Annex 7A
(informative)
UMT configuration examples (informative)

7A.4 Remote PON Management over UMT use case

7A.4.1 Introduction

This example illustrates a use case in which mulitple protocols are configured together to enable remote management of an OLT and its subtended ONUs. In this example, the OLT is managed using an extension of IEEE 802.3 Clause 57 OAM. Traditionally, ONUs would be managed by an entity that resides inside the OLT[1] and the GPON ONUs[2] are managed using OMCI. The "manager" entity for both protocols is located in a station (referred to simply as the manager) that is separate from the OLT (the management function is disaggregated from the phyiscal OLT).

In the most general sense, the manager is separated from the OLT by one or more MAC bridge entities (see Figure 7A-1). This use case assumes that the manager and the OLT are UMT aware, but the intermediate network elements and the ONUs are UMT unaware.

<editorial note: Figure 7A-1 to be replaced by figure normalized to the standard format>

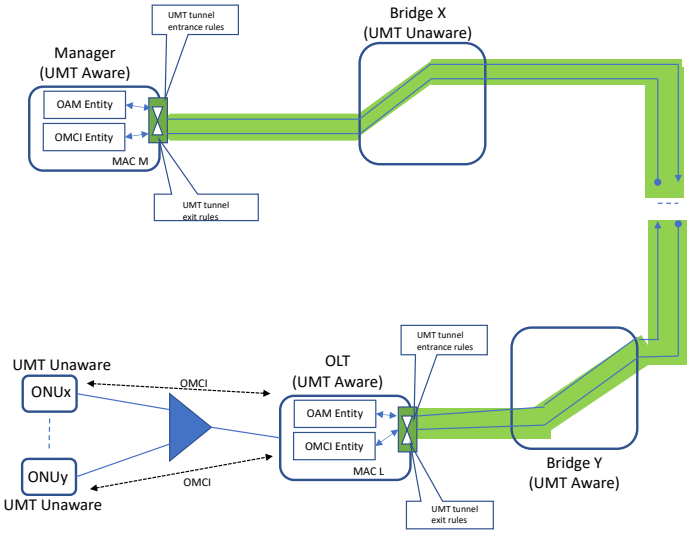

Figure 7A-4 — Remote PON Management over UMT

[1] In this use case, OLT is used generically to refer to an L-OLT, S-OLT or C-OLT as defined by IEEE 1904.1. If the distinction is important, the specific element name will be used.

[2] In this use case, ONU is used generically to refer to an L-ONU, S-ONU or C-ONU as defined by IEEE 1904.1. If the distinction is important, the specific element name will be used.

In Figure 7A-1, the Manager and OLT have MAC addresses M and L respectively. For simplicity, it is assumed that the Manager and OLT are single Ethernet port devices, but this is not a requirement.

Furthermore, it is assumed that Bridges X and Y, as well as all intermediate bridges, have already populated their forwarding tables with entries for MAC addresses M and L. These entries may be created dynamically by a MAC learning function or be provisioned statically by the NMS.

Note that this example assumes ITU-T PON and hence the reference to OMCI.

7A.4.2 UMT provisioning to establish tunnels

Since the Manager is not directly connected to the managed OLT and ONUs, the OAM and OMCI messages need to be carried over UMTPDUs. Therefore, before the Manager and the OLT are able to exchange OAM messages and the manager and ONUs are able to exchange OMCI messages, two UMT tunnels need to be provisioned:

- A forward UMT tunnel from Manager to OLT.
- A reverse UMT tunnel from OLT to Manager.

The establishement of each UMT tunnel involves provisioning of multiple rules to configure the UMT tunnel entrance and exit points.

To establish a UMT tunnel from PON contoller to OLT, the following rules are provisioned:

- A UMT tunnel entrance rule at the egress of Manager for OLT OAM messages
- A UMT tunnel entrance rule at the egress of Manager for ONU OMCI messages

To establish a UMT tunnel from OLT to Manager, the following rules are provisioned:

- A UMT tunnel entrance rule at the egress of OLT for OLT OAM messages
- A UMT tunnel entrance rule at the egress of OLT for ONU OMCI messages

No tunnel exit rule is necessary at the ingress of Manager M or at the ingress of OLT, since the UMT sublayer provides a built-in translation of UMTPDUs with subtype `OAM_subtype` into OAMPDUs and a built-in translation of UMTPDUs with subtype `OMCI_subtype` into OMCI frames (see Receive Path Specification in 6.2)

Each rule is provisioned using a separate *UMT_CONFIG* message.

7A.4.2.1 Addition of tunnel entrance rule at the egress of Manager for OLT OAM messages

The entrance rule for the UMT tunnel carrying the OAM messages is shown in Table 7A-13. The rule is provisioned at the egress of the Manager and its action is to replace the Slow Protocol destination address value (SP_DA) with the MAC address of OLT L and to replace the Slow Protocol Ethertype (SP_type) with the UMT Ethertype (UMT_type).

