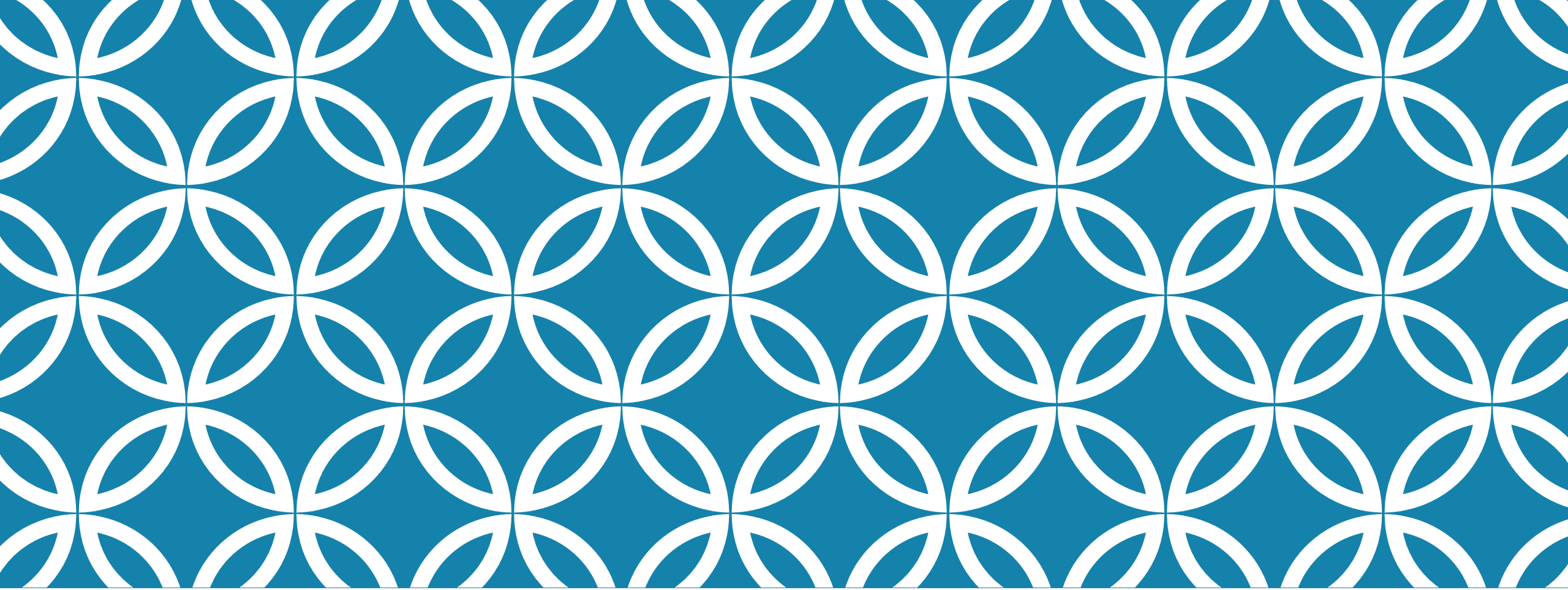

CNaaS at SUNET
Software architecture

Johan Marcusson
Developer at SUNET

Agenda

CNaaS-NMS Software:

- Goals
- Design principles & decisions
- Components/Architecture
- Change workflow
- ZTP (zero-touch provisioning)
- Demo
- Development status

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Goals of CNaaS NMS

Zero-touch provisioning

Automation of changes (VLAN/VXLAN, IP routing, port-config...)

