Developer Days Automation

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The bridge to possible

NSO in the Brownfield

Orchestrating T-HT Croatia Services

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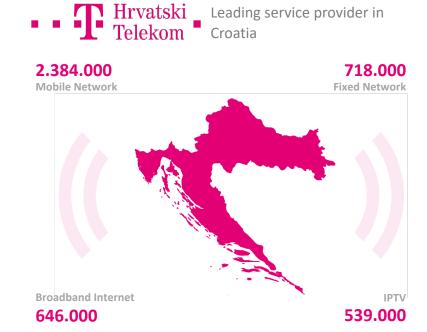
Agenda

- Introduction
- The Problem
- Warming up to Orchestration
- Brownfield Implementation
- Impact

Introduction

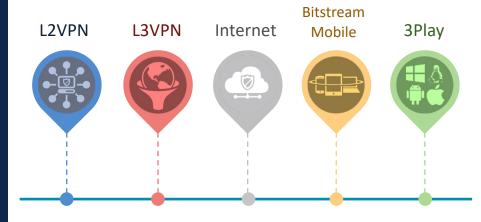
T-HT Croatia

- Leading Service provider in Croatia
- Part of DT NatCos group
- All NT/IT Mob/Fix services provider
- Strong focus on Automation



T-HT Croatia Network and Services

- 250+ MPLS-PE devices
- > 4000 L2VPNs (VPLS)
- > 3000 L3VPNs
- ~ 250.000 Subinterfaces



Cisco, Huawei, Juniper

Challenges:

- Single Provisioning WO over multiple teams
- Unified configs across IP Network needed
- Operational excellence increase (less Network faults)
- Speed up Legacy equipment swap-outs, SW upgrades etc., repetitive WO

Solution:

NSO as Multivendor tool, open for Customization

T-HT Croatia – Automation Strategy



Operational Engineering

Short Term - 2023

General Requirements

Core Network

Data Center

Service Core

CPE (Buss/Res)

(Mob/Fix)

Delivery issues

- Time Consuming Substantial Effort
- · Error Prone, Siloses

Multivendor

EoS equipment

Existing Tools

- Analysis
- Base Orchestration
- Fnd-to-Fnd View

LITOI FTOTIE, SIIOSES		
Manual Multivendor Service integrity HW/SW migration	 Config cleanup Unified service models Access Network Service Integrity 	
Manual Long migrations Compartmentalized	Use case definitionFW+NW+VmWareBase Orchestration	
Heterogenous Complex Error-Prone Multi-Domain	Assessment Identifying use cases for Orchestration	

Use cases definition

Solution

Strategy definition

Pilots Day1

Customer Experience

Mid Term - 2024

- Visualization and Insight
- Semi-automated workflow
- · Automated service assurance
- · Shorten Time-to-Service

 VPLS -> EVPN migration Customer CPE FBH/MBH Provisioning (IP, Radio, Optical) SW/HW upgrade 	 Extend Orchestration reach Break Silos Operational Excellence
VLAN -> EVPN/VXLANSW/HW UpgradeMigration to NSX-T	Everything OrchestratedAutomated Workflow
End-to-End ProvisioningMass 5G	Zero-touch deployment Slicing
 Develop all Day2 use- cases E2E Provisioning process 	Zero-touch deployment, Day1-2Day2 E2E provisioning
Challenges	Solution

End-to-End Service Delivery

Long Term - 2024+

- Fast Time-to-Market
- Lower Cost of change
- · E2E Tooling and Automation
- Lifecycle Management

Orchestrated Solution

- Single Source-of-Truth
- Sales/CS Provision Services
- Customer Self-Management
 - Integration with IPAM, DIS, etc.
- End-to-End Transformation
 - End-to-End Service Chain
 - Leverage API
 - DevOps
- End-to-End Workflow
- Operational Service Management
- Service Visualization
- Integrated Workflow Manager (Intential)

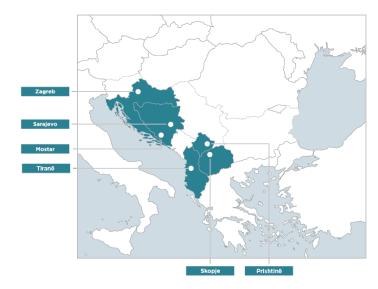
Challenges

Verso Altima Group

- 15+ years Cisco Gold Partner
- Service-Provider Integration
 - SP Networking
 - · IOT
 - SAP Billing and Charging
 - NMS and Orchestration



Business integrator **internationally recognized** in the software and networking business, IoT and digital transformation.