Table 7A-13 — Tunnel entrance rule at the egress of Manager for OLT OAM messages

Conditions	Actions
1. DA == SP_DA 2. ETH_TYPE_LEN == SP_type 3. SP_SUBTYPE == OAM_subtype	1.REPLACE(DA, L) 2.REPLACE(ETH_TYPE_LEN, UMT_type)

NOTE:
SP_type – Slow Protocol Ethertype value (see IEEE Std 802.3, 57A.4)
UMT_type – Ethertype value identifying UMTPDUs
OAM_subtype – Subtype value identifying OAMPDUs (see IEEE Std 802.3, 57A.4)
SP_DA – Destination MAC address associated with Slow Protocols (see IEEE Std 802.3, 57A.3)
L – MAC address of OLT

7A.4.2.2 Addition of tunnel entrance rule at the egress of Manager for ONU OMCI messages

The OMCI frames generated by the OMCI entity (OMCI client) in the Manager are encapsulated as a payload of UMTPDUs within the Transmit Process (see Figure 6-x). The entrance rule for the UMT tunnel carrying the OMCI messages is shown in Table 7A-14. The rule is provisioned at the egress of the Manager and its only action is to replace the UMTPDU's placeholder destination address (LOCAL_MAC_ADDR) with the MAC address of the OLT L.

Table 7A-14 — Tunnel entrance rule at the egress of Manager for ONU OMCI messages

Conditions	Actions
4. DA == LOCAL_MAC_ADDR 5. ETH_TYPE_LEN == UMT_type 6. SP_SUBTYPE == OMCI_subtype	3.REPLACE(DA, L)
NOTE: UMT_type – Ethertype value identifying UMTPDUs OMCI_subtype – Subtype value identifying OMCI frames LOCAL_MAC_ADDR – MAC address associated with the port where the Receive process state diagram is instantiated L – MAC address of OLT	

7A.4.2.3 Addition of tunnel entrance rule at the egress of OLT for OLT OAM messages

The entrance rule for the UMT tunnel carrying the OAM messages is shown in Table 7A-15. The rule is provisioned at the egress of the OLT and its action is to replace the Slow Protocol destination address value (SP_DA) with the MAC address of Manager M and to replace the Slow Protocol Ethertype (SP_type) with the UMT Ethertype (UMT_type).

Table 7A-15 — Tunnel entrance rule at the egress of OLT for OLT OAM messages

Conditions	Actions
7. DA == SP_DA 8. ETH_TYPE_LEN == SP_type 9. SP_SUBTYPE == OAM_subtype	4.REPLACE(DA, M) 5.REPLACE(ETH_TYPE_LEN, UMT_type)

NOTE:
SP_type – Slow Protocol Ethertype value (see IEEE Std 802.3, 57A.4)
UMT_type – Ethertype value identifying UMTPDUs
OAM_subtype – Subtype value identifying OAMPDUs (see IEEE Std 802.3, 57A.4)
SP_DA – Destination MAC address associated with Slow Protocols (see IEEE Std 802.3, 57A.3)
M – MAC address of Manager.

7A.4.2.4 Addition of tunnel entrance rule at the egress of OLT for ONU OMCI messages

The OMCI frames generated by the OMCI entity (OMCI client) in the OLT are encapsulated as a payload of UMTPDUs within the Transmit Process (see Figure 6-x). The entrance rule for the UMT tunnel carrying the OMCI messages is shown in Table 7A-16. The rule is provisioned at the egress of the OLT and its only action is to replace the UMTPDU's placeholder destination address (LOCAL_MAC_ADDR) with the MAC address of the Manager M.

Table 7A-16 — Tunnel entrance rule at the egress of OLT for ONU OMCI messages

Conditions	Actions
10. DA == LOCAL_MAC_ADDR 11. ETH_TYPE_LEN == UMT_type 12. SP_SUBTYPE == OMCI_subtype	6.REPLACE(DA, M)

NOTE:
UMT_type – Ethertype value identifying UMTPDUs
OMCI_subtype – Subtype value identifying OMCI frames
LOCAL_MAC_ADDR – MAC address associated with the port where the Receive process state diagram is instantiated
M – MAC address of Manager.

7A.4.3 UMT provisioning to delete tunnels

The deletion of a UMT tunnel involves the deletion of rules that control UMT tunnel entrance and UMT tunnel exit. Therefore, to delete a tunnel from Manager to OLT, the following rules are removed:

- A UMT tunnel entrance rule at the egress of Manager for OLT OAM messages
- A UMT tunnel entrance rule at the egress of Manager for ONU OMCI messages

To delete a UMT tunnel from OLT to Manager, the following rules are removed:

- A UMT tunnel entrance rule at the egress of OLT for OLT OAM messages
- A UMT tunnel entrance rule at the egress of OLT for ONU OMCI messages

Each rule deletion is provsioned using a separate *UMT_CONFIG* UMTPDU. The contents of all messages required to delete two tunnels for bidirectional communication are not shown here. The *UMT_CONFIG* UMTPDUs for deleting the rules are same as the corresponding *UMT_CONFIG* UMTPDUs for establishing the rules with the exception of the value of the field *MsgCode*, subfield *RequestCode*, which in case of rule deletion has the value of 0x2.