

Layer 2 VPN(L2VPN) Service Model (L2SM)

Interim meeting
Wednesday 27th September 2017
2pm-3:30pm London Time

Webex:

<https://ietf.webex.com/ietf/j.php?MTID=m269230aaa9b65847700af143006c1a55>

Adrian Farrel (adrian@olddog.co.uk)

Qin WU (bill.wu@huawei.com)

<http://tools.ietf.org/wg/l2sm/charters>

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Administrativa

- Charter:
<http://datatracker.ietf.org/wg/l2sm/charter/>
- Mailing List:
<https://www.ietf.org/mailman/listinfo/l2sm>
- Minutes:
 - <http://etherpad.tools.ietf.org:9000/p/l2sm-interim-2017-09-27-minutes>
 - Chairs will record conclusions during the meeting
 - Any volunteers to help?
- Virtual Bluesheet:
 - You MUST record your attendance on the (virtual blue sheets)
 - Use the space at the top of the Etherpad

Agenda (90 minutes)

- Introduction
 - Administrivia and Agenda Bash - (Chairs, 2 mins)
 - WG Status (Chairs, 3 mins)
- Document Status (Giuseppe, 15 mins)
 - High-level overview of model
 - Changes since last revision
- Work on Open Issues (Giuseppe / everyone, 45 mins)
- Lessons from L3SM revision (Qin, 10 mins)
- Raise new issues (All, 10 mins)
- Next steps and wrap-up (Chairs, 5 mins)

