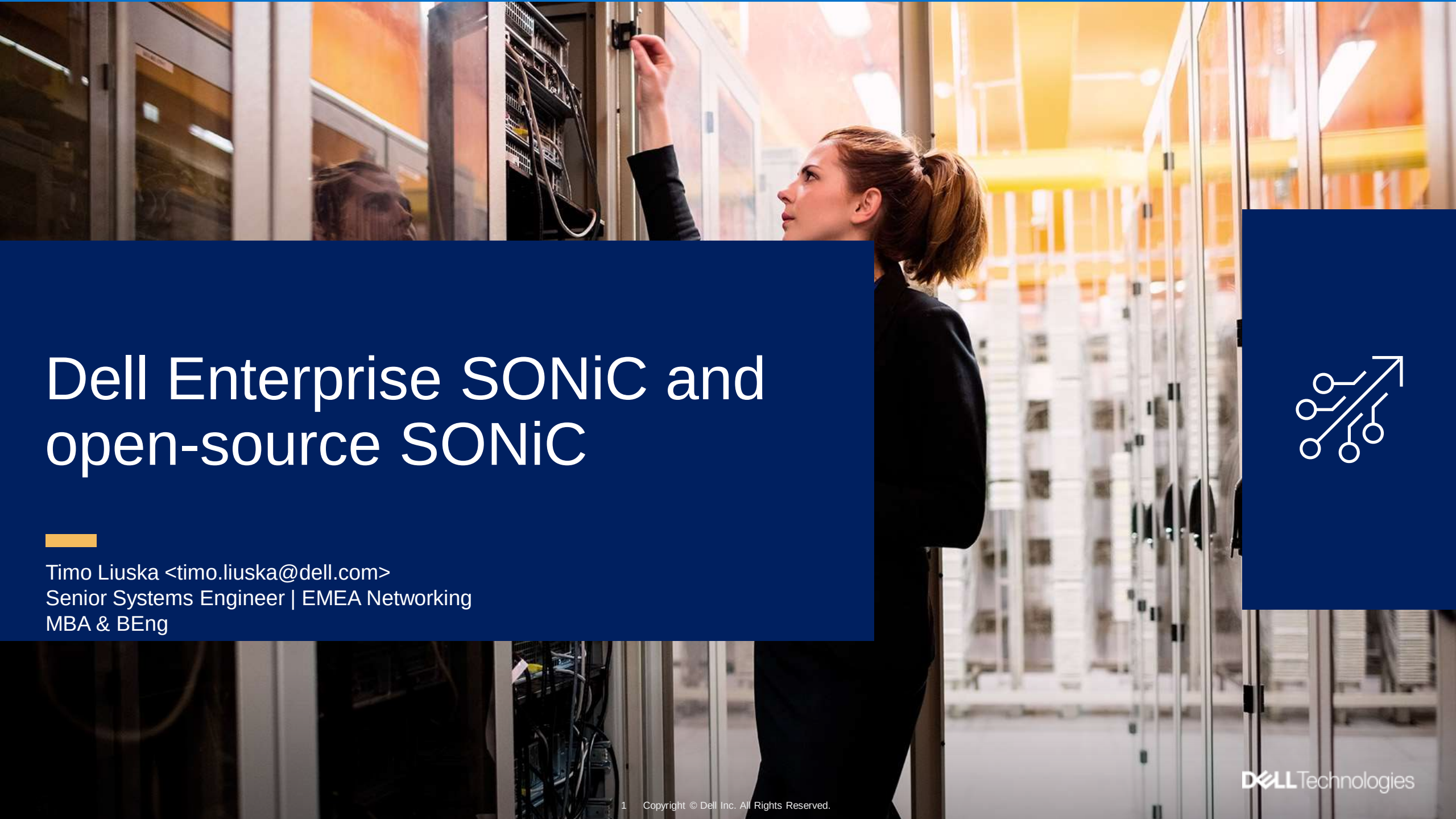
