

## SAI – Update and Roadmap

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#### [Networking]





## 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 <u>https://github.com/opencomputeproject/SAI</u>



\* @param[out] bridge\_port\_id \* @param[in] attr\_count number of attributes \* @param[in] attr\_list array of attributes \* \* @return SAI\_STATUS\_SUCCESS on success \* Failure status code on error \*/ typedef sai\_status\_t (\*sai\_create\_bridge\_fn)( \_\_Out\_ sai\_object\_id\_t\* bridge\_id, \_\_In\_ uint32\_t attr\_count, \_\_In\_ const sai\_attribute\_t \*attr\_list `;

`>move bridge

-i .d

ingress port flow





## SAI API and Objects

APIs:

- sai\_create\_api
- sai\_set\_api
- sai\_get\_api
- sai\_remove\_api



#### KEY SAI\_OBJECT\_TYPE:SAI\_OBJECT\_ID

SAI\_OBJECT\_ATTR

VALUE

SAI\_OBJECT\_ATTR

SAI\_OBJECT\_ATTR

VALUE

VALUE

SAI\_OBJECT\_TYPE\_NEXT\_HOP:0000001

SAI\_NEXT\_HOP\_ATTR\_IP 10.0.0.1

SAI\_NEXT\_HOP\_ATTR\_TY SAI\_NEXT\_HOP\_IP PE



## 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







## What is in SAI

























#### CISCO



## **SAI Telemetry And Monitoring v2.0** (SAI TAMv2)

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#### Agenda

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





#### Contributors

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#### SAI TAMv2 Use cases





- Streaming Telemetry
  - Stream data and events directly from ulletsilicon
- 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  $\bullet$
- Single Consistent Data Model for Internal and **External Consumption** 
  - Internal SONiC  $\bullet$
  - External Collector  $\bullet$
- Flexible data encoding
  - Proto, Thrift, JSON, custom ullet
- 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 single consistent way
- Generic Reporting
  - Data serialization used to parametrize a report Ο
  - Reporting object consists of serialization protocol Ο
  - Serialization/Deserialization is done using protocol compiler Ο
  - Seamlessly consumed by collector Ο
- Generic Event Framework
  - All events are a collection of event type and action
  - Event action can be report or a feedback loop Ο
- Mixed vendor deployment
  - No chip specific API Ο
  - Extensible Telemetry object, report types, and events Ο
- Advanced analytics
  - Thresholding, triggered streaming (threshold breach)
  - Running average/mean/mode
    - Historgrams

DCP

UMMIT







#### SAI TAMv2 Architecture....contd







#### **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

  - 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)



• Time synchronization among the switches and servers



## PTP Linux Stack







## **PTF Tests**

- Validate SAI Implementation
  - Call SALAPI
  - Send packet to validate ASIC forward the packet correctly









## Test case updates

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

Area	N
L2	1
L3	3
Host Interface	1
ACL	8
Mirror	5
Tunnel	1





umber		
5		
2		
1		
1		



# 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





# Open. Together.



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