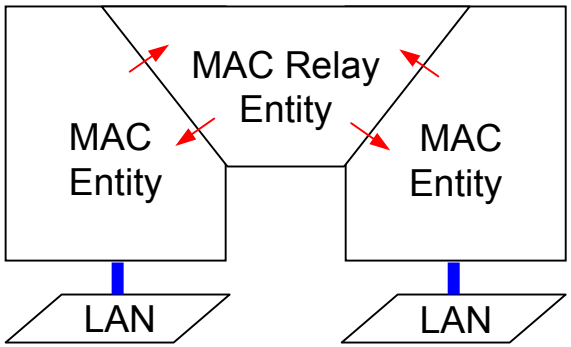
Issues of VPLS

November 20, 2002 The 55th IETF PPVPN WG

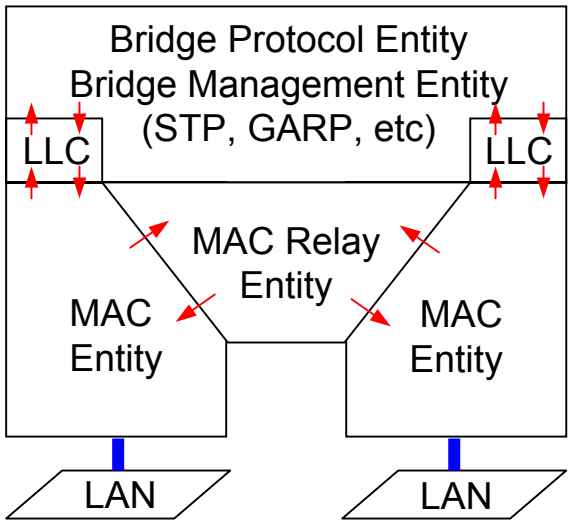
M. Suzuki

NTT

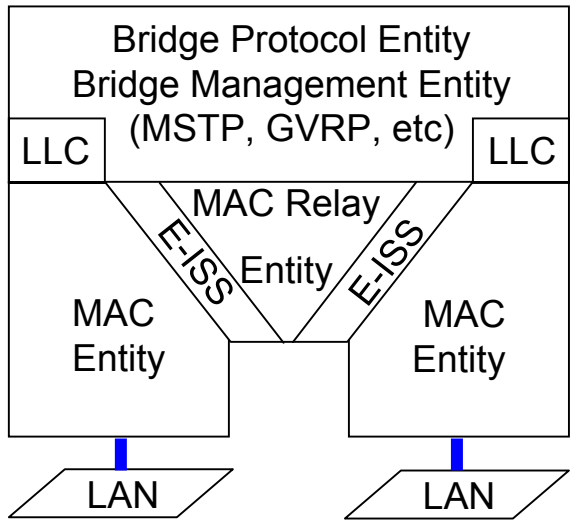
Reference Models



1982-style Bridge



1998-style Bridge
802.1D-1998
802.1t-2001
802.1w-2001 RSTP
(802.1y)



VLAN-aware Bridge
1998-style Bridge &
802.1Q-1998
802.1u-2001
802.1v-2001
(802.1s MSTP)

Customer View

- From the viewpoint of VPLS service customers, a service instance should be equivalent to:
  - A LAN
  - A single Bridge, that is:
    - A 1982-style Bridge
    - A 1998-style Bridge
    - A VLAN-aware Bridge
  - A Bridged LAN composed by:
    - 1982-style Bridges
    - 1998-style Bridges
    - VLAN-aware Bridges
- Question: Expected scenario from customer's perspective

SPs Requirements

- VPLS service providers must estimate order of maximum number of the customers to be supported
- SPs may restrict maximum number of MAC addresses supported by a single VPLS service
- Questions:
  - Order of the maximum number of customers assumed by SPs
    - $O(10^3)$ - $O(10^6)$...
  - The maximum number of MAC addresses supported by a single VPLS service
    - $O(10)$ - $O(10^4)$.....

Support of VPLS Service

- VPLS service is enabled by a logical Bridged LAN, which consists of physical or emulated LANs and Bridges
- A portion of the Bridged LAN is emulated by VSIs interconnected by Ethernet pseudo wires
- VLAN-aware Bridge can be used for VPLS service, however:
  - It supports 4094 VLANs only
  - Customer network cannot use VLAN
- Development of new layer 2 technology that supports SP class VLAN service is indispensable
  - Stacked-VLAN aware Bridge
  - MAC-in-MAC encapsulation Bridge

LAN/Bridge Emulation

- Robustness of Bridge protocols must be identified
  - Throughput, delay time, error rate, and reliability
  - MAC frames for Bridge protocols may be forwarded in high-priority or through a special communication path
- How the service instance handles Bridge protocols
  - Pass through/terminate
- STP/RSTP/MSTP snooping mechanism may be required for 1982-style Bridge and emulated LAN, that learns customer's MAC addresses
- SP can practically detect a loop in a customer network
  - How SP notify that the fact to the customer

Split-horizon forwarding scheme

- Scalability
  - Improvement techniques are proposed
- Support of broadcast and multicast
  - Waste bandwidth in SP network
  - Increase jitter of MAC frame forwarding
- Recovery time of PW may affect failure detection of STP/RSTP/MSTP
- Failure of a single pseudo wire in the mesh == particular two ports in a HUB/Bridge cannot communicate each other but the remains are normal
  - Do Bridge protocols properly work in this kind of situation?

Routing for LAN/Bridge Emulation

- Topology restriction is undesirable for SPs
  - SPs can not deploy PEs freely and full mesh topology may not scale
- If STP/RSTP/MSTP works in WAN environments, it only blocks links and constructs a tree or hierarchical tree topologies
  - It may not efficiently use link bandwidth
- Minimum OSPF or BGP-4 extension for MAC routing support may be required
  - This extended MAC routing protocol may be closed to layer 2
  - It does not need to interact with IP routing protocol