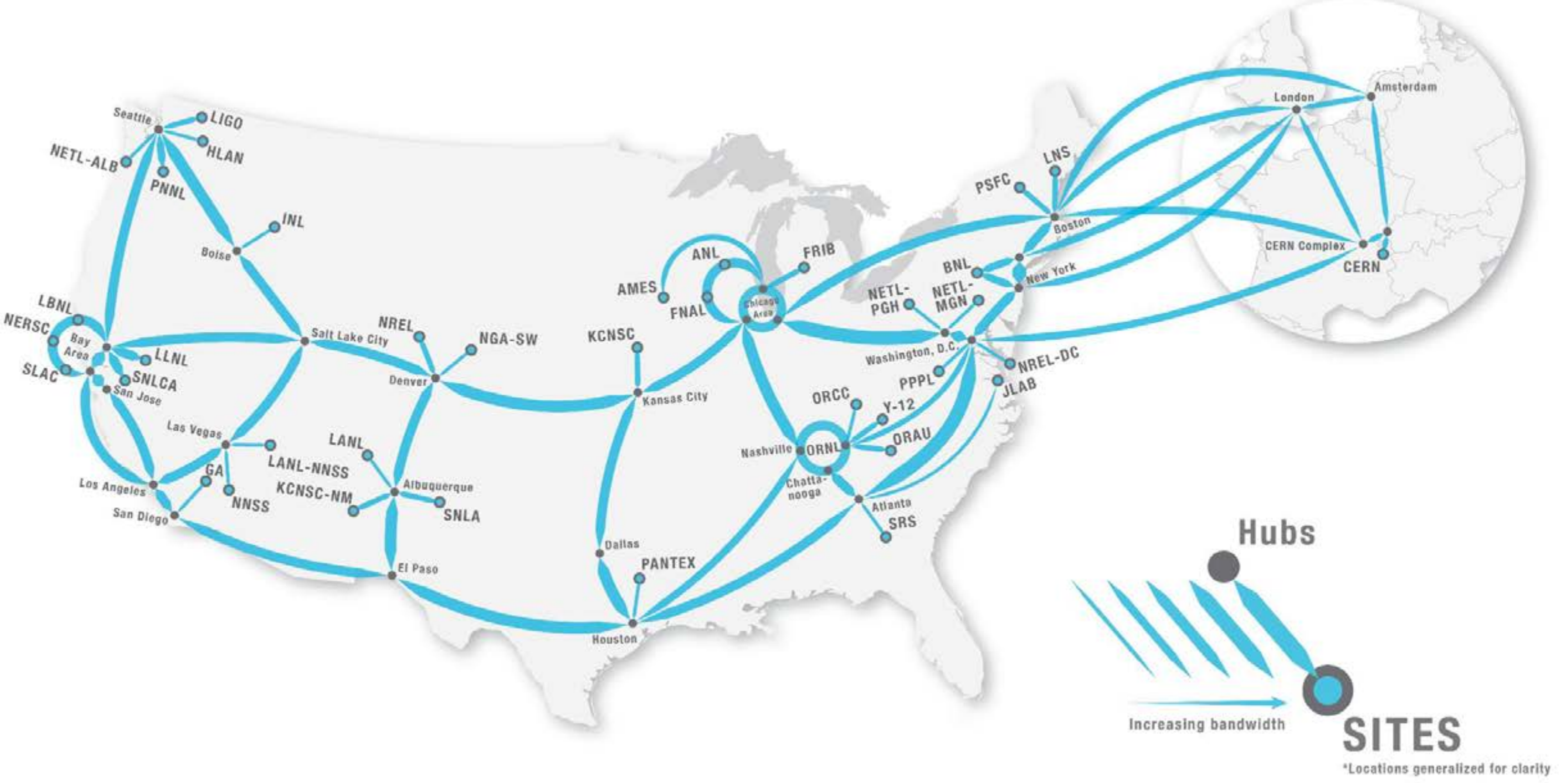
# ESnet6



*Locations generalized for clarity

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# What is Intent Based Networking?

