CHNUG 2026

Change with confidence

Our journey with SR Linux and ContainerLab

John Howard
Head of Network Disruption @ Proton
john.howard@proton.ch

MAY 2026

About me

John Howard (@fatred)

Head of Network Disruption

Automation “enthusiast"

20y+ “experience” automating networks (with varying success)

Professional ranter

Insufferable Optimist

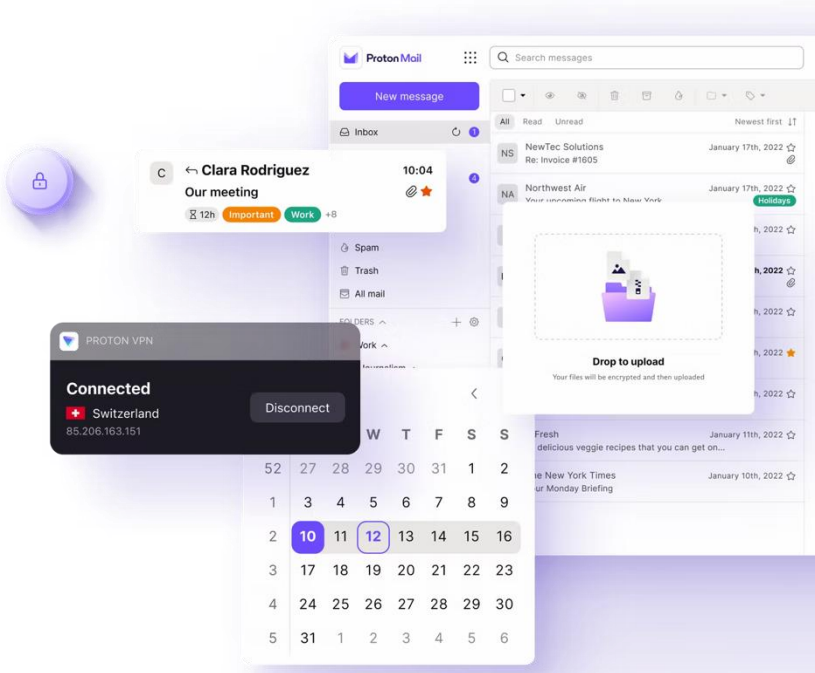
About Proton

Our mission: create a world where everyone is in control of their digital lives, and make digital freedom a reality.

The mean: provide the world's first **privacy-by-default ecosystem** of **easy-to-use** online services, **open source and independently audited**, that protect data with **end-to-end encryption**.

Founded at CERN in 2014, sustained growth of user base with millions worldwide, individual and corporate customers.

Key infrastructure imperatives: **reliability**, **scalability**, **velocity**, **self-hosting** and **global outreach**.



01

THE CHALLENGE

Build a datacenter network. New country. New vendor. Make no mistakes.

Norway · 2024 · Greenfield Data Centre

2024 · NORWAY

A full datacenter rollout, end to end

Multi-layer fabric

EVPN-VXLAN fabric, out-of-band mgmt, core and edge routing.

New vendor, no prior experience

Recovering Juniper engineers. No prior SR Linux or SROS use.

Tight timeline, no margin

Critical expansion of capacity. Long way from home. Limited on-site time.

No hardware lab

Long lead on lab kit, worsened by limited spec. Remote lab was booked.

THE PLATFORMS

Nokia 7220 IXR

D1 · D2 · D3 · H2

SR Linux

Nokia 7750 SR-1

Edge routing

SROS

VENDOR CHOICE

Why change at all?

Support challenges

QFX10002 CRB gateway devices were failing multiple times per year.

Three months of cascading failures in QFX5110.

Software quality was diminishing rapidly – bugs every month nearly.

Partner support was struggling to get JTAC attention. Direct support improved nothing.

Poor engagement

Juniper's DACH sales reps were constantly changing and difficult to engage with.

Narrative of "Juniper is a premium product", with no tangible evidence to support it.

Even with a frame agreement, pricing was double digit percentages over other BCM products

Weak labbing tools

Not generally available – beg your SE only.

vQFX and vMX are high spec QEMU VMs. Very slow, and highly unstable startup mechanisms.

Don't entirely reflect the capabilities of the emulated device.

Deprecated for vJunos (which is EVO – not the same product).

In my HUMBLE opinion, Juniper did not value their Data Centre customers at this time.

2024 · NORWAY

The playing field.

