

Market Leadership Brief

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Maximizing Success with SONiC

Learnings from the SONiC Deployment Journey at a Fortune 500 Enterprise

This Market Leadership Brief examines the rapid adoption of SONiC (Software for Open Networking in the Cloud), the challenges faced by the ecosystem evolving around it, and how organizations have been able to address those challenges to benefit from the value the open-source NOS (Network Operating System) delivers by adopting the “Disaggregated SONiC Support Model” championed by Aviz Networks.

1.Intro: SONiC and its Rapid Adoption

[SONiC](#) is experiencing rapid adoption by cloud providers, enterprises, and web-scale companies, who have always been looking for economical networking solutions that can scale. The majority of the hardware vendors have embraced SONiC, making it a viable option for multi-vendor deployments with developer-friendly networking around it. Today, SONiC runs on nearly all ASICs with switches available from most Original Equipment Manufacturers (OEMs) and white-box vendors.

SONiC offers the following advantages:

- Standardization of the NOS layer for control, flexibility, TCO savings, and in-house innovation
- Supply chain diversification via a single software platform that runs across a multitude of hardware, including white-boxes
- Standardization of the NOS layer bringing uniformity in orchestration and NetOps
- Hardware agnostic NOS for the entire fabric reduces network complexities, improving operational efficiency
- Open platform that fosters collaboration among networking experts across the globe
- Growing community of developers that includes hyperscalers, cloud providers, enterprises, startups, individuals, and hardware vendors

SONiC is growing as a popular way to build IP-based networks without requiring proprietary software because of the choice, control, and cost savings it provides.

2.Challenges: SONiC Qualification and Deployment

Open-source technologies, for all their advantages, bring a set of challenges that are difficult to overcome, even if there is in-house expertise, there are nuances that require a depth and breadth of SONiC expertise for each specific solution. While organizations try to replicate hyperscaler's success (e.g. Microsoft, Alibaba, Tencent, etc), most SONiC adopters are looking for qualified solutions and unified support channels that will allow them to deploy and scale their SONiC operations and address the following challenges:

- SONiC and/or its vendor-specific edition(s) readiness for their network's architecture and use case(s)
- SONiC aware validation, orchestration, and visibility tools for a smooth transition and day 0,1, and 2 operations across any switch platform
- Standardized APIs for integrations with existing network orchestration and visibility solutions
- Extensible troubleshooting framework that enables automated remediation and root-cause analysis for issues resulting in network downtime and failures.
- Unified, Service Level Agreement (SLA) backed, 24/7 support from a neutral vendor to resolve issues stemming from deploying SONiC on hardware sourced from multiple vendors
- Migration path when deploying SONiC between and during network refresh cycles
- Derive TCO savings by driving competition among hardware suppliers with multi-vendor deployments
- Ease of procurement for solutions sourced from multiple vendors with existing System Integrators, Value Added Resellers, and Distributors
- Developing features that may not be available in SONiC yet and integrating new SONiC versions in the network infrastructure

Before deploying SONiC, organizations need to have a vision for their open-source network, a strategy for how it will be built, and a plan for the network transformation. Organizations understand they face the above challenges and need a SONiC expert partner to help them succeed.

While these challenges might not be complex when deploying SONiC on hardware sourced from a single vendor, it is critical to realize that any significant savings that one derives

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from SONiC adoption are a result of driving competition between suppliers. Single-vendor deployments diminish the value propositions of SONiC in terms of choice, control, and cost savings.

One of the most important factors in addressing these challenges is to identify a neutral partner that can bring the expertise, tools, and support (see Figure 1. below) to facilitate a successful transition to SONiC.