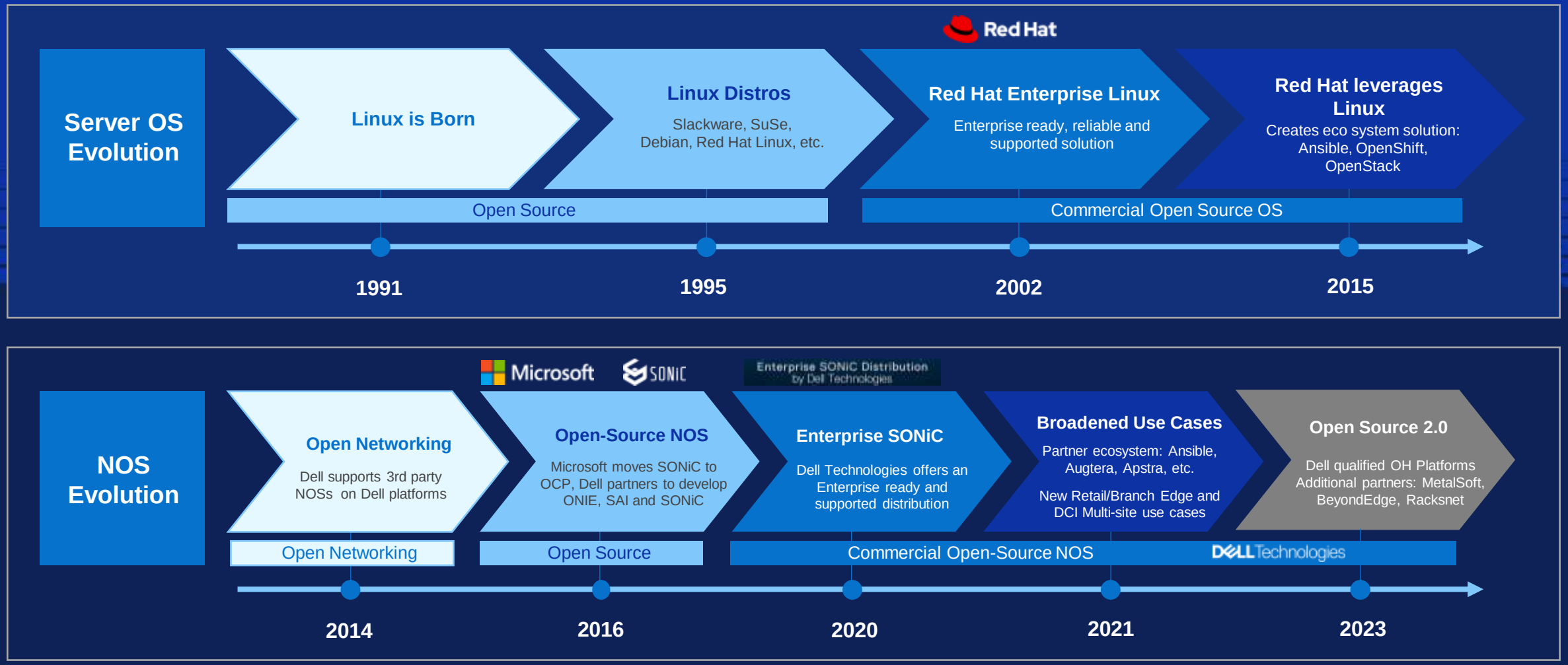