THE BENCHMARK

Juniper QFX

Fabric
Spine: QFX5100-32C
Leaf: QFX5120-48YC

DC Core: QFX5220-128C

Juniper MX

Edge: MX304

1 monetary unit

THE CHALLENGER

Arista

Fabric
Spine: 7260CX3-64
Leaf: 7050SX3-48YC8

DC Core: 7060DX4-32

Arista

Edge: 7280CR3-32D4

1.5 monetary units

THE MISFIT

Dell SONiC

Fabric
Spine: S5232F
Leaf: S5248F

DC Core: Z9332F

Juniper MX 🤔

Edge: MX304

0.8 monetary units

Proton
Privacy by default

2024 · NORWAY

Where’s Nokia?

M.I.A That’s where...

2024 · NORWAY

The playing field – take 2

STOCKHOLM SYNDROME

Juniper QFX

Fabric
Spine: QFX5100-32C
Leaf: QFX5120-48YC

DC Core: QFX5220-128C

Juniper MX

Edge: MX304

0.7 monetary units

TRUCK OF CASH

Arista

Fabric
Spine: 7260CX3-64
Leaf: 7050SX3-48YC8

DC Core: 7060DX4-32

Arista

Edge: 7280CR3-32D4

0.8 monetary units

THE MISFIT

Dell SONiC

Fabric
Spine: S5232F
Leaf: S5248F

DC Core: Z9332F

Juniper MX 🤔

Edge: MX304

0.5 monetary units

2024 · NORWAY

The playing field – take 2

STOCKHOLM SYNDROME

Juniper QFX

Fabric
Spine: QFX5100-32C
Leaf: QFX5120-48YC

DC Core: QFX5220-128C

Juniper MX

Edge: MX304

0.7 monetary units

TRUCK OF CASH

Arista

Fabric
Spine: 7260CX3-64
Leaf: 7050SX3-48YC8

DC Core: 7060DX4-32

Arista

Edge: 7280CR3-32D4

0.8 monetary units

THE OUTSIDER

Nokia SRLinux

Fabric
Spine: 7220 IXR-D3L
Leaf: 7220 IXR-D2L

DC Core: 7220 IXR-H2

Nokia SR

Edge: 7750 SR-1

2024 · NORWAY

The playing field – take 2

STOCKHOLM SYNDROME

Juniper QFX

Fabric
Spine: QFX5100-32C
Leaf: QFX5120-48YC

DC Core: QFX5220-128C

Juniper MX

Edge: MX304

0.7 monetary units

TRUCK OF CASH

Arista

Fabric
Spine: 7260CX3-64
Leaf: 7050SX3-48YC8

DC Core: 7060DX4-32

Arista

Edge: 7280CR3-32D4

0.8 monetary units

THE OUTSIDER

Nokia SRLinux

Fabric
Spine: 7220 IXR-D3L
Leaf: 7220 IXR-D2L

DC Core: 7220 IXR-H2

Nokia SR

Edge: 7750 SR-1

0.4 monetary units

VENDOR CHOICE

Why Nokia, and why now?

Feature coverage

Complete fit for our network needs across DC, core, and edge.

Modern NOS

Infra-as-code, disaggregation, OpenConfig. The way networks should be built.

Telemetry & automation

First-class gNMI, plus unique features like maintenance groups.

World-class support

Presales, product, and an active Discord community throughout.

Competitive pricing

Real budget headroom without compromising on capabilities.