The Problem

Usual Suspects, with a Twist



Configs	Every engineer left a markHighly skill-dependent
Sw and Hw	 Software upgrades difficult Hardware upgrades and replacement more difficult
Service Upgrades	 Moving customers between different PEs not easy VPLS -> EVPN. How?
Standards	 "Interpretative dance" Not easy to compare with customer DB

• "Incomplete"

Business Outcomes			
Service Activation	Semi-manual, error-proneAffects other tasks		
Service Accuracy	 Reconciliation between billing and service config not easy 		
Workflow Automation	Semi-automaticLots of manual work in workflow chain		
Time-to- Service	• Days		
Time-to- Repair	Skill-dependentHard to achieve targets		
Multivendor MPLS Network			

Documentation

Warming up to Orchestration

From Assessment to Proof of Concept





Analyze Network and Services

Identify problems and recommend solutions

- Topology
- Hardware & Software
- Traffic
- **Protocols & Config**
- Services

Restructure the Network and Services

Great ideas, but how?

- Standardize configs
- Perform service audits
- Re-purpose equipment
- VPLS -> EVPN

Implement Orchestration

Seeing is believing

- Step 1
 - Your configs -> Orchestrated services
- Step 2
 - PoC Power of Orchestration
- Step 3

Implementation







Running Start with Pre-Developed Models

- First for humans, then for machines
- Focus on service compatibility between platforms
- As little input as possible
- Expert mode for Brownfield
- Non-Expert mode for new services





L2VPN	L3VPN	Magic Commands
All Flavors	With Multicast	The Power of Orchestration
VPLS, EVPN, Both Point-to-Point Multipoint MEF Compliant Sensible Defaults	Auto RD, RT All Topologies PE-CE Protocols Bridge-Domain Mode Sensible Defaults	Create Pingable Interfaces VPLS -> EVPN Transition Virtual Interconnection Consistency Checks Service Tests

Cisco IOS, Cisco IOS XR, Cisco NXOS, Huawei, Juniper

Brownfield Implementation

Managing the Brownfield







- Tweaking existing models
- Detailed demo for all services
- Tests on lab equipment
- Crucial step: Identify orchestration 'ambassadors'



- Models for existing state & ideal state
- Automatic service discovery and reconciliation
- 100% match with existing configs
- **Crucial step:** Create models for the future



- Day-one All services
- Standardization
- Cleanup
- Knowledge transfer
- Training
- Crucial step: Create cookbooks based on current practices

Model Tweaking

100% Accurate Reconciliation

Production

Key: Most of the burden is on the competent integrator

Path to Success

- Carefully and clearly outlined steps
- Select realistic and manageable steps
- Start with CLI
- The goal is Operational Excellence – End-to-End orchestration and automation

End Goal

End-to-End automation Integrated workflows People think, machines provision

API

.....

Build API-based workflows Introduce component between NSO and expert systems, to protect NSO

Integration

IPAM first
Start integrating workflow
Less experienced staff operates
services

Complex End-to-End

Non-Expert models
Still CLI, but geared towards
machines

Normalization

Standardize all configs Cleanup, optimization, tweaking

Expert Models – CLI

Train operations staff
Transition to Orchestration

Implementation Maturity

Time to Operational Excellence





1 Assessment

- Equipment
- Services
- Configs
- Operations
- Reporting
- Net Mgmt.
- Model alignment

2 Implementation

- Detailed service analysis
- Detailed config analysis
- Brownfield reconciliation
- Model alignment
- Testing
- Training

3 Normalization

- Models are developed for the future
- Aligning all services and configs with desired state
- Standardization
- Perfect opportunity for knowledge transfer

4 Transformation

- Automated operations
- End-to-end orchestration
- End-to-end workflow
- CI/CD ops
- Machines configure, humans think
- Model development telecom hands

1 month

6 months

6 months

Year +

The Sync-From

- Operated manually for 20 years
- How to approach manual changes?
- Magic sync-from?



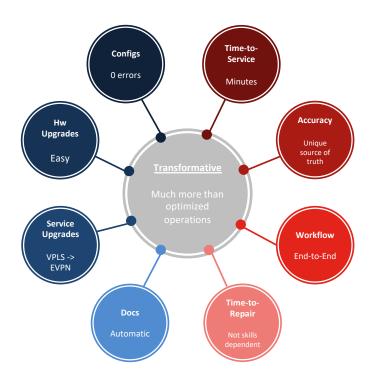
Test NEDs for full config through NSO Start with operations through NSO 3 Do not create magic 'sync-from' NSO is the source of truth Implement useful service tests 6 Add operational knobs to models

Impact

True Business Transformation

- Non-technical personnel can provision complex services
- Integration into DevOps
- Time-consuming tasks become trivial
- Ability to attract talent





CTO's Dream

Hrvatski VERSO

- Ultimately, ability to simply compose new service from well defined building blocks
- Consistent, unified, modeled software-like view of the underlying infrastructure is the key



You will never look back

The bridge to possible