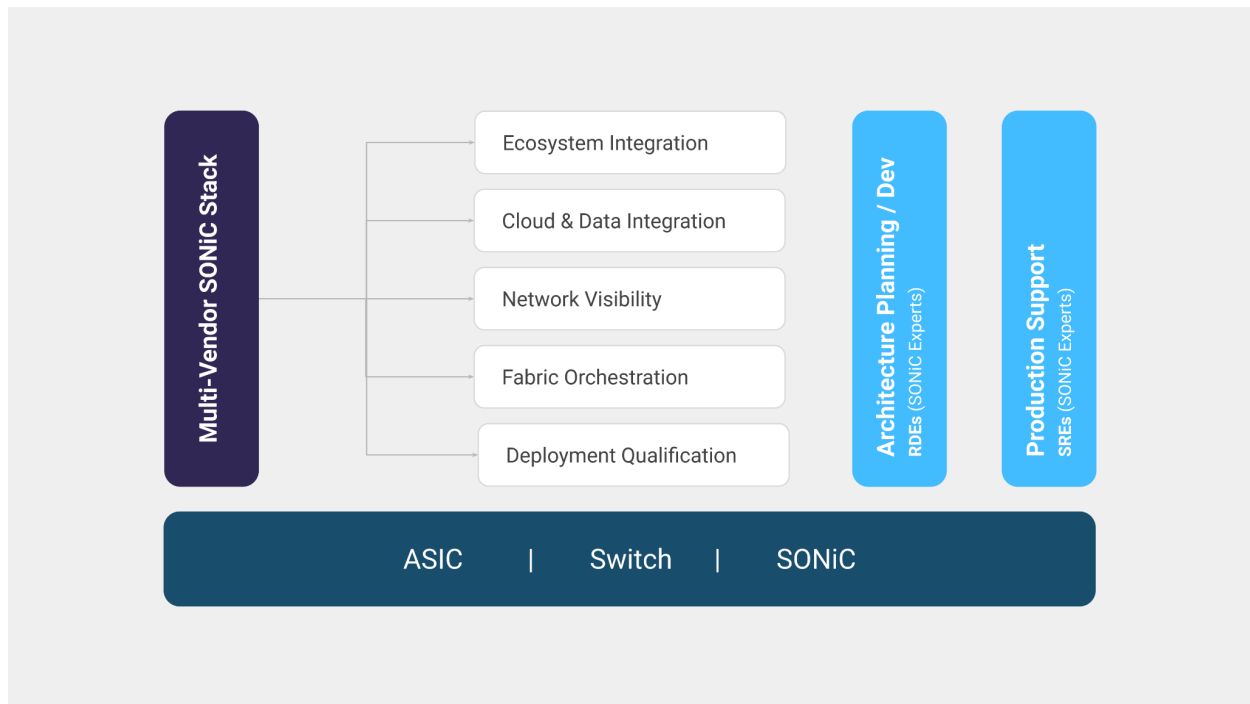


Figure 1. Essential Components of a Multi-vendor SONiC Stack

3. Case Study: SONiC Success in a Web-Scale Deployment

Several organizations have deployed SONiC at scale, but it's important to examine the ones with exceptional returns on their investment, ensuring SONiC delivered above and beyond its value propositions.

Futurion has worked with Aviz Networks to study how a large Fortune 500 e-commerce company has squeezed every bit of value out of its investment in SONiC and set the bar for open-source networking excellence. The company's extraordinary success with SONiC was possible through a disaggregated support model that separates the pre-deployment qualification and post-deployment support away from hardware vendors and delivers an end-to-end networking stack backed by experts and SLAs to enable multi-vendor network operations. Aviz Networks provided the tools needed for SONiC evaluations and operations along with Resident Development Engineers (RDEs) and Site Reliability Engineers (SREs).

The components of the disaggregated support model (see Figure 2. below):

- Pre-deployment supported by SONiC RDEs
 - Selection of SONiC options
 - System qualification and bug fixes
 - CI/CD system for regression testing
- Post-deployment supported by SONiC SREs
 - Tools and API enablement
 - SLA backed 24x7 support and bug fixes
 - Customer advocacy in the community

The above framework was employed to ensure a robust deployment and operations at the e-commerce company. The company owns data centers across three regions and originally ran its data centers with black boxes from two vendors. However, they recently moved to white boxes with SONiC to eliminate vendor lock-in, drive innovation, and realize the savings from open-source technology adoption.