Dell Enterprise SONiC and open-source SONiC

Timo Liuska <timo.liuska@dell.com>
Senior Systems Engineer | EMEA Networking
MBA & BEng

Networking Following the Footsteps of Compute Evolution



Dell Networking – Path Forward

Deliver plug and play connectivity from Core to Cloud to Edge with Open Standards based solutions

Open Standards Architecture

Choice of Orchestration and Monitoring tools

Open-Source Network Operating System

Open-Standards based Switching Platform – Data Center to Edge

Merchant Silicon

Leaf Spine Architecture

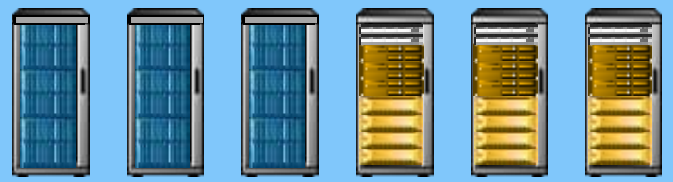
ANSIBLE | Dell Smart Fabric Manager | augtera networks | metalsoft | BEYONDEDGE | racks net | dorado

SONiC

Software for Open Networking in the Cloud

Spine switching

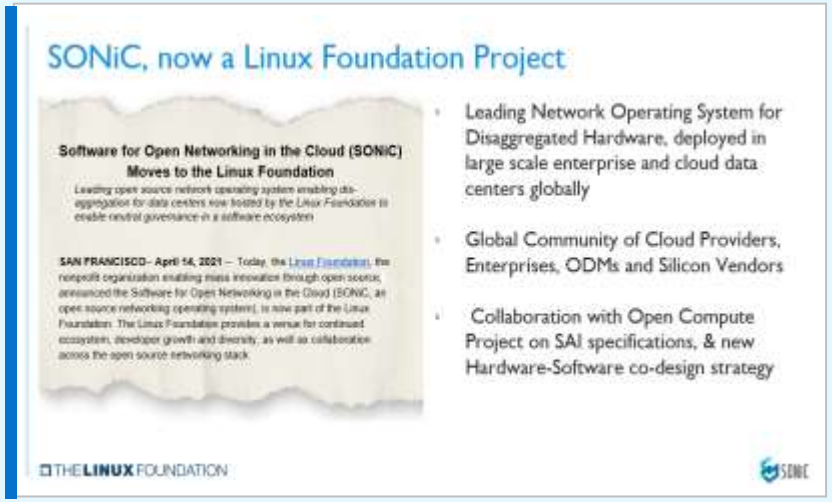
Top-of-Rack / Leaf switching



Portfolio Highlights

- Open Standards based architecture design
- Cloud Inspired Architecture – Agility, Scalability, Performance, and Interoperability
- Gen-AI ready (e.g., Next-Gen Ethernet Silicon, SONiC powered, validated designs, AIOps)
- Intelligent and Automated M&O
- Intrinsically Secure and Resilient
- Available in subscription / aaS options
- Embrace a wide ecosystem of partners – M&O and Telemetry

SONiC – Innovation of the industry > 1 Vendor Solution



Dell Technologies Participation in SONiC focused Industry Conferences and Events

Conference	Date	Location
SONiC Workshop India 2023	September 6, 2023	India
Open Compute Project, SONiC Mini Summit	October 17-19, 2023	San Jose, CA
Open Networking User Group (ONUG)	October 24-25, 2023	New York City
OCP Prague	April 23-25, 2024	Prague
ONE Summit, San Jose	April 29 – May 1, 2024	San Jose, CA
Open Networking User Group (ONUG) Dallas	May 15 – 17, 2024	Dallas, TX
OCP Global Summit	October 15-17, 2024	San Jose, CA

Enterprise SONiC Support Compared to Other SONiC Offerings

	ODM Vendors	ODM + HW Support	HW Support + Community SONiC Support	Enterprise SONiC
RnD investment	Community	HW onboarding	Tactical community engagements	200+ dedicated engineers
Predictable roadmap	Very limited input to community board	Very limited input to community board	Input to community board	✓ Most features upstreamed to community
HW+SW support level	×	Limited to HW and SAI	Through 3rd-parties	Global 24x7
Cable and Optics validation	×	×	✓	✓
User documentation, White papers	GitHub	GitHub	GitHub	GitHub + Enterprise grade
Training, Hands-on Labs	×	×	✓	✓
Technical and field support teams	×	Limited	✓	✓
Features and Functionality	Community	Community	Community	Community + Enterprise features
Unified management	×	×	×	✓
Automation integration	×	×	✓	✓
Silicon telemetry	×	×	✓	✓
Validated and supported ecosystem	×	×	×	✓
Multi-vendor support	✓	×	×	✓
Access	Free	Free	Support SKU	License and Support SKUs

