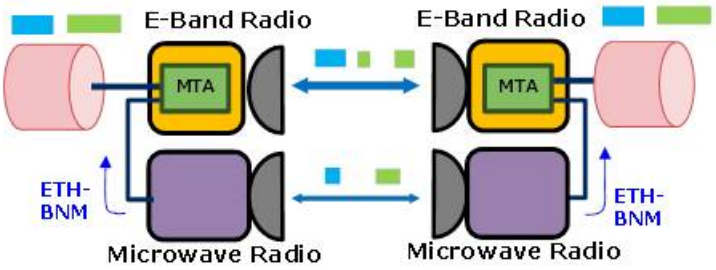
GGS-000559-02E
December 2022

iPASOLINK EX
Advanced

MTA ANNEXURE MANUAL



NEC Corporation
7-1, Shiba 5-Chome, Minato-Ku, Tokyo 108-8001, Japan

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DOCUMENT WARRANTY

1. The information in this document is subject to change without prior notice.

2. Screenshots of WebLCT provided in this document are examples. Screenshot samples in this document should be the latest as of issuing time, however, their appearances may vary according to configurations, operation modes and specified parameters of the equipment, WebLCT application's release version, etc.

3. This document is provided on the assumption that the targeted users have skills and knowledge of restrictions and precautions to operate the equivalent equipment. Refer to the equipment manual for details.

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1. OVERVIEW

1.1 About this Document

This document is created to describe the MTA feature of iPASOLINK EX Advanced Dual (hereinafter iPASOLINK EX/AD) and the interoperability of MTA feature with other features and other iPASOLINK variants.

1.2 Understanding Multi Traffic Aggregation (MTA)

1.2.1 Need for Multi Traffic Aggregation (MTA)

The iPASOLINK EX Advanced Dual realizes various network expansion demands with flexibility, agility, and lower cost compared to optical fibres, with high reliability that satisfies demanding customers and supports their business with 20Gbps link by two RF channel capacity features on single box with a lightweight, compact squared enclosure.

With the increasing demand for Bandwidth extension up to 25 Gbps, iPASOLINK EX Advanced Dual provides solution with MTA.

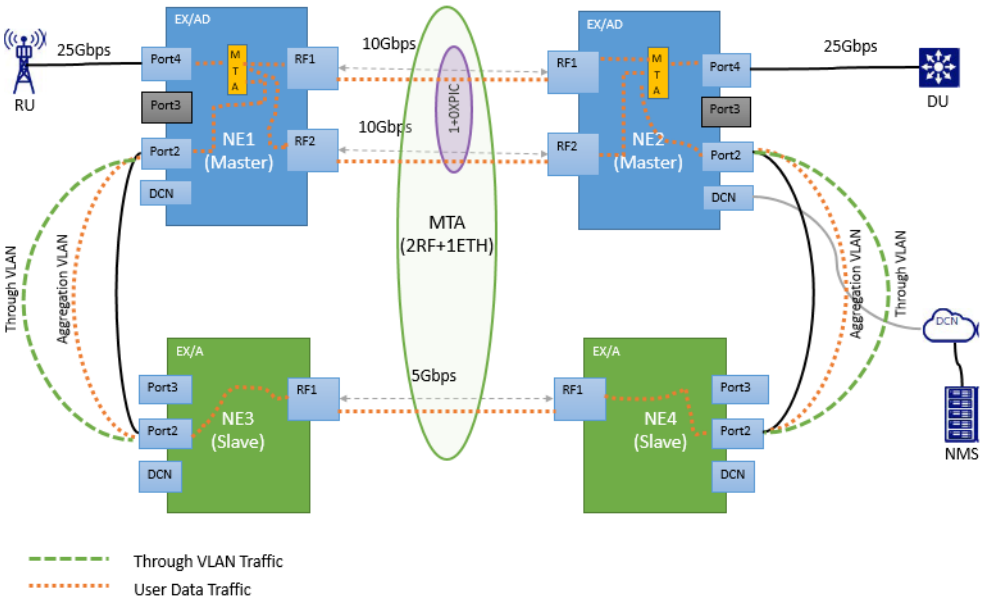
1.2.2 Multi Traffic Aggregation (MTA)

Previously, iPASOLINK introduced Radio Traffic Aggregation (RTA) function to achieve bandwidth extension and redundancy by aggregating wireless links collectively as a single logical interface.

Multi Traffic Aggregation (MTA) function is an extended RTA function to achieve bandwidth extension by aggregating wireless and wired link as a single logical interface. MTA function supports following configurations.

1. Aggregation of two Wireless links.
2. Aggregation of one Wireless and one Wired link.
3. Aggregation of two Wireless and one Wired link.

Figure 1-1 Multi Traffic Aggregation (MTA)



Above figure represent Multi Traffic Aggregation [MTA] of two Wireless and one Wired link. Here, the data traffic of 25 Gbps [from RU to DU or vice versa] flows through the MTA link between NE1-NE3 [Master – Slave] and NE2- NE4 [Master - Slave] Nodes. The MTA member ports [MODEMs RF1, RF2 and Ethernet port Port2] are linked by two methods, ***Direct Link*** or ***Relay Link***. The 20 Gbps data traffic is communicated directly through Direct link and the remaining 5 Gbps traffic is communicated using the ***Aggregation VLAN*** over the ***Relay Link***. The ***Through VLAN*** is used for Master-Slave Management data communication.

MTA Terminologies:

Direct Link: Direct Link is connecting to MTA opposite node with wireless link.

Relay Link: Relay Link is connecting to MTA opposite node through MTA slave node.

Aggregation VLAN: VLAN used for encapsulating the traffic between MTA Master and Slave node.

Through VLAN: VLAN used for ETH-BN (Rx) function and In-band management communication to MTA Slave node.

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2. Getting started with MTA on iPASOLINK EX/A Dual

2.1 Prerequisites for MTA Configuration

- Minimum one MODEM should be available.
- The MAX frame size of both master and slave node should be set to maximum size (9600 byte) as the aggregated frame size of MTA are up to 9600 bytes. Refer ***Condition 3-1***.
- ETH Port should be link up by 1 Gbps or 10 Gbps. Because the frame length of the encapsulated frame may be over 2000 Byte, ETH link of 10 Mbps or 100 Mbps (Fast Ethernet) is not suitable to be used.

2.2 Operational Conditions for MTA Configuration

- The MTA setting is applicable for iPASOLINK EX/A Dual equipment only.
- Only one MTA Group is allowed per equipment.
- Only MODEM port should be configured in MTA Direct Link. Refer ***Condition 3-1***.
- Only ETH port should be configured in MTA Relay Link. Refer ***Condition 3-1***.
- In case of setting MTA with one MODEM and ETH port, other MODEM should be set to "Not Used". Refer ***Figure 3-54***.
- In case of setting MTA with ETH port, only ETH Port2 is allowed as member of MTA group. Refer ***•Condition 3-2***.
- In case of setting MTA with ETH port2 (***Aggregation VLAN***).
    - ***Aggregation VLAN*** should not be already registered in VLAN list. Refer ***Condition 3-2•***.
    - ***Aggregation VLAN*** cannot be assigned for user traffic or other service. Refer ***Condition 3-3***.
    - MTA ***Aggregation VLAN*** should be used only for slave connection, not be used for user traffic.
    - The ETH port should be assigned MEP with ETH-BN (Rx) using MTA Through VLAN. [In EX/A, MEP for ETH-CCM on MTA Through VLAN is not supported.]
    - The output rate of ETH Port2 is fixed to ETH-BN (Rx) BW. Link Speed and Manual shaper rate are not supported.
    - Only Sync-E/ LLDP can be set to ETH Port2 interface.
- At the time of creating MTA setting, Multi group logical interface will take over the configuration of VLAN, ETH-OAM, QoS, Static FDB, RSTP / MSTP, LLF and PTP-BC of the least MODEM port associated in the MTA group. Refer .
- At the time on deleting MTA setting, the least MODEM Port associated in the MTA group will take over the configuration of VLAN, ETH-OAM, QoS, Static FDB, RSTP / MSTP, LLF and PTP-BC of the Multi group logical interface. The remaining ports (MODEM and ETH Port2) will be configured with default setting. Refer ***Condition 3-5***.
- After configuring MTA group, Header compression is fixed to disable on MODEM interface. Refer ***Condition 3-3***.
- When Port02 is member port of other LAG, it cannot be configured as the member port of Multi Group. Refer ***Condition 3-2•***.
- QoS Shaper rate for MTA link is calculated based on below condition. Refer ***Condition 3-4***.

i) MTA setting with ETH-BN (Rx) enabled on MTA GRP:

MTA link Shaper rate = MTA Master wireless link bandwidth + value received by ETH-BN (Rx) on Port2 from MTA slave

ii) MTA setting without ETH-BN (Rx) enabled on MTA GRP:

MTA link Shaper rate = MTA Master wireless link bandwidth

- In Transparent Mode, only below two MTA Configuration are allowed.

  i) MTA GRP with only two MODEM

  ii) MTA GRP with only two MODEM and one ETH Port (Port2)

- In case of setting MTA with only two MODEM in Transparent Mode, ETH-OAM settings are not recommended though LCT will not guard ETH-OAM configuration.
- If the ETH connection between Master and Slave fails, the MTA member reduction control will not work properly in the opposite site and all MTA traffic will be stopped. By setting LLF between Slave nodes, line failures can be detected by the opposite Slave node, avoiding the above problems.

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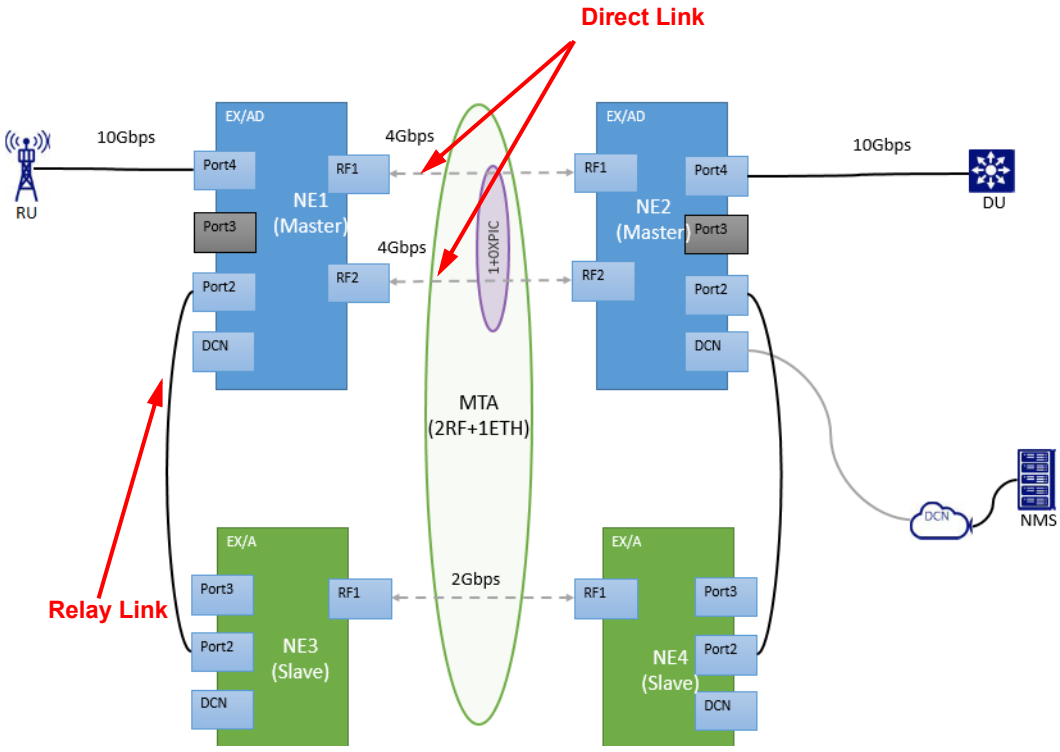
3. Use Cases for MTA

3.1 Use case 1 - MTA [2 MODEM (XPIC) and 1 ETH port] without PTP

3.1.1 Scenario briefing

This section explains a typical user scenario to bring up a MTA topology without PTP. Below topology represent Multi Traffic Aggregation of two Wireless and one Wired link. Data Traffic of 10 Gbps flows between the RU and DU through the MTA link.

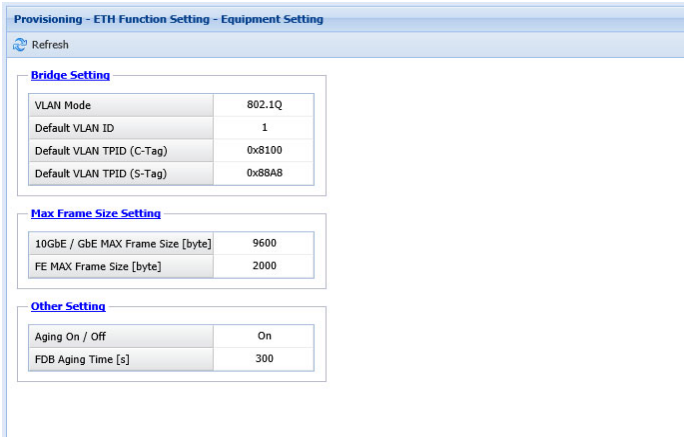
3.1.2 Topology



NOTE: *The Slave Nodes can be other VR series iPASOLINK Equipment also (**3.9 Other Example Topologies**). This Manual demonstrates Use cases with EX/A as Slave Nodes*

Condition 3-1

- *Only MODEM port should be configured in MTA Direct Link as shown in* ***3.1.2 Topology****.*
- *Only ETH port should be configured in MTA Relay Link as shown in* ***3.1.2 Topology****.*
- *The MAX frame size of both master and slave node should be set to maximum size (9600 bytes) as shown below. Refer* ***9.2.2 Max Frame Size Setting in Set Network and System Provisioning*** *for details.*



3.1.3 Step by step Configuration

This section contains the step by step procedure to bring up the above topology.

3.1.3.1 Steps Summary - NE1 and NE2

1. Register MODEM RF1, RF2 and enable XPIC configuration.
2. Configure CS/Reference Modulation for the MODEM RF1,RF2.
3. Configure ETH ports Port2 and Port4 as 10G port.
4. Create user traffic VLAN (VLAN X) and Through VLAN (VLAN Y).
5. Associate user traffic VLAN to ETH Port4 and MODEM Ports RF1 and RF2, Through VLAN to ETH Port2 and MODEM Port RF1.
6. Create MEG with ETH-CCM enable, ETH-BN Rx-enable.
7. Create MEP on MODEM Port RF1 [Least Port] using Through VLAN.
8. Create MTA GRP with MODEM Ports RF1, RF2 and ETH Port2, assign Aggregation VLAN (VLAN Z), Through VLAN and choose MEP Index created in Step 7 from drop-down menu.

3.1.3.2 Steps Summary - NE3 and NE4

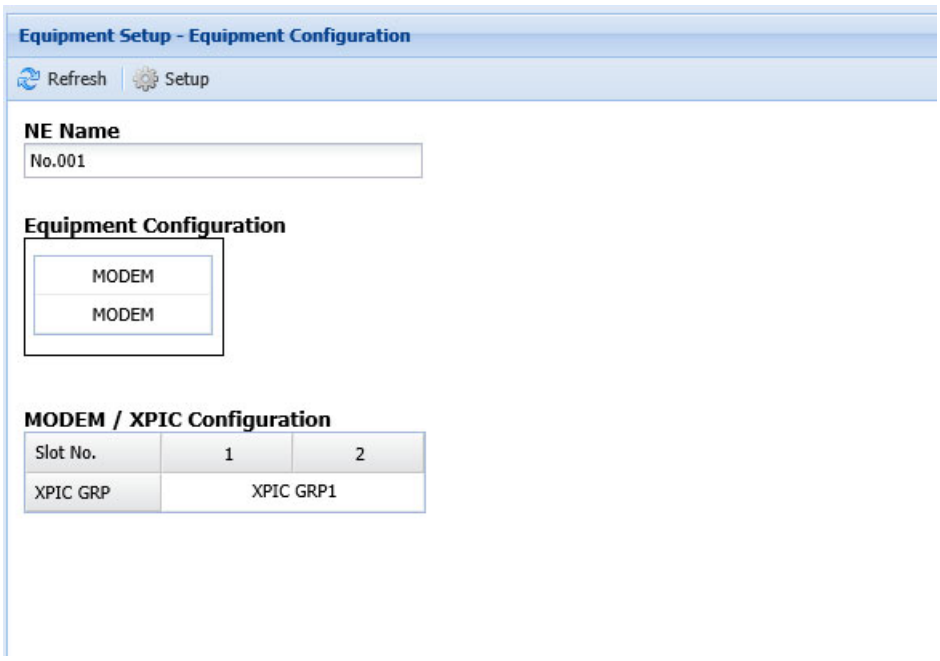
1. Register MODEM RF1.
2. Configure CS/Reference Modulation for the MODEM RF1.
3. Configure ETH port Port2 to as 10G port.
4. Create VLAN IDs same as Through VLAN (VLAN Y) and Aggregation VLAN (VLAN Z) in Master (NE1 and NE2).
5. Associate VLAN Y and VLAN Z to ETH Port2 and VLAN Z to MODEM Port RF1.
6. Create MEG with ETH-CCM enable, ETH-BN Tx-enable, BNM Server MEP as MODEM RF1.
7. Create MEP on ETH Port2 using Through VLAN.

