INVENTION DISCLOSURE

1.   **Invention Title.**
Automatic creation of Encapsulation tags for L2VPN tunnels

2.   **Invention Summary.**
Today VLAN tags are manually configured by the MSO in a L2VPN config file. This disclosure proposes the idea and methods in which the VLAN (Encapsulation) Tags can be automatically generated in the DOCSIS network for use as needed.

3.   **Invention Description**.
a.   Describe the invention in detail.
The L2VPN spec allows MSOs to provide L2 tunneling capabilities on DOCSIS devices. Part of the manual configuration includes assigning a VLAN tag to each L2VPN tunnel so that all traffic in that tunnel could be encapsulated with that tag. (A VLAN tag field contains 12 bits of a VLAN ID.)

This disclosure proposes the idea that these tags need not be manually provisioned and instead can be automatically generated.

There are at least two ways in which this can be implemented:
1. CM Based: The MSO provisions a specific/reserved L2VPN ID value in the config file. Based on this value in the config file, the CM could automatically create a VLAN ID; this ID could be based on something unique to the CM like its MAC address. Using a hashing algorithm (e.g MD5), the CM calculates the hash on the MAC address of the Cable Modem. The hash algorithm would take the MAC address (length= 48 bits) and convert it into a 12 bit VLAN-ID value. The CM sends this value up to the CMTS as part of the registration process and the CMTS uses that Tag value for that L2VPN.
2. CMTS Based: The MSO provisions a specific/reserved L2VPN ID value in the config file. The CM passes this L2VPN ID to the CMTS, and based on this special value from the CM in the registration process, the CMTS could automatically create a VLAN ID. This way, the CMTS can choose different tags for different tunnels as they get provisioned and manage the VLAN tags across the L2VPN footprint.

This idea could be used for any type of L2VPN tag, e.g 802.1Q or 802.1ad tags, MPLS labels, etc.

Impacts: (1.) would require upgrading CMs, while (2.) would require upgrading CMTS software. (2.) Gets around the possibility of hash collisions on the tags in (1.) above. In (2.) the CMTS track the tags and make sure there is no collisions/reuse of the tags. Also DOCSIS CMTSs need SW upgrades for L2VPN functionality anyway, so this will be an easier feature to get into CMTSs than getting the feature into the CMs.

INVENTION DISCLOSURE

b. **Why was the invention developed? What problem(s) does the invention solve? How is it better?**

Today the DOCSIS L2VPN specification requires an operator to provision the VLAN Tags associated with the L2VPN in the CM configuration file. The VLAN tags are used in DOCSIS network to provide Layer 2 VPN services where each individual instance of Layer 2 VPN service on a CMTS requires a unique VLAN tag. If there are a number of Cable Modems on a CMTS that are provisioned to provide Layer 2 VPN services, then each Cable Modem is required to have a unique configuration file (since they all will be using a different VLAN tag.) This works for a few L2VPN tunnels on a CMTS but clearly this is not scalable to large number of L2VPN tunnels. A unique configuration file per CM is not preferred by the operators when they have to provision a lot of tunnels. Automatic tag creation mitigates this issue.

c. Briefly outline the potential commercial value and customers of the invention.

Having the capability to provide automatic creation of VLAN tag using information avoids the hassle of creating CM specific configuration file and promotes the use of the L2VPN technology. This could be of use in future technologies such as DPoE which leverage the L2VPN model for creating various MEF Ethernet Virtual Circuits and other L2 services.