WG Status

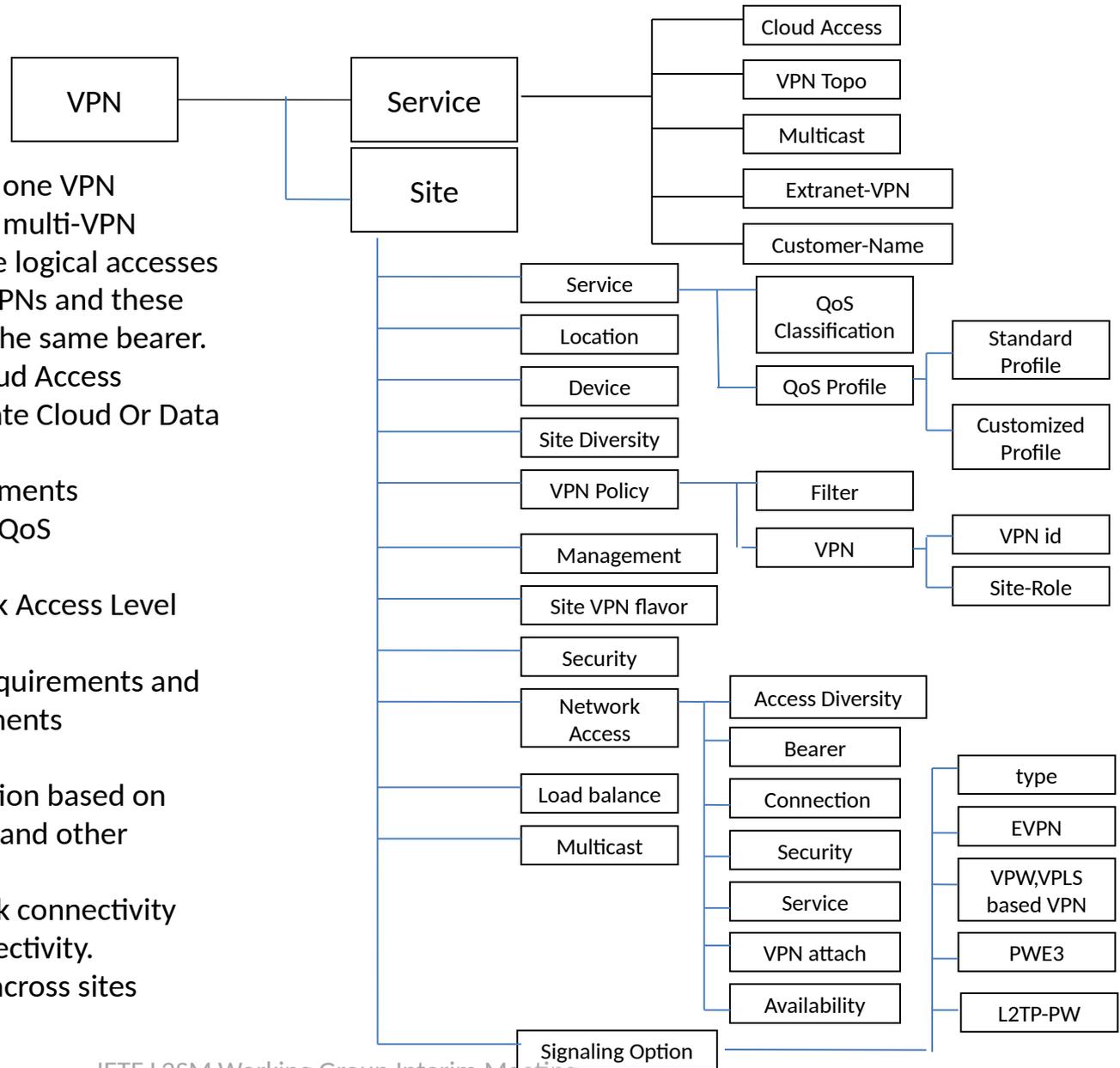
- Initial version of I-D by L2SM design Team comprising 4 operators before Seoul
 - draft-wen-l2sm-l2vpn-service-model-04
 - Four revisions issued
- Adopted L2sm draft in Feb 21 after Seoul Meeting
 - Two WG adoption calls on v-03 and v-04 of L2SM draft draft-wen-l2sm-l2vpn-service-model
 - V-04 adds usage example and change model structure to get in line with L3SM WG document (RFC8049)
- 1st L2SM meeting (IETF97) in Seoul
 - Discussed relationship with MEF and prepare Liaison response.
 - Discuss L2SM Charter and the Definition of Customer Service Model
 - Discuss L2SM Design Team work and several open issues.
- No Face to face L2SM meeting in Chicago (IETF 98). But Design Team members in Chicago had a short meeting with the following actions:
 - Advance the content of the document through regular meetings focusing on specific issues
 - Edit and post revision of the document (Giuseppe : May 23, 2017)
- One interim meeting before IETF99 scheduled on May 25, 2017
 - Discussion of outstanding issues
 - Edit and post revision of the document (Giuseppe : July 3, 2017)
- No Face to Face L2SM meeting in Prague (IETF99). But Design Team had a short meeting to discuss remaining issues and planned for the next step.
 - Edit and post revision of the document (Giuseppe : September 18, 2017)

