Virtual LAN Management Protocol (VLMP)

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What is VLMP?

A draft RFC researched and written by Prof. David Cheriton

- A MAC- or datalink-level protocol for exchanging VLAN info between switches on an extended LAN
- A way to name VLANs (and obtain membership info based on the name)
- A way for switches that implement different VLAN styles to participate in the same VLANs
- Vendor independent
- Open to significant comments/changes
- Postscript file available from the author (cheriton@cs.stanford.edu)

Definitions

Virtual LAN (VLAN)

- A broadcast domain
- A collection of endstations communicating as if they were on one physical broadcast LAN

Distributed virtual LAN

- A VLAN spanning two or more switches

ONC RPC

- Existing Remote Procedure Call standard

EGMP

- Proposed Ethernet Group Membership Protocol (MAC-level version of IGMP — the Internet Group Management Protocol)

Basic Ideas

Each Ethernet address is associated with one or more VLANs

- Each switch determines (autonomously) how to make this association for each directly-connected device
  - Default per segment, MAC address list, protocol type, layer 3, etc.

Each VLAN is identified by a variable-length character-string name

- "defaultVLAN"
- "engineering1"
- "ip/147.128.0.0", "ip/147.128.200.0/24", "ipx/ff001234"

Basic Ideas (continued)

For each VLAN, there is a group of switches that forward packets for that VLAN

- Switches use VLMP to join groups as needed

Switches forward a packet only on segments known to have directly connected stations belonging to the same VLAN as the source or switches belonging to the same group (subject to Spanning Tree)

- Switches use VLMP to query other switches when a source address's VLAN membership is unknown

VLMP is specified at the top level as a set of remote procedure calls

VLMP Group Membership Procedures

Switches use the EGMP "join" and "leave" calls to manage group membership

- Each procedure call has a VLAN's character-string name as a parameter
- In general, EGMP calls are multicast on a segment, responses are unicast, and calls and responses (if any) are not propagated beyond the switch

Membership timeouts

- "leave-all" call periodically initiated by an elected "interrogator switch" on each segment
- Members get a chance to re-join before being timed out

Switch Operation with VLMP

Data Structures

- A VLAN identifier (pointer to list of associated VLANs) must be maintained for each MAC address

Algorithms

- Packet forwarding is subject to source and destination VLAN membership
- If source VLAN membership is unknown, a VLMP callback is made to the originating switch ("virtualLANs" call)
  - Parameters include source MAC address and "type" field
- Packets may be dropped or queued during callback

Other

Loop prevention

- For now, Spanning Tree
- Other routing mechanisms could be considered

Use of different VLAN styles

- A switch using MAC-list VLANs could name a VLAN "ip/147.128.0.0" to interoperate with a switch supporting layer-3 VLANs
- Can also be used to communicate the meaning of the 32-bit SAID field between switches in the 802.10 encapsulation approach

Read the 21-page VLMP and 29-page EGMP draft RFCs!