- A high level definition of a Network Service
- Describes a service, but not *how* to implement it.
- Abstracts service offerings from implementation details

# What is Orchestration?

- Coordination of multiple computer and network systems
- Translates network *intent* into network *configuration*
- Workflow-based method for provisioning services
- Method for ensuring consistency in service delivery

# What is Orchestration *NOT* ?

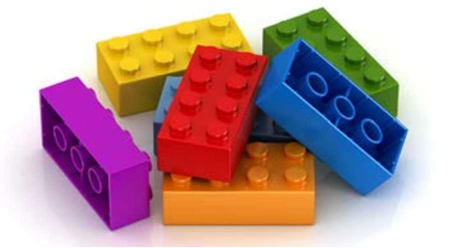
- A replacement for network engineers
- A way to have one network engineer do the job of multiple engineers
- A single tool to run all of ESnet

# Benefits of Orchestration

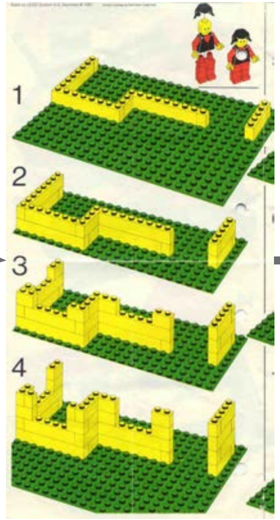
- Orchestration creates consistent configurations for complex services
- Reduces the chance for human error
- Makes the network more reliable
- Allows engineers to focus on more design than deployment (less busy-work)

