



CASE STUDY

How Broadcom Unified 10,000+ Switches Across 7 Data Centers and 93 Sites on SONiC

A SONiC transformation: from legacy lock-in to open networking at global scale

Why This Story Matters

For years, the conventional wisdom was that enterprise networking meant accepting vendor lock-in: pay for the software, pay for the hardware, pay for support, and accept that change is painful and slow. Broadcom, one of the world's largest semiconductor and infrastructure software companies, decided to challenge that assumption from the inside.

This is the user story of how Broadcom's own IT organization replaced its entire global network—16 data centers, WAN routers at 93 sites, campus networks, and lab environments—with SONiC running on open, disaggregated hardware. The result: better performance, zero-downtime upgrades, dramatically lower costs, and a network their team is no longer afraid to touch.

At a Glance

10,000+

SONiC switches
deployed

16 to 7

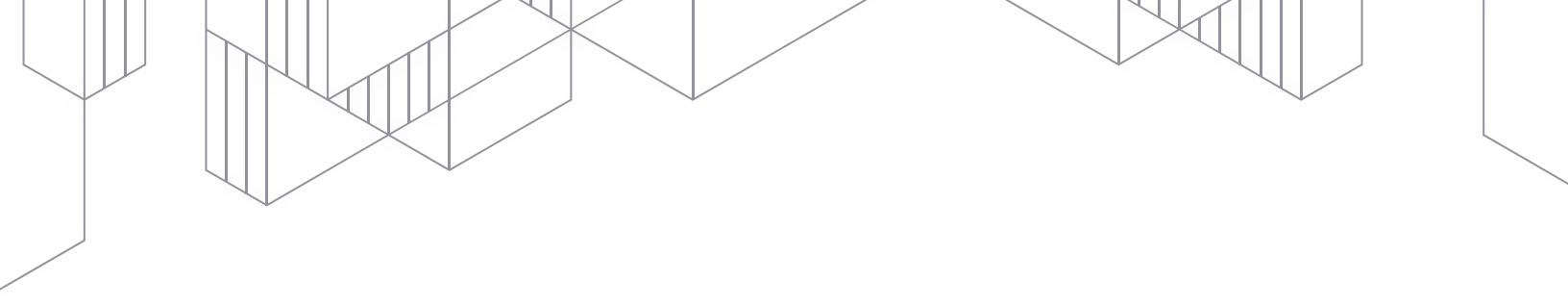
Data centers
consolidated

93

WAN sites
migrated

0

Downtime during
upgrades



The Problem: A Network Everyone Was Afraid Of

By 2019, Broadcom's largest data center in Las Vegas had grown to 600 racks served by just two Layer 3 gateways. The network had accumulated years of organic growth -- complex VLAN extensions, spanning tree everywhere, and heavy dependence on a single proprietary OEM vendor whose products came with extensive features and, as the team put it frankly, extensive bugs to match.

The architectural requirements were clear:

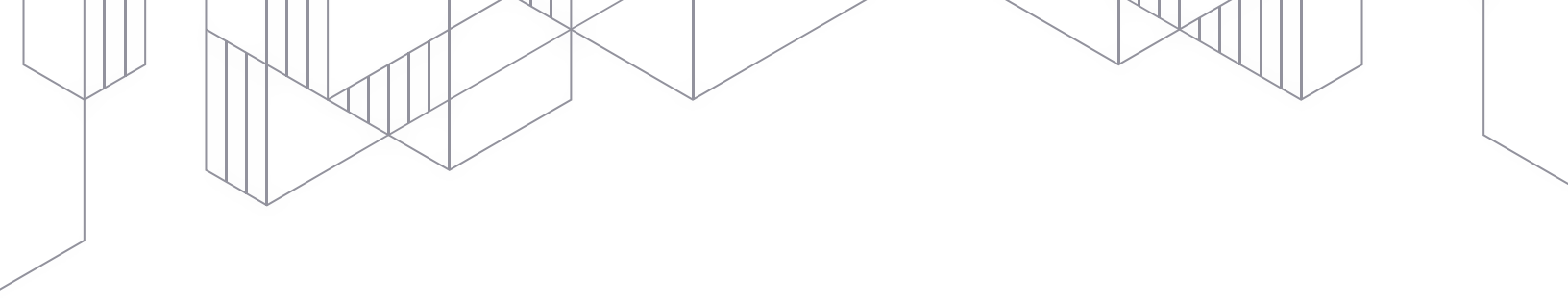
- **Scale without complexity:** the network had to grow without becoming harder to operate
- **No vendor lock-in:** the team was tired of paying millions annually for proprietary support contracts
- **Multi-tenancy:** with 24 divisions including security research labs that detonate live malware, strict traffic isolation was non-negotiable
- **Strong security:** VRF-based segmentation was essential, not optional
- **Automation-first:** manual CLI management at this scale was unsustainable
- **Cost efficiency:** open hardware and software had to be justifiable on the numbers