3.1.3.3 Detailed Configuration steps – NE1 and NE2

Procedure 3-1

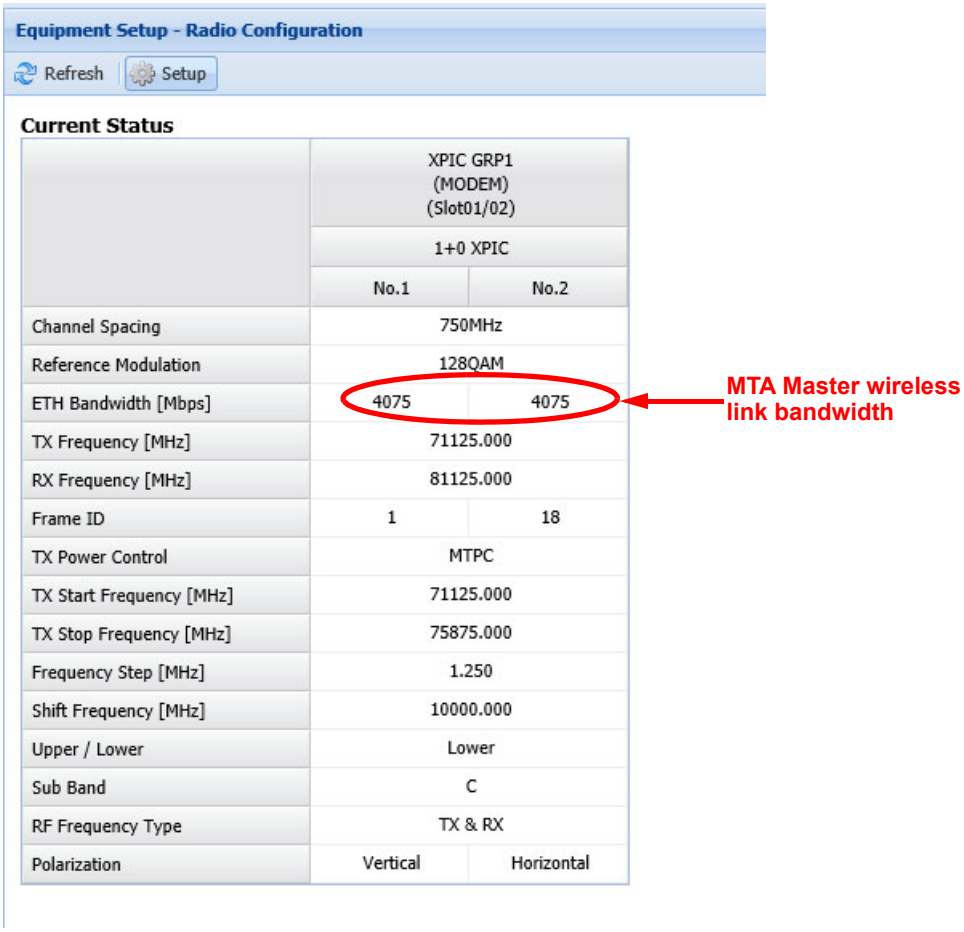
1. Register MODEM RF1, RF2 and enable XPIC configuration. Refer ***4.2 Equipment Configuration in Set Network and System Provisioning*** for details.

Figure 3-1 Equipment Configuration Window



2. Configure CS/Reference Modulation for the MODEM RF1,RF2. Refer ***4.3 Radio Configuration in Set Network and System Provisioning*** for details.

Figure 3-2 Radio Configuration Window



3. Configure ETH ports Port2 and Port4 as 10G port. Refer ***4.3 ETH Port Setting in Set Network and System Provisioning*** for details.

Figure 3-3 ETH Port Setting (Main - Port02) Window

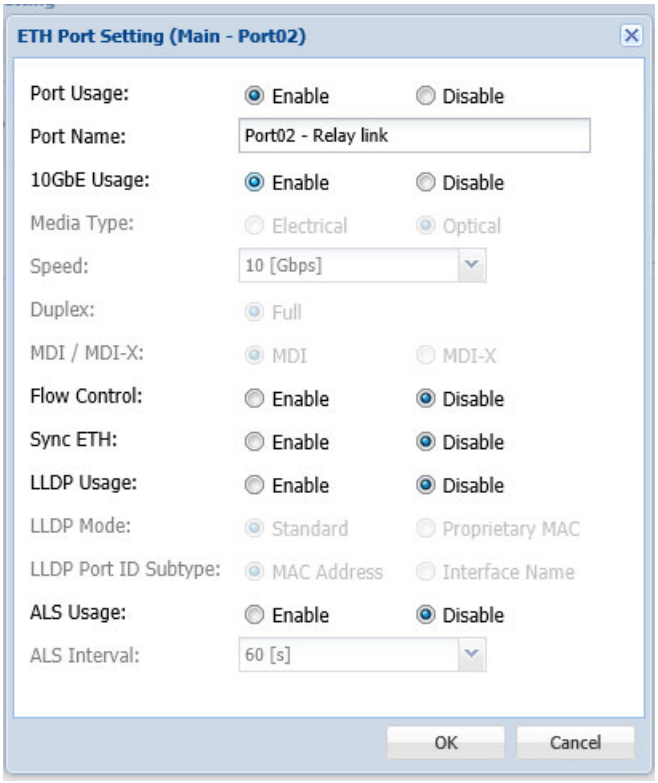


Figure 3-4 ETH Port Setting (Main - Port04) Window

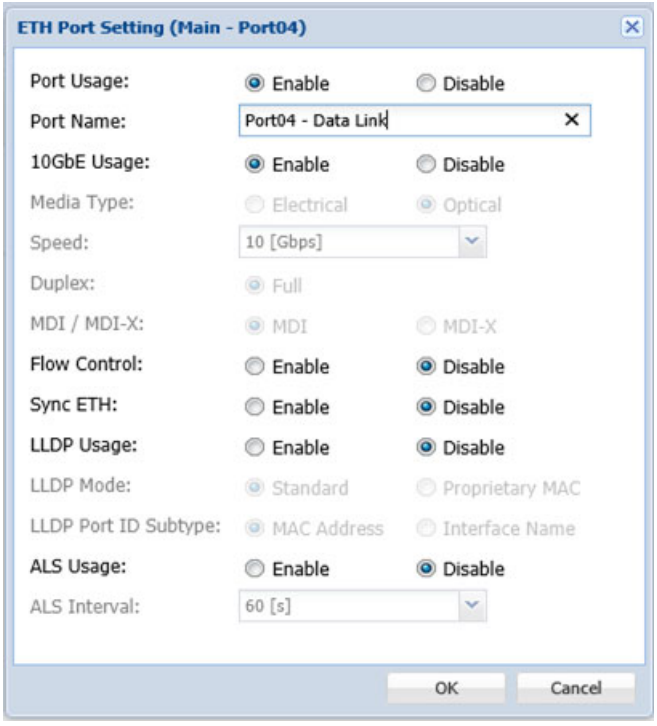


Figure 3-5 ETH Port Setting Window (1/2: on the leftmost)

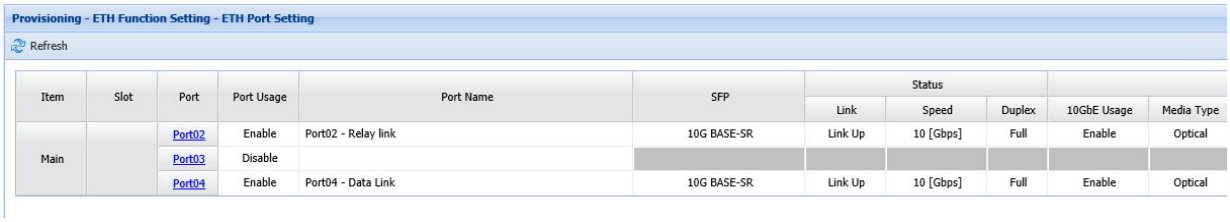
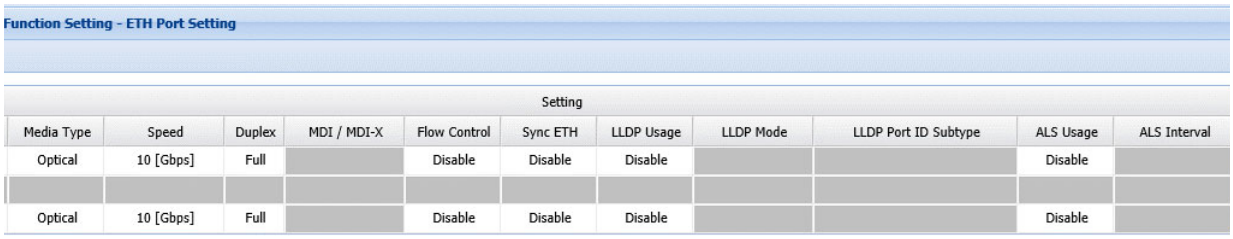
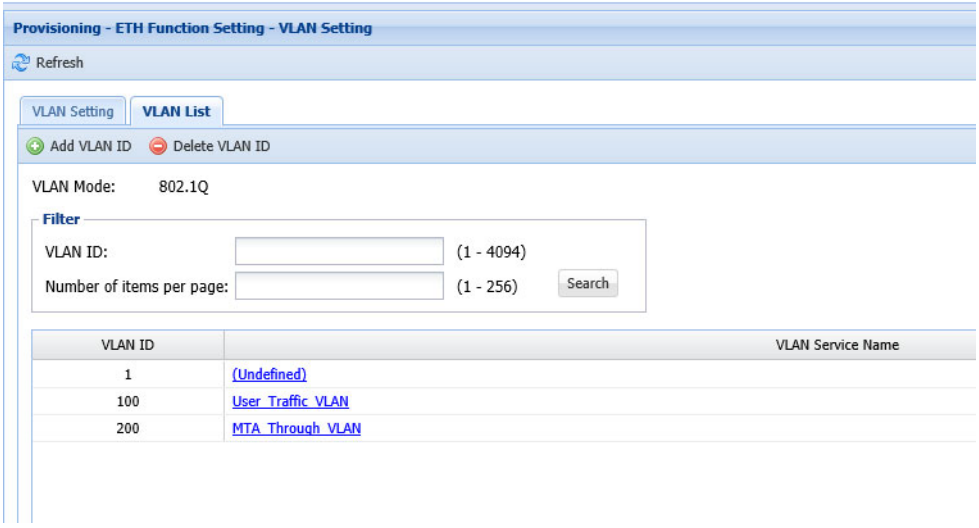


Figure 3-6 ETH Port Setting Window (2/2: on the rightmost)



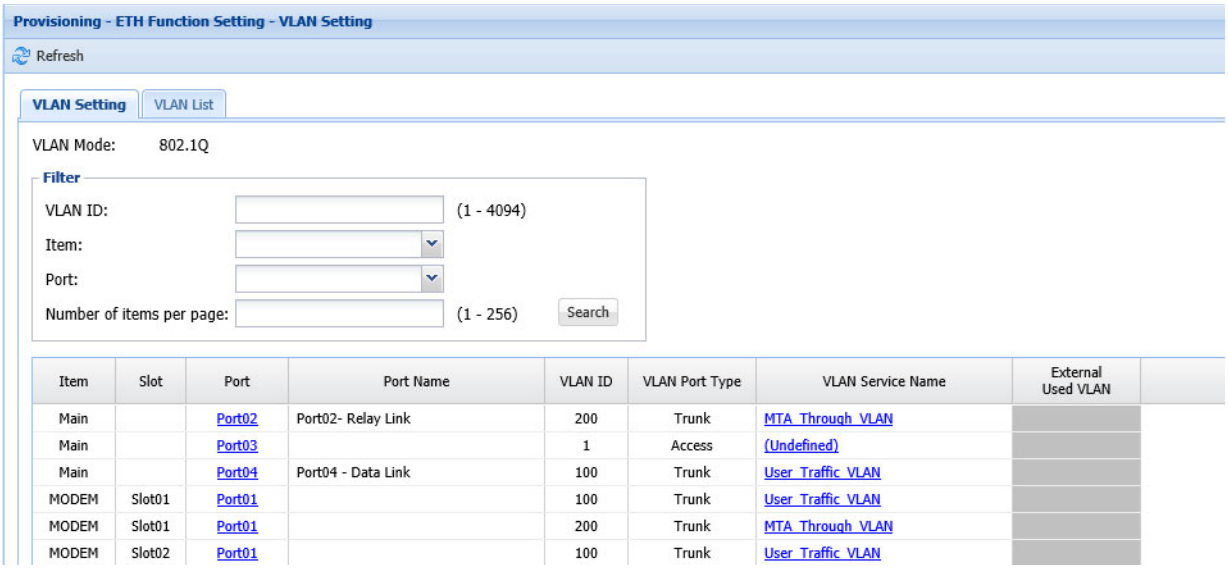
4. Create user traffic VLAN (VLAN X) and Through VLAN (VLAN Y). Refer ***9.4.1 Add VLAN/S-VLAN ID in Set Network and System Provisioning*** for details.

Figure 3-7 VLAN Setting Window



5. Associate user traffic VLAN to ETH Port4 and MODEM Ports RF1 and RF2, Through VLAN to ETH Port2 and MODEM Port RF1. Refer ***9.4.4 VLAN Setting (802.1Q Mode) in Set Network and System Provisioning*** for details.

Figure 3-8 VLAN Setting Window



6. Create MEG with ETH-CCM enable, ETH-BN Rx-enable. Refer ***9.6.1.1 Add MEG Index in Set Network and System Provisioning*** for details.

Figure 3-9 OAM MEG Setting (Add) Window

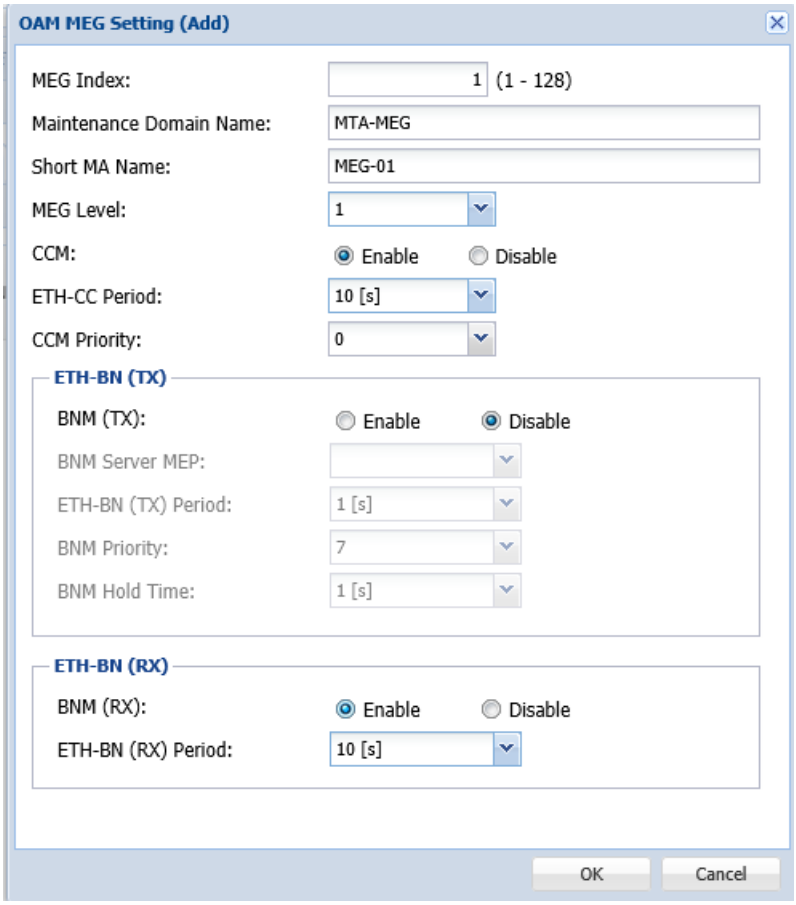
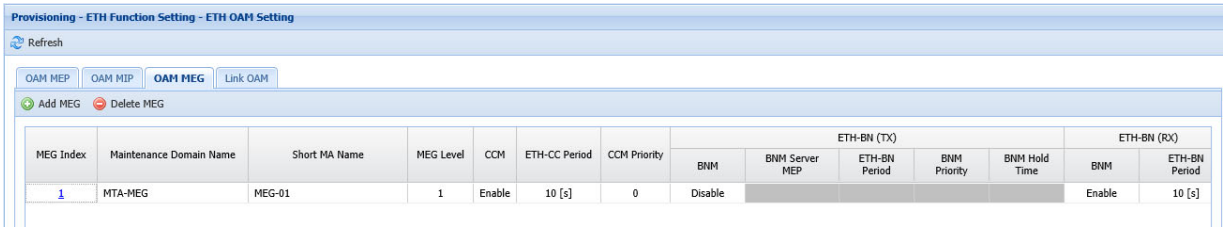


Figure 3-10 ETH OAM Setting Window



7. Create MEP on MODEM Port RF1 [Least Port] using Through VLAN. Refer ***9.6.2.1 Add MEP Index in Set Network and System Provisioning*** for details.