SONiC Community Contributions

Infrastructure

- Zero Touch Provisioning
- Build Improvements - Version Caching Support for Python and wget
- Gearbox
- KDUMP
- CMIS Initialization framework, CMIS Diagnostics
- SONiC Initialization enhancements
- FRR version upgrade to 8.2.2
- Build Time Improvement - Version cache framework
- Auto negotiation enhancement
- Bullseye Docker Migration - BRCM Platform, FRR, PDE, ICCPD
- MDIO IPC client lib
- SPYTEST framework and testcases (multiple feature test suites)
- Platform Development Framework (PDDF)
Updated PDDF SFP Class with refactored SFP framework
Updated PDDF kernel modules in compliance with kernel 5.10 APIs
Migrated PDDF to Bullseye
PDDF QSFPs Low Power Mode Support
PDDF enhancement - Support for FPGA devices
PDDF enhancement - Support S3IP compliant SysFS
PDDF enhancement – Support fan-drawer class
- Silicon abstraction enhancement
- SAI : Gearbox API standardization
- SSD upgrade integration with fw_util
- show tech enhancements
- Flashrom code refactoring
- sonic-host-services
- SSD upgrade during fast-reboot
- PCIe diag
- Infrastructure to upgrade BIOS
- CoPP and Sflow

Security, Documentation, and more

- Radius AAA
- Port Mirroring
- Egress shaping
- BUM Storm Control
- Link Training Enhancement
- BRCM KNET sflow p-sample API compliance upgrade
- NPU MDIO Access Support and gbsyncd Enhancement
- REST Server security enhancement
- SONiC-YANG Support: IPv6 Link-Local, KDUMP, ACL, MCLAG, BUM Storm Control, VXLAN, SNMP, Radius Server, Radius tables
- Webpage – Transition from Azure to Linux Foundation, construction and periodic updates
- Wiki, User Guides (that includes quick start guide), CLI guide, config guide – creation
- Roadmap, release tracking & release notes – prepare, review & publish
- Power BI & data collection Newsletters – data collection & publish
- Platform contributions – Z9332, Z9264, Z9100, S6100, S5212, S5224, S5248, S5296, N3248TE, N3248PXE

L3 & L2

- EVPN VXLAN
- PVST / RPVST
- Routed sub-interface
- BGP unnumbered
- NAT
- L2 scaling/performance enhancements
- MCLAG
- Ipv6 Link Local support
- VRF Support
- IGMP Snooping
- VRRP

Amongst Top 3 Open-Source SONiC Contributor
(features, infra, tool integration, documentation)

Enabling unified connectivity across DC to Edge to Cloud

Simplifying SONiC Configuration & Enterprise Adoption

Open souce SONiC

Management

- Python-based SONiC CLI:
  - Based on Python Click library
  - Supports for example creating VLANs, assigning IP-addresses etc.
- Free Range Routing (FRR):
  - Routing protocols are configured under FRR
  - FRR CLI is accessible with “vtysh” CLI command
- Config_db.json:
  - The primary databases hosted by the REDIS database include APPL_DB, CONFIG_DB, STATE_DB, ASIC_DB, and COUNTERS_DB.
  - Open source SONiC keeps the configuration in ConfigDB. ConfigDB uses a table-object schema, and config_db.json is a serialization of DB.
- Linux shell:
  - Folder /etc/sonic/ contains for example the config_db.json, frr configs etc.

Open source SONiC

Management framework

- Support for standard YANG models (OpenConfig, IETF, IEEE) and custom YANG models (SONiC YANG)
- Northbound interfaces:
  - CLI (based on Klish)
  - gNMI server
  - REST server
- Config validation by using YANG model
- Management framework running in single container named “sonic-mgmt-framework”

Reference: https://github.com/sonic-net/SONiC/blob/master/doc/mgmt/Management%20Framework.md