There was one NOS that checked every box: SONiC.

The Pain

"People were scared of going and making a change there. Nobody knew what would happen. One trip-up on HSRP and the entire DC could go down."

— Tobin Hawkshaw, Network Architect, Broadcom IT



The Solution: SONiC, Spine-Leaf, and Symmetric VXLAN

Starting with a pilot in Reno in 2019, Broadcom IT rolled out a modern spine-and-leaf architecture across all data centers, replacing the old three-tier spanning-tree topology with a symmetric VXLAN fabric running BGP EVPN.

Data Center Architecture

The flagship Las Vegas data center, now grown from 600 to 1,400 racks, illustrates the design philosophy:

- 20 racks per pod, 4 spines per pod, with 400G uplinks per ToR
- Symmetric VXLAN with VRFs: 15 VRFs per pod, with a firewall handling inter-VRF traffic—no VRF leaking, keeping operations simple
- A hub-and-spoke Pod Zero connects all pods, with iBGP multisite stretching subnets between pods and border leaves sharing host routes
- Trident 4-based superspines connect all pods at 400G with breakouts to 100G
- Nearly 5,000 switches in this single data center alone

The team was deliberate about keeping the design operationally simple—consistent architecture across every pod, one SONiC version everywhere, making upgrades predictable and repeatable.

Key Win

Zero-downtime upgrades, at least once or twice a year, across an entire data center—unthinkable on the legacy platform.

WAN and Campus Expansion

Following data-center success, the team moved quickly. By 2022 Q3, SONiC had replaced WAN routers across all 7 data centers and 93 branch sites. Because Broadcom was already running BGP peering with carriers, the swap was straightforward — and the pattern was replicable at pace.

By 2023 Q1, campus rollout was underway: core, distribution, and access layers at all sites, covering approximately 700 campus switches and 300 lab switches. The campus design mirrors the data center philosophy, three-tier hierarchy, MCLAG between access switches, BGP peering at every layer.

Scale Note

The VMware acquisition briefly expanded Broadcom from 7 back to 16 data centers. All were brought to SONiC standard within the target window.

Learnings Along the Way

No transformation at this scale is without friction. The table below captures the key challenges and how the team worked through them:

One learning stands out: SONiC's open, community-driven model meant that when Broadcom hit a gap—like the absence of symmetric VXLAN in early versions—they could contribute the fix themselves and benefit the entire ecosystem. That is a fundamentally different relationship with your network software than a traditional vendor contract provides.

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Site	Challenge	How It Was Resolved
DC	Need for EVPN/VXLAN	Broadcom contributed EVPN/VXLAN to SONiC in 2019, working closely with the community
DC	Symmetric VxLAN not available until 2020	Network was racked in CLOS but used STP as a stopgap until symmetric VxLAN arrived
DC	Firewalling in a decentralized network	Inserted firewalls in the path of inter-VRF traffic; team continues to optimize toward a distributed model
All	Early SONiC versions had bugs	Worked closely with the SONiC software team to identify and resolve issues quickly
All	Paradigm shift for network engineers	Moved from manual CLI to Ansible to Pantheon's Sandwork Orchestrator; teams are now fully bought in
All	Hardware vendor optics / tuning	Some early tuning file issues resolved with vendor support; now benefits from competitive optic sourcing

