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Switch Abstraction Interface

Change Proposal

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# Overview

IP Multicast provides a solution to eliminate traffic redundancy and reduce server and CPU loads. This document covers details of IP multicast object –IP multicast group creating, IP multicast group removing, IP multicast group attributes setting and getting, RPF interface adding to IP multicast group, and RPF interface removing from IP multicast group.

# Specification

[This section describes the details of the proposed interface/API]

## Changes to sai.h

/\*

typedef enum \_sai\_api\_t {

SAI\_API\_IPMC= 45, /\* sai\_ipmc\_api\_t \*/

} sai\_api\_t;

## Change to sainexthop.h

/\*\*

\* @brief Next hop type

\*/

typedef enum \_sai\_next\_hop\_type\_t

{

SAI\_NEXT\_HOP\_IP,

/\*\* MPLS(NHLFE) next hop \*/

SAI\_NEXT\_HOP\_MPLS,

/\*\* tunnel next hop \*/

SAI\_NEXT\_HOP\_TUNNEL\_ENCAP,

/\*\* next hop for ipmc\*/

SAI\_NEXT\_HOP\_IPMC

} sai\_next\_hop\_type\_t;

## Change to sainexthopgroup.h

/\*

\* Next hop group type

\*/

typedef enum \_sai\_next\_hop\_group\_type\_t

{

/\* Next hop group is ECMP \*/

SAI\_NEXT\_HOP\_GROUP\_ECMP,

/\* Next hop group is IP multicast \*/

SAI\_NEXT\_HOP\_GROUP\_IPMC,

/\* Other types of next hop group to be defined in the future, e.g., WCMP \*/

} sai\_next\_hop\_group\_type\_t;

## Change to saiswitch.h

/\*\*

\* @brief Switch notification table passed to the adapter via sai\_initialize\_switch()

\*/

typedef struct \_sai\_switch\_notification\_t

{

sai\_switch\_state\_change\_notification\_fn on\_switch\_state\_change;

sai\_fdb\_event\_notification\_fn on\_fdb\_event;

sai\_port\_state\_change\_notification\_fn on\_port\_state\_change;

sai\_port\_event\_notification\_fn on\_port\_event;

sai\_switch\_shutdown\_request\_fn on\_switch\_shutdown\_request;

sai\_packet\_event\_notification\_fn on\_packet\_event;

sai\_ipmc\_event\_notification\_fn on\_ipmc\_event;

} sai\_switch\_notification\_t;

## Change to saihostif.h

typedef enum \_sai\_hostif\_trap\_id\_t

{

/\*\* ipmc packets with RPF check fail

\* (default packet action is trap) \*/

SAI\_HOSTIF\_TRAP\_ID\_IPMC\_RPF\_FAIL = 0x00004002,

SAI\_HOSTIF\_TRAP\_ID\_CUSTOM\_EXCEPTION\_RANGE\_BASE = 0x00005000,

} sai\_hostif\_trap\_id\_t;

## New definitions in saiipmc.h

/\*

\* IP multicast entry key

\*/

typedef struct \_sai\_ipmc\_entry\_t

{

sai\_object\_id\_t vrf\_id;

sai\_ip\_prefix\_t destination;

sai\_ip\_prefix\_t source;

} sai\_ipmc\_entry\_t;

/\*

\* Attribute Id for IP multicast entry

\*/

typedef enum \_sai\_ipmc\_entry\_attr\_t

{

/\* READ-WRITE \*/

/\* RPF router interface list [sai\_object\_id\_t] \*/

SAI\_IPMC\_ATTR\_RPF\_ROUTER\_INTERFACE\_LIST,

/\* Next hop group id for the packet [sai\_object\_id\_t]

\* The next hop id should be next hop group.

\* The next hop id type should be SAI\_NEXT\_HOP\_GROUP\_IPMC \*/

SAI\_IPMC\_ATTR\_NEXT\_HOP\_GROUP\_ID,

/\* Custom range base value \*/

SAI\_IPMC\_ATTR\_CUSTOM\_RANGE\_BASE = 0x10000000

} sai\_ipmc\_entry\_attr\_t;

/\*

\* IPMC event type

\*/

typedef enum sai\_ipmc\_event\_t

{

/\* IPMC entry aged \*/

SAI\_IPMC\_EVENT\_AGED,

} sai\_ipmc\_event\_t;