Automated firmware upgrades

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Design principles

Multi-vendor

No per-device licensing

Open-source

Open API:s and plugins

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Design decisions

Nornir/NAPALM vs Ansible

Config replace vs config merge

Infrastructure-as-code vs WebUI

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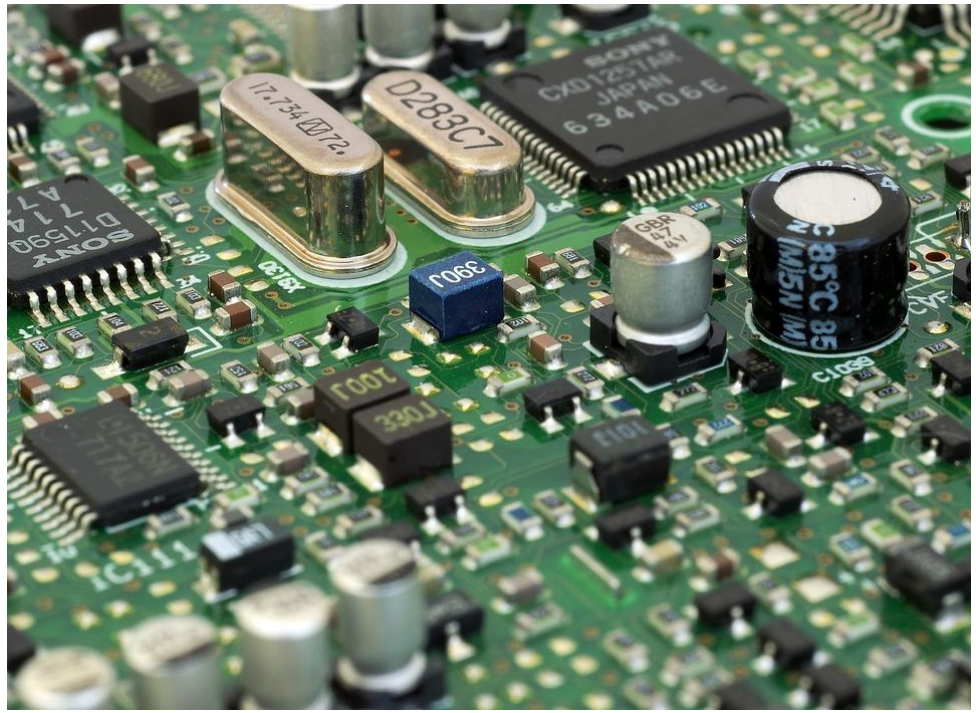
Components / Architecture

Support systems

Automation engine

User interfaces



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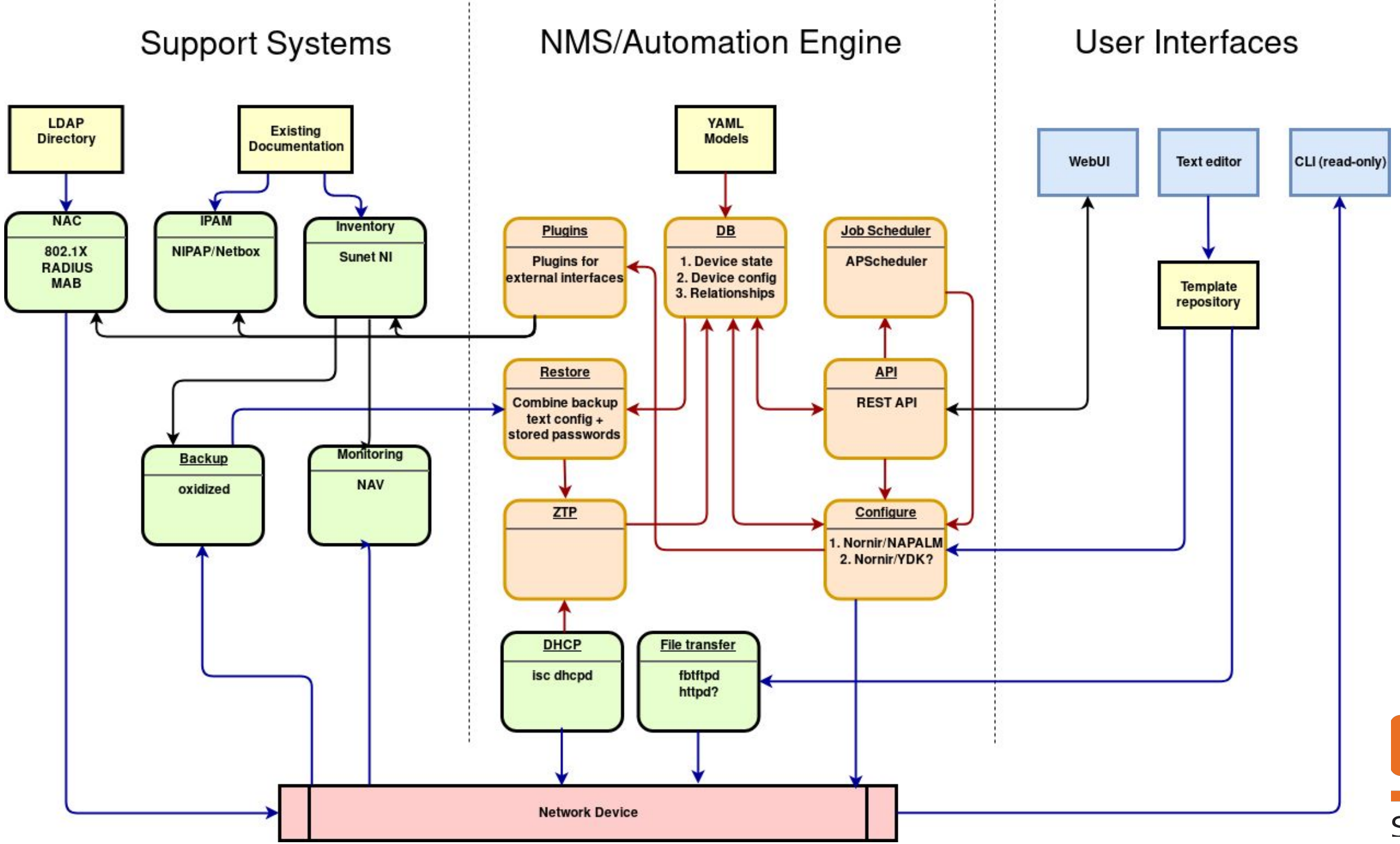
Support Systems
NMS/Automation Engine
User Interfaces
LDAP Directory
Existing Documentation
YAML Models
WebUI
Text editor
CLI (read-only)
NAC
802.1X
RADIUS
MAB
IPAM
NIPAP/Netbox
Inventory
Sunet NI
Plugins
Plugins for external interfaces
DB
1. Device state
2. Device config
3. Relationships
Job Scheduler
APScheduler
Template repository
Restore
Combine backup text config + stored passwords
API
REST API
Backup
oxidized
Monitoring
NAV
ZTP
Configure
1. Nornir/NAPALM
2. Nornir/YDK?
DHCP
isc dhcpd
File transfer
fbtftpd
httpd?
Network Device