VPN Service Definition

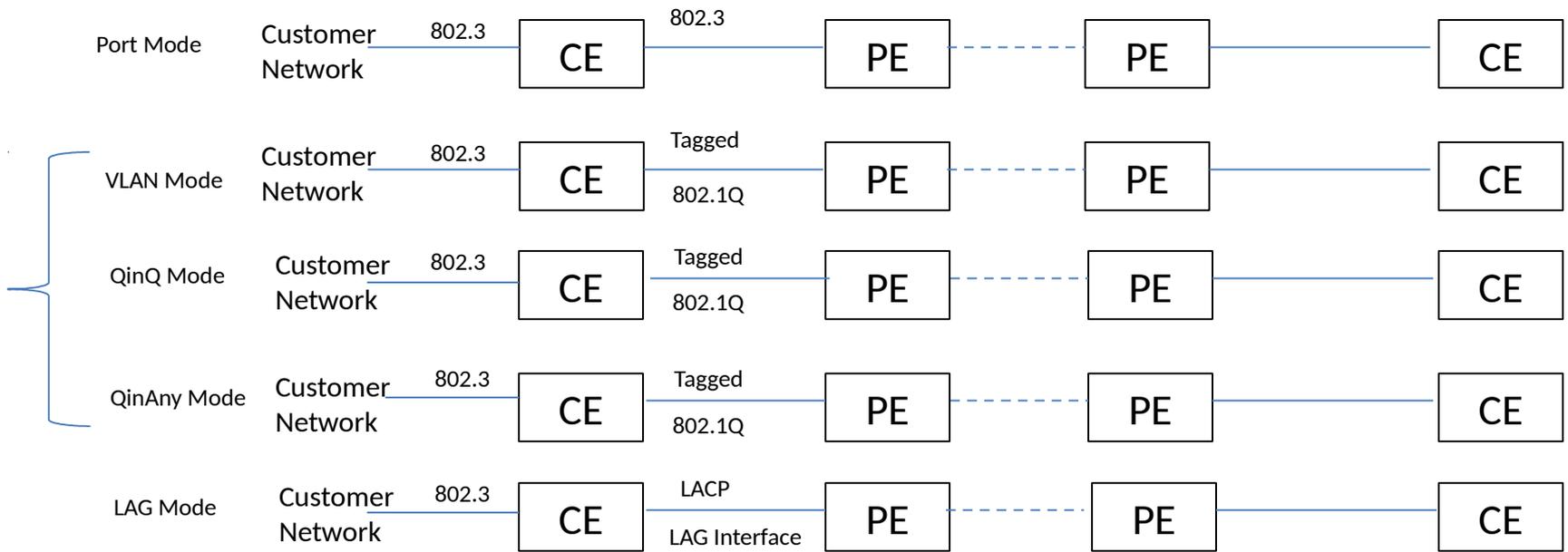
- Have a common base model that addresses multiple popular L2VPN service types.
- The working group will derive a single data model that includes support for the following:
 - Point-to-point Virtual Private Wire Services (VPWS);
 - Multipoint Virtual Private LAN services (VPLS) that use LDP-signaled Pseudowires ;
 - Multipoint Virtual Private LAN services (VPLS) that use a Border Gateway Protocol (BGP) control plane as described in RFC4761 and RFC6624 ;
 - Ethernet VPNs specified in RFC 7432;
 - Other L2VPN service types may be included if there is consensus in the working group.
 - EVC Service? (Open issue for discussion later)

What is the L2SM Service Model

1. Support L2VPN creation
2. Support one site belonging to one VPN
3. Support one site belonging to multi-VPN
4. Support one Site with multiple logical accesses
 - Connecting to multiple VPNs and these logical accesses sharing the same bearer.
5. Provide L2VPN with Public Cloud Access
6. Support extend L2VPN to Private Cloud Or Data Center Network
7. Support Site-level QoS requirements
8. Support Network Access level QoS requirements
9. Support Site level and Network Access Level Security Requirements.
10. Support Site level Multicast requirements and global level Multicast requirements
11. Multi-AS support
12. Support Network Access Creation based on Service Placement constraints and other constraints parameters.
13. Support point to point network connectivity and multi-point network connectivity.
14. Support distribute VPN route across sites belonging to different VPNs

