1.1 ~~MRP~~ MAC Address Registration Protocol (MMRP) - Purpose

MMRP provides a mechanism that allows end stations and MAC Bridges to dynamically register (and subsequently, deregister) Group membership and Individual MAC address information with the Bridges attached to the same LAN, and disseminates that information across all the Bridges that support Extended Filtering Services in the Bridged Local Area Network. The operation of MMRP relies upon the services provided by MRP.

The information registered, de-registered, and disseminated via MMRP is in the following forms:

a) Group membership information. This indicates the presence of MMRP participants that are members of a particular Group (or Groups), and carries the group MAC Address(es) associated with the Group(s). The exchange of specific Group membership information can result in the creation or updating of Group Registration Entries in the Filtering Database to indicate the Port(s) and VID(s) of the VLAN(s) on which members of the Group(s) have been registered. The structure of these entries is described in 8.8.4.

b) Group service requirement information. This indicates that one or more MMRP participants require Forward All Groups or Forward Unregistered Groups to be the default Group filtering behavior (see 6.12.7 and 8.8.6).

c) Individual MAC address information. The Individual MAC address may be, for example, a B-MAC associated with a Backbone Edge Bridge. MMRP propagates the address to be registered to other bridges in the network. The exchange of Individual MAC address information results in the construction of a static forwarding table entry associated with the MAC address to be registered.

Registration of Group membership information makes Bridges aware that frames destined for the group MAC Address concerned should only be forwarded in the direction of the registered members of the Group. Therefore, forwarding of frames destined for the address associated with that Group occurs only on Ports on which such membership registration has been received.

Registration of Group service requirement information makes the Bridges aware that Ports that can forward frames in the direction from which the information has been received should modify their default Group forwarding behavior in accordance with the service requirement expressed.

Registration of Individual MAC address information makes Bridges aware that frames destined for the Individual MAC address concerned should only be forwarded in the direction of the registered port.

NOTE—Modification of default Group forwarding behavior allows Bridge Ports to accommodate MMRP-unaware devices in the Bridged Local Area Network by forwarding frames destined for unregistered group MAC Addresses.

The operation of MMRP can result in

d) The propagation of Group membership information and Group service requirement information, and consequent creation, updating, or deletion of Group Registration Entries in the Filtering Databases of all Bridges in the network that support Extended Filtering Services.

e) Consequent changes to the Group filtering behavior of such Bridges.

f) The propagation of Individual MAC address information, and consequent creation, deletion of Individual MAC address Entries in the Filtering Databases of all Bridges in the network.

g) Consequent changes to the Individual filtering behavior of such Bridges.

In VLAN Bridges, MMRP Group membership registration operates only when the Bridge Filtering Mode is set to Extended Filtering Mode. Bridges that are unable to operate in Extended Filtering Mode, or have been set to operate in Basic Filtering Mode, are transparent with respect to MMRP Group membership registration protocol exchanges, and forward any Group membership registration MRPDUs destined for the MMRP application through all Ports that are in Forwarding. MMRP Individual MAC address registration can operate in both Basic and Extended Filtering Mode.

1.2 Model of operation

MMRP defines an MRP application that provides the extended filtering services defined in 6.12.5 and 6.12.7. To this end, MMRP makes use of

a. The declaration and propagation services offered by MRP Attribute Distribution (MAD; 10.2 and 10.3,) and MRP Attribute Propagation (MAP; 10.2 and 10.3) to declare and propagate Group membership ,Group service requirement and Individual MAC address information within the Bridged Local Area Network.

b. The registration services offered by MAD (10.2 and 10.3) to allow Group membership ,Group service requirement and Individual MAC address information to control the frame filtering behavior of participating devices.

1.2.1   Propagation of Group Membership information

1.2.2   Propagation of Group service requirement information

1.2.3   Source pruning

1.2.4   Use of Group service requirement registration by end stations

   NOTE: Don't need to change. But Only Valid to Group registration.
…Snip…

1.2.5   Propagation of Individual MAC address information

   A bridge registers a Individual MAC address to other bridges in the same bridged network. A bridge receiving a MMRP Registration PDU uses the contained MAC Address parameter and the identity of the receiving port, as well as the VID parameter if in a VLAN context, to create an associated Static Filtering Entry to the Filtering Database. A bridge receiving a MMRP Deregistration PDU on a given port, uses the contained MAC Address parameter and the VID parameter if in a VLAN context, to remove an associated Static Filtering Entry from the Filtering Database.

1.3   Default Group filtering behavior and MMRP propagation

   The propagation of MMRP registrations within a VLAN Context has implications with respect to the choice of default Group filtering behavior within a Bridged LAN. As MMRP frames are transmitted only on outbound Ports that are in the Member set (8.8.9) for the VLAN concerned, propagation of Group registrations by a given Bridge occurs only towards regions of the Bridged LAN where that VLAN has been (statically or dynamically) registered. This is illustrated in Figure 10-7; dotted lines in the diagram show those regions of the LAN where propagation of registrations for Group M in VLAN V does not occur. Consequently, the Filtering Databases of the lower two Bridges will not contain any Dynamic Group Registration Entry for Group M in VLAN V.

