

USER STORY

From Data Center to Edge: How Dell IT Deploys SONiC at Global Enterprise Scale

Organization

Dell Technologies has been a pioneering force in the SONiC community since the project’s earliest days, actively contributing to its development and evolution as one of the largest and consistent upstream contributors. From SONiC’s inception in 2016, when Microsoft open-sourced containerized network operating system—Dell has played a key role in enhancing its capabilities for broader adoption, including early contributions and internal deployment. Dell’s long-standing commitment extends to leadership within the Linux Foundation, guiding strategic direction, fostering ecosystem collaboration with silicon vendors, and accelerating industry-wide adoption.

Dell IT is the internal global IT organization within Dell Technologies, tasked with managing and innovating the company’s extensive IT infrastructure. It oversees operations across 23 global data centers and 10 manufacturing sites, supporting approximately 100,000 users worldwide. Dell IT’s networking environment spans diverse domains, including core data centers, edge locations such as branch offices and customer solution centers, and manufacturing/factory sites. By leveraging advanced technologies, Dell IT drives digital transformation both internally and for customers, delivering comprehensive solutions—from infrastructure and data services to cutting-edge networking—that enable businesses to modernize operations, accelerate innovation, and achieve sustainable growth.

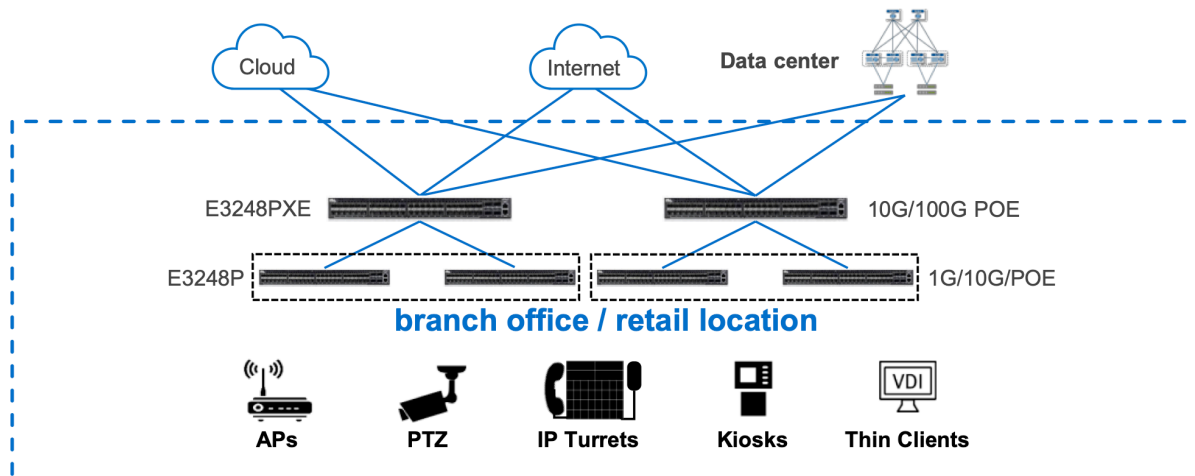
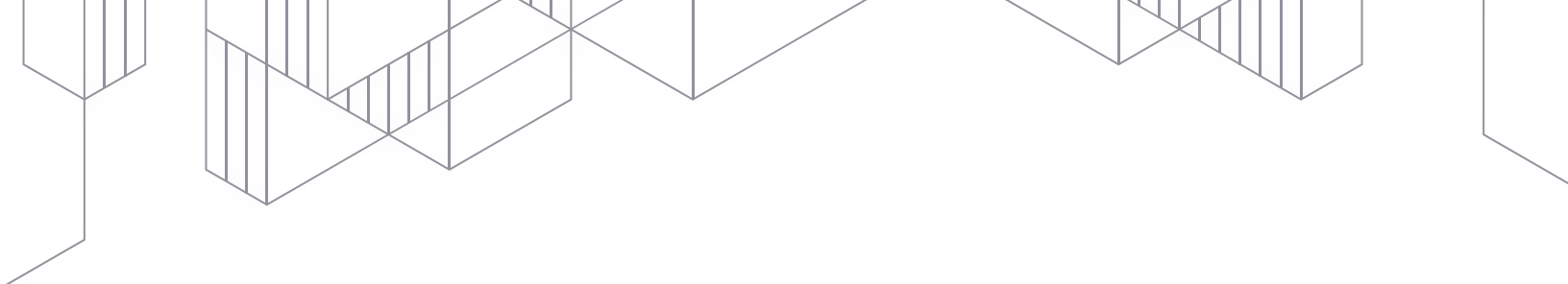