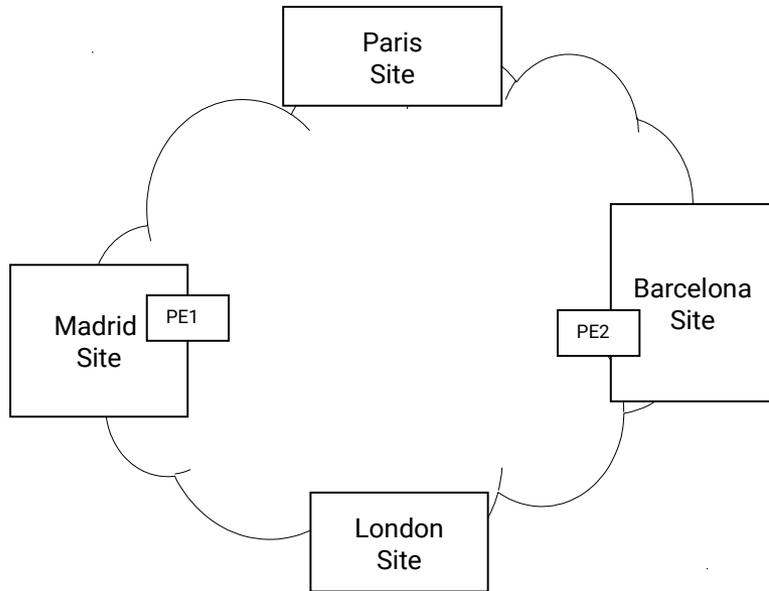


Connection Definition in L2SM model



- Under each Site Network Access, Ethernet connection in data plane supports several modes
 - Physical Interface Mode
 - Dot1q interface Mode
 - VLAN Mode:
 - QinQ Mode: Config both S-tag and C-tag on PE
 - QinAny Mode: Only Config S-tag on PE and PE doesn't know C-Tag
 - LAG Interface Mode
 - Need to specify LACP parameters.
 - In addition, we may support optional L2CP parameters between CE and PE

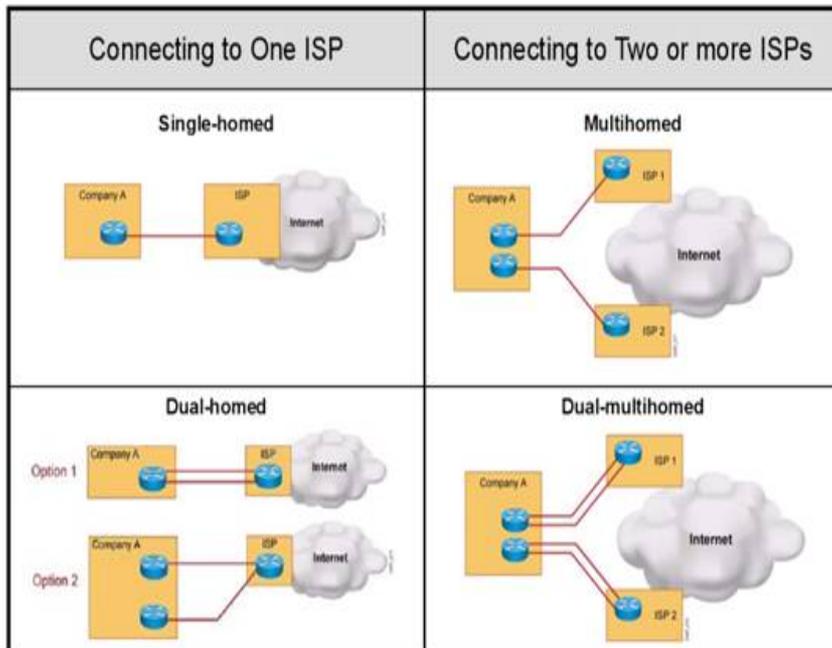
Multicast Support



- In case of multicast support, we describe multicast tree type, traffic type, and group-to-port-mapping type at a global level
- We also describe MAC Multicast Group at site level:
 - **VLAN ID:** Displays the VLAN ID of the Multicast group
 - **MAC Address Group:** Displays the MAC address of the group
 - **Ports/LAG:** Select to display the ports/LAGs belonging to the Multicast group

