

ETHERNET IN SERVICE CONTROL PLANE OPTIONS

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Overview

- Control plane options for Ethernet.
- Conclusion.

Overview

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- Conclusion.

Control Plane Options for Ethernet

- The essence of this presentation is the issue of current and future control plane options for Ethernet.
- As an originally (and predominantly) LAN-based transport protocol, Ethernet's transition from the enterprise space into the service provider backbone brought along with it the features that made it successful for small environments, but relatively cumbersome for larger ones.

Control Plane Options for Ethernet

- The currently most common control planes implemented for Ethernet in service provider networks (Metro-E) are:
 - 802.1Q + VLAN's.
 - 802.1ad + VLAN's (a.k.a. Q-in-Q).
 - STP (802.1D, 802.1w, 802.1s).
 - Assorted ring protection technologies.
 - VTP, MRP (GARP) or MVRP (GVRP).
- The above control plane is akin to that used in the enterprise LAN. It may work in the field, but has severe scaling limitations as the size of the network increases.

Control Plane Options for Ethernet

- ❑ So how is the industry addressing these scaling limitations?
- ❑ A so-called “Carrier Ethernet” solution is being proposed.
- ❑ Carrier Ethernet refers to the enhancement of regular LAN-based Ethernet to a level that can be recognized as so-called “carrier-grade”.
- ❑ Does that mean that existing Metro-E networks around the world should close up shop and head home?

Control Plane Options for Ethernet

- We are seeing two camps evolving out of this Carrier Ethernet proposal:
 - IP-based service providers familiar with operating packet-based infrastructure, moving “down” the value chain (and protocol stack) to use Ethernet both for their own transport requirements, as well as a new revenue stream.
 - TDM-based service providers familiar with operating circuit-switched infrastructure, moving “up” the value chain (and protocol stack) to use Ethernet, perhaps for transport in the core, but surely for access to their customers.

Control Plane Options for Ethernet

- The degree of stringency in either camp may create two types of (Carrier) Ethernets:
 - IP-based service providers are used to trading per-circuit service stringency for over-provisioning of core bandwidth and/or deployment of end-to-end QoS models.
 - TDM-based service providers may work to ensure that Ethernet is simply a transport service, but customer circuits will be provisioned in a stringent, perhaps bandwidth-stranded manner, consistent with existing circuit-switched networks today.

Control Plane Options for Ethernet

- These potentially two (Carrier) Ethernets mean:
 - IP-based service providers want to enjoy the freedom(s) associated with packet-based transport or service technologies, i.e., IP and Ethernet.
 - TDM-based service providers are mostly interested in Ethernet because of its granular bandwidth provisioning attributes, as well as its potential to cost-effectively provide 40Gbps, 100Gbps, and perhaps, 1Tbps – they may not care so much about the underlying features packet-based networks can offer.

Control Plane Options for Ethernet

- Looking at both models:
 - IP-based service providers looking to offer Ethernet-based transport services with bandwidth over-provisioning and end-to-end QoS may be unfavourably looked upon by customers already comfortable with TDM-based solutions.
 - For TDM-based service providers, Ethernet may not necessarily be cost-effective on the basis of what has made it successful and robust today; its simplicity, granularity and degree of freedom? Can we then say that Ethernet really is “cheaper” for the service provider environment?

Control Plane Options for Ethernet

- ❑ But like nearly everything else in the networking and telecommunications industry, “convergence” (for lack of a better word) seems to be the order of the day.
- ❑ Millions of applications are IP-based, or migrating to IP.
- ❑ Thousands of networks are Ethernet-based, or moving to Ethernet.
- ❑ The protocol stack is being collapsed, with IPoDWDM (OTN) currently being offered by router vendors.

Control Plane Options for Ethernet

- So it's not unreasonable to expect a "services plane convergence" too:
 - IP-based service providers are now re-using their IP/MPLS networks to provide Layer 2 pseudowire services.
 - TDM-based service providers are traditionally service-specific oriented, i.e., they may prefer to focus on transport, and not want to get involved in the provisioning of IP services. But for how long?

Control Plane Options for Ethernet

- In this continuously evolving and competitive local, regional and global market:
 - IP-based service providers can capture Layer 2 transport business from customers more familiar with circuit-switched technologies.
 - Similarly, TDM-based service providers cannot ignore moving higher up the protocol stack into IP.

Control Plane Options for Ethernet

- The potential for the convergence of the services plane for both camps is what is going to determine:
 - What Carrier Ethernet control plane is used in the access.
 - What Carrier Ethernet control plane is used in the core.
 - If a hybrid of Carrier Ethernet control planes between the core and the access is feasible depending on which services each service provider enables generate incremental growth or value to the business.

Control Plane Options for Ethernet

- One thing is for sure; if there is indeed a services plane convergence in the future:
 - It will not occur until either camp try to show the other that their control plane of choice is the better one.
 - New Metro-E service providers will likely end up spending twice on capex – first to get things going with whatever control plane options best suit them today, and second to transform into multi-service networks as industry and customer pressure, potentially, mounts.
- If this is, indeed, the case, will Ethernet truly have been the “cheaper” option?

Control Plane Options for Ethernet

- The alternative control plane options being eyed by TDM-based service providers moving up the protocol stack (but not interested in providing IP services):
 - 802.1ah (MAC-in-MAC or PBB).
 - 802.1Qay (PBT or PBB-TE).
 - 802.1ag (CFM)
 - MPLS-TP

Control Plane Options for Ethernet

- The alternative control plane options being eyed by IP-based service providers moving down the protocol stack (and interested in maintaining IP services):
 - Something I like to call “MUTE” (MPLS Up to The Edge), i.e., MPLS in the access.

Control Plane Options for Ethernet

- It is worth noting, however, that both camps may, initially, consider a hybrid model where:
 - Traditional Layer 2-based Ethernet control planes are used in the access.
 - IP/MPLS or IP/MPLS-TP/MPLS is used in the core.
- IP/MPLS proponents contend that MPLS-TP is unnecessary, because MPLS is already providing decent support for OAM&P, which is what MPLS-TP tries to add to MPLS.

Overview

- Current transport options.
- Ethernet, the new toy.
- Problems with Ethernet.
- Control plane options for Ethernet.
- **Conclusion.**

Conclusion

- ❑ It is clear that Ethernet is being looked at for different roles by different service providers, both incumbent and competitive.
- ❑ While there are several different control plane technologies that appeal to a group of operators (typically sharing a common operation history or model), it is premature, at this time, to conclude that there is a “one-size-fits-all” control plane solution.

Conclusion

- Control planes will either:
 - Co-exist in the network based on the capex/opex and business requirements.
 - Or certain providers will choose a single control plane network-wide, based on the same (capex/opex and business) requirements.
- Either way, vendors are bound to be happy for some time to come. This confusion can surely be good for business 😊.



END

Thank you!

Q&A

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