Figure 1. Dell IT SONiC Deployment at the Edge



Dell IT's extensive internal deployment of SONiC—scaling across global data centers, edge locations, and manufacturing sites—serves as a powerful testament to the technology's production readiness, resilience, and enterprise-grade viability, while underscoring Dell Technologies' unwavering dedication to SONiC as a cornerstone of open, innovative, and future-proof networking.

Overview

Dell IT recognized open-source networking as essential to future-proofing infrastructure and leading innovation. Historically managing multiple proprietary operating systems across diverse switching platforms between data center and edge created fragmentation, hindering standardization and automation. Dell IT aimed for a unified network environment that streamlines operations, reduces manual effort, and supports varied use cases with enhanced flexibility, scalability, and rapid feature evolution.

Core motivations included minimizing operational costs through automation, eliminating single points of failure

for greater resilience, and adopting a community-backed platform for accelerated innovation. SONiC (Software for Open Networking in the Cloud) stood out for its thriving open-source community, enterprise-grade capabilities (such as BGP EVPN, VXLAN overlays, and rich telemetry), and widespread adoption in hyperscale production environments. By choosing SONiC, Dell IT brought hyperscaler-level innovation in-house—enabling disaggregated, modular networking that avoids vendor lock-in and positions the organization to evolve swiftly with technologies and new use cases like AI Fabrics.

Dell IT's deployment demonstrates thought leadership in applying hyperscaler practices to enterprise IT: leveraging SONiC's containerized microservices architecture, where each network function (e.g., BGP, LLDP, SNMP) runs in independent Docker containers for isolation, fault tolerance, and independent updates. This enables easier, non-disruptive upgrades, patches, and feature additions without impacting unrelated services and downtime, contrasting sharply with monolithic proprietary NOS approaches.