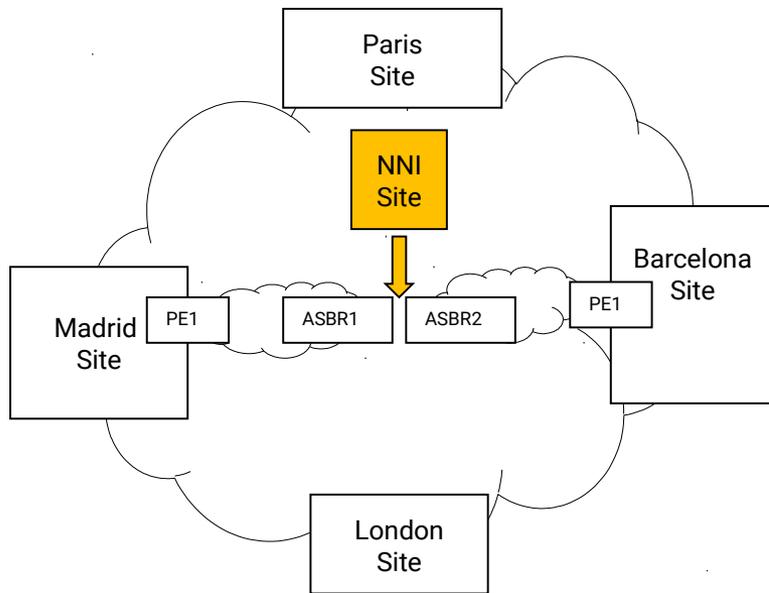
Single homed, Dual Home, and Multi-homing Support

Connection Redundancy



- The "site-type" defines the way the VPN multiplexing is done.
 - site-vpn-flavor-single: The site belongs to only one VPN.
 - site-vpn-flavor-multi: The site belongs to multiple VPNs, and all the logical accesses of the sites belong to the same set of VPNs.
- In addition, we have site-network-access/access-diversity parameters (e.g., group-id, constraint-type), they can tell us which of network accesses belong to the same group, what constraint type is.
- Intention is that text describes how to use all these parameters to achieve the four deployment models shown
 - Action point

NNI Support



- In case of both two sites belonging to one single AS or one administrative domain, we can use site-network-access to describe one or more network-connectivity under each site.
- In case of both two sites belonging to ASes, we can use NNI site type to describe network connectivity between ASBR1 and ASBR2.
- This enables us to provide Inter-provider control connections to run only between the two border routers

EVPN Support

- Main thing was to capture the relationship between broadcast domains (e.g., VLANs), Ethernet Tag IDs (e.g., VIDs), and MAC-VRFs in EVPN
- VLAN-Based Service Interface
 - One to one mapping between VLAN VID and MAC-VRF
- VLAN Bundle Service Interface
 - Multiple VLAN share the same bridge table
 - One bridge table is corresponding to one MAC-VRF
- Port-Based Service Interface
 - Special case of VLAN Bundle Service Interface
 - All VLANs on the port belong to one bundle service
- VLAN-Aware Bundle Service Interface
 - One to one mapping between VLAN and Bridge Table
 - Multiple Bridge tables share the same MAC-VRF
- Port-Based VLAN-Aware Service Interface
 - Special case of VLAN-Aware Bundle Service Interface
 - All VLANs on the port belong to one bundle service

Document Status

- Changes in recent versions
 - Introduce additional terminology
 - Modify figure 5 to get consistent with RFC8049
 - Add end to end Multi-segment connectivity support and site-vpn-flavor-e2e attribute
 - Add usage example to explain how to use EVC and OVC.
 - Discuss applicability of this model to inter-provider support.
 - Reduce redundant parameters related to encapsulation type and Ethernet type in the model.
 - Clarify the relationship between guarantee-bandwidth-percent and CIR, EIR and PIR.
 - Modify model structure for VPN service to make it consistent with the text in section 5.
 - Remove Sub-inf parameter since it is similar to QinQ parameter.
 - Add "direction" parameter for QoS profile.
 - Update XML example and figure in section 5.16.

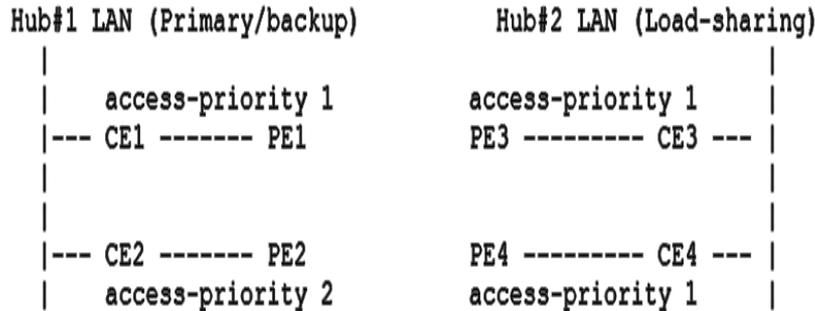
Open Issues

1. Support for EVC
2. LAG Loop Avoidance
3. L2VPN Interworking Support
4. Signaling Option Parameters
5. Applicability to Inter-Provider and Inter-Domain Case
6. Get text to describe all multi-homing options
7. Trivial pyang error & warning from IETF tools

Open Issue 1: Support for EVC?