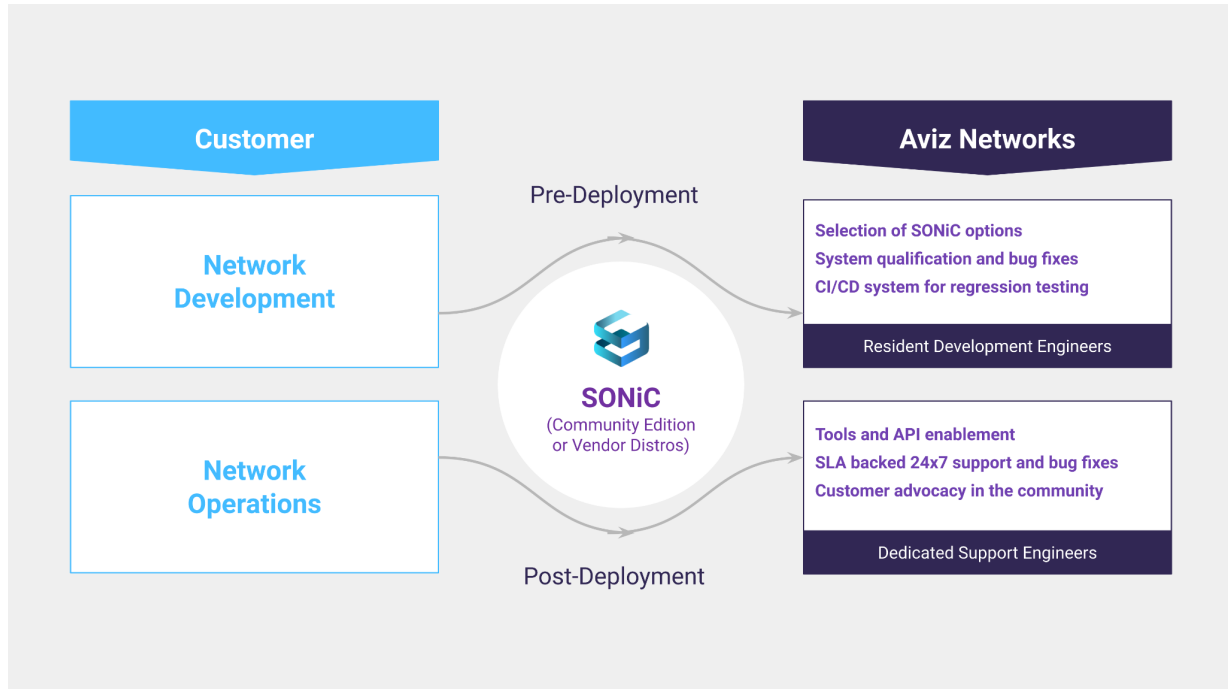


Figure 2. The Disaggregated SONiC Deployment and Support Model

Let's deep dive into each component that solved the key challenges with the SONiC transition for the large e-commerce company:

Pre-deployment supported by SONiC RDEs

1. Selection of SONiC options

The customer shared the speeds and feeds they needed and the feature list they were looking for in their SONiC deployment. In this case, the customer was clear from the beginning that they wanted to use the community version of SONiC, as it already had the features they were looking for. Aviz provided an impartial list of hardware options that was ready-to-use with community SONiC, which would work for the customer's use cases.

Aviz has partnered with the great majority of hardware manufacturers to keep a finger on the pulse of what is available on each platform with the community version of SONiC as well as any vendor distribution. Aviz employs its pre-deployment tools to continuously test SONiC capabilities of each vendor platform and the underlying ASIC.

To help the customer have a turn-key solution instead of disparate parts of hardware and constantly evolving open-source software, Aviz works with vendors to ensure compatibility of SONiC releases and its vendor editions for a wide range of use cases. Aviz's

pre-deployment test suite is designed for device-level use cases and for how each device may behave when part of a network fabric.

With well-tested options, Aviz was able to identify an initial set of SKUs that the customer was willing to try for their use cases.

2. System qualification and bug fixes

Once the SKUs were identified, the next step was to understand the scope of SONiC validation for customer-specific use cases. Multi-vendor deployments can be complex, especially in brownfield scenarios where newly deployed software is expected to be interoperable with existing systems. Variability across platforms and ASIC drivers makes it even more difficult to ensure a smooth and efficient transition.

