What is SONiC and how can enterprises try the open-source NOS?

Software for Open Networking in the Cloud (SONiC) is an open-source networking operating system that has the potential to become 'the Linux of networking,' experts say.

Interest in the open-source network operating system SONiC is rising as major networking vendors and start-ups look to offer resources to help enterprises give SONiC a try. A growing community of developers and users believe SONiC could change the way many large enterprises, hyperscalers and service providers run their networks.

What is SONiC?

The Linux-based SONiC – which stands for Software for Open Networking in the Cloud – decouples network software from the underlying hardware and lets it run on hundreds of switches and ASICs from multiple vendors while supporting a full suite of network features such as Border Gateway Protocol (BGP), remote direct memory access (RDMA), QoS, and Ethernet/IP. One of the keys to SONiC is its switch-abstraction interface, which defines an API to provide a vendor-independent way of controlling forwarding elements such as a switching ASIC, an NPU, or a software switch in a uniform manner.

SONiC is seen as a significant alternative to more traditional, less flexible network operating systems. Its modularity, programmability and general cloud-based architecture could make it a viable option for enterprises and hyperscalers to deploy as cloud networking grows.

Who created SONiC?

The Linux-based NOS was created by Microsoft for its Azure data centers and then open-sourced by Microsoft in 2017. In April 2022, Microsoft turned the project over to the Linux Foundation and its 450,000 developers.

The Linux Foundation focuses on the software element of SONiC, while continuing to partner with the Open Compute Project for hardware developments and evolving specifications. “The reason we made this change is because the Linux Foundation has been the center of gravity for the larger open-source community – particularly in enterprise,” said Dave Maltz, technical fellow and corporate vice president of Microsoft Azure networking, back in 2022.

Moving SONiC development to the Linux Foundation was a good move for SONiC and beneficial for the SONiC community, according to industry watchers. “SONiC will gain exposure under the auspices of the Linux Foundation, helping it sustain and expand community engagement and contributions,” said Brad Casemore, research vice president, datacenter and multicloud networks for IDC, at the time of the shift. “We should see SONiC continue to extend into new use cases.”

SONiC adoption on the rise

Some of the driving ideas behind SONiC-based systems are to simplify, scale and bring flexibility to cloud and edge networking environments.

“SONiC adoption will significantly outpace the overall market with growth in the coming years,” said Alan Weckel, an analyst with the 650 Group, in a 2022 Network World article about enterprise interest in SONiC.

“We will see two approaches to SONiC,” Weckel said. “The first and more common one will be enterprises using SONiC in combination with branded boxes from Arista, Cisco, Dell, and Juniper to get their feet wet and benefit from SONiC without huge risk.”

The second approach will be more of a pure-play SONiC, where it is installed on white-box switches and the existing network is replaced with SONiC, a model Weckel said would be viewed as “as a true replacement of branded vendor infrastructure. There are a lot of cloud automation pieces in SONiC that enterprises can use to complement existing vendors, which is why the first path will be more common.”

Weckel noted that SONiC can help solve challenges created by expanding multi-cloud environments and the need to move and shift workloads between clouds and on-prem environments: “SONiC continues to expand in both the T2 Cloud and the enterprise market. There is a lot of interest out there in SONiC from a NOS perspective, but also in developing an ecosystem on top of that for

additional services," he said in a 2023 Network World article about Cisco and Aviz working together.

The 650 Group predicts that worldwide SONiC revenue will exceed $8 billion in the data center switching arena by 2027.

Enterprise SONiC concerns

While SONiC is starting to attract the attention of some large enterprises, deployments today are still mainly seen in the largest hyperscalers.

"One of the biggest challenges when deploying an open operating system is knowing who to go to when things aren't working exactly as they should. Meaning, for anyone without an army of engineers to troubleshoot, this approach may be too risky," said Kevin Wollenweber, senior vice president and general manager with Cisco networking, data center and provider connectivity. (Wollenweber spoke to Network World for a 2023 article about Cisco teaming with Aviz Networks to offer an enterprise-grade SONiC offering.)

"This agreement is innovative in that it cuts out the finger-pointing that is typically associated with the integration of different solutions and focuses on issue resolution. As enterprises and service providers more broadly consider SONiC for their networks, end-to-end support is a critical aspect for adoption," Wollenweber said.

Vendors embrace SONiC

The vendor community supporting SONiC has been growing and includes Dell, Arista, Nokia, Alibaba, Comcast, Cisco, Broadcom, Juniper Apstra, Edgecore, Innovium, Nvidia, Celetica, and VMware. It has also been integrated with other

open-source projects, including Kubernetes and Ansible, and is being used by Verizon, AWS, Netflix and others to develop cloud-based services.

Startups, in particular, have increased SONiC's momentum by promising to deliver enterprise-grade support for the NOS.

Recent SONiC product and service highlights include:

- 10 vendors join SONiC project: In April 2024, SONiC added 10 new members to its roster of developer and contributor vendors: Asterfusion Data Technologies, Augtera Networks, Celestica, Denvr Dataworks, Edgecore Network Corporation, Micas Networks, Netweb Technologies, PalCNetworks, QualitySoft Corporation, and EPFL.
- SONiC launches new workgroup for enterprise edge: Member organizations Aviz Networks, Wistron, Cisco, and Celestica helped form the PoE Edge Networks with SONiC (PENS) workgroup. This initiative seeks to adapt SONiC – which is traditionally used in cloud-scale and data center networks – for enterprise edge networking environments. The workgroup will adapt SONiC to edge LANs, integrating specialized protocols including Power Over Ethernet (PoE), Spanning Tree, and 802.1x, which are essential for enhancing connectivity and network efficiency at the enterprise edge.
- Aviz gives its enterprise SONiC offering an AI boost: Avizcontinues to add features to its enterprise-grade SONiC offering. The latest addition is an AI-based package called Network Copilot that's aimed at improving network operations, management and capacity planning. The ultimate goal is to help network professionals integrate AI into their daily jobs and streamline the way organizations operate their future networks, according to Vishal Shukla, CEO for Aviz. "Right now, network operations are template driven. But going forward, operations will be data driven, and AI will help you to manage your network from the observability and the

orchestration point of view, ultimately making networks open and much easier to manage," Shukla said.

