SONiC - Programmability, Extensibility and Beyond

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Microsoft Azure Networking
**Application & Management tools**

**SONiC** [Software For Open Networking in the Cloud]

**Switch**
- Dell
- Arista
- Mellanox Technologies
- Facebook
- Delta
- Inventec
- Quanta Computer
- Edge-core Networks
- Ingrasys
- Cisco
- Celestica
- Alpha Networks Inc.

**Silicon/ASIC**
- Barefoot Networks
- Broadcom
- Mellanox Technologies
- Nephos
- Cisco
- Cavium
- Centec Networks
- Marvell
- Innovium
SONiC Recap – Containerized Open Source NOS

Configuration and management tools:
- Ansible
- Puppet
- Chef
- 1st party
- Telemetry

Network applications:
- More apps
- SNMP
- BGP
- DHCP
- IPv6

SONiC Base:
- Database
  - SWSS
- Platform
- Utility
- Quagga
- LLDP
- RedisDB
- SYNC

Platform Agnostic

Velocity

Reliability

SAI

Hardware
What Is New -

• SONiC supports Open Optical Monitoring (OOM)

• Richer features, thanks to
  • Alibaba: Vlan Trunk, TACACS, etc. and leading streaming telemetry work
  • LinkedIn: leading FRR integration, BGP convergence and Open 19
  • Tencent: leading VRF work
  • Mellanox: leading RDMA work

• Richer classes of devices
  • Arista: modular chassis
  • Marvell: ARM-based switch

• Richer scenarios via programmability
  • SONiC Network Virtualization
New Challenges from Broad Spectrum of Workload

Microsoft and NetApp Unleash the Power of Data Through the Industry’s First

Cray is bringing its supercomputers to Microsoft Azure

Get Ready for VMware Horizon Cloud on Microsoft Azure

Microsoft Runs SAP HANA Enterprise Cloud on Azure

Microsoft will run SAP HANA Enterprise Cloud on Microsoft Azure. This will allow customers to run SAP S/4HANA in a secure, managed cloud.

Related Articles

Microsoft

That’s a lot of eye-crossing product names, so we asked SAP for some clarification. A spokesperson explained:
Case Study - VNET Peering in Legacy Network

Traditional Implementation

- VNET represented by VRF
- VNET1 peering with VNET2 implies copy routes from VNET1 to VNET2 and vice versa
- 1K VMs and 100 VNETs will require up to 10M routes !!!
SONiC Implementation

- Two match action tables
- Port to VNET
  - Key: Port
  - Action: Set metadata
    - Where metadata = VNET ID
- VNET routing
  - Key: metadata, prefix
    - Where metadata = VNET peers
  - Action: next hop
- VNET1 peering with VNET2
  - Turn on VNET1 VNET ID in VNET routing metadata of all routes originated by VNET2
  - A single route per VM
  - VM update requires a single route update

1K VMs and 100 VNETs need only 100k routes
SAI Part: Programmable SAI API

User programs

P4 SAI Compiler

Tunnel.p4

SAI pipeline

Parser  port  Flex1  Bridge  Flex2  router  flex3  tunnel  deparser

SAI host adapter

NOS

Application SandBox

Auto generated SAI objects
tunnel  app

- Multiple switching SW options, develop apps
- SAIFlexAPI – uniform API for all programming language
SONIC Part: Supporting VNET

- RestAPI: Provide RestAPI for external
  - Allow external control to config the switch
  - Provides real-time data path counters and resource monitoring
  - Use OpenAPI specification (swagger)

- SWSS/Orchestration Agent
  - Use SAI with tunnel extension API
  - Provide tunnel support to upper applications
SONiC Part: Achieving Scalability via DPDK

- SWSS/Orchestration agent: manage multiple SAI instances
  - Manage tunnel entry cache between DPDK and ASIC

- Server: data plane scalability and programmability
  - 16M tunnels
  - 40G/100G line rate
  - 25 ~ 30 us forwarding latency

- ASIC: High port density and rich data plane functionality
  - Tunnel entry cache
  - Underlay routing
  - Traffic policing/shaping
  - ACL
  - Mirroring
Demo: SONiC for Network Virtualization

**Demo setup**

<table>
<thead>
<tr>
<th>BM 1</th>
<th>VM 1 192.168.3.1</th>
<th>Port 2</th>
<th>Port 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>BM 1</td>
<td>VM 2 192.168.3.2</td>
<td>Port 4</td>
<td>Port 1</td>
</tr>
<tr>
<td>VM 1</td>
<td>VM 3 192.168.3.3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Demo: SONiC on Chassis Switch

cEOS SAI App for Managing Modular Chassis

Base OS

ASIC-1 (Linecard-1)

ASIC-2 (Linecard-2)
Moving Forward: Enabling WAN Scenarios

- Global network is growing exponentially, requires
  - Agility for fast Time to Market feature release and defect remediation
  - To minimize hardware dependencies
  - To scale and grow the WAN efficiently while controlling costs

- Sonic is an integral element of our cloud SDN solutions for intelligent traffic management

- Two major roles
  - Edge Peering Router
  - Backbone Router
More Demos in Microsoft (A11) and Partner Booths

- New ASIC Supported
- Pizza box and Chassis
- Rich Hardware Platform Supported
- Programmability
- Virtualization
Open Invitation

- **OCP SONiC/SAI workshop on 3/22**

- Inviting contributions in all areas
  - SONiC/SAI
  - Hardware platform
  - New features, applications and tools
  - Download it, test it and use it!

Website:  [https://azure.github.io/SONiC/](https://azure.github.io/SONiC/)
Mailing list:  sonicproject@googlegroups.com
Wiki:  [https://github.com/Azure/SONiC/wiki/](https://github.com/Azure/SONiC/wiki/)