   The action of these two Bridges on receipt of frames, on either of their lower Ports, destined for Group M and VLAN V, will depend upon the Default Group Filtering Behavior adopted by their upper Ports, which are the Ports that are in the Member set for VLAN V. If the Default Group Filtering Behavior is either Forward All Groups or Forward Unregistered Groups, then these Bridges will forward the frames. If the Default Group Filtering Behavior is Filter Unregistered Groups, then these Bridges will filter the frames. In the scenario shown, the choice of Default

Group Filtering Behavior is therefore crucial with respect to whether or not end station S, or any other station that is "outside" the VLAN, is able to send frames to members of the Group. The choice between Filter Unregistered Groups and the other default behaviors therefore has the effect of defining VLANs that are closed to external unregistered traffic (Filter Unregistered Groups) or open to external unregistered traffic (either of the other default behaviors).

1.4   Definition of the MMRP application

1.4.1   Definition of MRP protocol elements

NOTE: Don't need to change.
…Snip…

1.4.1.1   MMRP AttributeType definitions

MMRP defines three AttributeTypes (10.8.2.2) that are carried in MRP protocol exchanges, as follows:

  a. The Service Requirement Vector Attribute Type.
  b. The Group Vector Attribute Type.
  c. The MAC Register Vector Attribute Type

Attributes identified by the Service Requirement Attribute Type are instances of VectorAttributes (10.8.1), used to identify values of Group service requirements. The value of AttributeType used to identify the Service Requirement Attribute Type in MRPDUs (10.8.2.2) shall be 1.

Attributes identified by the Group Vector Attribute Type are instances of VectorAttributes (10.8.1), used to identify a sequence of values of group MAC Addresses. The value of AttributeType used to identify the Group Vector Attribute Type in MRPDUs (10.8.2.2) shall be 2.

MAC Register Vector Attribute Type is derived from VectorAttributes. It's used to carry the value of Individual MAC address. The value of Attribute Type shall be 3.

1.4.1.2   MMRP FirstValue definitions

The FirstValue field (10.8.2.5) in instances of the Group Vector Attribute Type shall be encoded in MRPDUs as six octets, each taken to represent an unsigned binary number. The octets are derived from the Hexadecimal Representation of a 48-bit MAC Address (defined in IEEE Std 802) as follows:

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a. Each two-digit hexadecimal numeral in the Hexadecimal Representation is taken to represent an unsigned hexadecimal value, in the normal way, i.e., the rightmost digit of each numeral represents the least significant digit of the value, the leftmost digit is the most significant.

b. The first octet of the attribute value encoding is derived from the left-most hexadecimal value in the Hexadecimal Representation of the MAC Address. The least significant bit of the octet (bit 1) is assigned the least significant bit of the hexadecimal value, the next most significant bit is assigned the value of the second significant bit of the hexadecimal value, and so on.

c. The second through sixth octets of the encoding are similarly assigned the value of the second through sixth hexadecimal values in the Hexadecimal Representation of the MAC Address.

The FirstValue field in instances of the Group Vector Attribute Type shall not be used to carry Individual MAC Addresses; there are no other restrictions on the range of values that can be represented in these data types.

The FirstValue field in instances of the Service Requirement Attribute Type shall be encoded in MRPDUs (10.8.2.5) as a single octet, taken to represent an unsigned binary number. Only two values of this type are defined:

a. All Groups shall be encoded as the value 0.

b. All Unregistered Groups shall be encoded as the value 1.

The remaining possible values (2 through 255) are reserved.

The First Value field in instances of the The MAC Register Attribute Type is encoded as six octets, and defined as a 48-bit Individual MAC Address as specified in IEEE Std802-2001 clause 9.2.
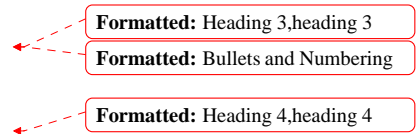
1.4.2   Provision and support of Extended Filtering Services

NOTE: Don't need to change

…Snip…

1.4.3   Provisioning and support of the Individual MAC address service

1.4.3.1   Bridge Individual MAC address declaration

The MMRP application supports dynamic registration and de-registration services, as follows:

On receipt of an ES_REGISTER_INDIVIDUAL_MAC service primitive, the MMRP participant issues a MAD_Join.request service primitive. The attribute_type argument is set to the MAC Register Attribute Type, and the attribute value argument set to the value of MAC_ADDRESS parameter of the service primitive.

On receipt of an ES_DEREGISTER_INDIVIDUAL_MAC service primitive, the MMRP participant issues a MAD_Leave.request service primitive. The attribute_type argument set to the MAC Register Attribute Type, and the attribute value argument set to the value of MAC_ADDRESS parameter of the service primitive.

1.4.3.2 Bridge Individual MAC address registration

When a MMRP participant receives a register or de-register event signaled by MAD, It handles as follows:

On receipt of a MAD_Join.indication whose attribute_type is set to the MAC Register Attribute Type, the MMRP participant creates a Static Filtering Entry in the Filtering Database containing the MAC address carried in the attribute_value parameter, the port associated with the Participant, and the VID associated with the MAP Context. If there is a Dynamic Filtering Entry exists with the same MAC address, creation of the Static Filtering Entry will remove the conflicting information that contained in the Dynamic Filtering Entry. After removal of such conflicting information, if Port Map of the Dynamic Filtering Entry does not specify forwarding on any Port, then this Dynamic Filtering Entry is removed from the Filtering Database. The structure of Static/Dynamic Filtering Entry is specified in IEEE802.1D-2004 clause 7.9.1.

On receipt of a MAD_Leave.indication whose attribute_type is set to the MAC Register Attribute Type, the MMRP participant deletes a Static Filtering Entry in the filtering database containing the MAC address carried in the attribute_value parameter, the port associated with the Participant, and the VID associated with the MAP Context.. If such an entry does not exist in the filtering database, then the indication is not propagated and the deregistration fails.

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