/\*\* Notification data format received from SAI IPMC callback\*/

typedef struct \_sai\_ipmc\_event\_notification\_data\_t {

sai\_ipmc\_event\_t event\_type;

sai\_ipmc\_entry\_t ipmc\_entry;

} sai\_ipmc\_event\_notification\_data\_t;

/\*\*

\* Routine Description:

\* IPMC notifications

\*

\* Arguments:

\* [in] count - number of notifications

\* [in] data - pointer to ipmc event notification data array

\*

\* Return Values:

\* None

\*/

typedef void (\*sai\_ipmc\_event\_notification\_fn)(

\_In\_ uint32\_t count,

\_In\_ sai\_ipmc\_event\_notification\_data\_t \*data

);

/\*

\* Routine Description:

\* Create IP multicast entry

\*

\* Arguments:

\* [in] ipmc\_entry - IP multicast entry

\* [in] attr\_count - number of attributes

\* [in] attr\_list - array of attributes

\*

\* Return Values:

\* SAI\_STATUS\_SUCCESS on success

\* Failure status code on error

\*/

typedef sai\_status\_t (\*sai\_create\_ipmc\_entry\_fn)(

\_In\_ const sai\_ipmc\_entry\_t\* ipmc\_entry,

\_In\_ uint32\_t attr\_count,

\_In\_ const sai\_attribute\_t \*attr\_list

);

/\*

\* Routine Description:

\* Remove IP multicast entry

\*

\* Arguments:

\* [in] ipmc\_entry - IP multicast entry

\*

\* Return Values:

\* SAI\_STATUS\_SUCCESS on success

\* Failure status code on error

\*/

typedef sai\_status\_t (\*sai\_remove\_ipmc\_entry\_fn)(

\_In\_ const sai\_ipmc\_entry\_t\* ipmc\_entry

);

/\*

\* Routine Description:

\* Set IP multicast entry attribute value

\*

\* Arguments:

\* [in] IP multicast - IP multicast entry

\* [in] attr - attribute

\*

\* Return Values:

\* SAI\_STATUS\_SUCCESS on success

\* Failure status code on error

\*/

typedef sai\_status\_t (\*sai\_set\_ipmc\_entry\_attribute\_fn)(

\_In\_ const sai\_ipmc\_entry\_t\* ipmc\_entry,

\_In\_ const sai\_attribute\_t \*attr

);

/\*

\* Routine Description:

\* Get IP multicast entry attribute value

\*

\* Arguments:

\* [in] ipmc\_entry - IP multicast entry

\* [in] attr\_count - number of attributes

\* [inout] attr\_list - array of attributes

\*

\* Return Values:

\* SAI\_STATUS\_SUCCESS on success

\* Failure status code on error

\*/

typedef sai\_status\_t (\*sai\_get\_ipmc\_entry\_attribute\_fn)(

\_In\_ const sai\_ipmc\_entry\_t\* ipmc\_entry,

\_In\_ uint32\_t attr\_count,

\_Inout\_ sai\_attribute\_t \*attr\_list

);

/\*

\* Routine Description:

\* add RPF interface list to IP multicast

\*

\* Arguments:

\* [in] ipmc\_entry - IP multicast entry

\* [in] router interface list - router interface list

\*

\* Return Values:

\* SAI\_STATUS\_SUCCESS on success

\* Failure status code on error

\*/

typedef sai\_status\_t (\*sai\_add\_rpf\_interface\_to\_ipmc\_fn)(

\_In\_ const sai\_ipmc\_entry\_t\* ipmc\_entry,

\_In\_ const sai\_object\_list\_t \*router\_interface\_list

);

/\*

\* Routine Description:

\* remove RPF interface list from IP multicast

\*

\* Arguments:

\* [in] ipmc\_entry - IP multicast entry

\* [in] router interface list - router interface list

\*

\* Return Values:

\* SAI\_STATUS\_SUCCESS on success

\* Failure status code on error

\*/

typedef sai\_status\_t (\*sai\_remove\_rpf\_interface\_from\_ipmc\_fn)(

\_In\_ const sai\_ipmc\_entry\_t\* ipmc\_entry,

\_In\_ const sai\_object\_list\_t \*router\_interface\_list

);

/\*

\* IP multicast method table retrieved with sai\_api\_query()