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Change workflow

1. Update settings or templates
2. Commit and push to git
3. Ask API to pull changes from git (API-call)
4. Dry run on devices (API-call)
5. Verify diff
6. Live run (API-call)

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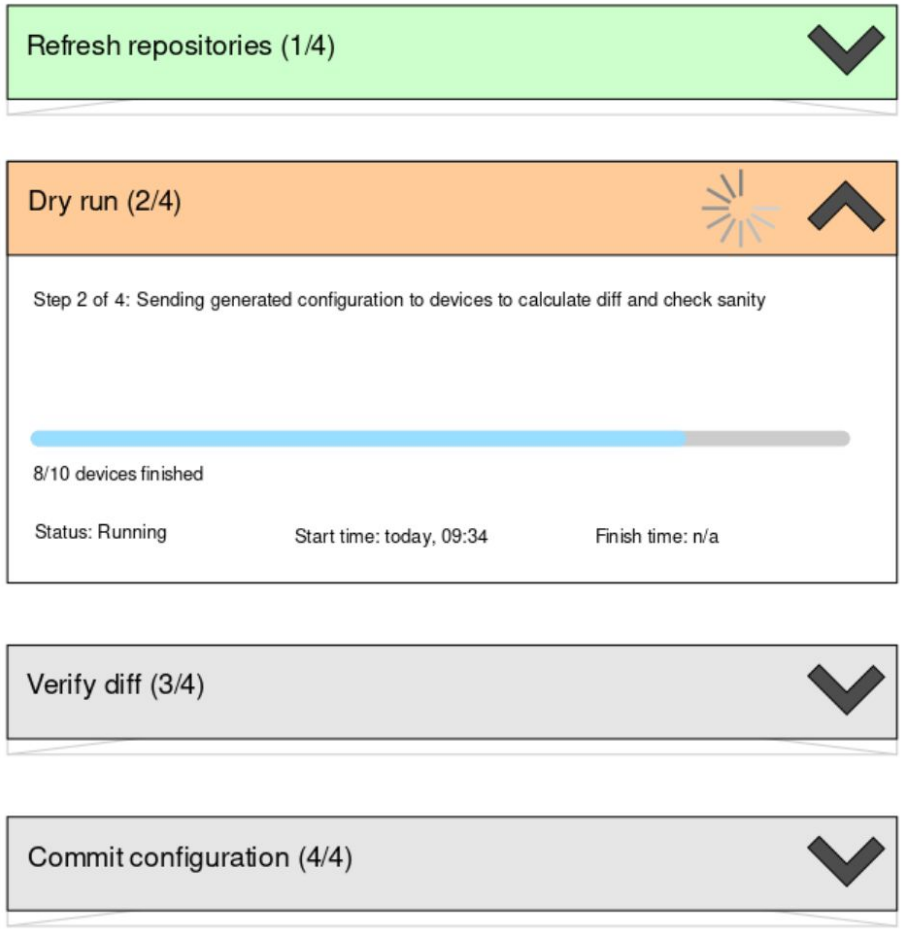
Change workflow UI mockup