- Do we want to support for EVC in this model?
 - Someone has to do the work!
- Do we know of operators offering EVC services?
- Is it in scope for the IETF to do this? Debate...
 - Yes, if it is just identifying the service type
 - No, if it requires us to write details of the service
 - We don't own the definition of the service
 - Yes, if we can point to a module written elsewhere
 - Maybe just a hook if that module doesn't exist yet

Open Issue 2: LAG Loop Avoidance



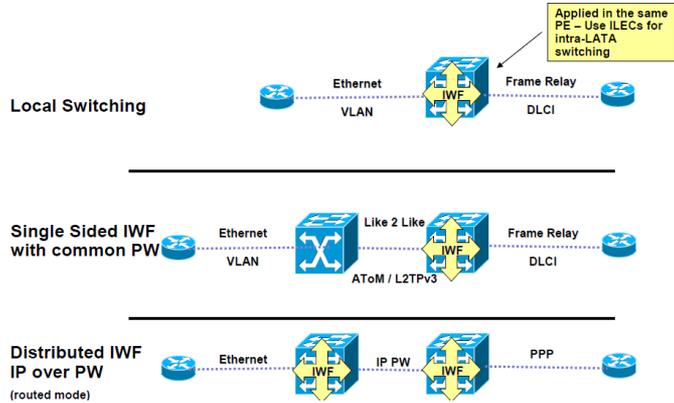
```
+--rw LAG-interface {LAG-interface}?
  +--rw LAG-interface* [LAG-interface-number]
    +--rw LAG-interface-number      uint32
    +--rw LACP
      +--rw LACP-state?              boolean
      +--rw LACP-mode?               boolean
      +--rw LACP-speed?              boolean
      +--rw mini-link?               uint32
      +--rw system-priority?         uint16
    +--rw Member-link-list
      | +--rw member-link* [name]
      |   +--rw name                  string
      |   +--rw port-speed?          uint32
      |   +--rw mode?                neg-mode
      |   +--rw mtu?                 uint32
      |   +--rw oam-802.3AH-link {oam-3ah}?
```

In L3SM model, site-network-access/availability parameter(i.e., access-priority) and site-network-access/access-diversity parameters (e.g., group-id, constraint-type)are defined to provide site redundancy support. For example...

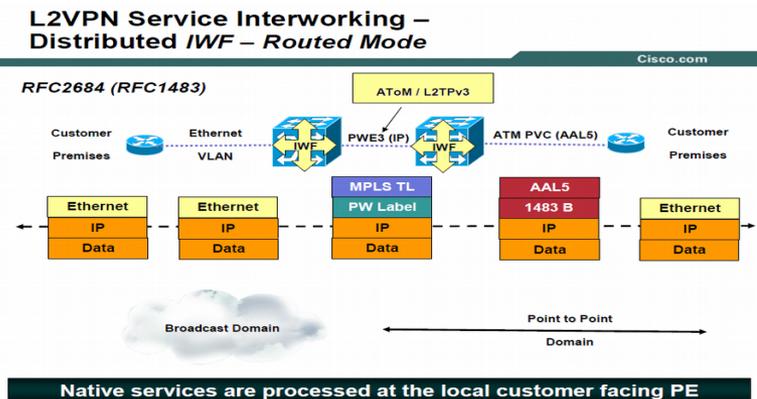
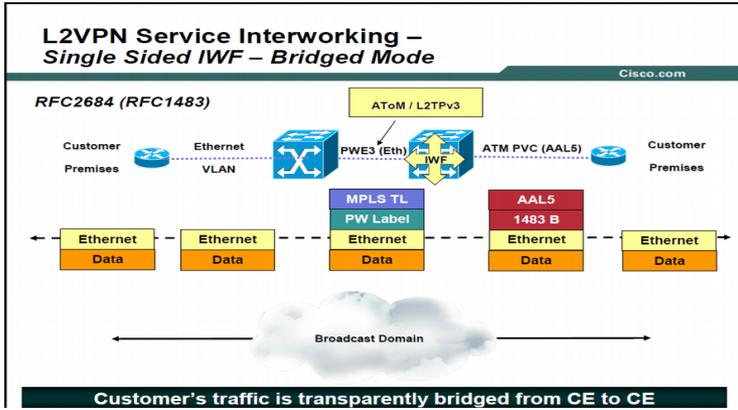
- CE1-PE1 link access-diversity/group-id =1, access-priority =1
- CE2-PE2 link access-diversity/group-id =1, access-priority =2
- CE3-PE3 link access-diversity/group-id =2, access-priority =1
- CE4-PE4 link access-diversity/group-id =2, access-priority =1