# What are workflows?

Finite resources exist in other systems

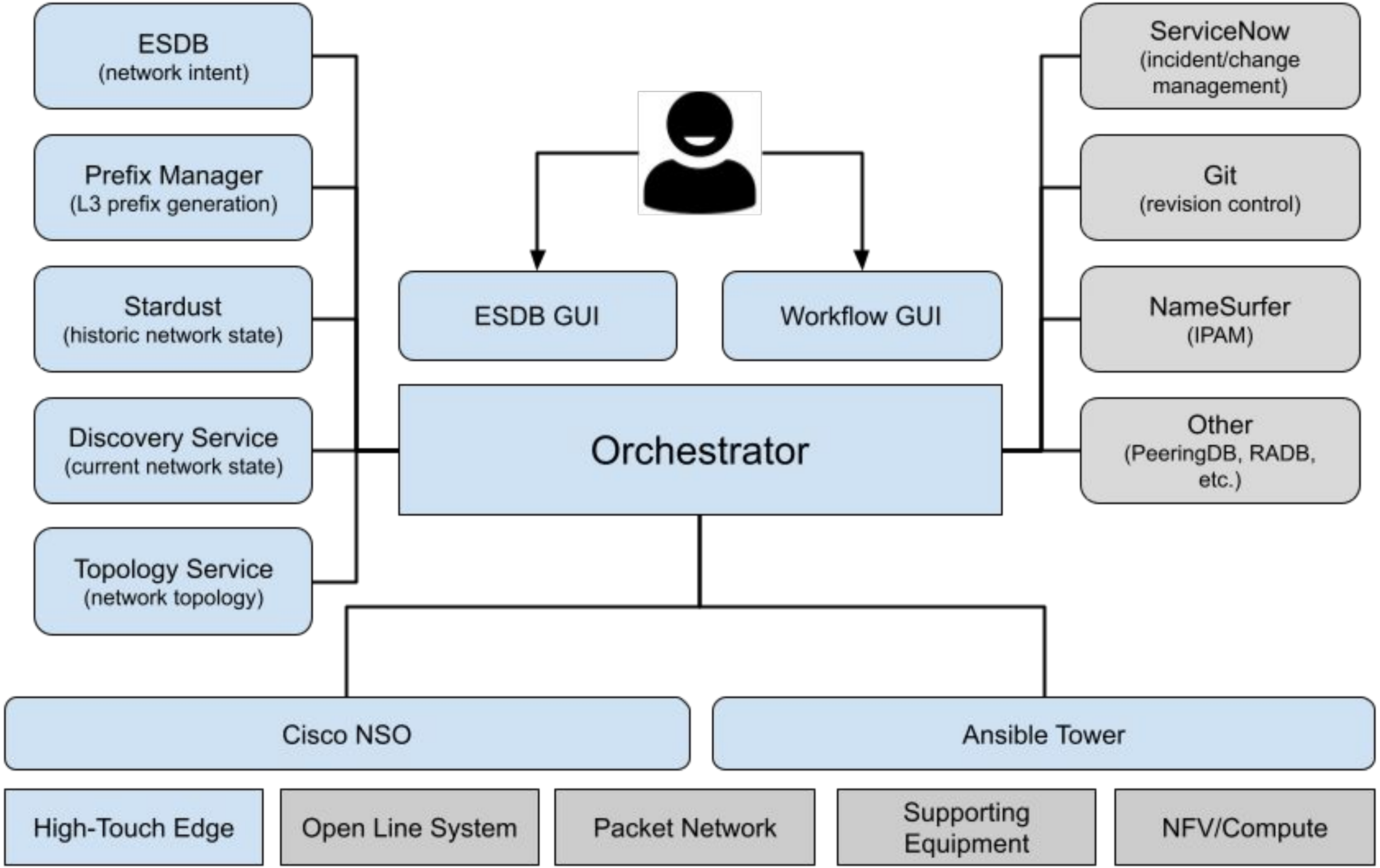


The workflow contains the “Steps” needed to complete the work

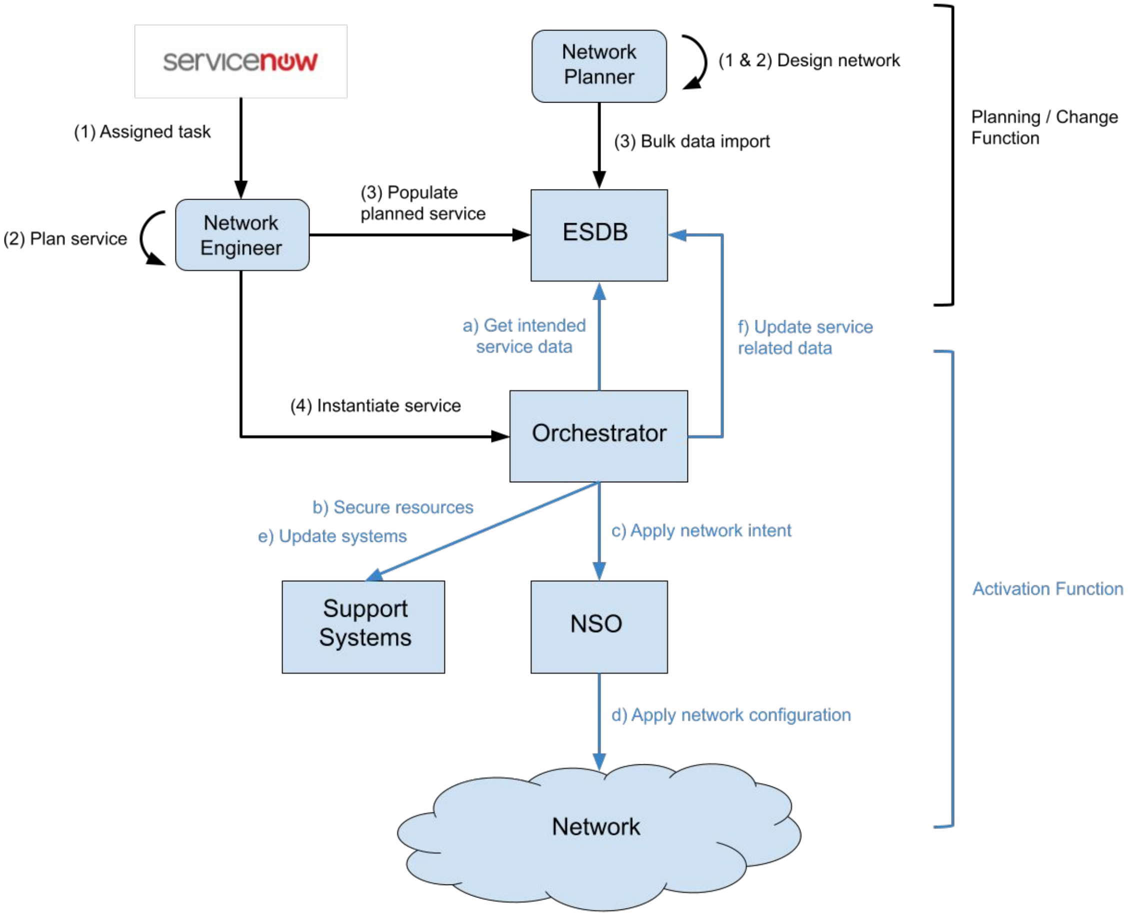