UI for commit workflow only

All configuration changes are made via git

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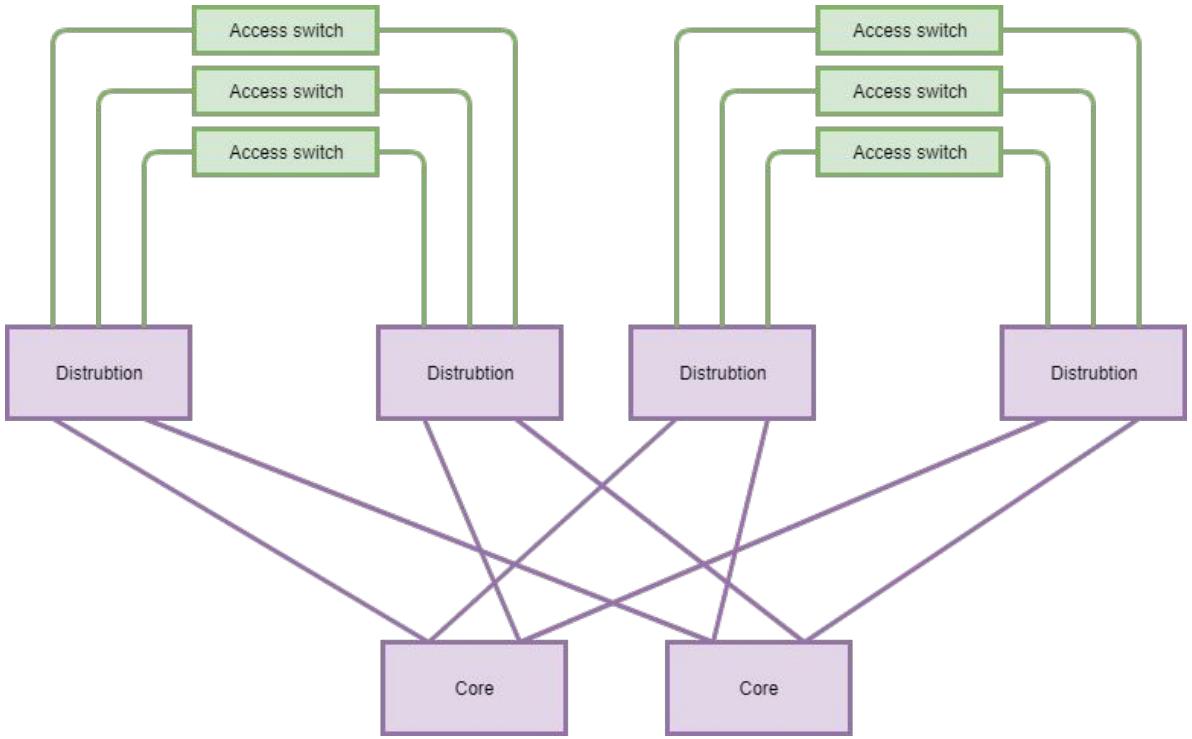
Network architecture



