Layer 2 Gateway (L2GW)

draft-xia-nvo3-l2gw-01

Liang Xia, Lucy Yong, Weiguo Hao

July 2014 Toronto

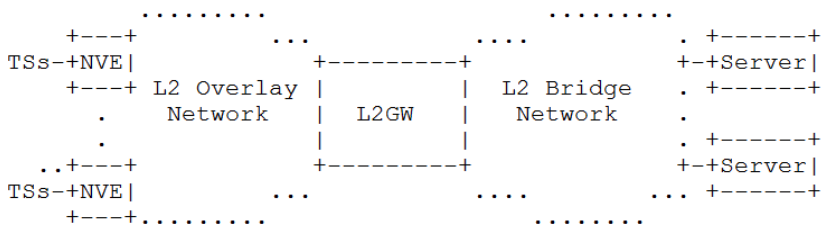
Problem

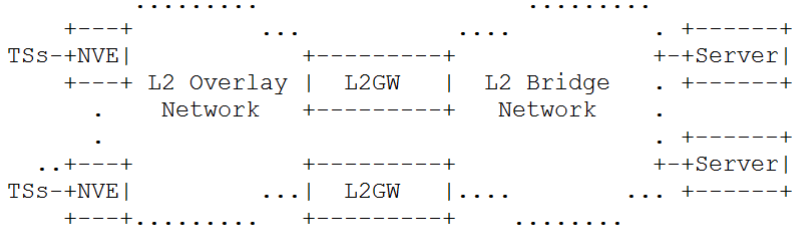
- Present situation:
  - NVO3 tech-based L2 overlay networks are more and more deployed in DC currently;
  - Traditional L2 bridge network [IEEE 802.1Q] still exists widely in DC for connecting non-virtualized devices (e.g. physical servers, storage systems, etc);

- Problem: How to interconnect L2 overlay network with L2 bridge network?

L2GW Solution

- L2GW (Layer 2 Gateway) -- gateway functions to interconnect an L2 overlay network with an L2 bridge network:
  - In data plane: Encapsulation translation, mac sync, arp handling, multi-homing;
  - In control plane: Process Layer 2 Control Protocol (L2CP) frames between 2 networks





What is L2CP?

- L2CP (Layer 2 Control Protocol) -- defined by IEEE802.1 to be used for L2 bridge network control, e.g., STP, LACP, etc. An L2CP is identified by one of the following MAC destination addresses:
  - ***01-80-C2-00-00-00*** through ***01-80-C2-00-00-0F***: Bridge Block of protocols
  - ***01-80-C2-00-00-20*** through ***01-80-C2-00-00-2F***: GARP/MRP Block of protocols

L2CP process in L2 bridge network specified by IEEE 802.1

MAC DA	Assignment	Protocol Type	L2CP Action	
			VLAN-based L2 services	PORT-based L2 services
01-80-C2-00-00-00	Nearest Customer Bridge	STP/RSTP/MSTP, LACP/LAMP	Filter	Pass
01-80-C2-00-00-01	IEEE MAC Specific Control Protocols	PAUSE	Filter	Filter
01-80-C2-00-00-02	IEEE 802 Slow Protocols	LACP/LAMP, Link OAM, ESMC	Filter	Filter
01-80-C2-00-00-03	Nearest non-TPRM Bridge	Port Authentication, LACP/LAMP	Filter	Filter
01-80-C2-00-00-04	IEEE MAC Specific Control Protocols		Filter	Filter
01-80-C2-00-00-05	Reserved for Future Standardization		Filter	Filter
01-80-C2-00-00-06				
01-80-C2-00-00-09				
01-80-C2-00-00-0A				

Table part--1

01-80-C2-00-00-07	MEF ELMI	E-LMI	Filter	Filter
01-80-C2-00-00-08	Provide Bridge Group		Filter	Filter
01-80-C2-00-00-0B	Reserved for Future Standardization		Filter	Pass
01-80-C2-00-00-0C				
01-80-C2-00-00-0D	Provider Bridge MVRP		Filter	Pass
01-80-C2-00-00-0E	Nearest Bridge, Individual LAN Scope	LLDP, PTP Peer Delay	Filter	Filter
01-80-C2-00-00-20 through 01-80-C2-00-00-2F		GARP/MRP Block	Pass	Pass

Table part--2

Analysis of L2CP process in L2 overlay network

- L2CP in L2 overlay network: most of L2CPs are unnecessary in L2 overlay network because NVO3 has its own control plane functions for the corresponding requirements;

- It is very useful to document how these service frames should be handled at L2GW to ensure that two networks can interwork.

Detailed analysis of L2CP process in L2 overlay network

Detailed analysis of L2CP handling across L2GW

- L2CP Frames Filtered (Peered or Discarded) in L2GW: xSTP, LACP/LAMP(01-80-C2-00-00-02), PAUSE, E-LMI, LLDP, PTP Peer Delay;

- L2CP Frames Passed through L2GW: LACP/ LAMP(01-80-C2-00-00-00), GARP/MRP series protocols (i.e., MMRP, MVRP);

- TBD: Link OAM, …

Next Step

- Comments and suggestions?
- Hope to get feedbacks from IEEE!
- Other Interworking Cases:
  - L2 bridge network: Provider Bridge [IEEE802.1AD], Backbone Bridge [PBB] [IEEE802.1AH];
  - L2 overlay network: VPLS [RFC4761] [RFC4762], EVPN [EVPN], Shortest Path Bridging [IEEE SPB] and TRILL [RFC6325]

Thanks!

Liang Xia