The e-commerce company selected 6 different SKUs from multiple vendors, and Aviz was engaged to help with the system qualification. Aviz has a dedicated lab to help customers with SONiC qualification, which hosts a huge number of platforms from different vendors. This provides relief for customers so they no longer need to purchase every single piece of hardware that they would like to qualify before deploying to production. Aviz has also created a test automation suite that looks at the deployment from a holistic perspective to ensure that the devices running SONiC work well within a multi-vendor fabric. Aviz's [FTAS \(Fabric Test Automation Suite\)](#) delivers up to 95% automation for running SONiC qualification tests focused on networking features, resilience, and scalability. The tests in Aviz's FTAS are designed to work on any platform with any release or version of SONiC, along with a set of tests to deal with the nuances of various platforms and version-specific use cases. As depicted in Figure 3 below, Aviz works with a wide range of platform vendors to qualify their switches for customer-specific use cases on Community SONiC and vendor SONiC distributions.

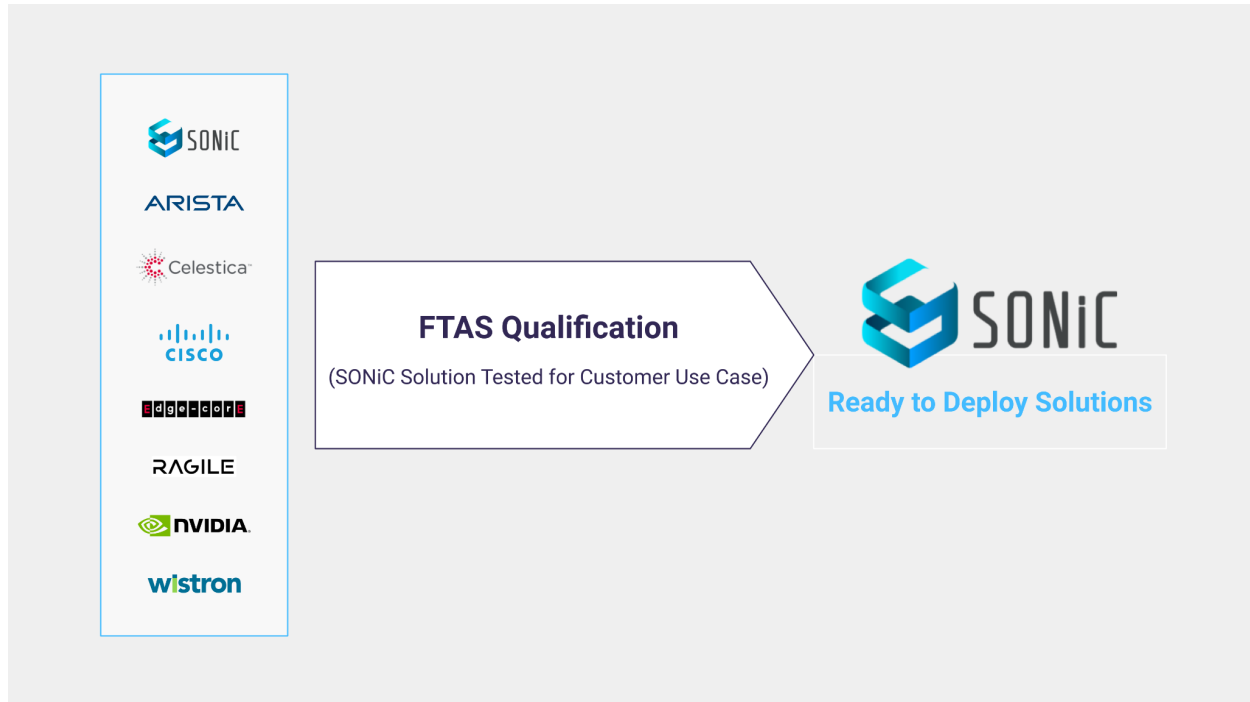


Figure 3. Ready-to-Deploy SONiC Solutions

The SONiC qualification by Aviz resulted in a detailed report that was shared with the customer to narrow down the options that would be best suited for their networking requirements.

3. CI/CD system for regression testing

An important aspect of the pre-deployment support is the continuous need to re-qualify SONiC releases (patches and upgrades) before they are pushed to production. This becomes extremely critical when new features are added to the SONiC NOS.

Aviz's FTAS employs a CI/CD pipeline that continuously validates the SONiC releases so that any patches and upgrades are tested automatically with minimal effort from the network engineering teams. In addition, the Aviz RDEs are responsible for ensuring that any new test cases pertaining to the customer's environment are brought into the FTAS solution and are automated for continuous delivery. Aviz RDEs also aided in setting up the customer's on-premise lab to help vet SONiC releases more frequently via the FTAS solution.