ContainerLab

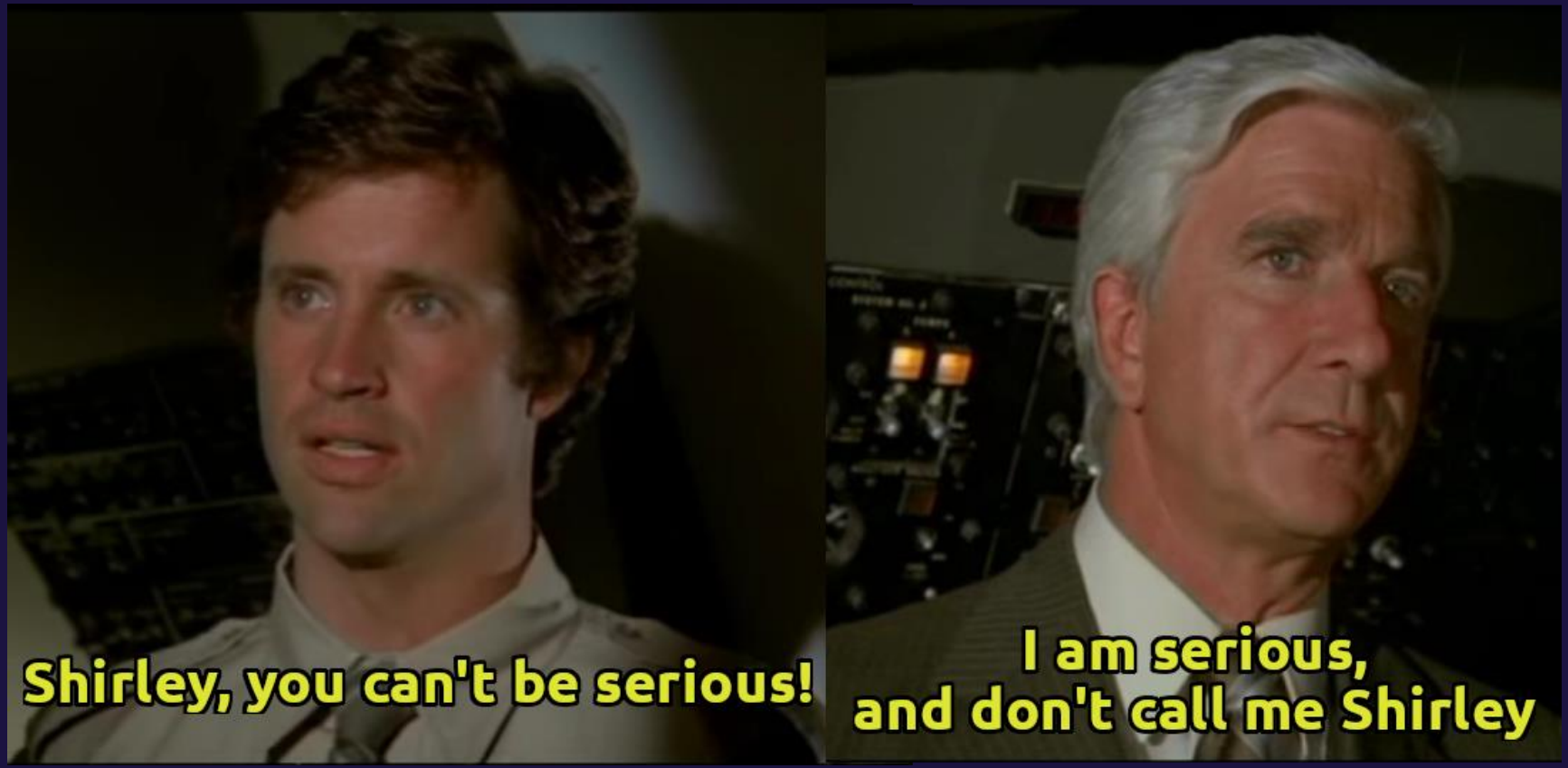
Last, but not least — the reason this whole story is possible.

02

THE SECRET WEAPON

We bought a network we never touched

ContainerLab gave us the confidence to commit to hardware before it ever shipped.


Shirley, you can't be serious!
I am serious,
and don't call me Shirley

WHY IT WORKED

Six things ContainerLab gave us

Lightweight

Containers, not VMs. The whole DC project fit on a 32 GB laptop.

Faithful images

Nokia-provided images that match real model and version behaviour.

Working starting points

Lab examples ship with working config — start the design from there.

A lab fits in a repo

YAML topology, configs, deploy & test scripts. Shareable like any code.

Real Linux networking

vnet links → capture, inject, flap, packet-loss with ip/netns.

Automatable end-to-end

Deploy, change, test — control plane and data plane. All scripted.

THE RECEIPTS

The numbers that mattered

36

Devices

Delivered direct to site. Racked. Cabled. Configured. Into service inside 14 days.

400k

Invested

0

post-deploy changes

Every device worked first time, with the lab-tested config.

100%

scaling figures held

Every limit we measured on hardware was reflected in Clab.

The bottom line. *Clab let us validate design, config and scale without owning the gear.*

Proton
Privacy by default

HONEST LIMITS

What ContainerLab can't do

Performance

You cant speed test a container.

Broadcom is Broadcom, but still…

Mitigation: Ask the SE to share testing data from Antwerp.

HW-only behaviours

GNMI Race-condition when VLAN tagging many interfaces (03764186).

Link-local ND quirks on certain models (468674).

BFD over unnumbered BGP broken in v23.

Mitigation: Caught on first hardware deploys. Documented, reported, fixed.

Lifecycle ops

Software upgrade, reboot, and the issues those can trigger.

ZTP – Duh

v23>24 upgrade swapped centos for Debian and they forgot SSD Trim.

Mitigation: Validated on real devices during commissioning windows.

Net result. *Clab helped us catch the vast majority of issues before they hit prod.*

03

SCALING IT UP

So we did it again. Bigger. Bolder. The brownfield migration.

Switzerland · 2025 · 86 devices · a new design · a seamless backfill

2025 · SWITZERLAND

New site, polished design

SCOPE

86

devices

7220 IXR D1, D2, D3, D5 (replaced H2)

7750 SR-1

DESIGN CHANGES

01 **Fabric & core rework**

Removed VRF leaking. Replaced with interface ACLs towards the core.