What's Next: Eliminating Spanning-Tree and MCLAG in the DMZ

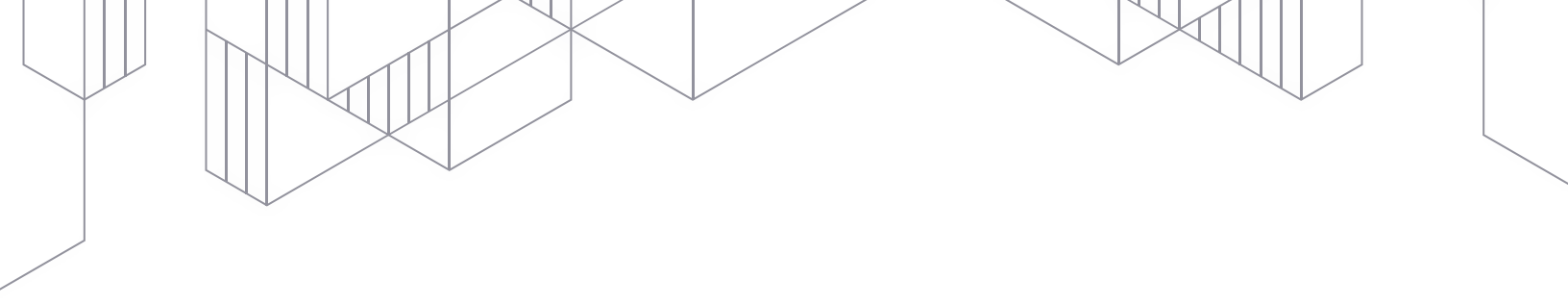
With the core transformation complete, attention has turned to the one remaining area where legacy protocols still create risk: the DMZ, which currently runs an L2 network with MCLAG and spanning tree.

The future design replaces MCLAG with ESI (Ethernet Segment Identifiers) and extends VXLAN into the DMZ, bringing the same resilience and simplicity of the data-center fabric to the network edge:

- ESI replaces MCLAG - servers still see a single logical device via LACP, but there is no MCLAG sync, timing, or optic dependency between switches
 - BGP peering to DMZ access switches enables direct NSX T0 peering at the access layer, improving VMware NSX integration
 - Distribution switches act as pure BGP route reflectors, dedicated to routing only, no VRFs at distribution layer
 - Full automation of configuration and support functions, reducing human error
- VXLAN-based CLOS fabric replaces the L2 DMZ, eliminating spanning tree

Results and Business Impact

Cost Savings	Eliminated millions of dollars per year in proprietary support contracts. Optics now sourced competitively with next-day delivery.
Operational Confidence	Engineers no longer afraid to make changes. Upgrades happen at least twice a year across entire data centers with zero downtime.
Scale	Flagship DC grew from 600 to 1,400 racks. 16 data centers consolidated to 7. 10,000+ SONiC switches and growing.
Security & Isolation	VRF-based multi-tenancy separates 24 divisions including active security research labs from corporate traffic.
Automation	Progressed from manual CLI to Ansible to a full orchestration platform (Pantheon Sandwork). Changes driven by code.
Community	Broadcom contributed EVPN/VXLAN to SONiC in 2019—improvements that benefited the entire ecosystem.



The Broader Lesson

Broadcom's journey is a proof point that matters not just because of its scale, but because of who it involves. A company that manufactures the silicon inside most of the world's network switches chose open networking and SONiC for its own infrastructure, not as a demonstration, but because it was simply the right technical and business decision.

The vision of disaggregation, open standards, and no vendor lock-in has moved from theoretical ideal to operational reality at one of networking's most demanding environments. The network that everyone was once afraid to touch is now upgraded on a schedule, managed by code, and scaled to tens of thousands of switches without drama.

In Their Words

“We have been able to transform all of Broadcom's data centers. We are running SONiC everywhere, not just in the data center, but in campus and WAN as well.”

— Kamran Naqvi, Broadcom Core Switching Group



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sonicfoundation.dev/join-sonic