Dell Enterprise SONIC

Management framework

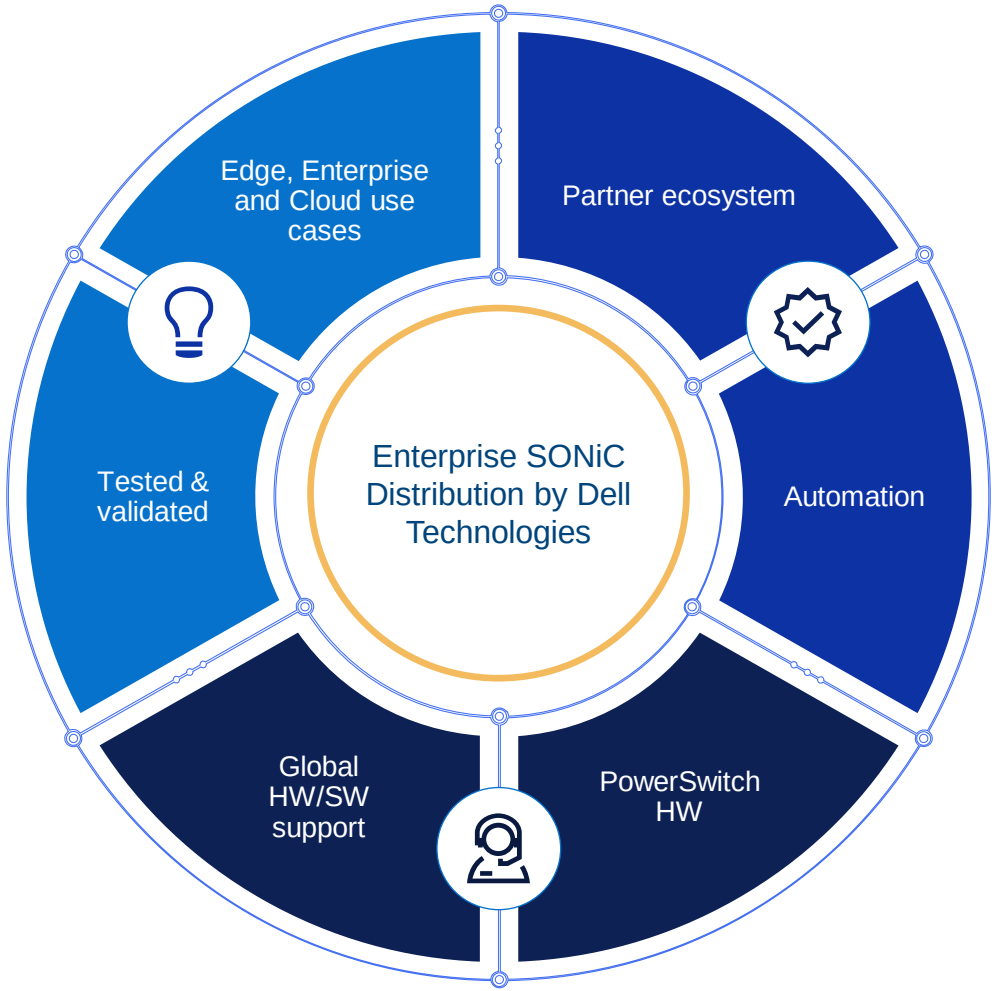
- CLI
  - Dell Enterprise SONiC Management Framework CLI is responsible for managing configuration and status on Enterprise SONiC switches.
  - Centralized operation and management for all operations.
  - All relevant functionalities included in the CLI (routing etc.)
  - User guides, training courses and certification exam (SONiC deploy) available
- REST, gNMI, GNOI, OpenConfig
  - SONiC may also be configured and administered using a REST API and a gRPC network management interface (gNMI) using YANG data models.
  - The Management Framework supports both standard and custom YANG models for communication with the corresponding management servers.
- Config_db.json
  - Similar as in Open-source model + includes FRR configs etc.
  - Can be used for example to backup & restore configs

Ansible

Open-source and
Dell Enterprise SONiC

- Open-source SONiC uses community.sonic Ansible collection (https://github.com/ansible-collections/community.sonic)
  - Contains currently only VLAN and interface configs
  - Not very active, latest commit in Feb 2024 ☹
- Routing in open-souce SONiC is handled in frr.frr Ansible collection (https://github.com/ansible-collections/frr.frr)
  - Actively maintained, latest commit in Aug 2024
- Dell Enterprise SONiC uses unified Dellemc.Enterprise_Sonic collection (https://docs.ansible.com/ansible/latest/collections/dellemc/enterprise_sonic/index.html)
  - Up-to-date, constant updates, latest commit in Oct 2024
  - Contains all NOS functionalities

Key takeaways



SONiC enables future-proof highly-programmable, cloud-native and scalable networking

Enterprise SONiC offers flexibility of open-source together with Enterprise-grade support

Standard APIs for automation & Partner ecosystems for orchestration