SAI – Update and Roadmap

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Switch Abstraction Interface

CRUD operation over extensible Entity/Attribute/Value data model

Reference data-plane behavior model supports various devices

Significant feature/partner growth since announcement in 2014

https://github.com/opencomputeproject/SAI
SAI API and Objects

APIs:
- sai_create_api
- sai_set_api
- sai_get_api
- sai_remove_api
SAI Function Calls & Pipelines

- Register SAI APIs to achieve specific functions and control logging separately
- Construct the right order to execute SAI function calls
- Refer to SAI Pipelines to create the right packet action flow
<table>
<thead>
<tr>
<th>Monitoring</th>
<th>Protocol Support</th>
<th>Reliability/QoS</th>
<th>Infrastructure</th>
</tr>
</thead>
<tbody>
<tr>
<td>INT [Barefoot]</td>
<td>Basic L2/L3 Forwarding</td>
<td></td>
<td>SAI Ext API [Dell]</td>
</tr>
</tbody>
</table>
Agenda

• Contributors
• Uses cases
• High Level Architecture
• Next Steps
Contributors

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  - Gidi Navon, Marvell, Inc
  - Ashok Daparthi, Dell Inc.
  - Mike Lazar, Dell Inc.
  - Mickey Spiegel, Barefoot Inc.
SAI TAMv2 Use cases

- Streaming Telemetry
  - Stream data and events directly from silicon

- Ability to define Advanced Mathematical Functions (AMF) on data
  - Hierarchical Analytics
  - Stream Raw Data or Summary Reports
  - Promote HW implementations of AMF
  - Walk towards ML

- Single Consistent Data Model for Internal and External Consumption
  - Internal – SONiC
  - External - Collector

- Flexible data encoding
  - Proto, Thrift, JSON, custom

- Flexible transport
  - UDP, TCP, localhost, gRPC
SAI TAMv2 Architecture

- **Generic TAM Objects**
  - *Telemetry Streaming object* is a collection of data, transport, report and collector
  - All telemetry data is characterized in a single consistent way

- **Generic Reporting**
  - Data serialization used to parametrize a report
  - Reporting object consists of serialization protocol
  - Serialization/Deserialization is done using protocol compiler
  - Seamlessly consumed by collector

- **Generic Event Framework**
  - All events are a collection of event type and action
  - Event action can be report or a feedback loop

- **Mixed vendor deployment**
  - No chip specific API
  - Extensible Telemetry object, report types, and events

- **Advanced analytics**
  - Thresholding, triggered streaming (threshold breach)
  - Running average/mean/mode
  - Histograms
SAI TAMv2 Architecture….contd

TAM as a Unified Object
SAI TAMv2 Next Steps

Pull Request 874 – Reviewed and Closed, Target Release SAI 1.4
https://github.com/opencomputeproject/SAI/pull/874

Pull Request JaiOCP/2 – IFA/IOAM/P4INT API, Open for Review
https://github.com/JaiOCP/SAI/pull/2
PTP (Precision Time Protocol)

- Use cases
  - Time synchronization among the switches and servers
  - Debug packet latency issues in the network
- ASIC functions
  - Timestamping Tx/Rx packets
  - Adjust hardware clock time, e.g., offset, frequency
- SAI Interface
  - Host traps (trap PTP packets)
PTP Linux Stack

Linux PTP Stack

Netdev driver

Clock driver

ASIC

HW Clock

User Space

Kernel Space

Hardware

Send Pkt

Recv Pkt

Get Time

Set Time

SAI

Enable PTP timestamping

Open. Together.
PTF Tests

- Validate SAI Implementation
- Call SAI API
- Send packet to validate ASIC forward the packet correctly
Test case updates

- Add 18 cases, L2, L3, ECMP, Neighbor, ACL
- Total 82 test cases

<table>
<thead>
<tr>
<th>Area</th>
<th>Number</th>
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<tbody>
<tr>
<td>L2</td>
<td>15</td>
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<tr>
<td>L3</td>
<td>32</td>
</tr>
<tr>
<td>Host Interface</td>
<td>11</td>
</tr>
<tr>
<td>ACL</td>
<td>8</td>
</tr>
<tr>
<td>Mirror</td>
<td>5</td>
</tr>
<tr>
<td>Tunnel</td>
<td>11</td>
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Call for participation

• New spec contribution in new area
  • IFA, NAT, external phy, mac sec
• New PTF test contribution
  • Improve PTF test coverage
Open Invitation

Inviting contributions in all areas

- SAI
- New features spec, test code

Website: https://github.com/opencomputeproject/SAI

Mailing list: https://ocp-all.groups.io/g/OCP-SAI
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