02 **Simpler anycast routing**

Made possible by the ACL-based segmentation above.

03 **Protocol standardization**

Removed numbered BGP and OSPF. Unnumbered BGP (v6) everywhere.

04 **New capability foundations**

Flow visibility, DDoS scrubbing, and more on the roadmap.

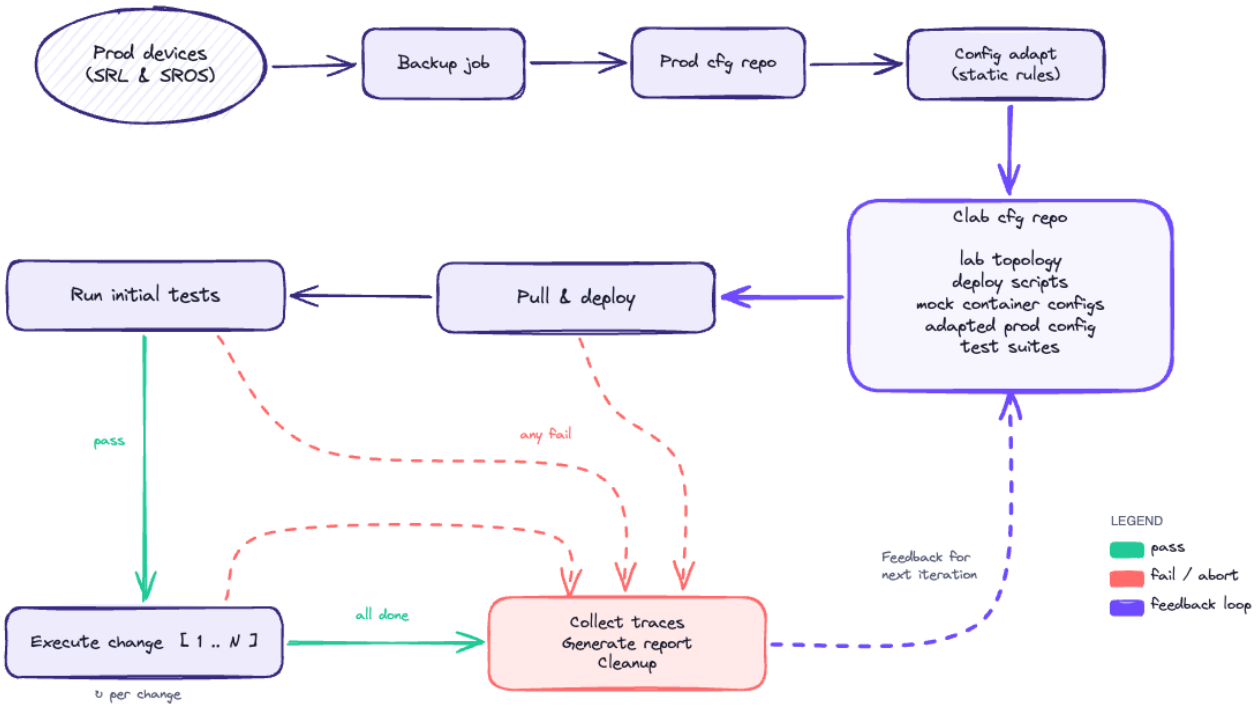
Plus. Upgrade 23.10 → 24.10 and backfill to Norway. Seamlessly.

Proton
Privacy by default

THE PROCESS

What our change process looks like

Prep is linear. Iteration is a cycle. The feedback closes the loop.



WHAT'S NEXT

Two bets we're making for the year ahead

01

CI/CD for every change

Generalize Clab-based validation to all production changes.

- Pipeline-driven validation, not bespoke runs
- Templates → CMDB → config → lab → prod
- Test suite as a first-class deliverable

02

Clabernetes everywhere

Stand up a Clabernetes cluster — scale far beyond one DC.

- Validate the global network, not just a site
- Larger topologies, parallel scenarios
- Shared lab as a platform across teams

IF YOU REMEMBER THREE THINGS

Takeaways

01

Lab-tested config is shippable config.

We've now deployed three datacenters where the first config push worked. Not luck — process.

02

Container labs scale further than you think.

A 32 GB laptop can hold a real DC. A cluster can hold the whole global network. The economics are different now.

03

Confidence is the deliverable.

Clab didn't just validate changes — it changed how we plan and execute migrations. That's the real win.


PRIMARY-ROUTER#
@network_phil

Proton

Thank you

Questions, war stories, hot takes, abuse?

Join Proton

John Howard
john.howard@proton.ch

Privacy by default