Figure 3-11 OAM MEP Setting (Add) Window

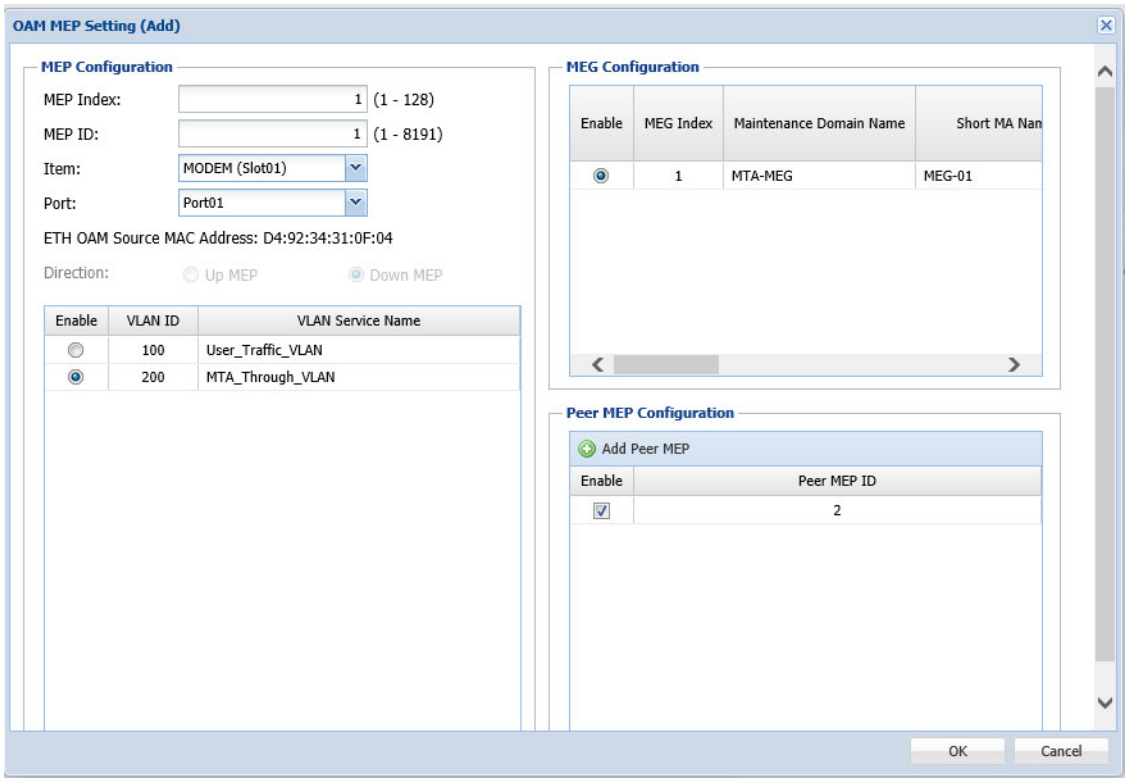
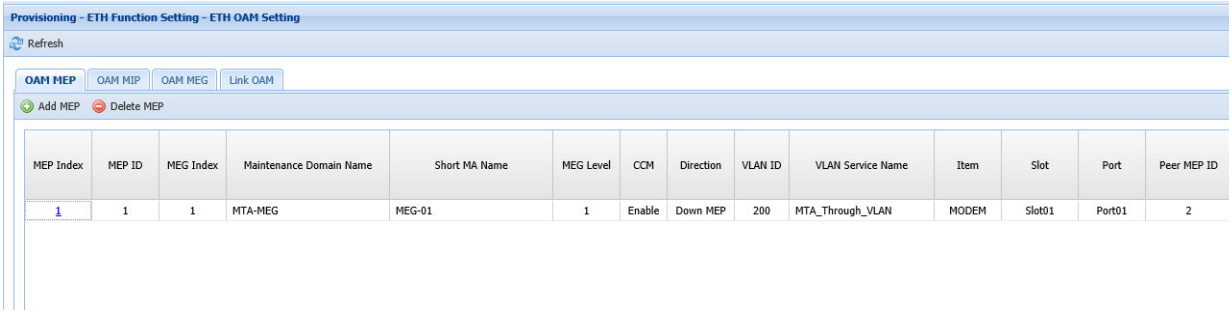
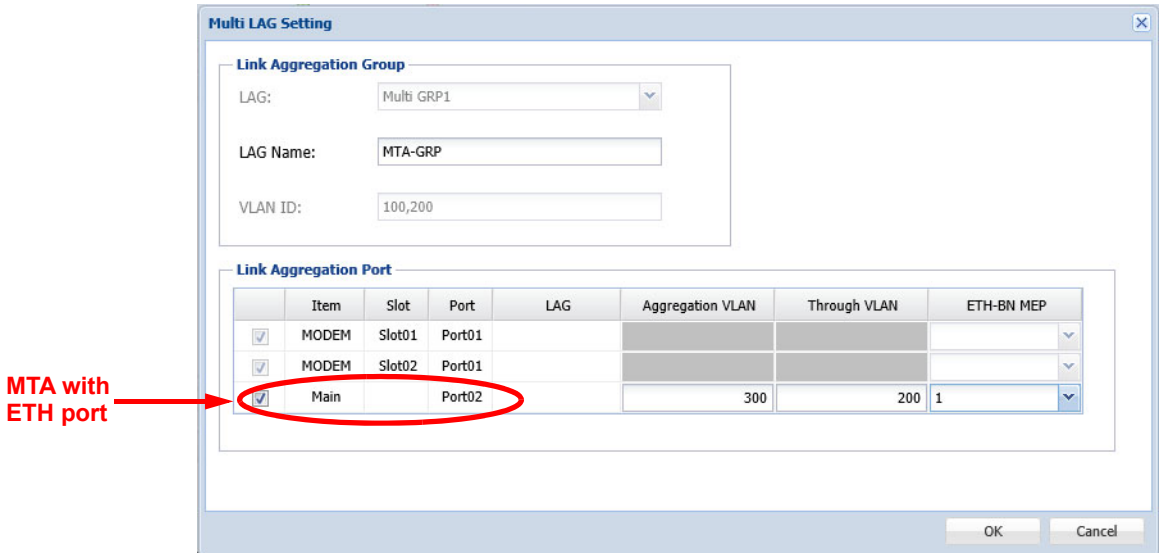


Figure 3-12 ETH OAM Setting Window



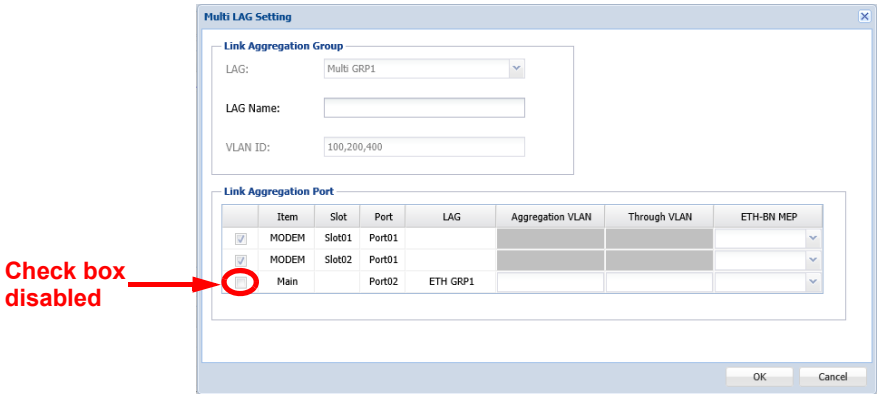
8. Create MTA GRP with MODEM Ports RF1, RF2 and ETH Port2, assign Aggregation VLAN (VLAN Z), Through VLAN and choose MEP Index created in Step 7 from drop-down menu. Refer ***8.2.3 Add Multi LAG in Set Network and System Provisioning*** for details.

Figure 3-13 Multi LAG Setting Window



Condition 3-2

- *In case of setting MTA with ETH port, Only ETH Port2 is allowed as member of MTA group as shown in above* ***Figure 3-13****.*
- *When Port02 is member port of other LAG, it cannot be configured as the member port of Multi Group as shown below.*



- *Aggregation VLAN should not be already registered in VLAN list. Using Aggregation VLAN from VLAN List throws below error.*

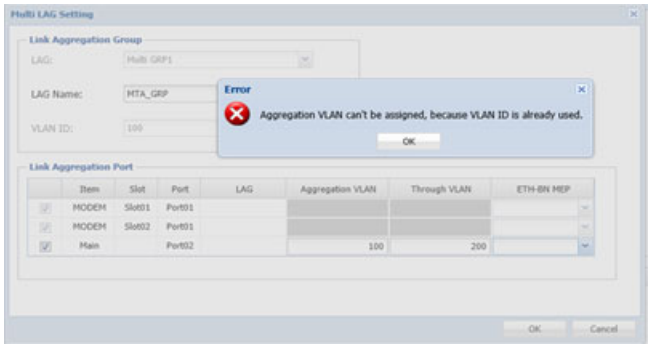
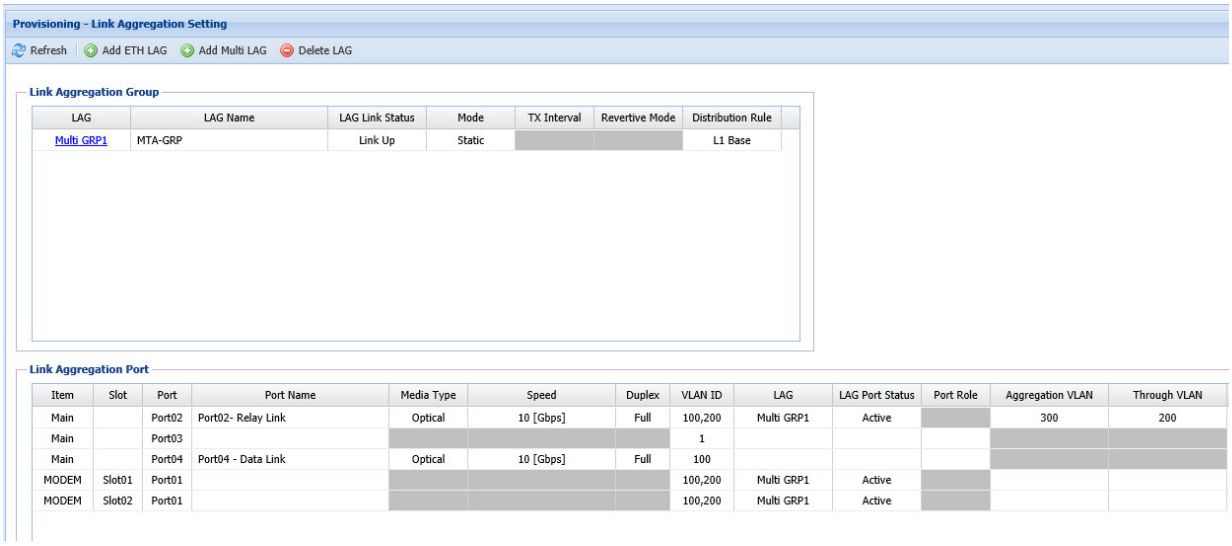
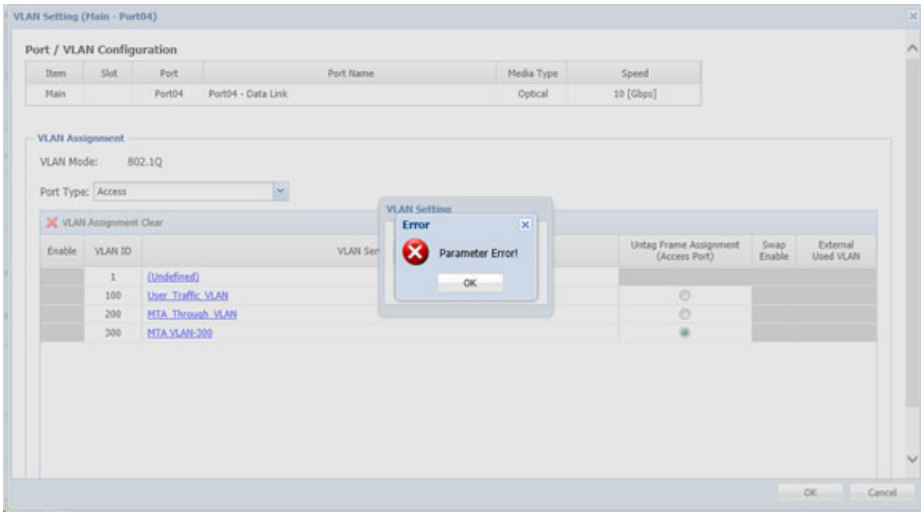


Figure 3-14 Link Aggregation Setting Window

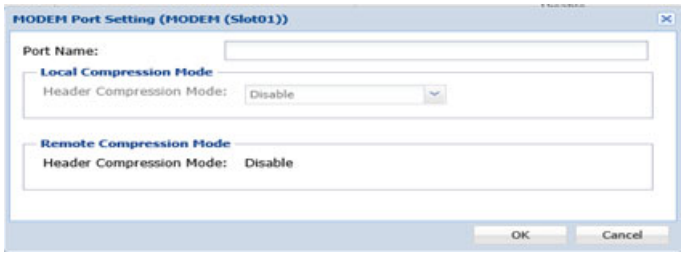


Condition 3-3

- *Aggregation VLAN cannot be assigned for user traffic or other service. Throws below Error.*



- *After configuring MTA group, Header compression is fixed to disable on MODEM Interface.*

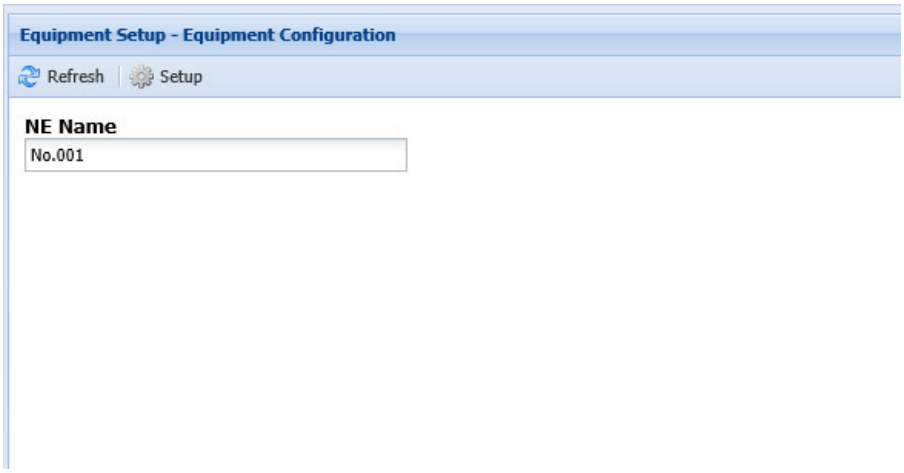


3.1.3.4 Detailed Configuration steps – NE3 and NE4

Procedure 3-2

1. Register MODEM RF1. Refer ***4.2 Equipment Configuration in Set Network and System Provisioning*** for details.

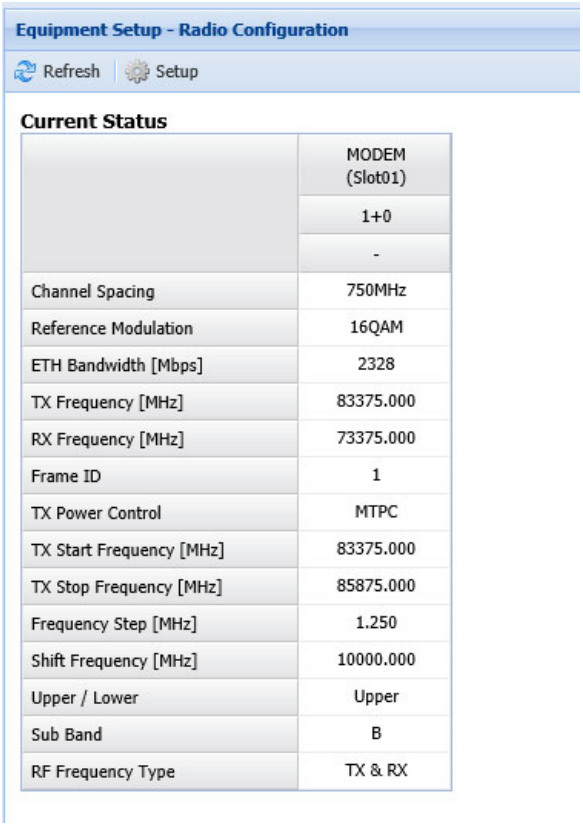
Figure 3-15 Radio Configuration Window



NOTE: *Slave node used is EX/A, hence MODEM registration is not required.*

2. Configure CS/Reference Modulation for the MODEM RF1. Refer ***4.3 Radio Configuration in Set Network and System Provisioning*** for details.

Figure 3-16 Radio Configuration Window



3. Configure ETH port Port2 as 10G port. Refer ***4.3 ETH Port Setting in Set Network and System Provisioning*** for details.

