Demystifying SONiC: Its Importance in Modern Data Centers

SONiC - Software for Open Networking in the Cloud - was developed by Microsoft for its Azure data centers and open-sourced in 2016. It is based on the Linux distributive Debian. SONiC uses SAI to decouple software from the underlying hardware that allows it to run on multi-vendor ASICs. According to Gartner, with the increase in interest for SONiC, there is a strong possibility that SONiC will become analogous to Linux for networking operating systems in the next three to six years. Analysts predict that SONiC switching could exceed $5 billion in revenue by 2026.

Over the last half-decade or so, there has been a notable increase in the level of interest and engagement surrounding SONiC. Data centers are rapidly expanding and evolving to an architecture that is disaggregated and Software-defined to meet the exponential growth in AI, Big Data, and high-performance computing. SONiC offers serviceability and adaptability with the potential to cope with this demand in Data Centers. Gartner also predicts that by 2025, 40% of organizations that operate large data center networks (greater than 200 switches) will run SONiC in a production environment.

Proprietary network devices installed in data centers use exclusive operating systems leading to vendor lock. Moreover, these NOS solutions incur high costs due to license fees and support contracts. SONiC's openness gives customers the flexibility to switch platforms without changing the software stack. Customers can seamlessly scale and automate their network by taking advantage of the open-source OS, resulting in savings and more control. Moveover, it is multi-vendor supported and it uses open & standardized protocols like REST APIs for configuration and monitoring. This means the network can be managed and configured using common tools regardless of the underlying hardware brand.

The modular architecture of SONiC is well-suited for data center environments due to its ability to provide serviceability, enhancements, and support for zero downtime. For example, Individual software components like the OS updates, drivers etc. can be upgraded, or new protocols or applications can be added dynamically without affecting other modules or bringing down the whole switch. Hence, customers are not dependent on the vendor's product roadmap for innovation and the addition of new features. Instead, they have control over the system's functionality, allowing them to seamlessly incorporate important features such as automation and applications or address issues like bug fixes and upgrades. This modular approach enables efficient failure recovery and in-service upgrades, allowing for the replacement or enhancement of specific components without disrupting the overall system's operation. This design empowers customers to maintain and evolve their SONiC deployment in a data center with flexibility and scalability, all while keeping the system running smoothly.

SONiC has the capability to operate from core to edge network, helping streamline deployments, operations, and monitoring in data centers and even in ISPs or enterprise networks. It provides L2, L3 and L4 functionality, serving as the solid foundation for the overlay network services and applications running in the data center.

SONiC is a reliable NOS. As per a study conducted by a team, led by Dave A. Maltz, Technical Fellow & CVP, Azure Networking, Microsoft & Chair of the Governing Board for the SONiC Foundation, that tracked 180,000 switches in Azure data centers for three months, only two percent of network switches will fail within three months, but that figure is cut in half if the vendor's operating software is replaced by SONiC. The study found these were one percent more likely to survive three months - nearly halving the failure rate.

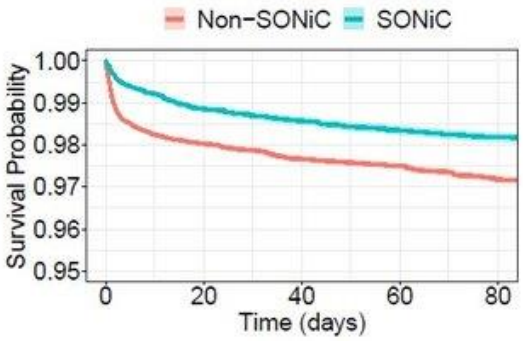

Figure: *Shows the Kaplan-Meirer survival curve of switches in Azure datacenter. At the start of the study, the survival probability is 100% since no failures have occurred. As switch failures are observed, the survival probability drops to 98.5%. This shows that data center switches have a 98.5% chance of staying uninterrupted for at least 3 months since deployment in production. With time, the gap in reliability widens and at the end of 3 months, the survival likelihood of SONiC switches is 1% higher than that of non-SONiC switches.*

Conclusion

The concept of disaggregation and the utilization of Software for Open Networking in the Cloud (SONiC) offer a multitude of benefits for data centers and network infrastructure. Its expandability, agility, and ease of integration with various software components make it a valuable asset for providers and operators. As modern applications and workloads continue to evolve, SONiC proves to be a flexible solution that empowers data centers to adapt and scale to the demands of the ever-changing digital landscape.

About the Author:

Wajahat Razi, a Network Engineer at xFlow Research Inc., specializes in Network Operations (NetOps) with a focus on Automation, Cloud, and Networks. With a keen interest in cutting-edge technologies, he has extensively researched and comprehensively understands the architecture of SONiC, particularly its relevance in modern data centers.