Layer 2 Gateway (L2GW)
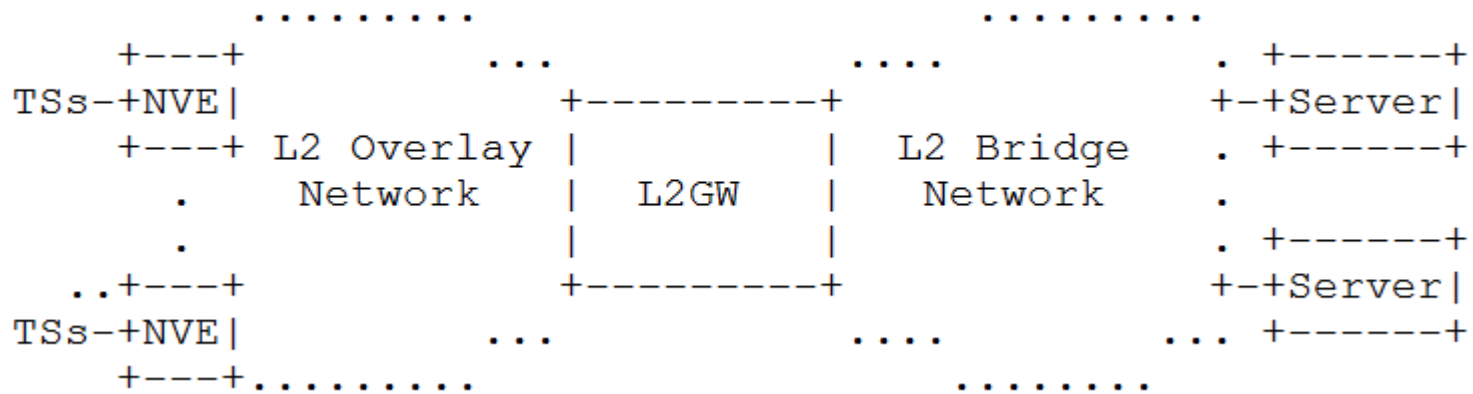## draft-xia-nvo3-l2gw-00

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Background

- Present situation:
  - NVO3 tech-based L2 overlay networks are becoming 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:
  - Encapsulation translation between 2 networks;
  - Deals with Layer 2 Control Protocol (L2CP) frames between 2 networks—*specified in this draft*

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           .........                          .........
     +---+           ...              ....           . +------+
TSs-+NVE|                  +---------+                +-+Server|
     +---+ L2 Overlay |              |  L2 Bridge     . +------+
       .      Network  |  L2GW       |    Network     .
       .              |             |                . +------+
  ..+---+             +---------+                +-+Server|
TSs-+NVE|      ...              ....           ... +------+
     +---+.........                          ........
```

What is L2CP?

- L2CP (Layer 2 Control Protocol) -- defined by IEEE802.1 to be used for L2 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

Table part--1

MAC DA	Assignment	Protocol Type	L2CP Action VLAN-based L2 services	L2CP Action 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 01-80-C2-00-00-06 01-80-C2-00-00-09 01-80-C2-00-00-0A	Reserved for Future Standardization		Filter	Filter

Table part--1

Table part--2

MAC DA	Assignment	Protocol Type	VLAN-based L2 services	PORT-based L2 services
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 01-80-C2-00-00-0C	Reserved for Future Standardization		Filter	Pass
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 it has its own control plane functions to support needed L2 communication such as transport over a tunnel or OAM;

- And, 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

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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?

- Need 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!

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