- Cisco and Aviz coordinate support for enterprise SONiC networks: In late 2023, Cisco teamed up with Aviz Networks to offer an enterprise-grade SONiC offering for large customers interested in deploying the open-source network operating system. Under the partnership, Cisco's 8000 series routers will be available with Aviz Networks' SONiC management software and 24/7 support. "The agreement also shows that Cisco's customers are getting more vocal about asking for SONiC, and that Cisco sees the Aviz partnership as an advantage for the 8000 Series," said The 650 Group's Weckel. "It also shows Cisco is clearly seeing SONiC demand beyond one or two hyperscalers."
- SONiC test lab gains industry support: Aviz Networks and a group of well-established industry vendors and organizations are collaborating on a testing facility. The Open Networking Experience (ONE) Center for SONiC, announced in 2023, is being offered by SONiC startup Aviz and will be supported by collaboration with Linux Foundation, The Open Compute Project, Celestica, Cisco, Edgecore, Nvidia, Ragile, Supermicro, Wistron, and Keysight. The lab will feature online and in-person access at no cost for network operators to try out the capabilities of SONiC across a wide range of hardware, according to Aviz.
- Cisco invites enterprises to its SONiC sandbox: Cisco showed support for SONiC in September 2023 by rolling out SONiC Developer Sandbox, which provides a Cisco 8000 emulator that lets customers build virtual network simulations (or labs) to experiment with new topologies, protocols, and configuration changes. In the sandbox, customers can automate network tests through CI/CD pipeline integration and learn more about SONiC and the Cisco 8000 line. The sandbox topology includes four Cisco 8000 routers that run SONiC and a Linux server that functions as a traffic generator.
- Aviz attracts new investors, including Cisco: Cisco is part of Dec. 2023 round of investing aimed at making Aviz Networks' SONiC-based operating system more mainstream. Founded in 2019, Aviz Networks has previously

raised $4 million with venture capital firms, including Accton, Moment and Wistron, as well as vendors Broadcom and Edgecore. Cisco's contribution brings its latest funding round to $10 million.

- Hedgehog launches: Hedgehog announced its launch in October 2002 as a company focused on making SONiC ready for mainstream adoption and easier to procure, deploy and manage. "Our design goal is to make it nearly as easy to deploy your cloud native workload wherever you want to deploy it via an open network fabric that's as easy as it is today to deploy it to AWS or Google Cloud. And we enable you to choose the deployment architecture that's optimal for your workload," said Mark Austin, founder and CEO of Hedgehog, in a Network World article. "SONiC gives enterprises the break from vendor lock-in the networking space, and we fully automate it with cloud-native tool chain Kubernetes so that businesses can use existing cloud-native infrastructure, processes and tools, and you're breaking out of vendor lock-in the cloud as well."

Real world adoption: eBay scores with SONiC

In a bold move aimed at cutting costs, increasing bandwidth and providing network capacity for years to come, online auction powerhouse eBay built a 400Gbps Ethernet fabric for its on-prem data centers based on white-box switches running SONiC.

"One of our motivating factors was to build a chunk of network fabric, and we don't want to touch it. We don't want a custom network for applications that move. We wanted to break away from that cycle," said Parantap Lahiri, vice president of network and data center engineering, in an interview with Network World. With the new network, "all changes are automated, nobody is making CLI changes."

And that translates into business benefits. “Developers can come up with a new feature, and get it deployed fast,” Lahiri said. By taking the open-source/white box route, Lahiri has been able to slash operational expenses by an estimated 25%, while quadrupling bandwidth.

Read the full feature on Network World: eBay scores cost savings and a bandwidth boost with white-box switches running SONiC

Early SONiC drivers

One of the driving forces behind SONiC is its relative simplicity, proponents said.

“Microsoft built a heterogeneous network using equipment and software from multiple vendors, which is great because it gave us access to the newest, fastest technologies. But I still have to stitch all of that together and make a reliable network,” said Dave Maltz, a Microsoft distinguished engineer, during a SONiC industry roundtable in 2020. “What we really needed was a uniform software layer where we can implement changes once and easily spread them out. SONiC lets us do that on a global scale.”

The ability to quickly add key features, such as automation, and applications were some of the reasons Dell invested in SONiC, according to Ihab Tarazi, CTO and senior vice president of networking and solutions with Dell Technologies.

“SONiC is the first networking system that lets us containerize applications and link them quickly across the network,” Tarazi told the 2020 roundtable. “It gives us a common language that lets us deploy applications on any hardware and lets us more easily manage and support a variety of services.”

One of the long-term benefits of SONiC's being an open-source package will be the ability to more easily program applications and other features. "We think it will open up the talent pool as we won't need to transition software people into network programmers and vice versa," said Yiu Lee, vice president, architecture, networking and communications engineering with Comcast, at the roundtable. "We will be able to more easily share problems with the community and take advantage of a variety of skillsets to build better applications."