- In L2SM model, Availability parameter(i.e., access-priority) is also supported and can be used together with site-network-access/access-diversity parameter.
- In addition, in L2SM model, LAG-interfaces parameter under connection is defined to provide link aggregation support
- We need to understand the relationship between LAG-interface parameter such as member link name and network-access-id
 - Looks like LAG-interface related other parameters are complementary to access-priority defined in L2SM.
- Can we close this issue?

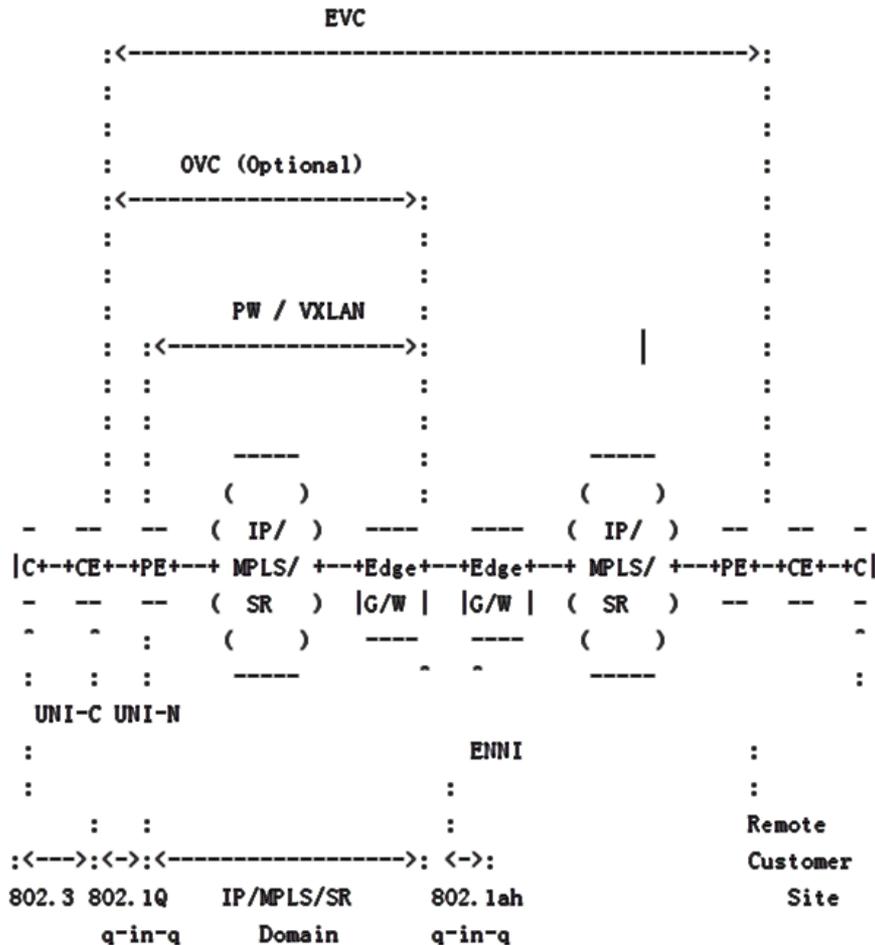
Open Issue 3: L2VPN Interworking Support