Figure 3-17 ETH Port Setting (Main - Port02) Window

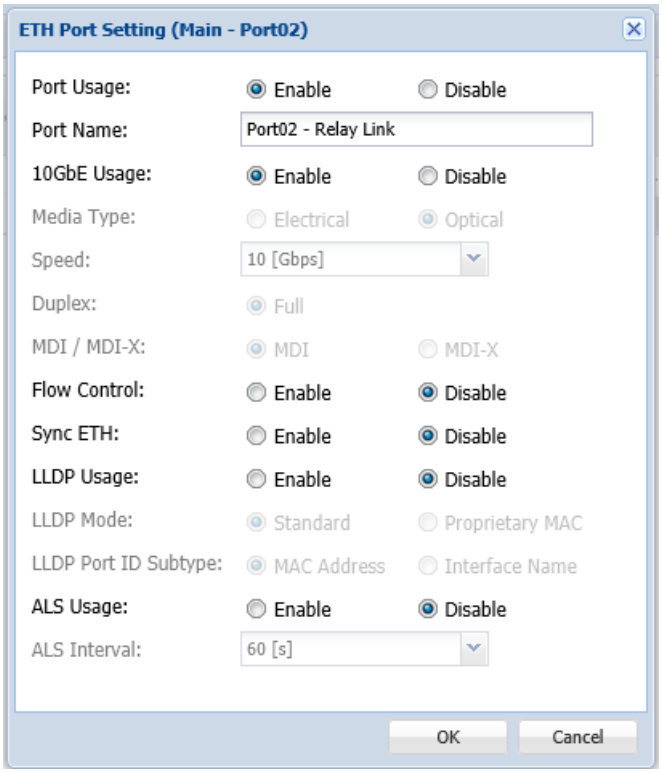


Figure 3-18 ETH Port Setting Window (1/2: on the leftmost)

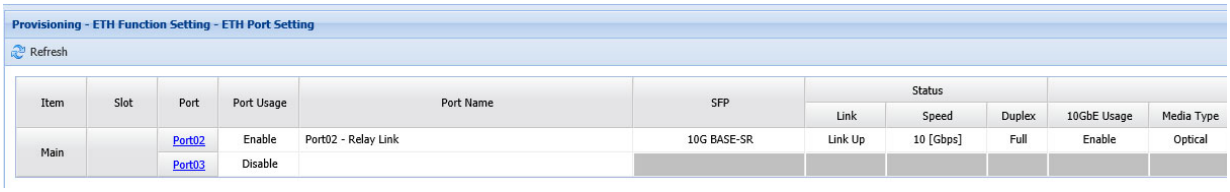
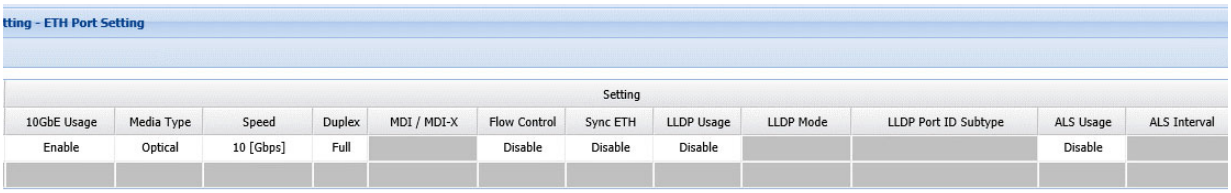
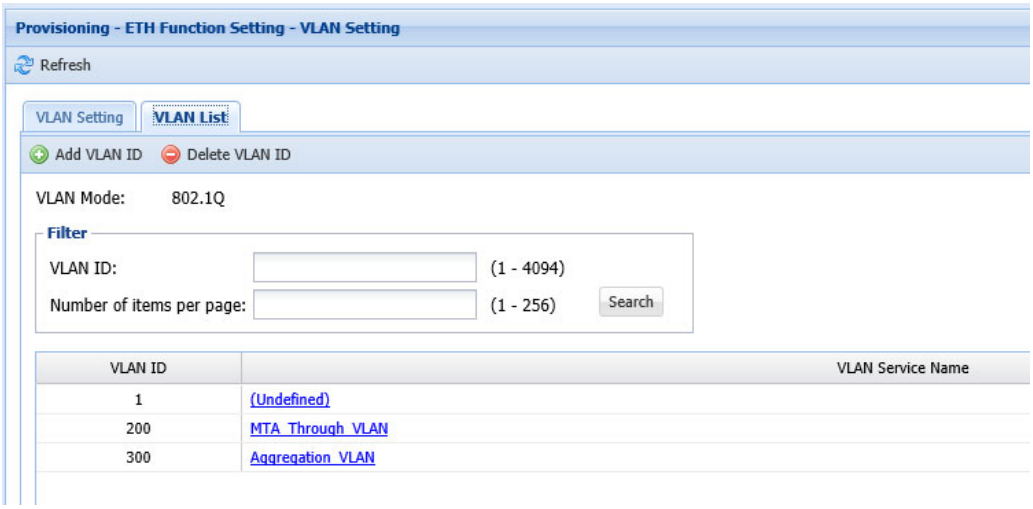


Figure 3-19 ETH Port Setting Window (2/2: on the rightmost)



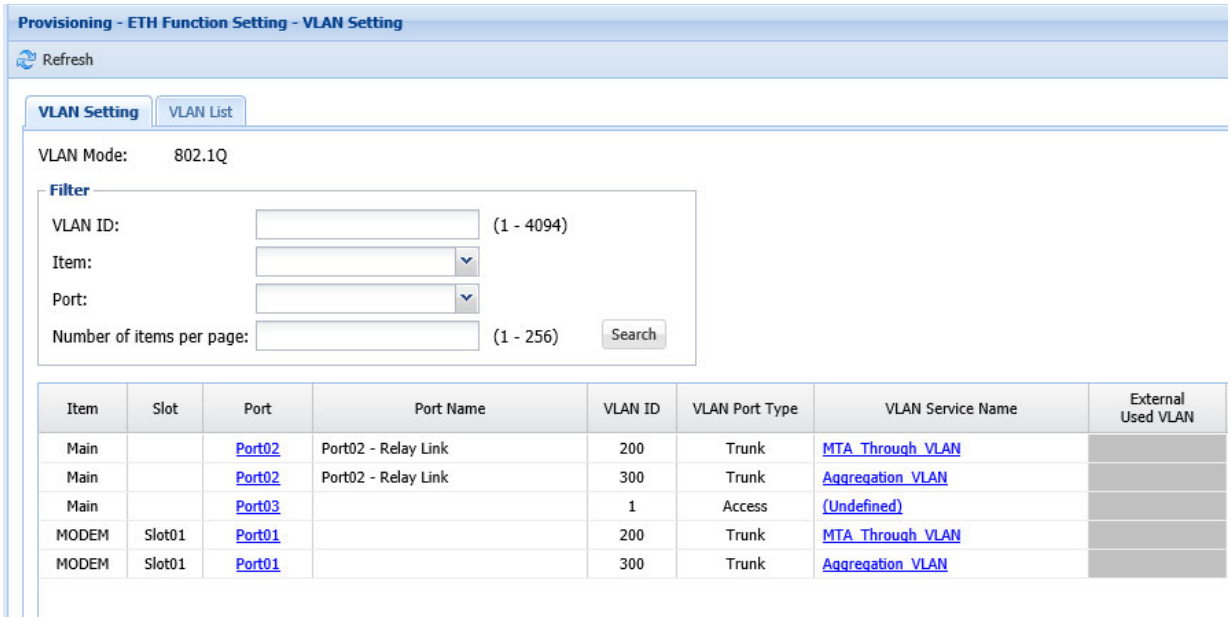
4. Create VLAN IDs same as Through VLAN (VLAN Y) and Aggregation VLAN (VLAN Z) in Master (NE1 and NE2). Refer ***9.4.1 Add VLAN/S-VLAN ID in Set Network and System Provisioning*** for details.

Figure 3-20 ETH Function Setting - VLAN Setting Window



5. Associate VLAN Y and VLAN Z to ETH Port2 and VLAN Z to MODEM Port RF1. Refer ***9.4.4 VLAN Setting (802.1Q Mode) in Set Network and System Provisioning*** for details.

Figure 3-21 ETH Function Setting - VLAN Setting Window



6. Create MEG with ETH-CCM enable, ETH-BN Tx-enable, BNM Server MEP as MODEM RF1. Refer ***9.6.1.1 Add MEG Index in Set Network and System Provisioning*** for details.

Figure 3-22 OAM MEG Setting (Modify) Window

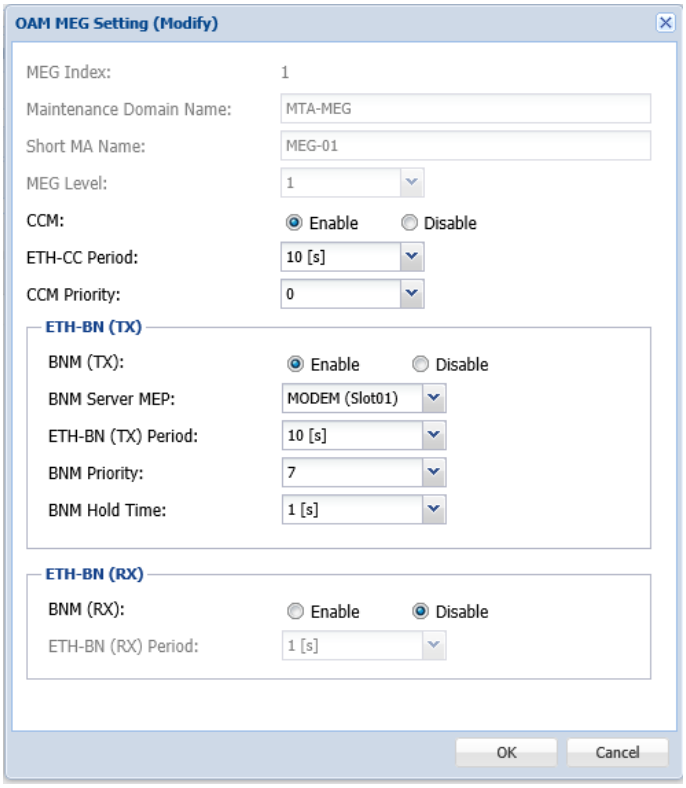


Figure 3-23 ETH OAM Setting Window (1/2: on the leftmost)

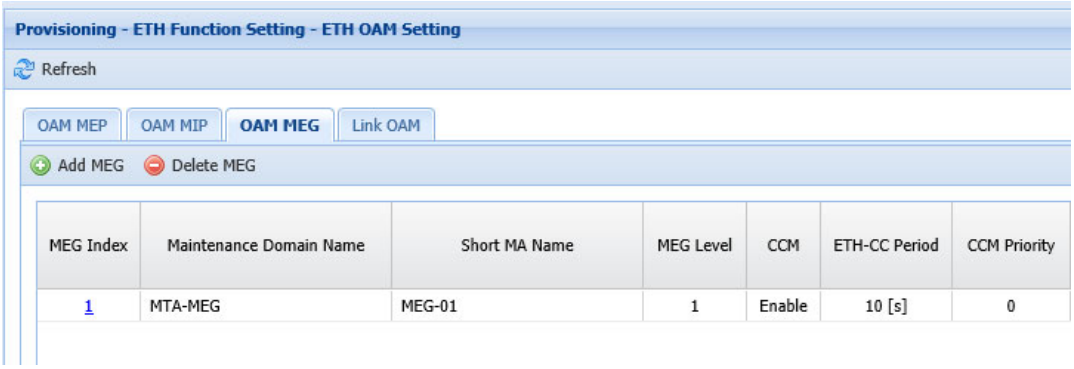
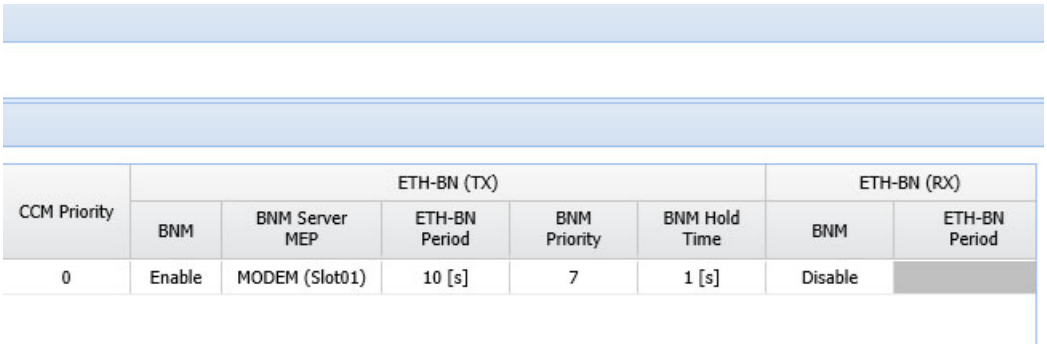


Figure 3-24 ETH OAM Setting Window (2/2: on the rightmost)



CCM Priority	ETH-BN (TX)					ETH-BN (RX)	
	BNM	BNM Server MEP	ETH-BN Period	BNM Priority	BNM Hold Time	BNM	ETH-BN Period
0	Enable	MODEM (Slot01)	10 [s]	7	1 [s]	Disable	

7. Create MEP on ETH Port2 using Through VLAN. Refer ***9.6.2.1 Add MEP Index in Set Network and System Provisioning*** for details.

Figure 3-25 OAM MEP Setting (Add) Window

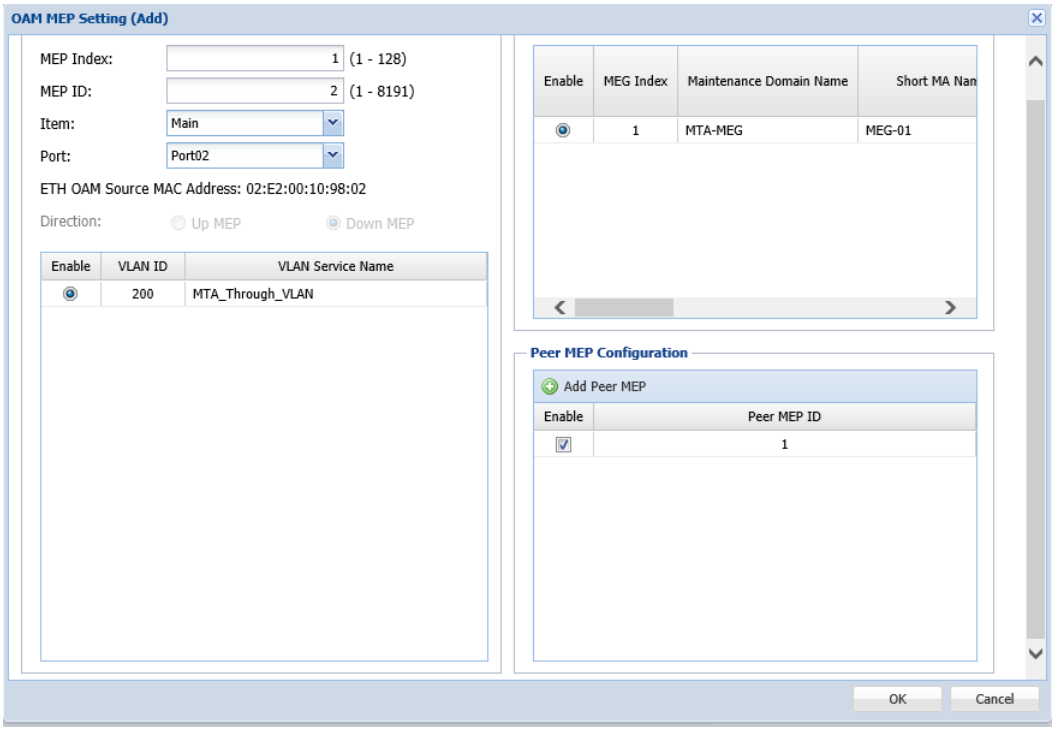


Figure 3-26 ETH OAM Setting Window (1/3: on the leftmost)

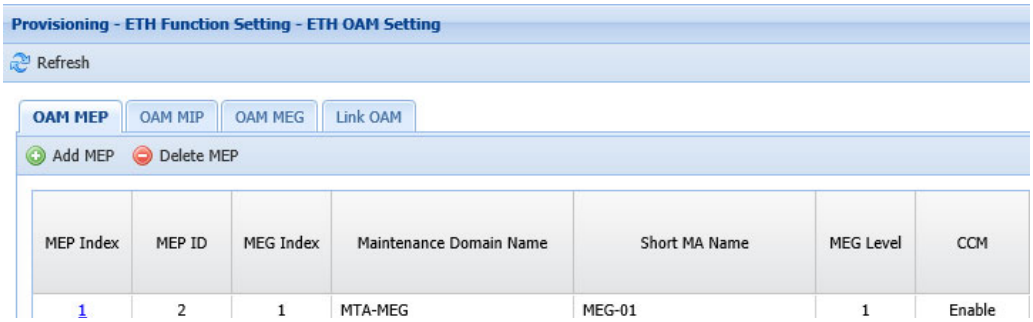


Figure 3-27 ETH OAM Setting Window (2/3: on the middle)

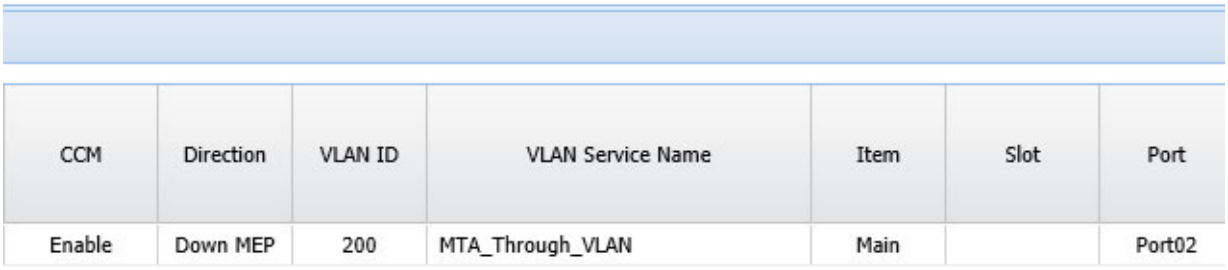
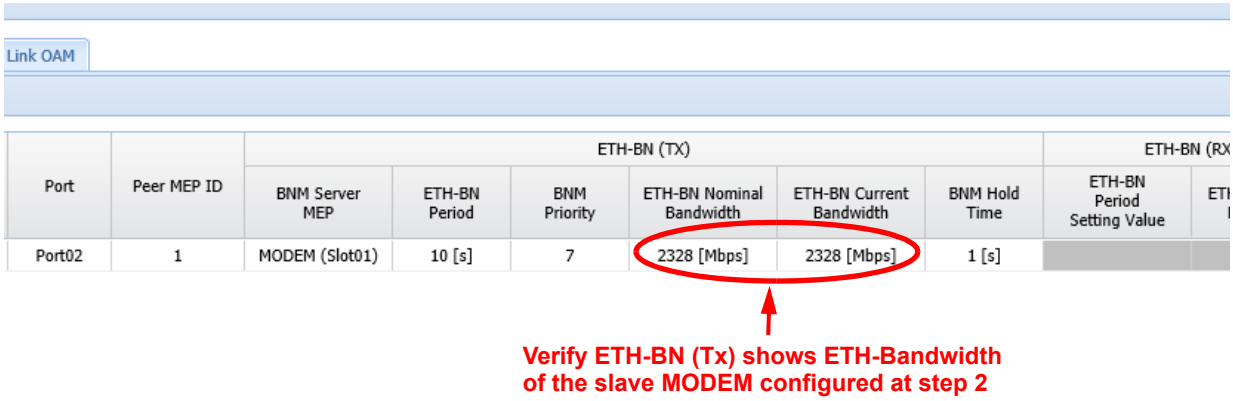


Figure 3-28 ETH OAM Setting Window (3/3: on the rightmost)



3.1.4 Alarm and Troubleshooting:

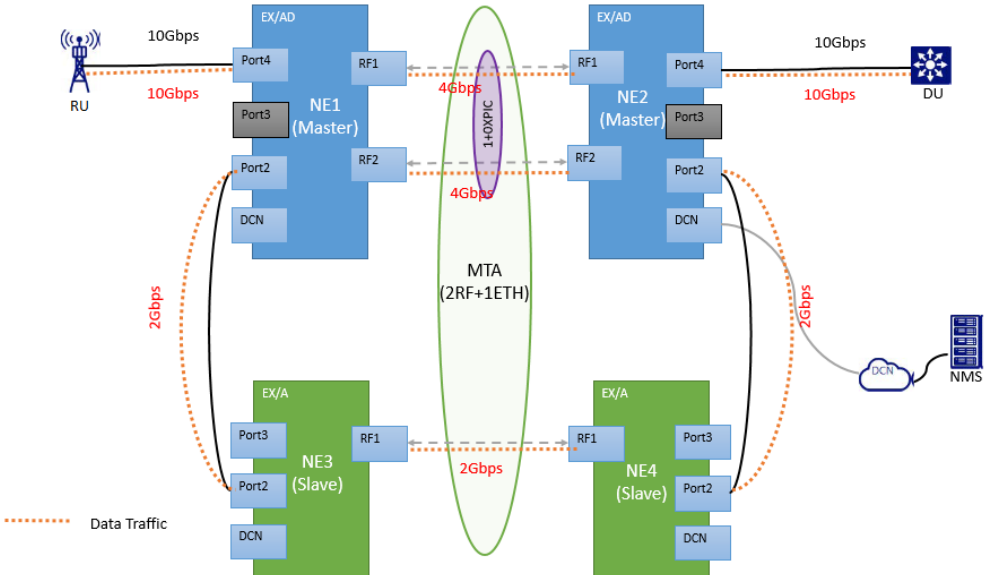
Once the topology configuration is complete, check for below possible alarms.

