VyOS Networks

VYOS SUCCESS STORY

UEC Tokyo Builds Redundant Full-BGP Infrastructure for Hands-On Network Training with VyOS

Customer Overview

AS38649 (UEC-EXP) is an educational and experimental network operated by the Yazaki Laboratory at the University of Electro-Communications (UEC Tokyo). It is intentionally separated from the university's production infrastructure, providing students and researchers with a dedicated environment for learning, testing, and validating network technologies.

Through AS38649, student members gain hands-on experience with internet routing, peering, and day-to-day network operations. Rather than relying exclusively on simulation, the laboratory gives students direct exposure to the protocols, configurations, and operational practices used in real networks.

The Challenge

As AS38649 grew, the Yazaki Laboratory needed to introduce router redundancy while preserving the technical capabilities of a full-view BGP environment.

The lab had primarily relied on proprietary hardware routers, but several limitations made that model difficult to scale:

- **Hardware costs made redundancy impractical:** Deploying multiple routing appliances required an investment level that was difficult to justify in a research environment.
- **Full View BGP capability was essential:** Any new platform had to carry and process complete Internet routing tables reliably, not a reduced lab-scale route set.
- **It had to run a real network, not a simulation:** The team wanted a proven network operating system it could trust as the operational edge of AS38649.
- **Students needed direct access, at scale:** The environment had to be one that every student member could configure, validate, and operate as part of their training, rather than a scarce shared resource.

The laboratory, therefore, began looking for a flexible, software-based platform that could support both resilient routing infrastructure and practical network education.

Why VyOS

Student members were already using VyOS for personal and hobby projects, giving the laboratory an initial level of familiarity with the platform. The team evaluated BIRD and FRRouting alongside VyOS before making its decision. VyOS stood out because it provided:

- **A proven Full View BGP platform:** VyOS has an established track record of handling complete internet routing tables in operational environments.
- **A familiar, structured CLI:** The syntax was close to what the team already knew from its existing hardware routers, reducing the learning curve for experienced operators and students alike.

- **Strong community and documentation:** Abundant, well-organized information gave the team confidence that it could deploy and operate the platform independently.
- **Linux-based flexibility:** Built on Debian, VyOS let the team customize system behavior and perform deeper analysis when needed, alongside built-in integrations such as the Zabbix monitoring agent.
- **Modern networking capabilities:** Built-in support for protocols and technologies such as VXLAN and WireGuard expanded the range of use cases the laboratory could explore.

The team also highlighted the attentive and thorough support it received from VyOS throughout the evaluation process.

Implementation

The Yazaki Laboratory deployed VyOS entirely in-house and completed integration in approximately one week.

The implementation included:

- **BGP edge routing** with full Internet routing tables
- **OSPF integration** with the laboratory's existing network environment
- **Redundant software-based router configurations** without dependence on multiple proprietary appliances
- **Virtual routing environments** for validation, experimentation, and student training

The BGP and OSPF configurations came together smoothly. Well-organized documentation answered the questions that arose along the way and removed any need for external professional services.

VyOS now operates as the laboratory's BGP edge router.

Results

Five months after deployment, VyOS runs the laboratory's production BGP edge and has met every goal the team set for the project:

- **Redundancy without appliance sprawl:** Resilient router configurations no longer depend on acquiring multiple proprietary hardware appliances.
- **Lower infrastructure costs:** Retiring dedicated routing hardware freed up budget while maintaining the full-view BGP capability the lab requires.
- **Fast, self-sufficient deployment:** Staff and student members completed the entire implementation in about one week, without outside help.

The team is already recommending VyOS to others looking for a flexible, accessible software router.

Operational and Educational Impact

VyOS now supports both the operation of AS38649 and the Yazaki Laboratory's broader educational mission in two ways that matter most to the lab.

Training resources that were once out of reach are now standard issue. Working with full internet routing tables once required specialized hardware that few students could ever touch. Because VyOS deployments are not tied to licenses, the laboratory can stand up as many routers as its training programs need: every student member can now work in a complete, realistic, production-level BGP environment, configuring routing protocols, building virtual routers, and troubleshooting real network behavior on the same platform that runs the laboratory's edge.

Maintaining the lab became a much smaller task. Creating, rebuilding, and retiring validation environments is now routine work rather than a hardware project. Unlimited, license-free deployments make it trivial to prepare fresh environments for student and research projects, and strong documentation lets the team operate and evolve the entire setup using their own resources.

By combining operational routing with a practical training environment, VyOS provides students with experience directly relevant to real-world network engineering.

Looking Ahead

The Yazaki Laboratory is considering several ways to expand its use of VyOS:

- **Deploy a VyOS looking glass node** to provide greater routing visibility and support troubleshooting
- **Automate configuration workflows,** with NETCONF-based tooling among the options under evaluation
- **Expand hands-on training exercises** around real-world VyOS deployment scenarios
- **Develop additional validation environments** for routing, peering, and modern networking protocols

For the Yazaki Laboratory, VyOS has turned a hardware constraint into a teaching platform: a redundant, full-view BGP edge that its students can operate, rebuild, and learn from.

> *VyOS allows us to easily build virtual routers with fully functional BGP, giving student members hands-on opportunities to work with BGP and use it for training exercises. This is especially valuable because hardware capable of handling full BGP routes is typically difficult to obtain.*
>
> — Koichi Hirachi, Network Team, Yazaki Laboratory, AS38649 (UEC-EXP), University of Electro-Communications (UEC Tokyo)