Deployment Details

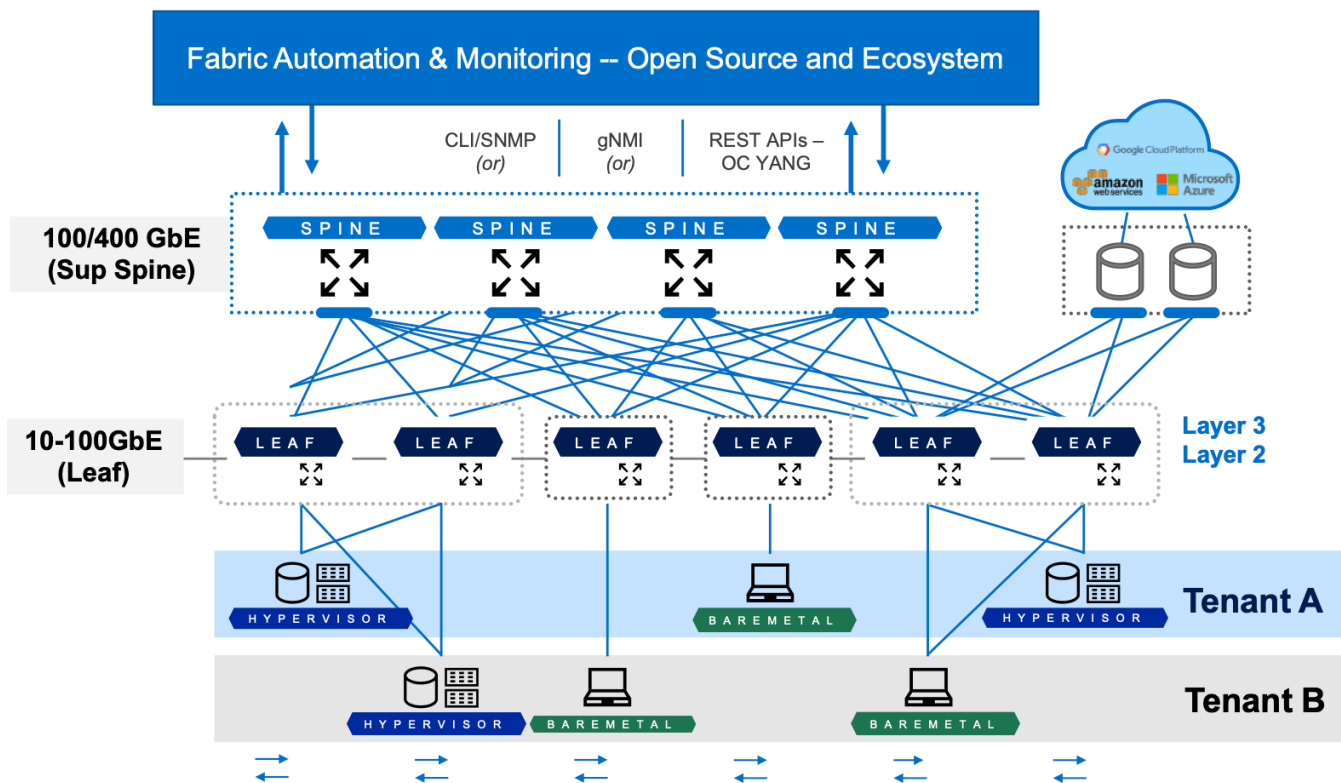


Figure 2. Dell IT SONiC Deployment for EVPN VXLAN Fabric with Multitenancy

Dell IT’s SONiC deployment utilizes Dell PowerSwitch platforms supporting multi-rate ports from 1G/10/25/100/400G and 800G, currently scaling beyond 3400 SONiC switches in production across Core and AI Data Center environments and 1/10G PoE (Power over Ethernet) for Branch Edge and Manufacturing locations, all running SONiC as a unified operating system. The architecture employs a highly scalable Clos topology (two-tier or three-tier leaf-spine with super-spine for pod interconnects):

- **Leaf layer:** Server connectivity at 10/25G, uplinks to spines at 100G.
- **Spine layer:** Aggregation at 100/400G.

- **Super-spine layer:** Pod interconnection at up to 800G.
- **Border leaves:** External connectivity at 25/100G.
- **AI Fabrics:** 800G connectivity
- **Edge Locations:** 1/10G PoE switching

Phased integration ensures business continuity, gradually incorporating SONiC platforms into the fabric. This rollout has activated critical features:

- Advanced automation for provisioning and configuration
- Unified NOS management across Core, AI and Edge use cases

- VXLAN overlays for workload mobility and segmentation
- Enhanced monitoring and observability via streaming telemetry
- Streamlined lifecycle management for upgrades and operations

The unified SONiC platform now manages core data centers and edge environments consistently, treating edge sites with the same connectivity, tools, and observability as data centers — enabling centralized control, standardized policies, and simplified operations across the entire footprint.

Benefits

Facilitating Modern IT and AI Workloads

Over the 12-15 months since initial deployment, Dell IT has seamlessly expanded SONiC to over 3400 devices with zero major incidents, consolidating disparate systems into a single standardized platform and slashing operational complexity. SONiC’s open, modular design—rooted in hyperscaler best practices—allows precise tailoring to use

cases without proprietary constraints. Its containerized architecture integrates smoothly with existing tools, replacing legacy systems with a unified OS across data centers and edge. This delivers unmatched agility, scalability, and the freedom to pivot rapidly as technologies evolve, including easier deployment of Core and AI workloads through lossless fabrics, RoCE support, Adaptive Routing, Telemetry based congestion management and avoidance, and high-bandwidth scaling.

