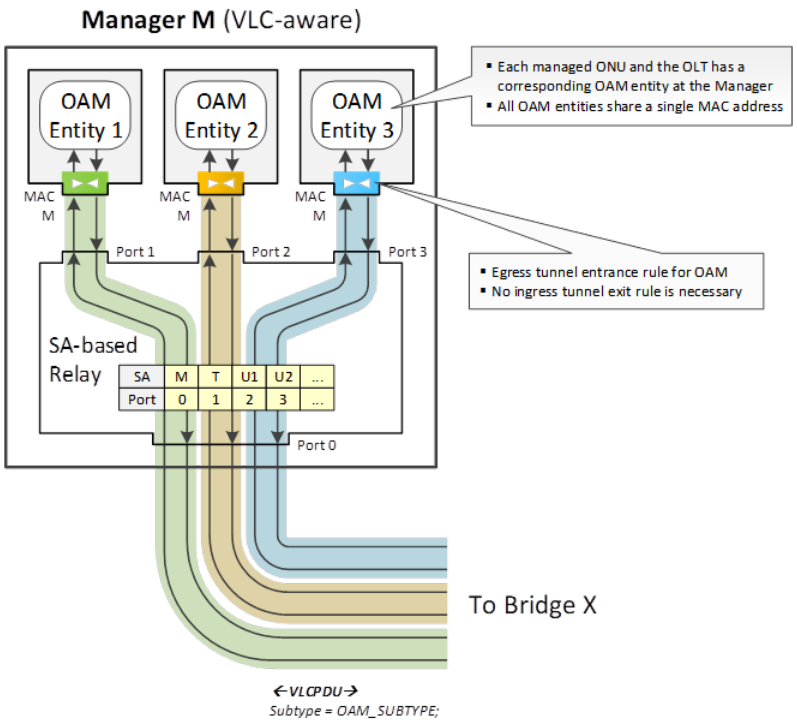
Editorial Note: This section to be inserted as 8A.5.3

8A.1.1 Scalable Management of an EPON using OAM over VLC

The OAM is a link-based protocol that requires each OAM entity in a manged device to have a corresponding peer OAM entity in the Manager. Each pair of peer OAM entities is conncted via a VLC tunnel. However, since the Manager typically does not have a separate physical port for each VLC tunnel, some or all the tunnels may share the same physical link. The manager incudes a functionality to segregate different tunnels. In the example implementation illustrated in Figure 8A-5, each OAM entity within the Manager is assigned an individual MAC address (addresses M1, M2, and M3) and the Switch at the ingress to the Manager contains a typical frame DA-based relay entity, which uses the destination MAC address on ingress VLCPDUs to determine which OAM entity is to receive the given VLCPDU.

An alternative implementation of the Manager may conserve MAC addresses by relying on VLCPDU's source addresses instead of the destination addresses to distinguish between multiple tunnels. In such implementation, the DA-based relay entity at the ingress of the Manager in Figure 8A-5 is replaced with an *SA-based* relay entity as shown in Figure 8A-6.



Deleted: The challenge for a scalable implementation is to allow Manager M to manage multiple ONUs while minimizing the resources required to do so. The example described in 8A.5.1 requires one MAC instance, and one MAC address, on Manager M for each ONU that is under management. This is because the recipient VLC sublayer relies on the source MAC address to distinguish between tunnels. In other words, Manager M relies on the source MAC address on ingress VLCPDUs to determine which OAM entity should receive the VLCPDU.¶
It would not be unusual to expect a single OLT port to have up to 128 ONUs subtended and for a single OLT chassis to contain 64 or more OLT ports, for a potential total of 8192 ONUs. It would further not be unreasonable to expect that Manager M would be able to manage the ONUs connected to many OLT chassis. Therefore, an instance of Manager M should be capable of managing many thousands of ONUs using OAM over VLC with a single MAC address through a single Ethernet port.¶
Under these conditions, the example illustrated in Figure 8A-5 would require many thousands of MAC addresses to be available on Manager M.¶
An implementation could choose from several possible alternatives to solve this scaling problem. As illustrated in __Fig__ *(Editorial Note: Replace __Fig__ with that of figure below)* , one approach is to replace the switch shown inside Manager M in Figure 8A-5 with a relay entity that can forward based on the source and/or destination MAC address. This new entity is referred to as an SA-based Relay.¶
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Alternative text to replace the 4 paragraphs above.¶

Using this model, each OAM entity in Manager M is configured to use a shared MAC address, such that all OAM entities in Manager M use the same MAC address. OAMPDUs egressing Manager M are encapsulated as VLCPDUs and forwarded in the same way as described in 8A.5.1, and using the same egress rules defined in 8A.5.2.1, but using MAC M as the source MAC address of the egress VLCPDU.

The SA-based relay's forwarding table, programmed by the NMS, contains an entry for shared MAC M that points to Port 0, the egress port of Manager M. The forwarding table also contains entries for the MAC address of each ONU being managed. These entries point to the port associated with the OAM entity that manages the given ONU.

VLCPDUs egressing the OAM entities are received by the SA-based relay. The SA-based relay inspects the source MAC address and find MAC address M, the shared MAC address. The SA-based relay forwards the VLCPDU to port 0 based on the forwarding table that was configured by the NMS.

VLCPDUs ingressing Manager M contains the shared address, M, as the destination MAC address. When the VLCPDU is received at Manager M's Port 0, the SA-based relay inspects the source MAC address. The source MAC address contains the MAC address of the ONU being managed. The SA-based relay forwards the VLCPDU to the port indicated by the forwarding table that was configured by the NMS, presumably the port associated with the OAM entity that is managing the ONU from which the VLCPDU was received.

In this way, Manager M consumes only one MAC address to manage an arbitrary number of ONUs. Further, the rules given in 8A.5.2 can be used as they are written.

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