Orchestrator stores the final product until we break it all apart again

# ESnet6 Provisioning Stack



# ESnet6 Provisioning Workflow



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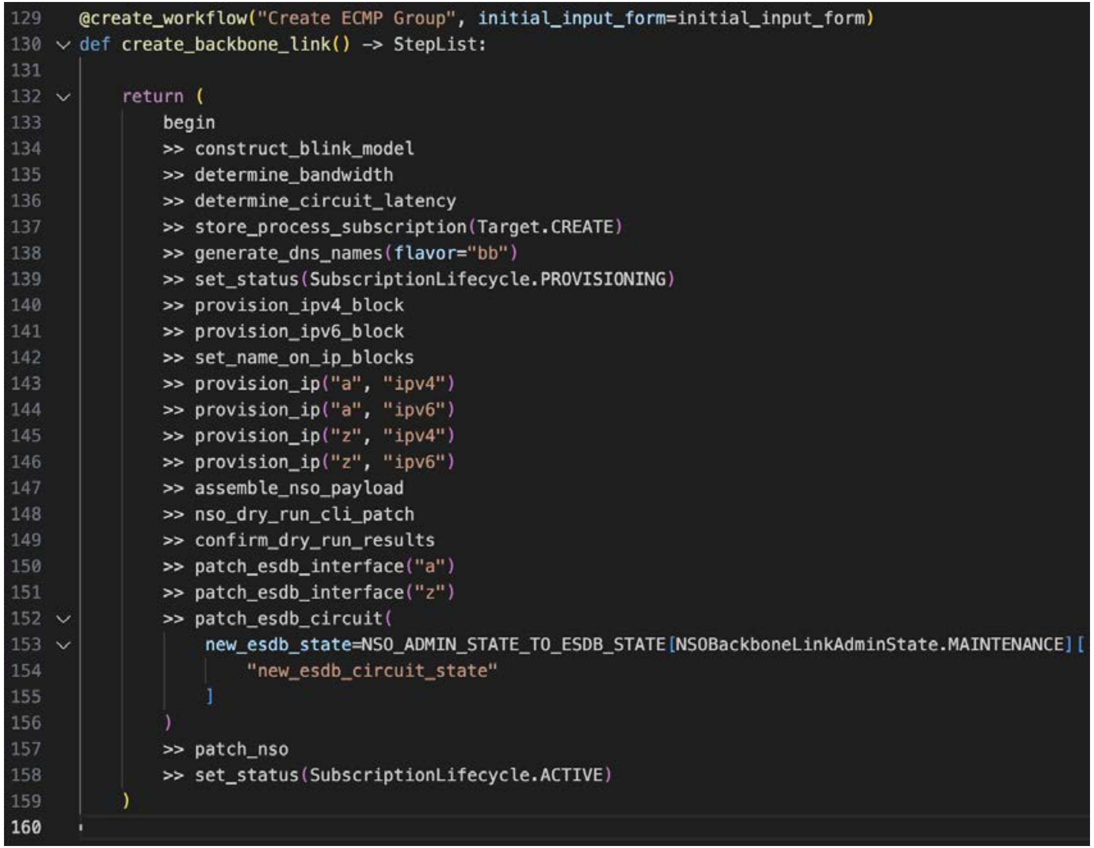
# Demonstration