1. ETH-BN LOC
2. ETH LOS
3. Multi Traffic Aggregation Link
4. Multi Traffic Aggregation Setting Mismatch

To Clear the Alarms, refer to ***5.5 Trouble Clearing in Operation and Maintenance*** for details.

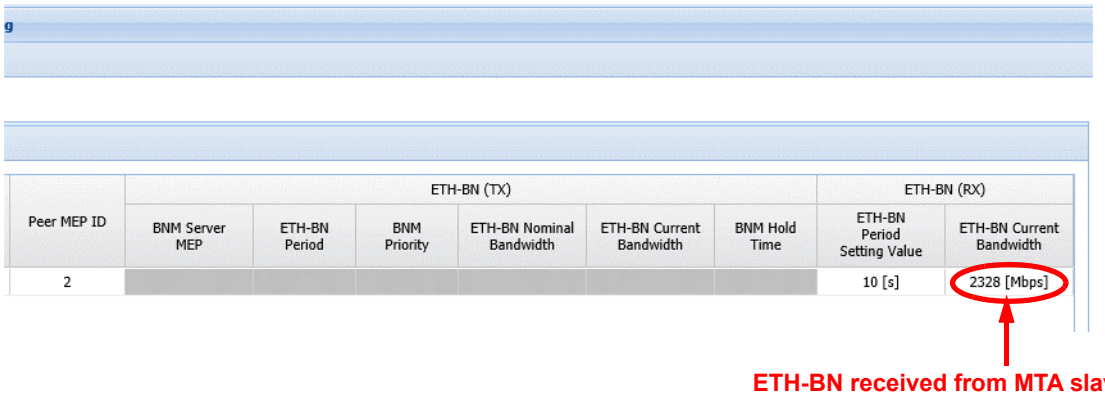
3.1.5 Use Case Verification

Figure 3-29 Data Traffic Flow



1. Verify ETH-BN (Rx) on Master Node shows the ETH-BN received from MTA slave.

Figure 3-30 ETH OAM Setting - OAM MEP [on the rightmost on NE1]



2. Verify the counters in ETH RMON Report on Slave [NE3 and NE4] Port02 for traffic taken through relay link. Refer ***3.3.3 ETH RMON Report in Operation and Maintenance*** for details.

3. Verify the counters in ETH RMON Report on receiving end Master [NE2] Port04 for the entire traffic aggregated back from MTA ports. Refer ***3.3.3 ETH RMON Report in Operation and Maintenance*** for details.

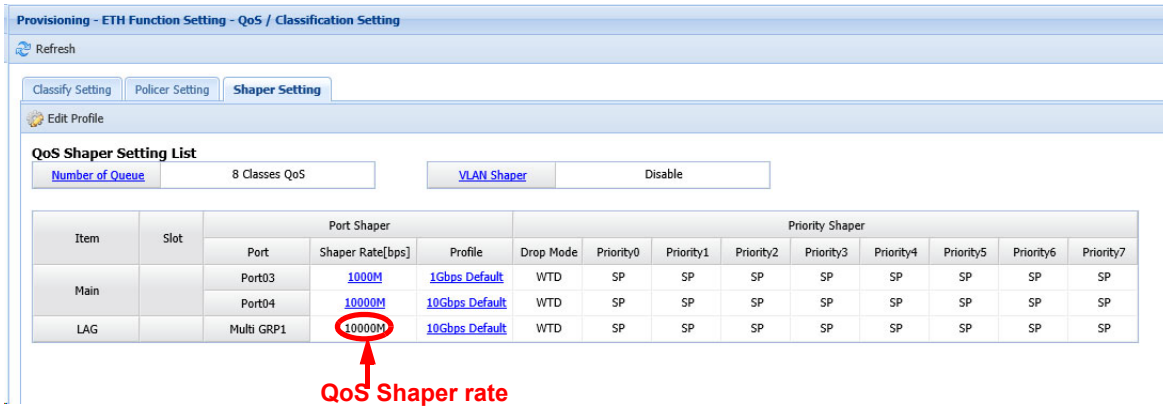
Condition 3-4

- *QoS Shaper rate for MTA link is calculated based on below condition.*

  i) MTA setting with ETH-BN (Rx) enabled on MTA GRP:

  MTA link Shaper rate** = **MTA Master wireless link bandwidth** + **value received by ETH-BN (Rx) on Port2 from MTA slave

  ***NOTE:** When ETH bandwidth is not received from port2 value "0" is used for calculation.*

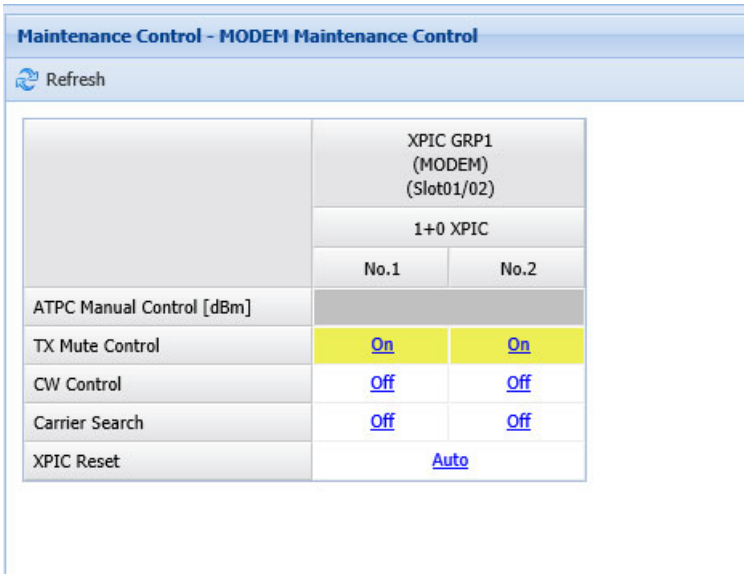


ii) MTA setting without ETH-BN (Rx) enabled on MTA GRP:

MTA link Shaper rate** = **MTA Master wireless link bandwidth

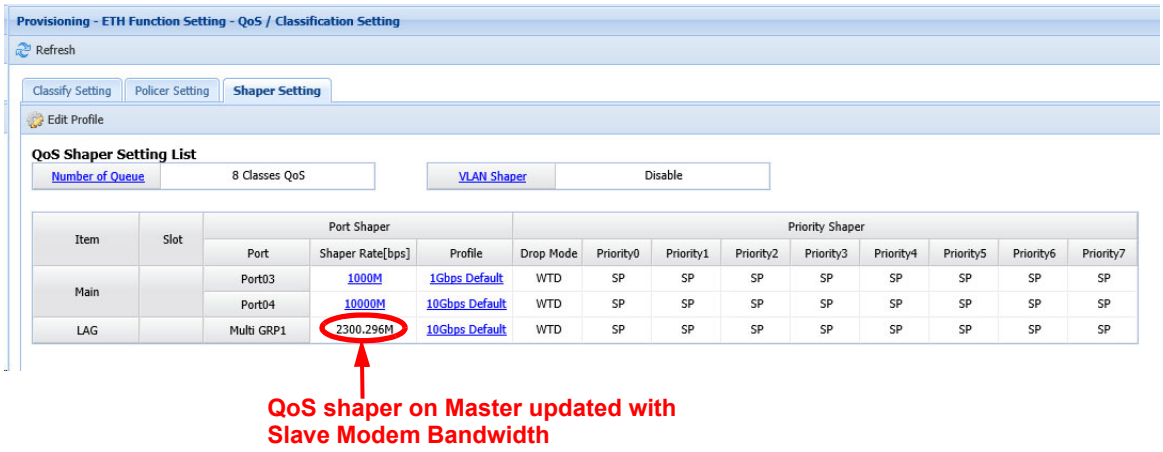
4. Perform TX mute on MODEM RF1 and MODEM RF2 on sender end Master [NE1].

Figure 3-31 MODEM Maintenance Control Window



5. Verify the QOS shaper on Master got updated with Slave Modem Bandwidth received via ETH-BNM.

Figure 3-32 QoS / Classification Setting Window



6. Verify the counters in ETH RMON Report on Slave [NE3 and NE4] Port02 and MODEM RF1 for traffic taken through relay link.

Debugging:

1. When the RX rate is not as per the TX rate, check below settings

   a. MTA Direct link is up.

   b. MTA Relay link is up.

   c. Max Frame size in Master and Slave is set to 9600 bytes.

   d. ETH-BN (Rx) is updated in Master from Slave.

   e. Sender traffic TX rate = ETH Bandwidth in Master + ETH Bandwidth in Slave.

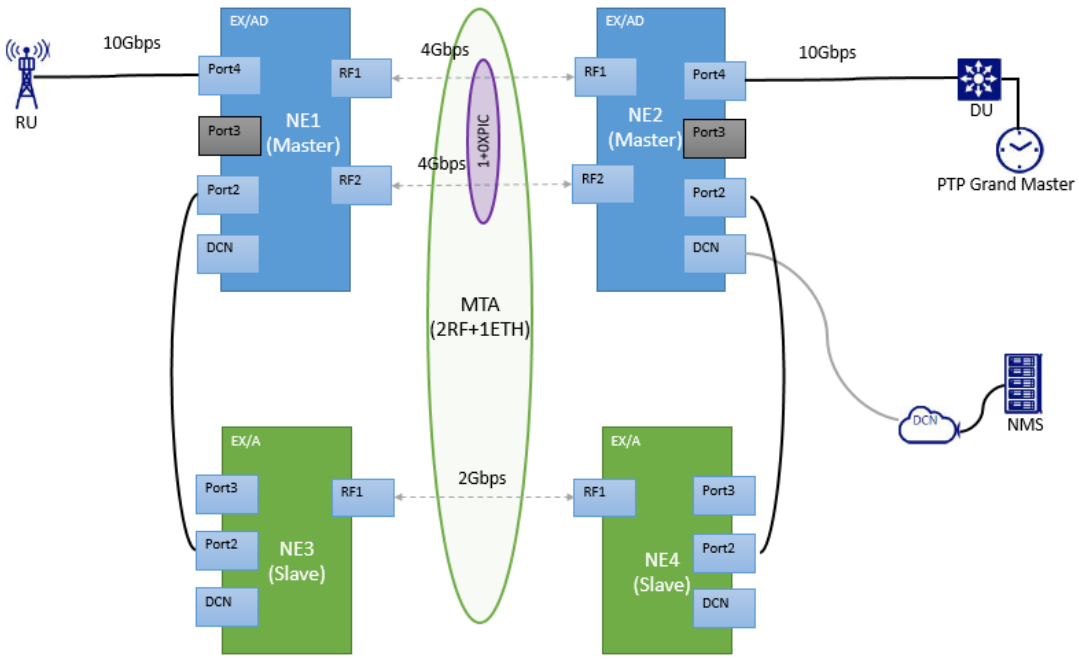
   f. QOS Shaper setting for MTA GRP matches sender traffic TX rate.

3.2 Use case 2 - MTA [2 MODEM (XPIC) and 1 ETH port] with PTP

3.2.1 Scenario briefing

This section explains a typical user scenario to bring up a MTA topology with PTP. Below topology represent Multi Traffic Aggregation of two Wireless and one Wired link. Data Traffic of 10 Gbps flows between the RU and DU through the MTA link with the PTP Packets from the RU.

3.2.2 Topology



3.2.3 Step by Step Configuration

This section contains the step by step procedure to bring up the above topology.

3.2.3.1 Steps Summary - NE1 and NE2

1. Follow steps 1 to 8 in ***3.1.3.1 Steps Summary - NE1 and NE2***.
2. Configure PTP Mode to Boundary Clock (BC).
3. Configure Sync ETH on ETH Port 02.
4. Configure Equipment Clock mode to Slave and below timing sources.
   a. Timing Source as PTP Line CLK in NE1
   b. Timing Sources as Line CLK (MODEM) with MODEM RF1 and GbE line CLK1 with ETH Port02 in NE2
5. Create PTP VLAN to transmit PTP Packets in 'VLAN List'.
6. Associate the PTP VLAN to MTA GRP.
7. Create below PTP Logical interfaces
   a. ETH Port04 with user traffic VLAN [Act as PTP slave, create only on NE1]
   b. MTA GRP with PTP VLAN [Act as PTP Master]
   c. MTA GRP with MTA Through VLAN [Act as PTP Master when MTA Direct link is down]

3.2.3.2 Steps Summary - NE3 and NE4

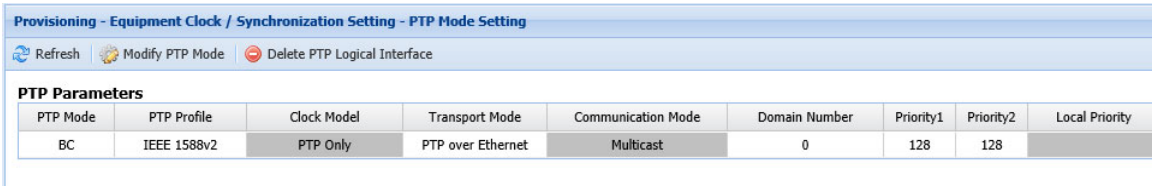
1. Follow steps 1 to 7 in ***3.1.3.2 Steps Summary - NE3 and NE4***.
2. Configure PTP Mode to Transparent Clock (TC).
3. Configure Sync ETH on ETH Port02.
4. Configure Equipment Clock mode to Slave and below timing sources
   a. Timing Source as GbE Line CLK1 with ETH Port02 in NE3
   b. Timing Source as Line CLK(MODEM) with MODEM RF1 in NE4

3.2.3.3 Detailed Configuration steps - NE1 and NE2

Procedure 3-3

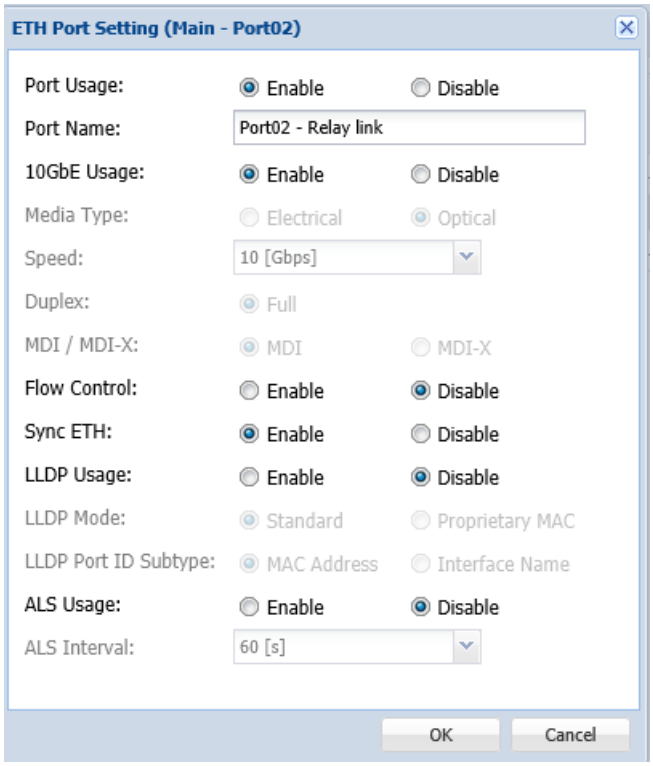
1. Follow steps 1 to 8 in ***3.1.3.3 Detailed Configuration steps – NE1 and NE2***.
2. Configure PTP Mode to Boundary Clock (BC). Refer to ***10.2.2 Modify PTP Mode in Set Network and System Provisioning*** for details.

Figure 3-33 Radio Configuration Window



3. Configure Sync ETH on ETH Port02. Refer to ***9.3 ETH Port Setting in Set Network and System Provisioning*** for details.