- L2VPN interworking supports 3 models:
 - Local Switching Model
 - Single sided IWF
 - Distribute IWF
- Single sided IWF corresponds to Bridged Mode
- Distributed IWF corresponds to Routed Mode
- Open questions:
 - If Interworking is supported, how do we configure ATM PVC?
 - Do we need to support legacy technology like ATMoMPLS, PPPoMPLS, FroMPLS?



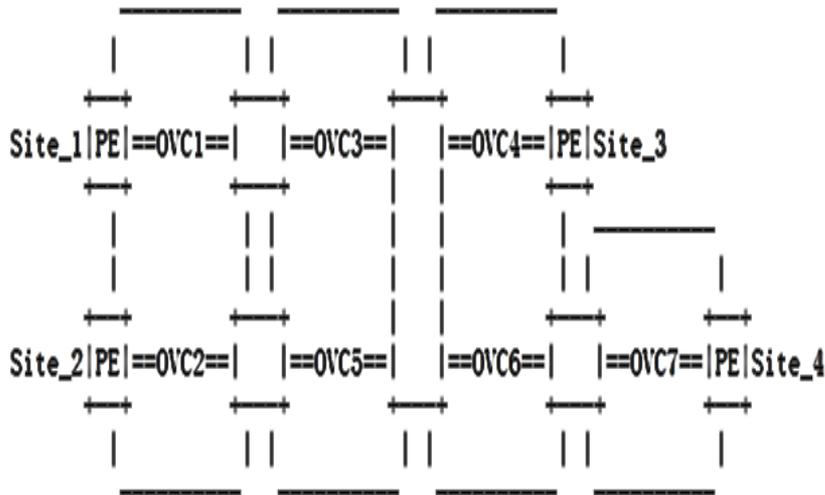
Open Issue 4: Signaling Option Parameters



- In L2SM, four signaling protocols are supported, i.e., BGP L2VPN, BGP EVPN, TLDP, L2TP.
- some parameters we defined for each signaling option is for signaling and VPN auto-discovery such as control word, VC label, mac learning, arp suppression which will be used to configure PE.
- In addition, we have some parameters(e.g., vc-id, peer-id) used to describe connectivity between PE and Edge Gateway.

Issue 5: Applicability to Inter-Provider and Inter-Domain Case

- In addition to Inter-provider control connections to run only between the two border routers, we can also offer an end-to-end, multi-segment connectivity to be constructed out of several connectivity segments, without maintaining an end-to-end control connection.



- End to end connectivity between site_1 and Site 3 spans across multiple domains and can be constructed by stitching network access connectivity within site_1 with OVC1, OVC3, OVC4 and network access connectivity within site3
- The assumption is service orchestration layer in figure 5 should have visibility of the complete abstract topology and resource availability

Lessons Learnt from L3SMbis

- Add default value or description for optional parameter.
- For optional parameter without default value,
Behavior associated with each parameter needs to be well defined.
- Incomplete description statements
- Fixed broken example and Add mandatory element in the examples.
- Remove redundant parameters in the cloud access.
- Add YANG statement to check the validity of parameters
- Add in the XPATH string representation of identityrefs and remove unqualified name.

New Issues

- Does anyone have any other issues or concerns to raise now?

Wrap-up /Next Steps

- Minutes capture all agreements and new issues
 - Will be posted SOON
- Author team will address agreed points in new revision
 - That revision will be ready for pre-last-call review
 - Wake up the implementers
 - Get YANG Doctor review
- Discuss remaining open issues on list
- Short meeting at IETF 100
 - Close off open issues
 - Get ready for WG last call
- Request WG last call before end of year
- Send to AD in February