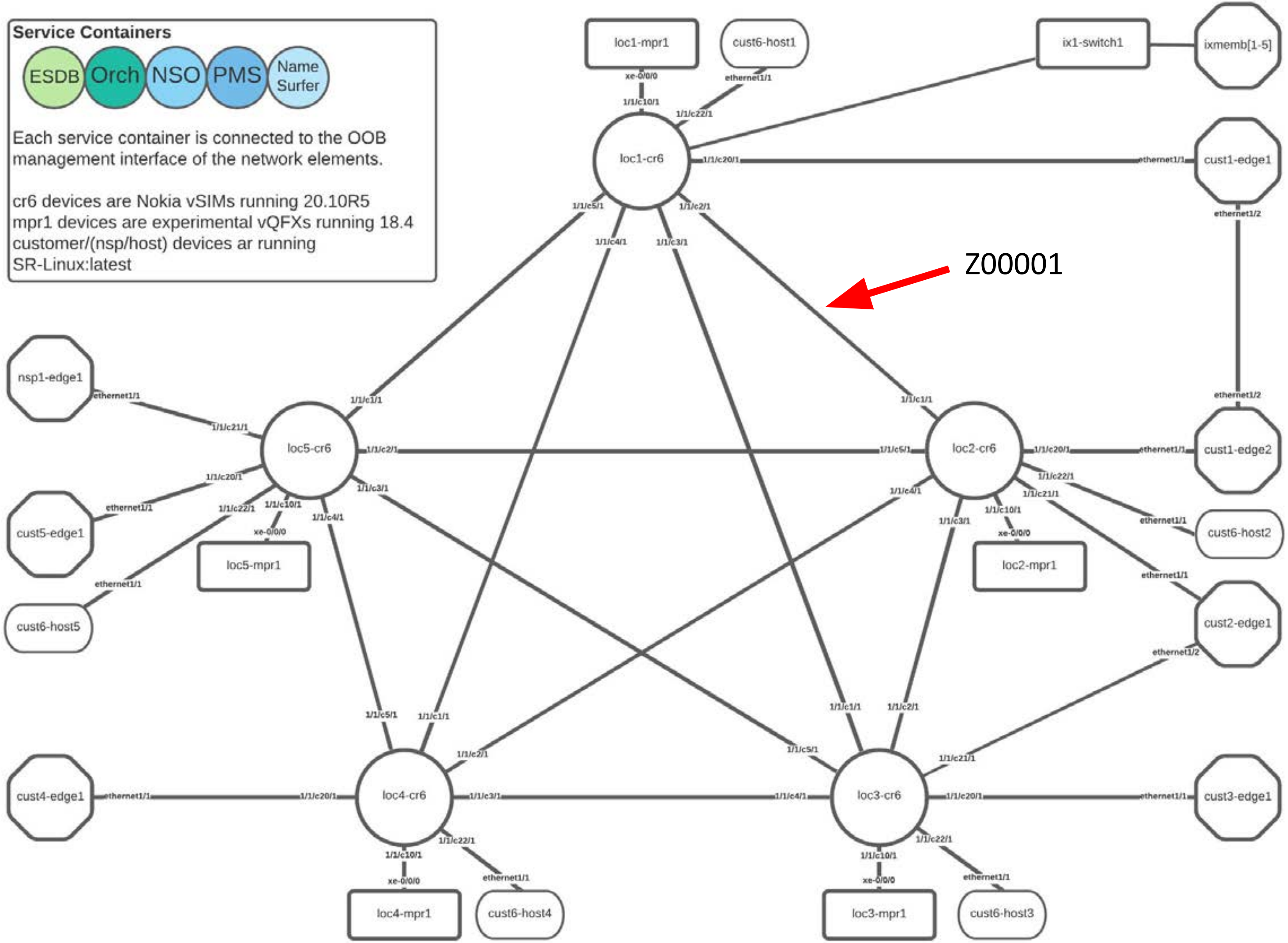
- ECMP Group (Backbone Link)

# ECMP Group Steps



```python
@create_workflow("Create ECMP Group", initial_input_form=initial_input_form)
def create_backbone_link() -> StepList:

    return (
        begin
        >> construct_blink_model
        >> determine_bandwidth
        >> determine_circuit_latency
        >> store_process_subscription(Target.CREATE)
        >> generate_dns_names(flavor="bb")
        >> set_status(SubscriptionLifecycle.PROVISIONING)
        >> provision_ipv4_block
        >> provision_ipv6_block
        >> set_name_on_ip_blocks
        >> provision_ip("a", "ipv4")
        >> provision_ip("a", "ipv6")
        >> provision_ip("z", "ipv4")
        >> provision_ip("z", "ipv6")
        >> assemble_nso_payload
        >> nso_dry_run_cli_patch
        >> confirm_dry_run_results
        >> patch_esdb_interface("a")
        >> patch_esdb_interface("z")
        >> patch_esdb_circuit(
            new_esdb_state=NSO_ADMIN_STATE_TO_ESDB_STATE[NSOBackboneLinkAdminState.MAINTENANCE][
                "new_esdb_circuit_state"
            ]
        )
        >> patch_nso
        >> set_status(SubscriptionLifecycle.ACTIVE)
    )
```



### Service Containers

Each service container is connected to the OOB management interface of the network elements.

cr6 devices are Nokia vSIMs running 20.10R5
mpr1 devices are experimental vQFXs running 18.4
customer/(nsp/host) devices ar running
SR-Linux:latest

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# Questions?

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