Figure 3-34 ETH Port Setting (Main - Port02) Window



4. Configure Equipment Clock mode to Slave and below timing sources.
   a. Timing Source as PTP Line CLK1 in NE1
   b. Timing Sources as Line CLK (MODEM) with MODEM RF1 and GbE line CLK1 with ETH Port02 in NE2

Refer to ***10.1.1 Specify/Modify Equipment Clock Setting in Set Network and System Provisioning*** for details.

Figure 3-35 Equipment Clock Setting Window [In NE1]

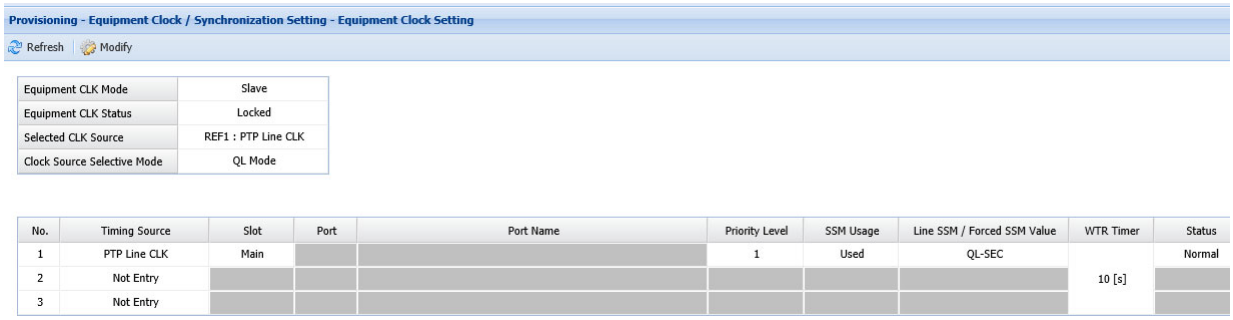
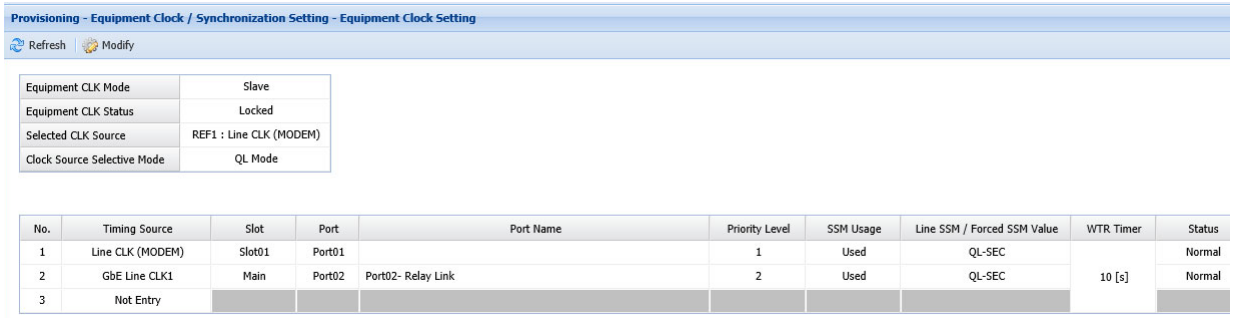
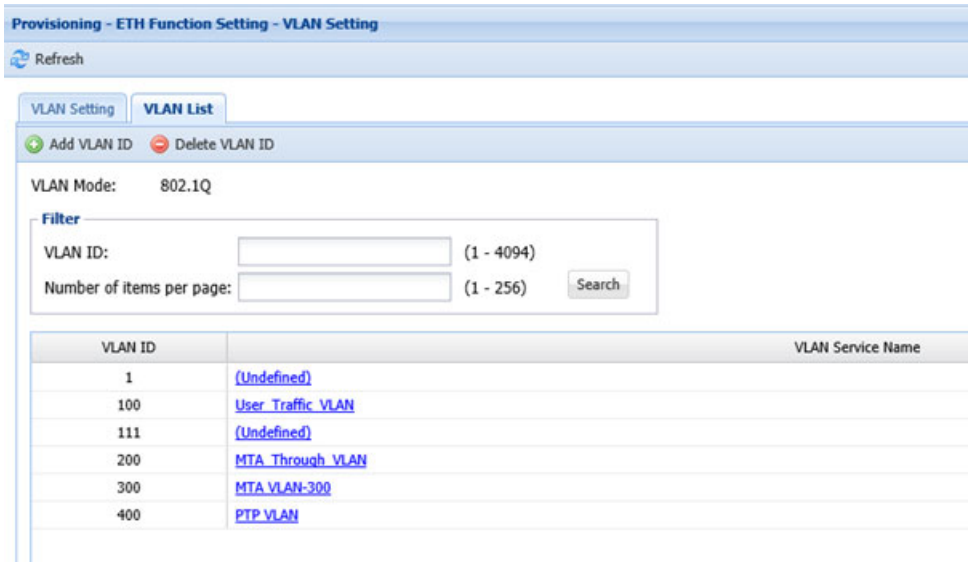


Figure 3-36 Equipment Clock Setting Window [In NE2]



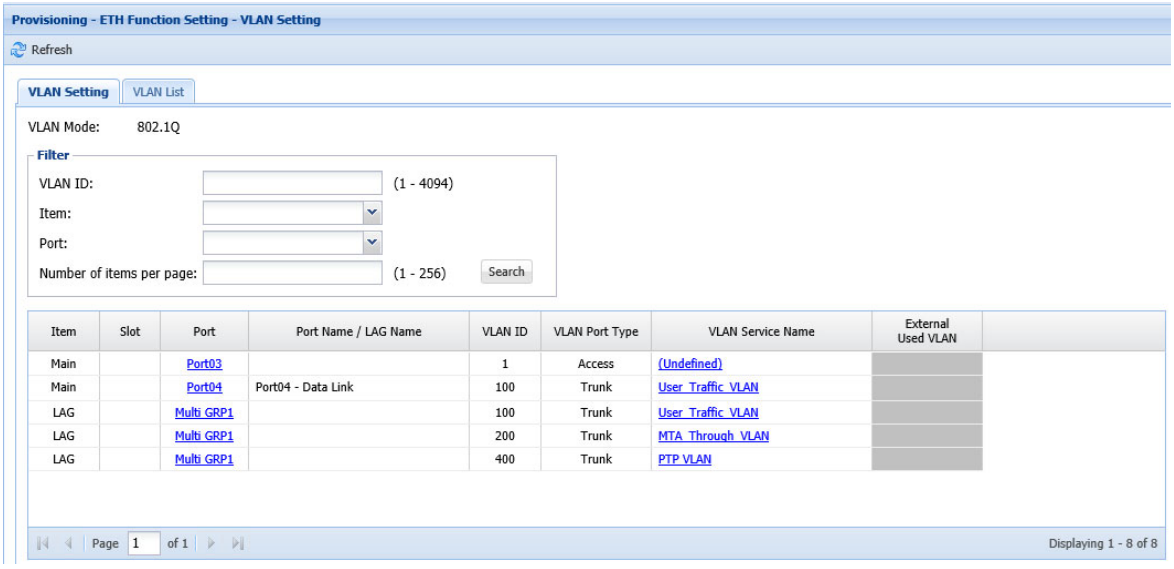
5. Create PTP VLAN to transmit PTP Packets in 'VLAN List'. Refer to ***9.4.1 Add VLAN/S-VLAN ID in Set Network and System Provisioning*** for details.

Figure 3-37 VLAN Setting Window



6. Associate the PTP VLAN to MTA GRP. Refer to ***9.4.4 VLAN Setting (802.1Q Mode) in Set Network and System Provisioning*** for details.

Figure 3-38 VLAN Setting Window



7. Create below PTP Logical interfaces.

a. ETH Port04 with user traffic VLAN [Act as PTP slave, create only on NE1]

b. MTA GRP with PTP VLAN [Act as PTP Master]

c. MTA GRP with MTA Through VLAN [Act as PTP Master when MTA Direct link is down]

Refer to ***10.2.3 Add/Modify PTP Logical Interface in Set Network and System Provisioning*** for details.

Figure 3-39 PTP Mode Setting Window [In NE1]

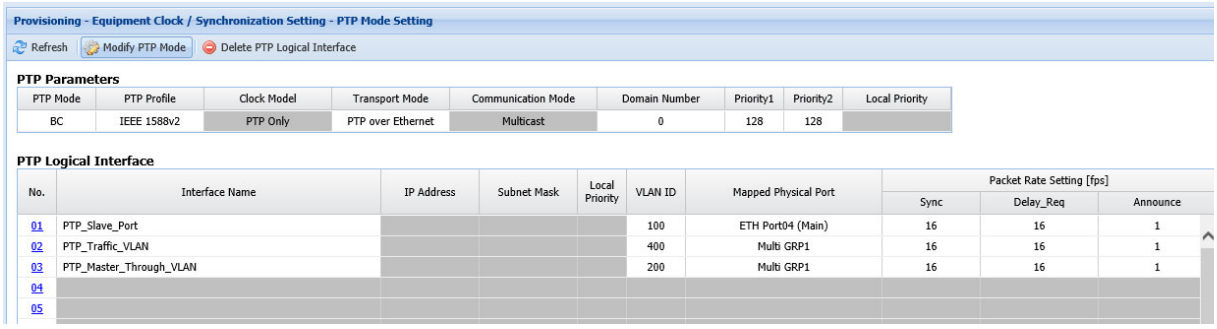
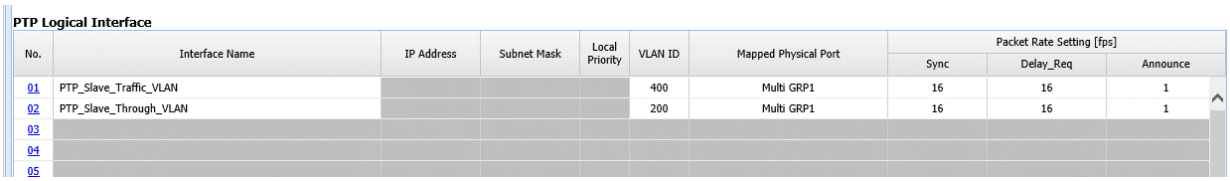


Figure 3-40 PTP Mode Setting Window [In NE2]



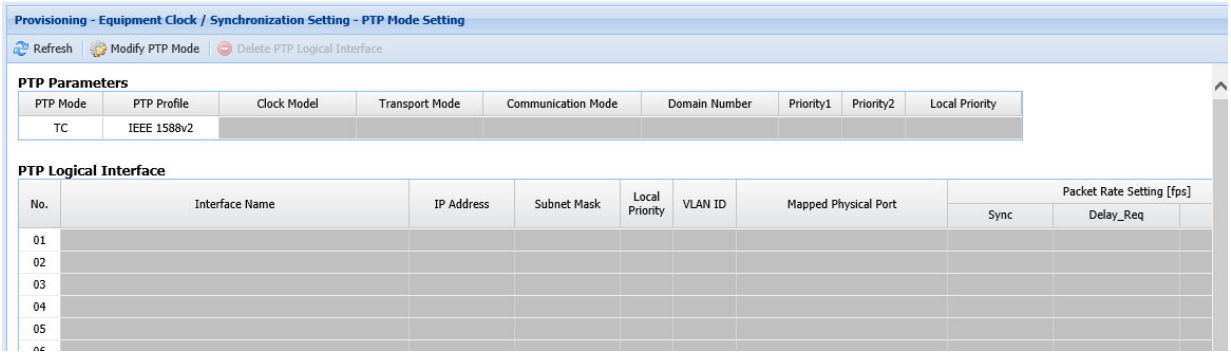
3.2.3.4 Detailed Configuration steps - NE3 and NE4

Procedure 3-4

1. Follow steps 1 to 7 in ***3.1.3.4 Detailed Configuration steps – NE3 and NE4***.

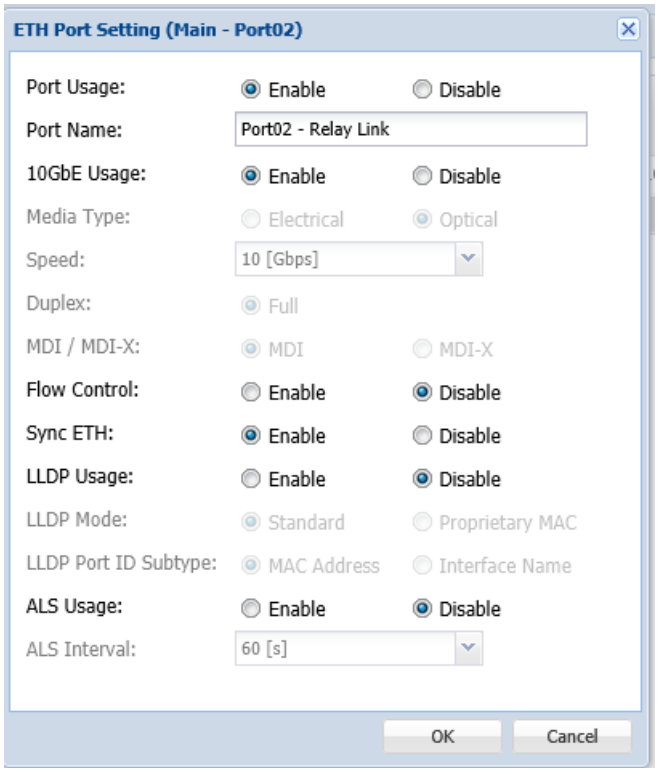
2. Configure PTP Mode to Transparent Clock (TC). Refer to ***10.2.2 Modify PTP Mode in Set Network and System Provisioning*** for details.

Figure 3-41 PTP Mode Setting Window



3. Configure Sync ETH on ETH Port02. Refer to ***9.3 ETH Port Setting in Set Network and System Provisioning*** for details.

Figure 3-42 ETH Port Setting (Main - Port02) Window



4. Configure Equipment Clock mode to Slave and below timing sources

   a. Timing Source as GbE Line CLK1 with ETH Port02 in NE3

b. Timing Source as Line CLK (MODEM) with MODEM RF1 in NE4

Refer to ***10.1.1 Specify/Modify Equipment Clock Setting in Set Network and System Provisioning*** for details.

Figure 3-43 Equipment Clock Setting Window [In NE3]

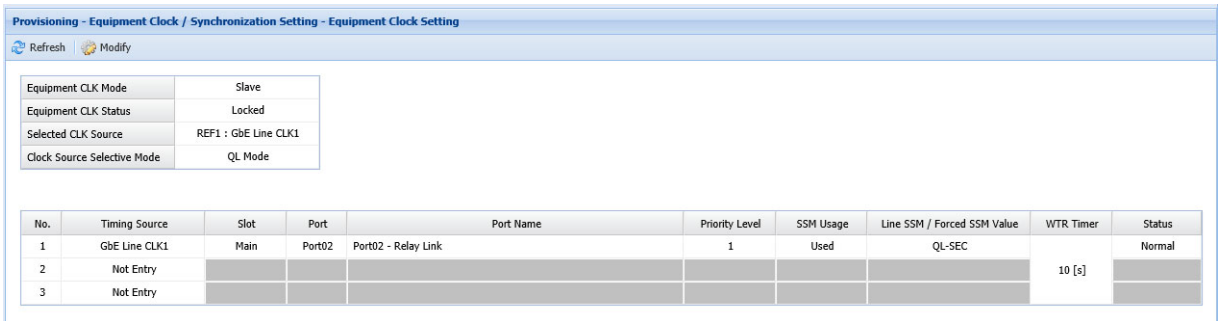
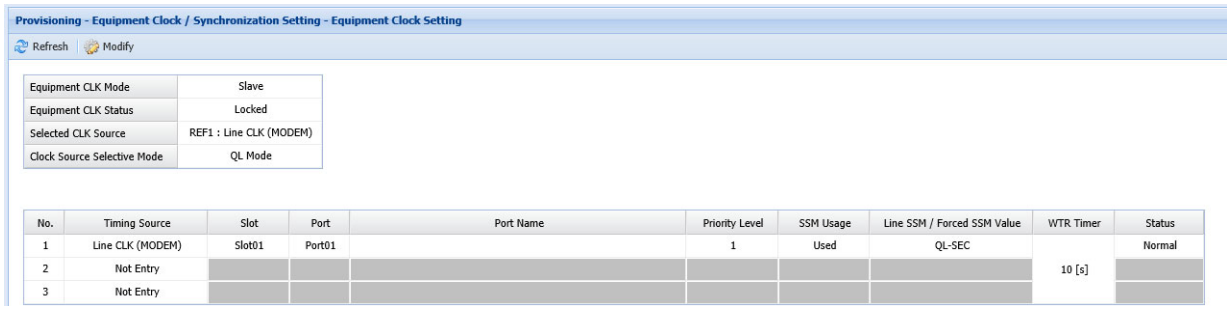


Figure 3-44 Equipment Clock Setting Window [In NE4]



3.2.4 Alarm and Troubleshooting:

Once the topology configuration is complete, check for below possible alarms.

1. ETH-BN LOC
2. ETH LOS
3. Multi Traffic Aggregation Link
4. Multi Traffic Aggregation Setting Mismatch
5. PTP Mode Setting Mismatch

To Clear the Alarms, refer to ***5.5 Trouble Clearing in Operation and Maintenance*** for details.

