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Switch Abstraction Interface

Change Proposal

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# List of Changes

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| Version | Changes | Name | Date |
| Initial Version | Base version |  | 17/10/2015 |
| 0.6 | Redesign | Min Yao | 17/10/2015 |
| 0.7 | Add RPF interface attributes in IPMC entry attributes | Min Yao | 25/8/2015 |
| 0.8 | Change RPF interface list to RPF group  Update example | Min Yao | 18/9/2015 |

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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 sairouterinterface.h

/\*\*

\* @brief Routing interface attribute IDs

\*/

typedef enum \_sai\_router\_interface\_attr\_t

{

/\*\* READ-WRITE \*/

**/\*\* V4 Mcast enable [bool] (CREATE\_AND\_SET) (default to FALSE) \*/**

**SAI\_ROUTER\_INTERFACE\_ATTR\_V4\_MCAST\_ENABLE,**

**/\*\* V6 Mcast enable [bool] (CREATE\_AND\_SET) (default to FALSE) \*/**

**SAI\_ROUTER\_INTERFACE\_ATTR\_V6\_MCAST\_ENABLE,**

} sai\_router\_interface\_attr\_t;

## Change to saigroup.h

/\*\*

\* @brief Generic object group type

\*/

typedef enum \_sai\_group\_type\_t

{

/\*\* Group members are ECMP nexthops \*/

SAI\_GROUP\_TYPE\_ECMP,

/\*\* Group members are outputs of a L2 multicast group \*/

SAI\_GROUP\_TYPE\_L2MC,

**/\*\* Group members are outputs of a L3 multicast group \*/**

**SAI\_GROUP\_TYPE\_IPMC,**

**/\*\* Group members are RPF interfaces of a L3 multicast group \*/**

**SAI\_GROUP\_TYPE\_RPF,**

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

} sai\_group\_type\_t;

## New definitions in saiipmc.h

/\*\*

\* @brief Enum defining ipmc entry types.

\*/

typedef enum \_sai\_ipmc\_entry\_type\_t

{

/\*\* IPMC entry with type (S,G) \*/

SAI\_IPMC\_TYPE\_SG = 0x00000001,

/\*\* IPMC entry with type (\*,G) \*/

SAI\_IPMC\_TYPE\_XG = 0x00000002,

} sai\_ipmc\_entry\_type\_t;

/\*

\* IP multicast entry key

\*/

typedef struct \_sai\_ipmc\_entry\_t

{

sai\_object\_id\_t vrf\_id;

sai\_ipmc\_entry\_type\_t type;

sai\_ip\_address\_t destination;

sai\_ip\_address\_t source;

} sai\_ipmc\_entry\_t;

/\*

\* Attribute Id for IP multicast entry

\*/

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

{

SAI\_IPMC\_ENTRY\_ATTR\_START,

/\*\* READ-ONLY \*/

/\*\* READ-WRITE \*/

/\*\* Packet action [sai\_packet\_action\_t] (MANDATORY\_ON\_CREATE|CREATE\_AND\_SET) \*/

SAI\_IPMC\_ATTR\_PACKET\_ACTION = SAI\_IPMC\_ENTRY\_ATTR\_START,

/\*\* Packet priority for trap/log actions [uint8\_t] (CREATE\_AND\_SET)

(default to 0) \*/

SAI\_IPMC\_ATTR\_TRAP\_PRIORITY,

/\*\* Output group id for the packet [sai\_object\_id\_t] (CREATE\_AND\_SET)

\* The generic group type should be SAI\_GROUP\_TYPE\_IPMC

\* (MANDATORY\_ON\_CREATE when SAI\_IPMC\_ATTR\_PACKET\_ACTION == SAI\_PACKET\_ACTION\_FORWARD)

\* (CREATE\_AND\_SET) \*/

SAI\_IPMC\_ATTR\_OUTPUT\_GROUP\_ID,

/\*\* RPF interface group id for the packet [sai\_object\_id\_t] (CREATE\_AND\_SET)

\* The group type should be SAI\_GROUP\_TYPE\_RPF.