The CI/CD integration ensures the integrity of the selected solutions as patches and upgrades become available. The customer continues to qualify new SKUs as part of their ongoing evaluations via FTAS, and every qualified SKU is integrated with their CI/CD pipeline during network refreshes.

Post-deployment supported by SONiC SREs

1. Tools and API enablement

Once qualified, the challenge for the customer and Aviz was to deploy the solution across multiple data centers. Deploying and managing a multitude of devices sourced from multiple vendors and running different versions of SONiC can be a daunting task and requires specialized tools. In any production network, the single most important goal for the customer is to rapidly detect and resolve issues.

Aviz developed a multi-vendor SONiC support stack called [ONES \(Open Networking Enterprise Suite\)](#) to specifically address this problem. ONES provides deep visibility into network fabrics running SONiC by collecting telemetry (200+ data points), normalizing the data across multiple hardware and NOS combinations, and turning them into powerful insights for real-time monitoring. The deep diagnostic capabilities ONES brings help customers identify and resolve issues quickly thereby improving SLAs. In addition to SONiC, ONES is capable of bringing in telemetry from other proprietary NOSs to ensure comprehensive visibility into brownfield deployments, which is extremely critical when transitioning to SONiC. ONES also offers a comprehensive set of APIs for integrations with existing tools.

Figure 4 below depicts a high-level overview of ONES architecture, and how it collects and normalizes data across nearly every switch platform running SONiC with any underlying ASIC.

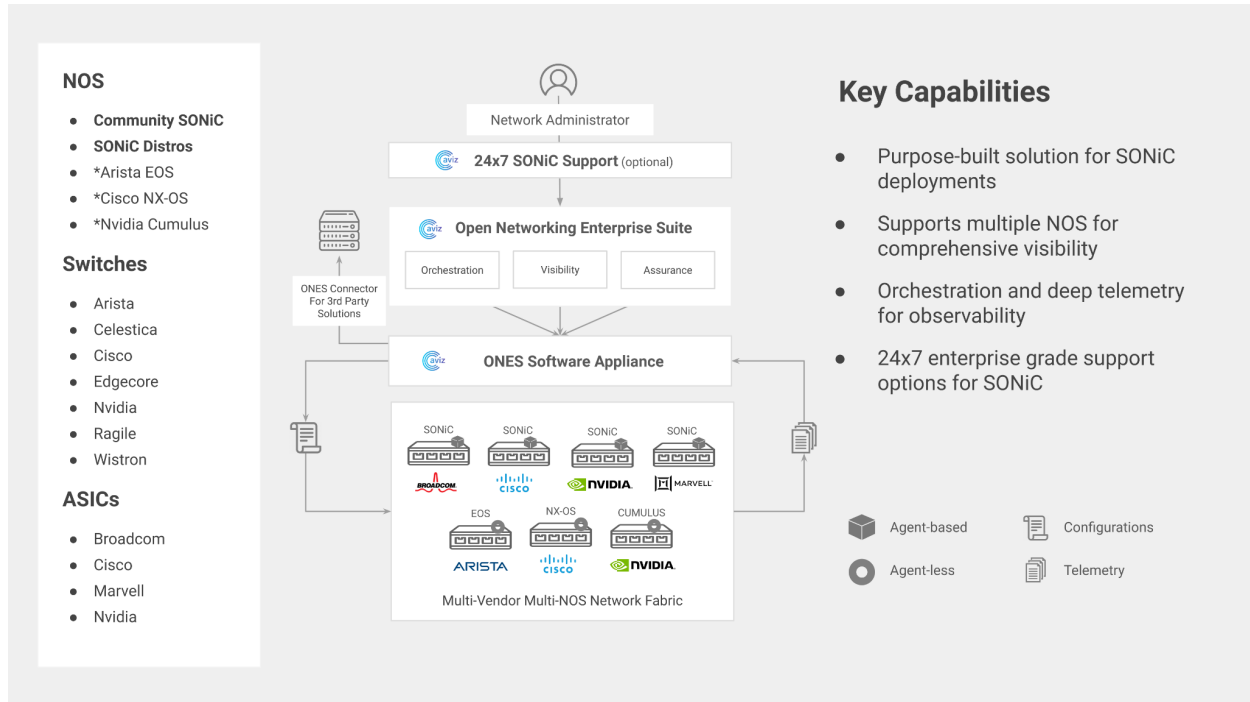


Figure 4. Aviz ONES (Open Networking Enterprise Suite)