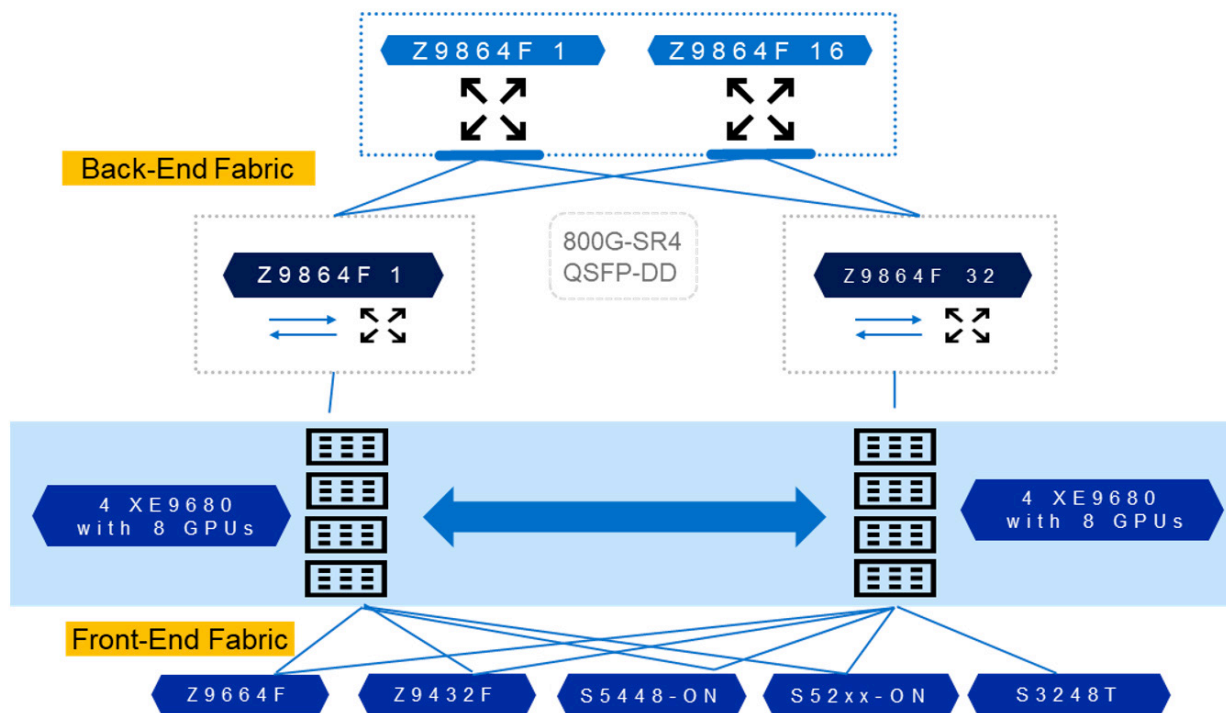


Figure 3. SONiC Deployment for AI Fabrics

Greater Automation, Efficiency, and Robustness

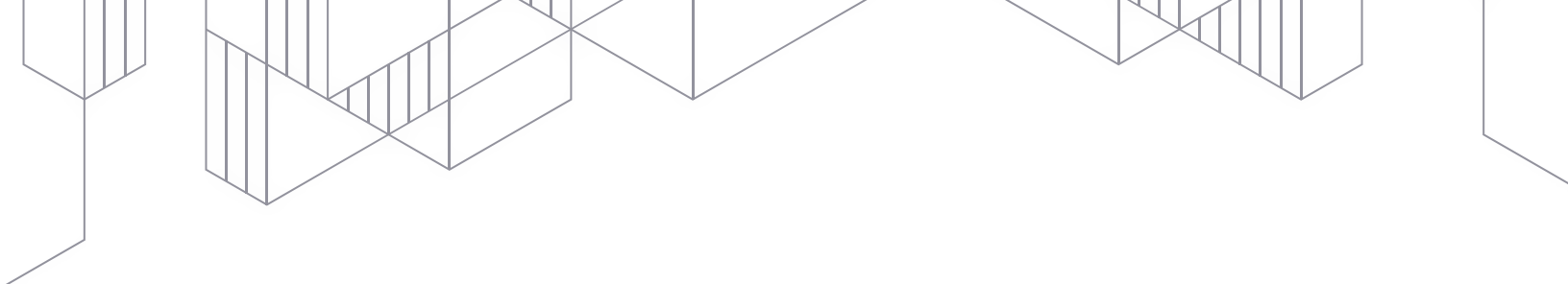
SONiC automates routine tasks, drastically cutting manual intervention and costs while freeing teams for strategic innovation. Standardization across all 23 global data centers ensures consistent, error-free deployments and uniform behavior. The Docker container model provides inherent robustness—isolating failures, enabling granular scaling, and simplifying updates/upgrades by targeting specific services without full-system disruption. Community-driven peer review accelerates vulnerability fixes and feature delivery, strengthening security and reliability in a more robust, scalable solution.