3.2.5 Use Case Verification

Figure 3-45 Data Traffic Flow

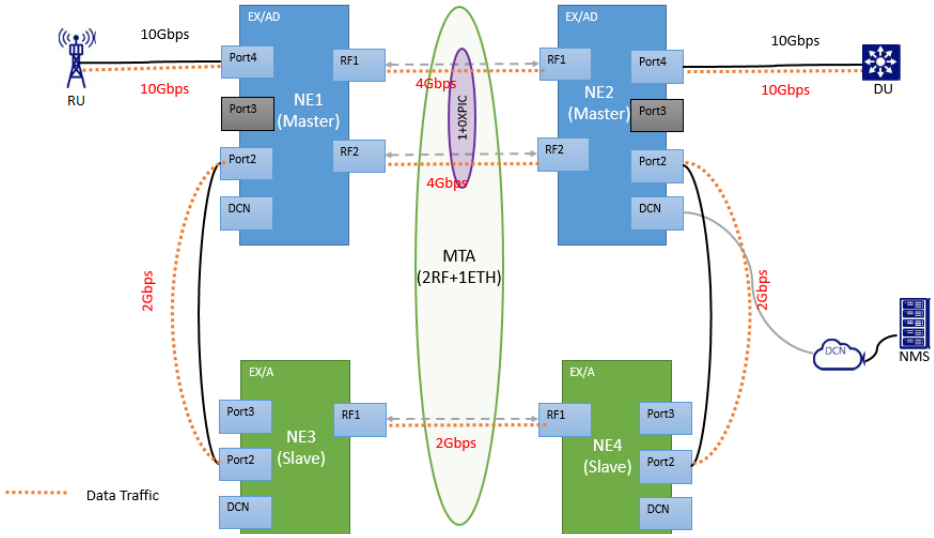
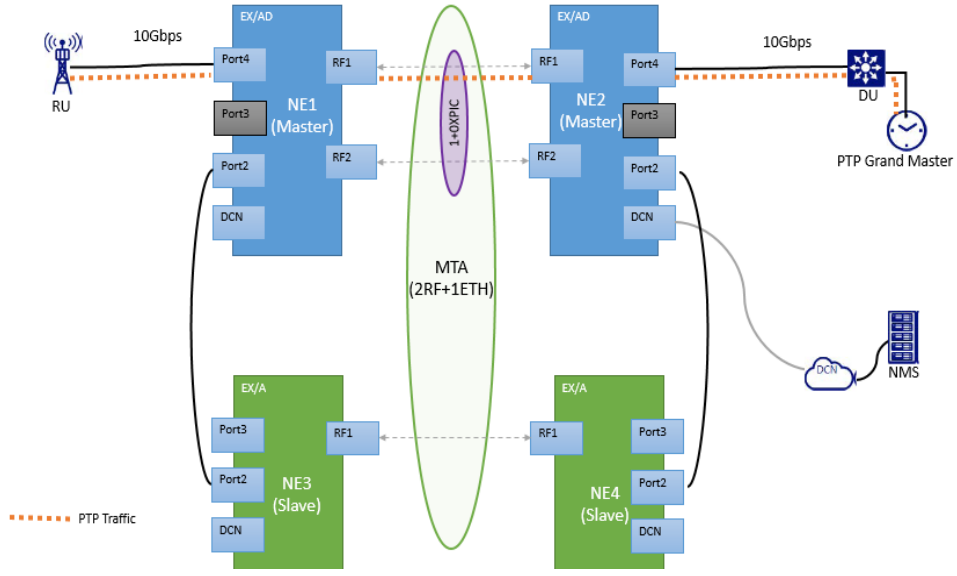


Figure 3-46 PTP Traffic Flow



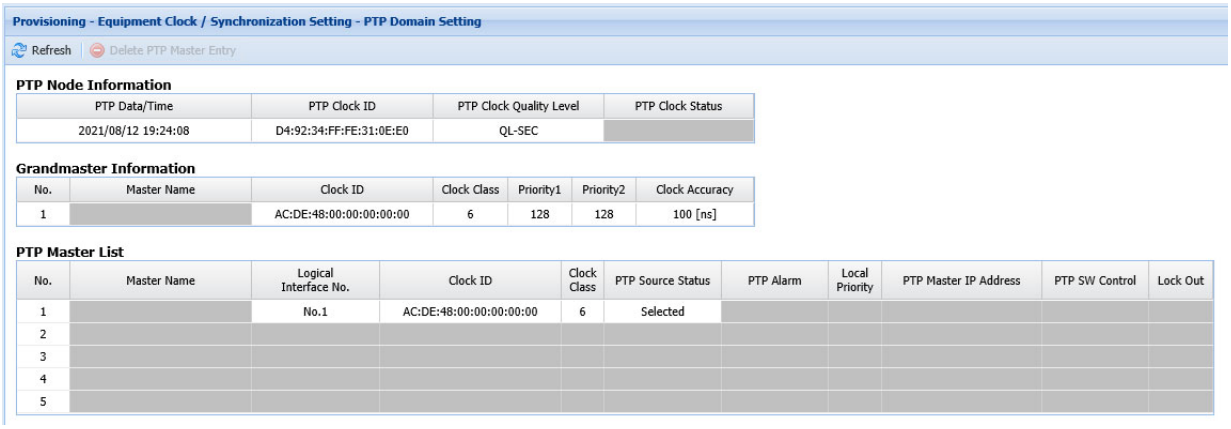
1. Verify the counters in ETH RMON Report on Slave [NE3 and NE4] Port02 for traffic taken through relay link. Refer ***3.3.3 ETH RMON Report in Operation and Maintenance*** for details.

2. Verify the counters in ETH RMON Report on receiving end Master [NE2] Port04 for the entire traffic aggregated back from MTA ports. Refer ***3.3.3 ETH RMON Report in Operation and Maintenance*** for details.

3. Check PTP synchronization status in PTP Domain Setting.

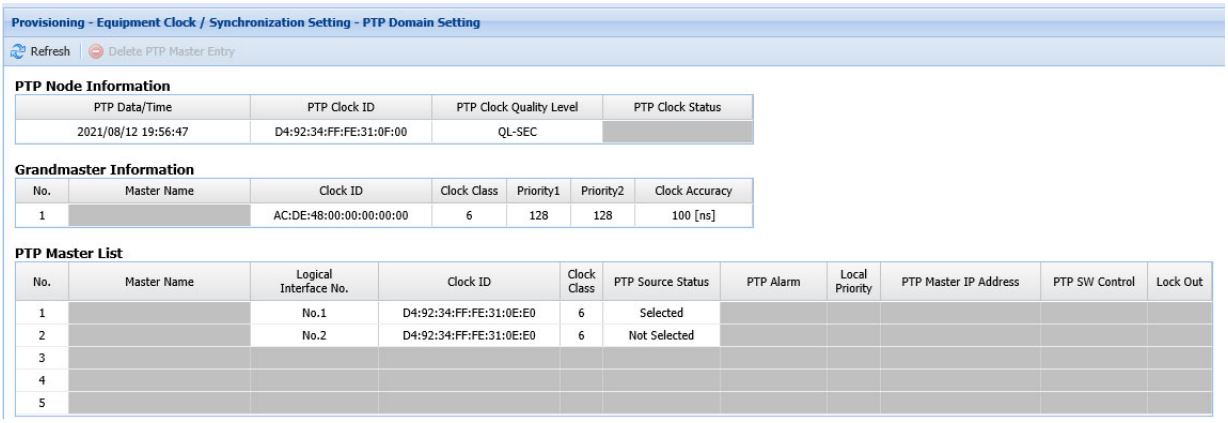
   a. PTP Clock Quality Level should be QL-SEC

Figure 3-47 PTP Domain Setting Window [In NE1]



b. PTP Source Status should be Selected for PTP logical interface 1

Figure 3-48 PTP Domain Setting Window [In NE2]



c. When the MODEM Link [MTA direct link] is down, PTP Logical interface 2 should be Selected as PTP Source [In NE2]

Figure 3-49 PTP Traffic Flow when MTA Direct link is Down

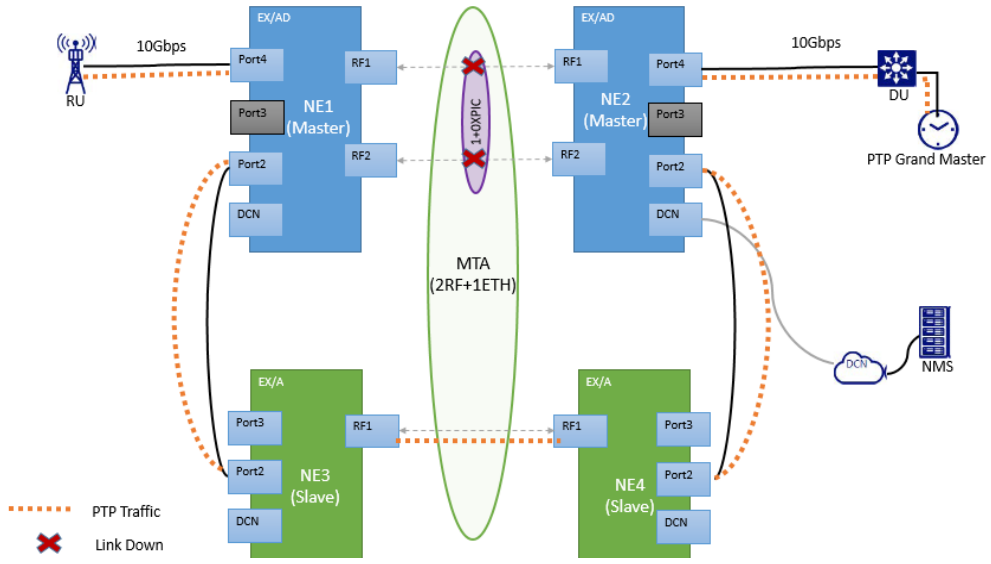
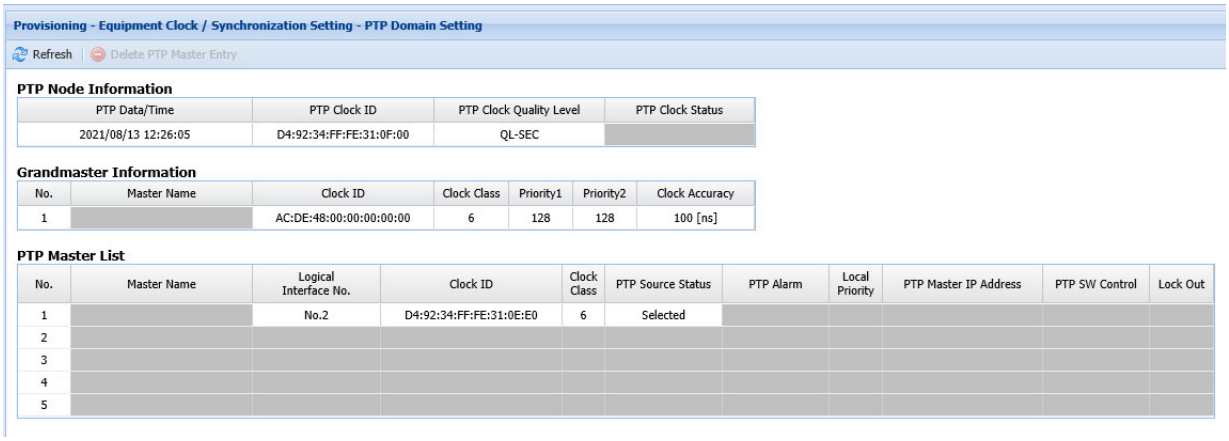


Figure 3-50 PTP Domain Setting Window [In NE2]

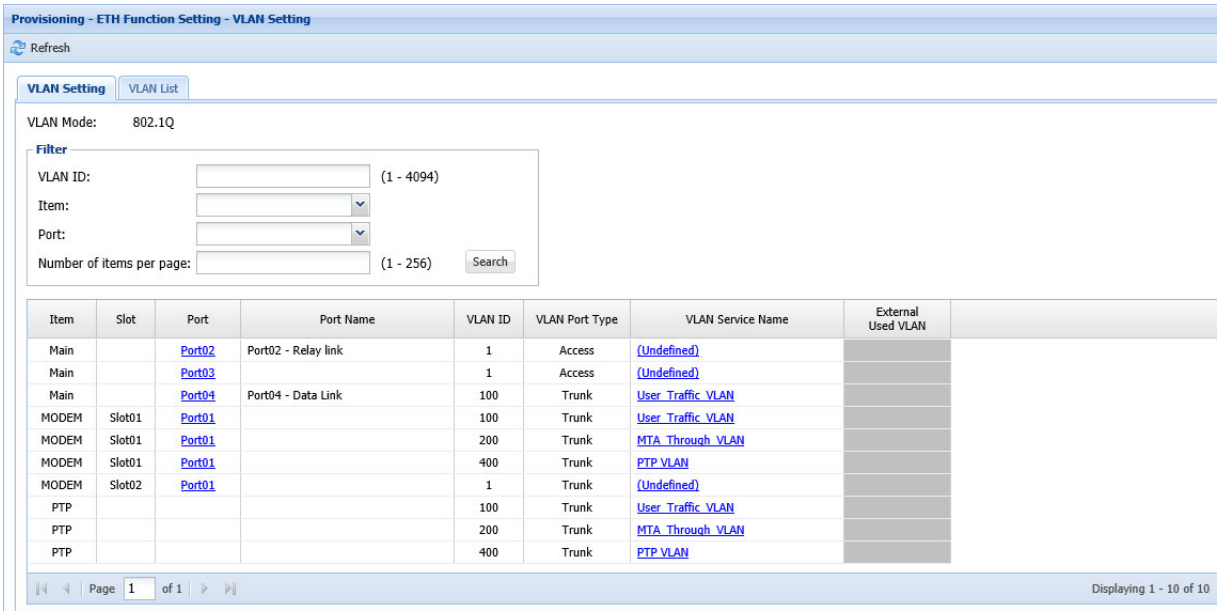


Condition 3-5

- *At the time on deleting MTA setting, the least MODEM Port associated in the MTA group will take over the configuration of VLAN, ETH-OAM, QOS, Static FDB, RSTP/MSTP, LLF and PTP-BC of the Multi group logical interface. The remaining ports (MODEM and ETH Port2) will be configured with default setting.*

Example 1:

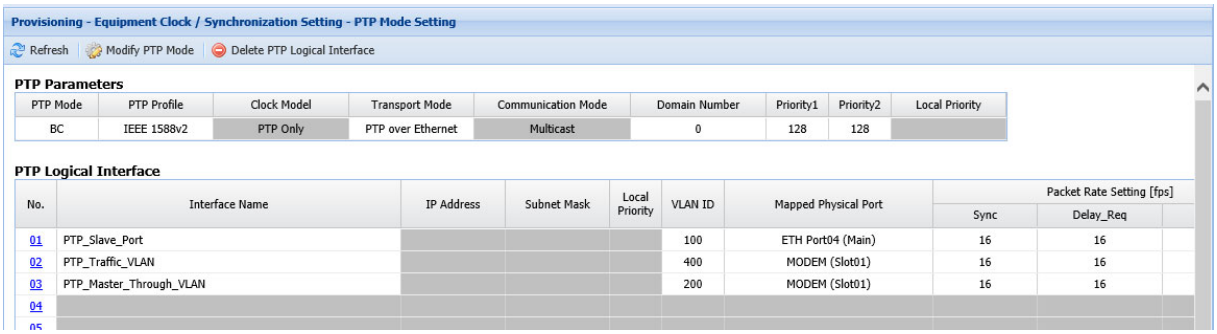
Refer ***Figure 3-38 VLAN Setting Window*** *for MTA GRP VLAN Setting. Below figure shows MODEM RF1 taking over the configuration of VLAN and port2 configured to default setting after MTA GRP is deleted.*



Example 2:

Refer ***Figure 3-39 PTP Mode Setting Window [In NE1]*** *for PTP Logical interfaces with MTA GRP.*

Below figure shows MODEM RF1 taking over the configuration of PTP Logical interfaces after MTA GRP is deleted.

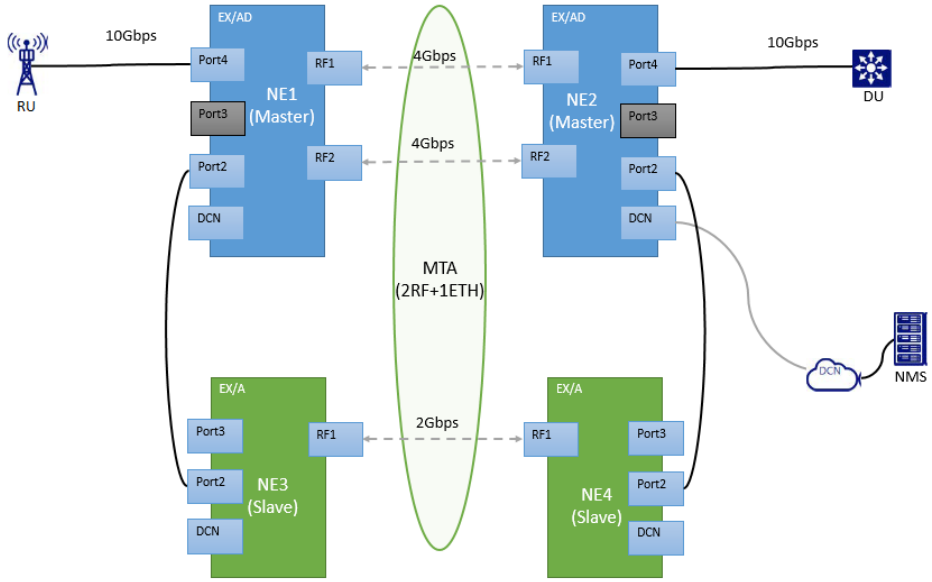


3.3 Use case 3 - MTA with 2 MODEM (not XPIC) and 1 ETH port

3.3.1 Scenario briefing

This section explains a typical user scenario to bring up a MTA topology with modems without XPIC. Below topology represent Multi Traffic Aggregation of two Wireless and one Wired link. Data Traffic of 10 Gbps flows between the RU and DU through the MTA link.

3.3.2 Topology



3.3.3 Step by Step Configuration

This section contains the step by step procedure to bring up the above topology.