With comprehensive visibility from ONES, the customer is detecting deep-rooted problems such as intermittent failures for a specific vendor’s switches resulting from high CPU temperatures, in one such incident. In another incident, ONES proactively identified uneven/asymmetric traffic patterns on switch uplinks for a different vendor and helped with a quick resolution. ONES continues to add more metrics to its telemetry as it comes across unseen problems. Because of its progressive nature, every customer benefits from the experience of others in a network effect that compounds positively by monitoring a SONiC fabric with ONES.

2. SLA-backed 24x7 support and bug fixes

Any new technology requires a lead time to build in-house expertise. When it comes to open-source technologies, it is extremely challenging to identify people who have the right expertise and are available to help when you need them. The problem gets exacerbated in the case where you have open-source software being deployed on hardware sourced from multiple vendors. Supporting software on multiple platforms requires well-defined channels across each vendor with SLAs that align with your organization’s needs. Customers prefer a single unified channel where they don’t have to knock on different doors for issues across different platforms.

Aviz provides [24x7 support for multi-vendor SONiC](#) deployments, which is backed by tight SLAs with the majority of the platform and ASIC vendors through its partnership

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agreements. The Aviz team's expertise goes as deep as the Switch Abstraction Interface (SAI)/Software Development Kit (SDK) that binds the hardware drivers to SONiC. Aviz SREs have amassed significant experience and expertise in SONiC and the underlying platform drivers, which allows them to troubleshoot issues quickly. Aviz's rapidly growing team has dozens of SONiC experts distributed across the globe to provide 24x7 coverage to customers.

Figure 5 below depicts the workflow of how Aviz engages with customers and vendor partners to resolve production issues in a timely manner.