Benefitting from a Connected Community and Hyperscaler Innovation

Embracing SONiC connects Dell IT to continuous, community-fueled advancements from thousands of contributors and industry leaders. This infuses enterprise-grade features with hyperscaler velocity, enabling Dell IT to deploy innovations faster than traditional models allow.

Lessons Learned

- 1. Open source maturity is real** SONiC has moved far beyond “hyperscaler-only solution” status. Dell IT’s multi-thousand switch deployment across Core, AI, and Edge use cases proved that SONiC is not just ready — it is production-hardened open network OS ready for enterprise deployment at scale.
- 2. Community velocity is real — but you get out what you put in** The speed at which features, fixes, and improvements appear is astonishing... but the companies that influence the roadmap the most are the ones who actively contribute code, test cases, requirements, and feedback. Passive consumption works — active participation wins.
- 3. Telemetry & observability maturity matters more than most people realize at first** SONiC’s streaming telemetry + open, rich data models allow you to build dramatically better monitoring than was possible with most legacy vendors. Once you have real-time, high-resolution visibility everywhere, it changes how you troubleshoot, how you capacity plan, and how you prevent incidents.
- 4. Phased, business-aware rollout is the only sane way to transform at this scale** Trying to do a flash-cut to a new network OS across a global environment is extremely risky. The controlled, incremental, zero-major-incident rollout strategy that Dell IT followed was the single biggest factor in building organizational trust and momentum.
- 5. You must invest in automation early** The full value of SONiC is unlocked when you build (or adopt) automation from the beginning. Organizations that try to manage SONiC manually at scale quickly realize they are missing most of the economic and operational benefits.
- 6. Edge and data center can (and should) be managed with the exact same OS and same tools** One of the biggest operational wins was proving that the same SONiC image, same automation pipelines, same telemetry stack, and same operational playbooks can be used across core data center fabrics and widely distributed edge / factory / briefing center locations. This unification dramatically reduces operational complexity and cognitive load.
- 7. Open networking is no longer a “future” strategy — it is the current best practice for large-scale, forward-looking organizations – Hyperscalers or Enterprises** The hyperscalers were first followed by early adopter enterprises. We are now entering the phase where the most advanced enterprises realize that staying on



legacy monolithic proprietary NOS is the riskier, slower, and more expensive path. Open Networking.

Future Plans

Dell IT's experience underscores SONiC's transformative power: it introduces open standards, superior automation, granular telemetry, and container-driven modularity, empowering networks customized to exact needs while bringing hyperscaler innovation to enterprise scale. Managing edge environments with data center like consistency has proven feasible and highly beneficial, reducing operational silos and enhancing visibility.

Dell IT plans aggressive expansion of SONiC footprint to 12,000 switches in the coming year, fully extending SONiC to all Core and AI data centers and Branch Edge locations, including executive briefing centers, customer solution centers, and manufacturing sites. By leveraging SONiC's containerized ease of updates, feature richness, and edge-to-core unification, Dell IT ensures a resilient, future-proof network infrastructure that not only meets current demands but pioneers the next era of networking innovation.



Join SONiC

Become a SONiC member to collaborate, learn and shape the future of the Open Network Operating System.

sonicfoundation.dev/join-sonic