\* If not set or the group has no member, RPF checking will be disabled \*/

SAI\_L2MC\_ATTR\_RPF\_GROUP\_ID,

/\* Custom range base value \*/

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

} sai\_ipmc\_entry\_attr\_t;

/\*

\* 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

);

/\*

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

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

} sai\_ipmc\_api\_t;

## Change to sairouter.h

typedef enum \_sai\_virtual\_router\_attr\_t

{

SAI\_VIRTUAL\_ROUTER\_ATTR\_START,

/\*\* READ-WRITE \*/

**/\*\* Action for Unknown L3 multicast packets [sai\_packet\_action\_t] (CREATE\_AND\_SET)**

**\* (default to SAI\_PACKET\_ACTION\_DROP) \*/**

**SAI\_VIRTUAL\_ROUTER\_ATTR\_UNKNOWN\_L3\_MULTICAST\_PACKET\_ACTION,**

} sai\_virtual\_router\_attr\_t;

## Change to saihostif.h

typedef enum \_sai\_hostif\_trap\_type\_t

{

**/\*\* unknown l3 multicast packets**

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

**SAI\_HOSTIF\_TRAP\_TYPE\_UNKNOWN\_L3\_MULTICAST = 0x00004002,**

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

} sai\_hostif\_trap\_type\_t;

# Examples

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

## Create generic groups

sai\_api\_query(SAI\_API\_GROUP, &group\_api);

sai\_object\_id\_t ipmc\_group\_id = 0;

sai\_object\_id\_t rpf\_group\_id = 0;

sai\_attribute\_t attr[1] = {0};

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

attr[0].value.s32 = SAI\_GROUP\_TYPE\_IPMC;

group\_api->create\_group(&rpf\_group\_id, 1, attr);

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

attr[0].value.s32 = SAI\_GROUP\_TYPE\_RPF;

group\_api->create\_group(&rpf\_group\_id, 1, attr);

## Create group members and RPF group

sai\_object\_id\_t ipmc\_group\_member\_id1 = 0;

sai\_object\_id\_t ipmc\_group\_member\_id2 = 0;

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

attr[0].id = SAI\_GROUP\_MEMBER\_ATTR\_GROUP\_ID;

attr[0].value.oid = ipmc\_group\_id;

attr[1].id = SAI\_GROUP\_MEMBER\_ATTR\_MEMBER\_ID;

attr[1].value.oid = routerinterface\_obj1; /\* some valid routerinterface object\*/

group\_api->create\_group\_member(&ipmc\_group\_member\_id1, 2, attr);

attr[0].id = SAI\_GROUP\_MEMBER\_ATTR\_GROUP\_ID;

attr[0].value.oid = ipmc\_group\_id;

attr[1].id = SAI\_GROUP\_MEMBER\_ATTR\_MEMBER\_ID;

attr[1].value.oid = routerinterface\_obj2; /\* some valid routerinterface object\*/

group\_api->create\_group\_member(&ipmc\_group\_member\_id2, 2, attr);

sai\_object\_id\_t rpf\_group\_member\_id1 = 0;

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

attr[0].id = SAI\_GROUP\_MEMBER\_ATTR\_GROUP\_ID;

attr[0].value.oid = rpf\_group\_id;

attr[1].id = SAI\_GROUP\_MEMBER\_ATTR\_MEMBER\_ID;

attr[1].value.oid = routerinterface\_obj3; /\* some valid routerinterface object\*/

group\_api->create\_group\_member(&rpf\_group\_member\_id1, 2, attr);

## Create IPMC entry

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

sai\_ipmc\_entry\_t ipmc\_entry;

sai\_attribute\_t attr[3] = {0};

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

ipmc\_entry.type = SAI\_IPMC\_TYPE\_XG;

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

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

attr[0].id = SAI\_IPMC\_ATTR\_PACKET\_ACTION;

attr[0].value.s32 = SAI\_PACKET\_ACTION\_FORWARD;

attr[1].id = SAI\_IPMC\_ATTR\_OUTPUT\_GROUP\_ID;

attr[1].value.oid = ipmc\_group\_id;

attr[2].id = SAI\_IPMC\_ATTR\_RPF\_GROUP\_ID;

attr[2].value.oid = rpf\_group\_id;

sai\_ipmc\_api->create\_ipmc\_entry(&ipmc\_entry, 3, attr);