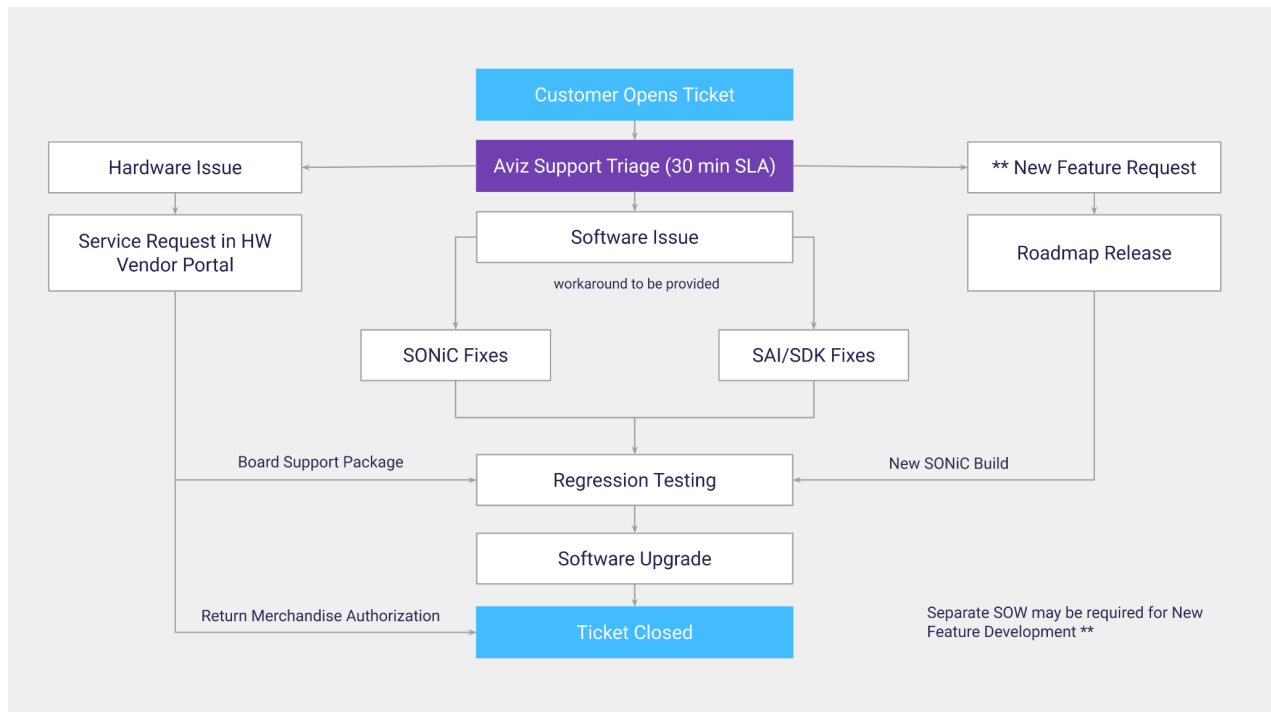


Figure 5. The Disaggregated SONiC Support Workflow

"At the 'Open Networking Day with SONiC' community event hosted by Aviz, the need for a SONiC support stack was articulated well by one of the guest speakers. Referring to the disaggregated SONiC support model, the speaker said, "If you bring apps that have deep diagnostics capabilities, your SLAs are improved. It's in the combination of support and related apps that there is an opportunity in the SONiC ecosystem. Based on our experience we feel that the missing piece is the support piece. It is the final puzzle piece for the rest of us to take on SONiC."

3. Customer advocacy in the community

The open-source community typically releases a new version of SONiC every six months. It is critically important that the issues identified by the customers and fixes make it to the newly released software. Else, the customer will go out of sync with the latest versions and lose their ability to utilize any new features delivered by the SONiC community. In addition, customers want to exert their influence on the open-source community to ensure that the features they need are prioritized in the SONiC release roadmap.

Customers typically do not have the bandwidth to actively participate and influence open-source communities and their decisions. This is where Aviz's leadership position in the SONiC community helps ensure that the bug fixes and features important to the customer are included in the upcoming SONiC releases and/or the roadmap. Aviz team members have been the program moderators for the open-source SONiC community since 2019, and continue to be the voice of customers.

At the e-commerce company, Aviz RDEs help resolve issues and constantly engage with the SONiC community to upstream the fixes and enhancements on behalf of the customer. Aviz sits in a neutral position in the ecosystem as a partner with the hardware vendors and as the customer advocate to ensure new features and bug fixes are included in the upcoming releases of community SONiC.

Conclusion

Implementing SONiC enables organizations to standardize on their NOS layer and gain the flexibility and control needed to drive in-house innovation. Because the source code is openly available, organizations can customize SONiC to meet their specific needs, rather than being limited by the features and functionality of proprietary software.

While open-source software is often free or available at a lower cost than proprietary software, it is important to recognize that the real savings is realized by diversifying the underlying hardware portfolio and driving competition between suppliers. However, procuring from multiple sources comes with its own set of challenges: 1) selecting tools that are hardware agnostic and abstract the nuances of each platform and the specific version of the open source software running on it, and 2) a support channel that unifies the processes and SLAs across multiple vendors to minimize the complexity of dealing with issues originating from multi-vendor SONiC deployments.

Working with the e-commerce company for over 12 months, Aviz Networks championed the 'Disaggregated SONiC Support Model' that comes with necessary tools and the unified support channel necessary for successful SONiC deployments. Today, with its roots deeply embedded in the SONiC community, Aviz is the only neutral entity that is proven able to deliver the value customers are looking for in the SONiC deployment journey. Aviz continues to roll out the 'Disaggregated SONiC Support Model' at several Fortune 500 companies to maximize their success with SONiC.

About Aviz Networks

Aviz Networks helps cloud providers, enterprises, and web-scale companies replicate Microsoft's success with SONiC deployment at scale. Aviz makes SONiC a trusted choice for NOS deployments in the most comprehensive and inclusive way. Aviz created an end-to-end multi-vendor networking stack that delivers orchestration, visibility, and monitoring capabilities for any version of SONiC running on any hardware platform, regardless of the underlying ASIC. Aviz solutions provide visibility into proprietary networking solutions to ensure a smooth transition to SONiC. Aviz solutions are backed with 24/7 support by global SONiC experts and tight SLAs with the vast majority of hardware vendors.

More information is available at www.aviznetworks.com.