- Access switches connected to two distribution switches (LACP)
- Distribution switches deployed in pairs using EVPN ESI
- Anycast gateway in dist switch
- Distribution and core switches form VXLAN/EVPN fabric (Clos)

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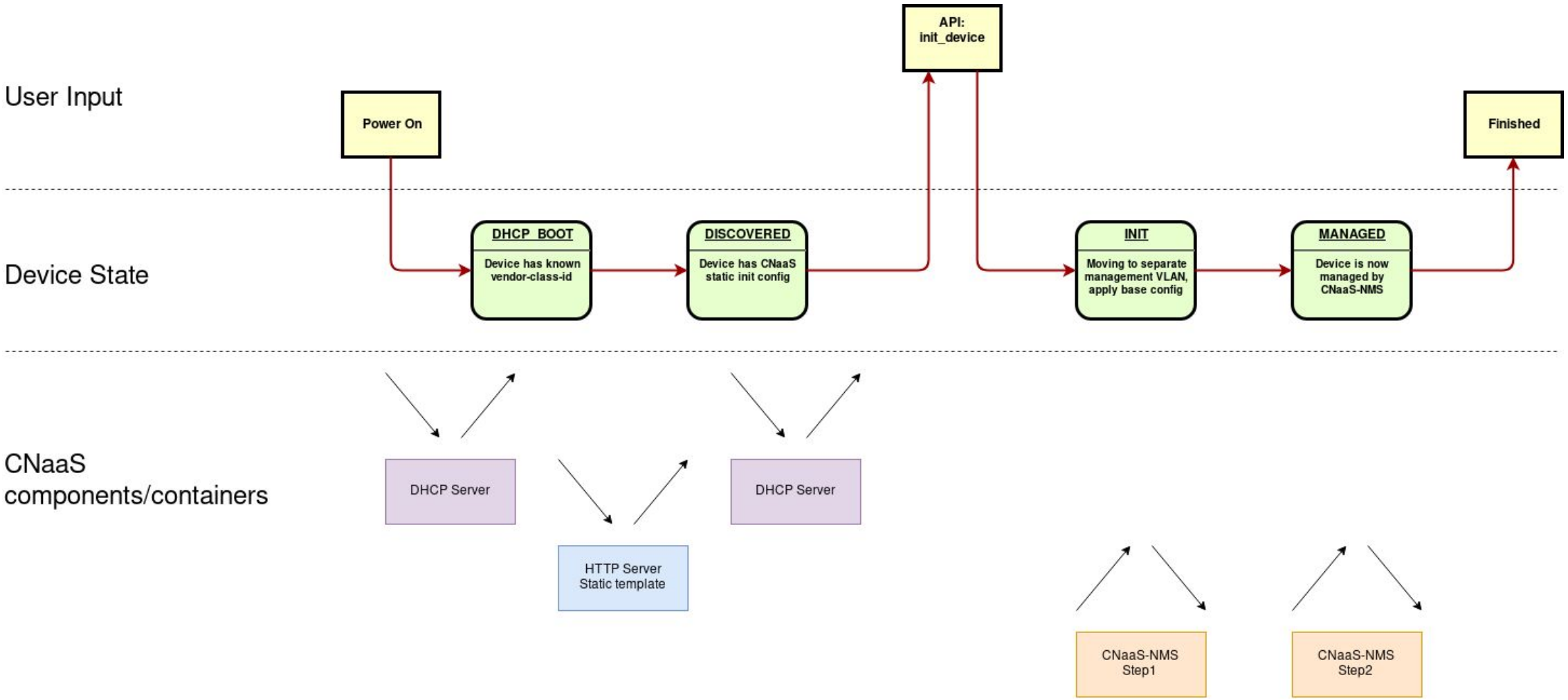
ZTP workflow



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Demo Video

https://play.sunet.se/media/t/0_dj4ic054

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Status

ZTP: working for access

Change: working for access, limited on dist/core

Firmware: initial development started

NAC/WebUI/etc: planning/initial development started

No customers in production

500+ commits on github

Tested with 1000 mock devices (fake-switch)

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Thanks for listening! Questions?

SUNET wiki:

https://wiki.sunet.se/display/CNaaS

Source code available at GitHub:

https://github.com/SUNET/cnaas-nms

mail: johan.marcusson@sunet.se

#automation @ NREN slack

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