\*/

typedef struct \_sai\_ipmc\_api\_t

{

sai\_create\_ipmc\_entry\_fn create\_ipmc\_entry;

sai\_remove\_ipmc\_entry\_fn remove\_ipmc\_entry;

sai\_add\_rpf\_interface\_to\_ipmc\_fn sai\_add\_rpf\_interface\_to\_ipmc;

sai\_remove\_rpf\_interface\_from\_ipmc\_fn sai\_remove\_rpf\_interface\_from\_ipmc;

sai\_set\_ipmc\_entry\_attribute\_fn set\_ipmc\_entry\_attribute;

sai\_get\_ipmc\_entry\_attribute\_fn get\_ipmc\_entry\_attribute;

} sai\_ipmc\_api\_t;

# Examples

Router interface should be created first, for example, rif1\_object, rif2\_object and rpf\_object have been created.

## Create nexthop for router rif1 and rif2

sai\_api\_query(SAI\_API\_NEXT\_HOP, & sai\_nexthop\_api);

sai\_object\_id\_t nh1\_object;

sai\_attribute\_t attr[2] = {0};

attr[0].id = SAI\_NEXT\_HOP\_ATTR\_TYPE;

attr[0].value.oid = SAI\_NEXT\_HOP\_IPMC;

attr[1].id = SAI\_NEXT\_HOP\_ATTR\_ROUTER\_INTERFACE\_ID;

attr[1].value.oid = rif1\_object;

sai\_nexthop\_api-> create\_next\_hop (&nh1\_object, 2, attr);

sai\_object\_id\_t nh2\_object;

sai\_attribute\_t attr[2] = {0};

attr[0].id = SAI\_NEXT\_HOP\_ATTR\_TYPE;

attr[0].value.oid = SAI\_NEXT\_HOP\_IPMC;

attr[1].id = SAI\_NEXT\_HOP\_ATTR\_ROUTER\_INTERFACE\_ID;

attr[1].value.oid = rif2\_object;

sai\_nexthop\_api->create\_next\_hop (&nh2\_object, 2, attr);

## Create nexthop group

sai\_api\_query(SAI\_API\_NEXT\_HOP\_GROUP, &sai\_nexthop\_group\_api);

sai\_object\_id\_t nexthop\_group\_object;

sai\_object\_id\_t nexthop\_list\_obj[2] = {0};

sai\_attribute\_t attr[2] = {0};

attr[0].id = SAI\_NEXT\_HOP\_GROUP\_ATTR\_TYPE;

attr[0].value.oid = SAI\_NEXT\_HOP\_GROUP\_IPMC;

attr[1].id = SAI\_NEXT\_HOP\_GROUP\_ATTR\_NEXT\_HOP\_LIST;

nexthop\_list\_obj [0] = nh1\_object;

nexthop\_list\_obj [1] = nh2\_object;

attr[1].value.objlist.count = 2;

attr[1].value.objlist.list = nexthop\_list\_obj;

sai\_nexthop\_group\_api->create\_next\_hop\_group(&nexthop\_group\_object, 2, attr);

## Create IPMC entry

sai\_api\_query(SAI\_API\_IPMC, &sai\_ipmc\_api);

sai\_ipmc\_entry\_t ipmc\_entry;

sai\_object\_id\_t rpf\_interface\_list\_obj[2] = {0};

sai\_attribute\_t attr[2] = {0};

ipmc\_entry.vrf\_id = vr\_id\_obj;

ipmc\_entry.destination.addr\_family = SAI\_IP\_ADDR\_FAMILY\_IPV4;

ipmc\_entry.destination.addr.ip4 = 0xE0010101;

ipmc\_entry.destination.mask.ip4 = 0xFFFFFFFF;

ipmc\_entry.destination.addr\_family = SAI\_IP\_ADDR\_FAMILY\_IPV4;

ipmc\_entry.source.addr.ip4 = 0XC0A80001;

ipmc\_entry.source.mask.ip4 = 0xFFFFFFFF;

attr[0].id = SAI\_IPMC\_ATTR\_NEXT\_HOP\_GROUP\_ID;

attr[0].value.oid = nexthop\_group\_object;

attr[1].id = SAI\_IPMC\_ATTR\_RPF\_ROUTER\_INTERFACE\_LIST;

rpf\_interface\_list\_obj[0] = rpf\_object;

attr[1].value.objlist.count = 1;

attr[1].value.objlist.list = rpf\_interface\_list\_obj;

sai\_ipmc\_api->create\_ipmc\_entry(&ipmc\_entry, 2, attr);