3.3.3.1 Steps Summary - NE1 and NE2

1. Register MODEM RF1, RF2.
2. Configure CS/Reference Modulation for the MODEM RF1, RF2.
3. Follow steps 3 to 8 in ***3.1.3.1 Steps Summary - NE1 and NE2***.

3.3.3.2 Steps Summary - NE3 and NE4

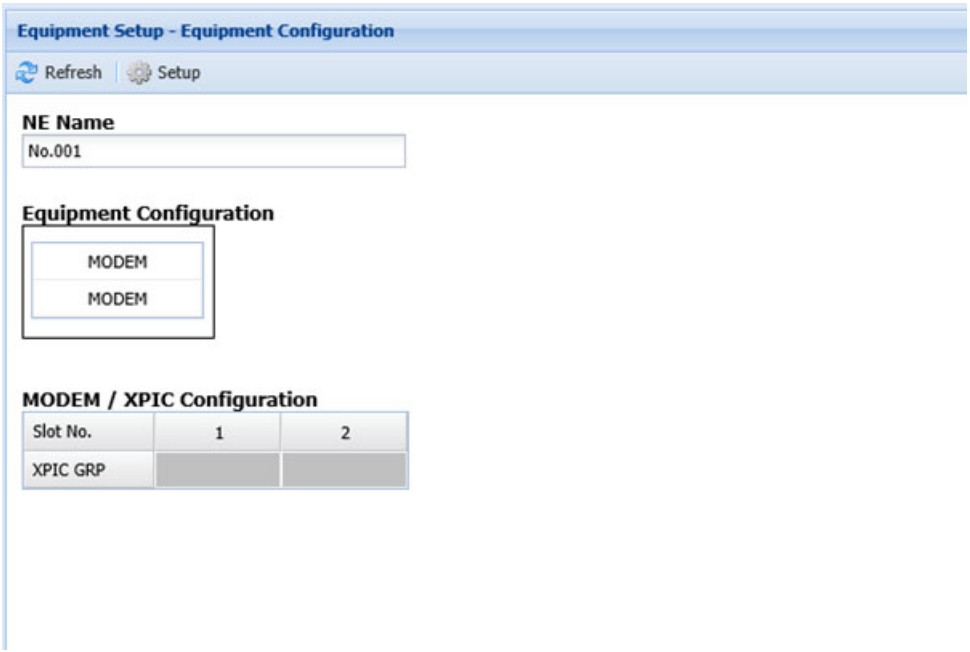
1. Follow steps 1 to 7 in ***3.1.3.2 Steps Summary - NE3 and NE4***.

3.3.3.3 Detailed Configuration steps - NE1 and NE2

Procedure 3-5

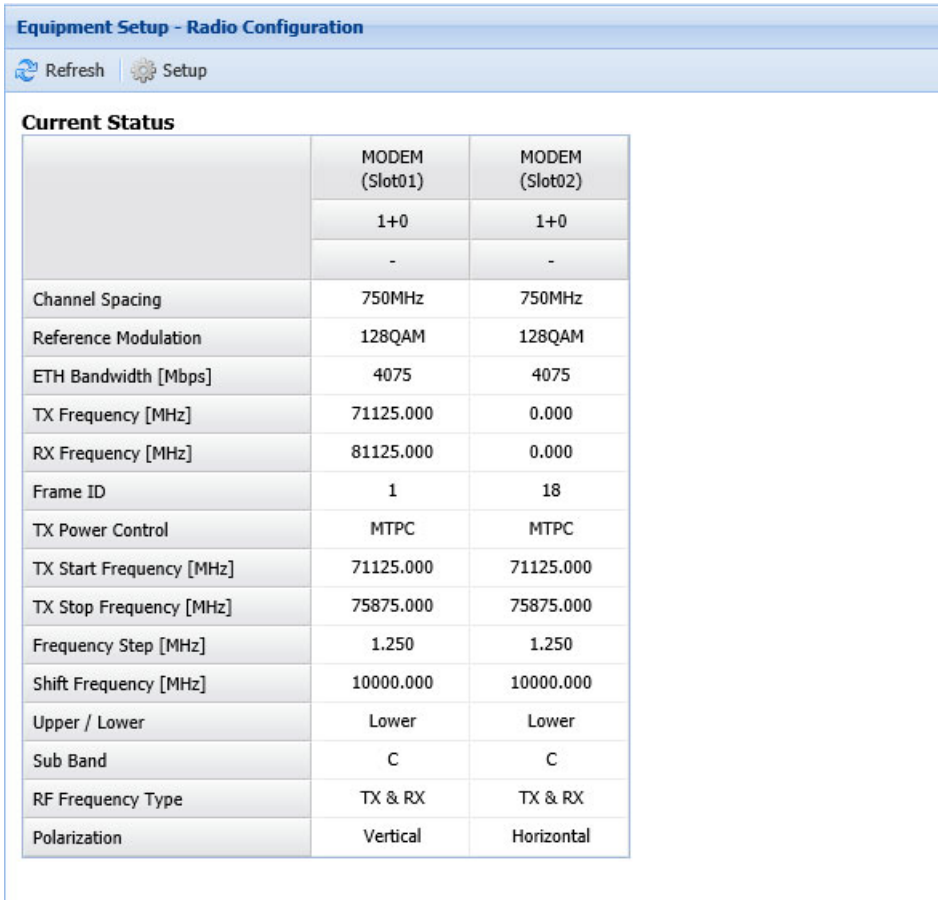
1. Register MODEM RF1, RF2. Refer ***4.2 Equipment Configuration in Set Network and System Provisioning*** for details.

Figure 3-51 Equipment Configuration Window



2. Configure CS/Reference Modulation for the MODEM RF1, RF2. Refer ***4.3 Radio Configuration in Set Network and System Provisioning*** for details.

Figure 3-52 Radio Configuration Window



	MODEM (Slot01)	MODEM (Slot02)
	1+0	1+0
	-	-
Channel Spacing	750MHz	750MHz
Reference Modulation	128QAM	128QAM
ETH Bandwidth [Mbps]	4075	4075
TX Frequency [MHz]	71125.000	0.000
RX Frequency [MHz]	81125.000	0.000
Frame ID	1	18
TX Power Control	MTPC	MTPC
TX Start Frequency [MHz]	71125.000	71125.000
TX Stop Frequency [MHz]	75875.000	75875.000
Frequency Step [MHz]	1.250	1.250
Shift Frequency [MHz]	10000.000	10000.000
Upper / Lower	Lower	Lower
Sub Band	C	C
RF Frequency Type	TX & RX	TX & RX
Polarization	Vertical	Horizontal

3. Follow steps 3 to 8 in ***3.1.3.3 Detailed Configuration steps – NE1 and NE2***.

3.3.3.4 Detailed Configuration steps - NE3 and NE4

Procedure 3-6

1. Follow steps 1 to 7 in ***3.1.3.4 Detailed Configuration steps – NE3 and NE4***

3.3.4 Alarm and Troubleshooting:

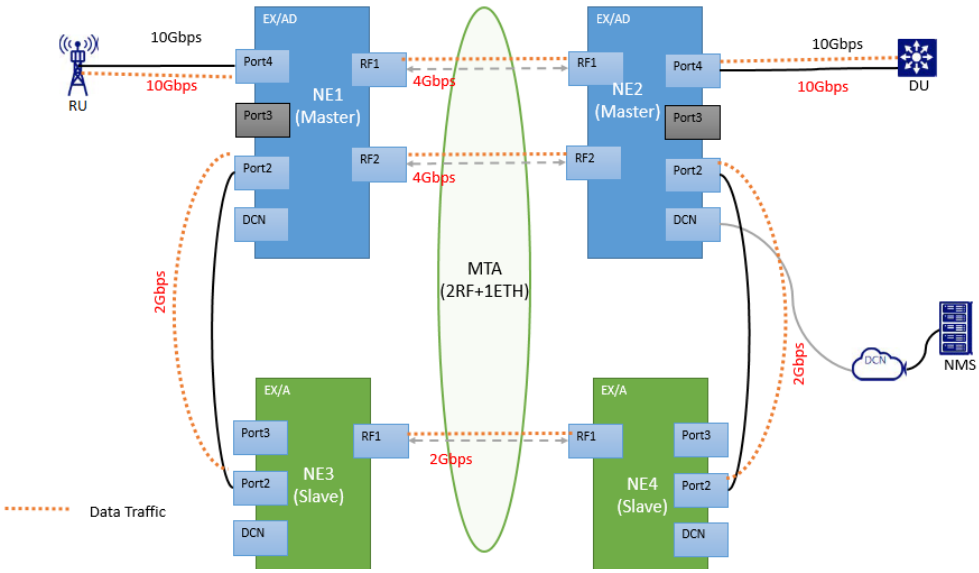
Once the topology configuration is complete, check for below possible alarms.

1. ETH-BN LOC
2. ETH LOS
3. Multi Traffic Aggregation Link
4. Multi Traffic Aggregation Setting Mismatch
5. PTP Mode Setting Mismatch

To Clear the Alarms, refer to ***5.5 Trouble Clearing in Operation and Maintenance*** for details.

3.3.5 Use Case Verification

Figure 3-53 Data Traffic Flow



1. Verify the counters in ETH RMON Report on Slave [NE3 and NE4] Port02 for traffic taken through relay link. Refer ***3.3.3 ETH RMON Report in Operation and Maintenance*** for details.

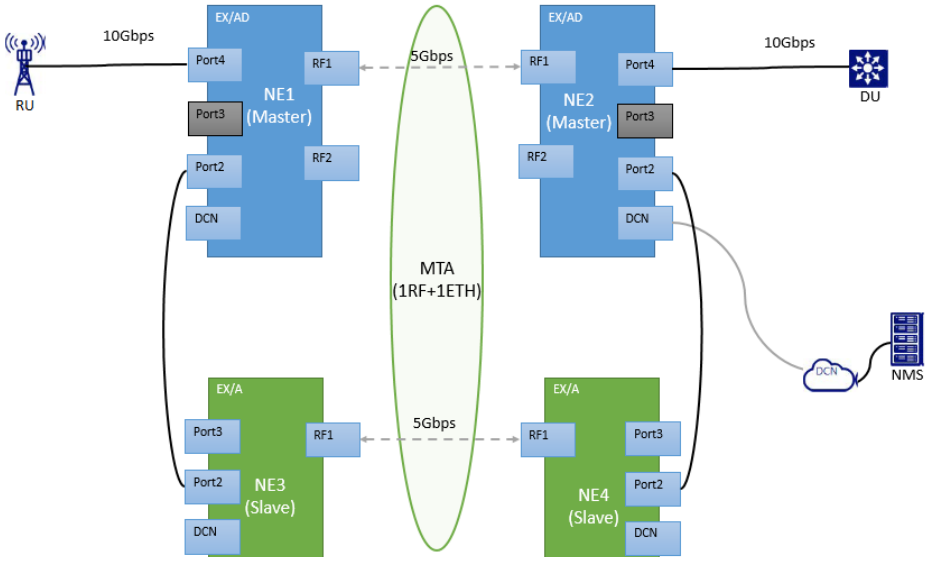
2. Verify the counters in ETH RMON Report on receiving end Master [NE2] Port04 for the entire traffic aggregated back from MTA ports. Refer ***3.3.3 ETH RMON Report in Operation and Maintenance*** for details.

3.4 Use case 4 - MTA with 1 MODEM and 1 ETH port

3.4.1 Scenario briefing

This section explains a typical user scenario to bring up a MTA topology with 1 MODEM and 1 ETH port. Below topology represent Multi Traffic Aggregation of one Wireless and one Wired link. Data Traffic of 10 Gbps flows between the RU and DU through the MTA link.

3.4.2 Topology



3.4.3 Step by Step Configuration

This section contains the step by step procedure to bring up the above topology.

3.4.3.1 Steps Summary - NE1 and NE2

1. Register MODEM RF1.
2. Configure CS/Reference Modulation for the MODEM RF1.
3. Follow steps 3 to 8 in ***3.1.3.1 Steps Summary - NE1 and NE2***.

3.4.3.2 Steps Summary - NE3 and NE4

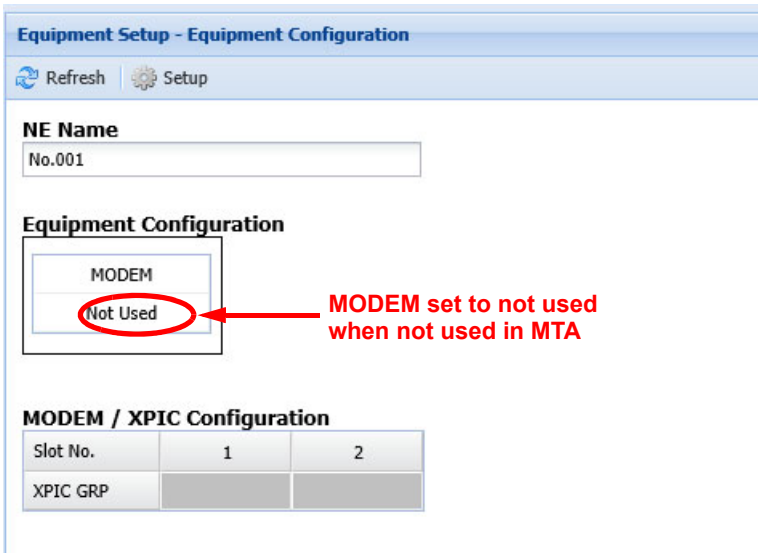
1. Register MODEM RF1.
2. Configure CS/Reference Modulation for the MODEM RF1.
3. Follow steps 3 to 7 in ***3.1.3.2 Steps Summary - NE3 and NE4***.

3.4.3.3 Detailed Configuration steps - NE1 and NE2

Procedure 3-7

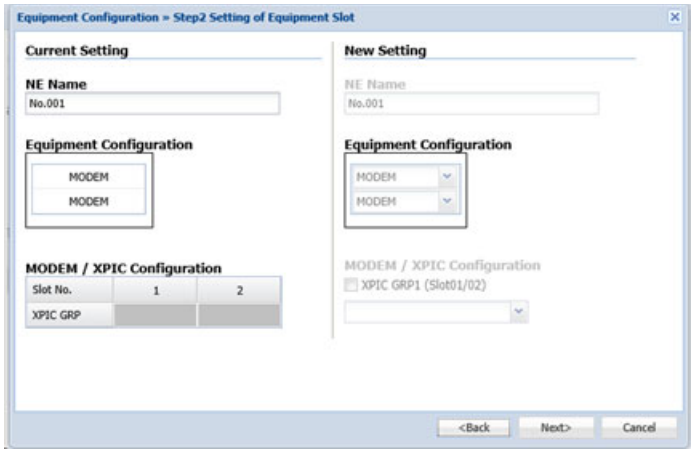
1. Register MODEM RF1. Refer ***4.2 Equipment Configuration in Set Network and System Provisioning*** for details.

Figure 3-54 Equipment Configuration Window



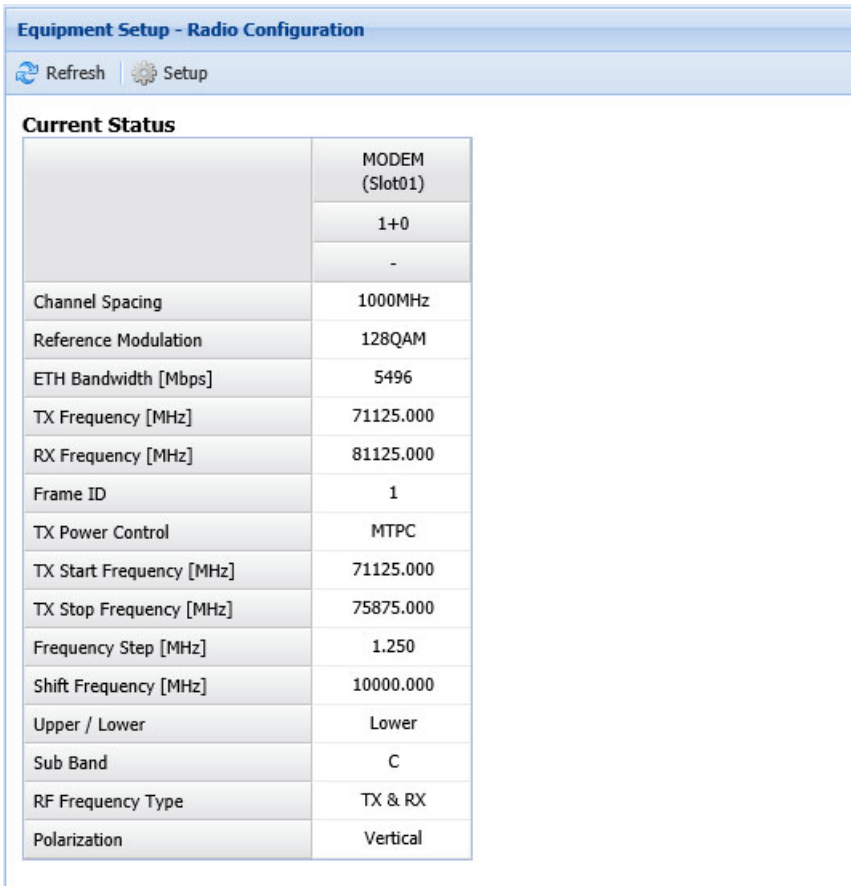
Condition 3-6

- *In case of setting MTA with one MODEM and ETH port, other MODEM should be set to "Not Used" as shown in* ***Figure 3-54 Equipment Configuration Window****.*
- *It is recommended to change the Equipment Configuration before creating MTA GRP as the Configuration cannot be changed when MTA GRP is created as shown below.*



2. Configure CS/Reference Modulation for the MODEM RF1. Refer ***4.3 Radio Configuration in Set Network and System Provisioning*** for details.

Figure 3-55 Radio Configuration Window



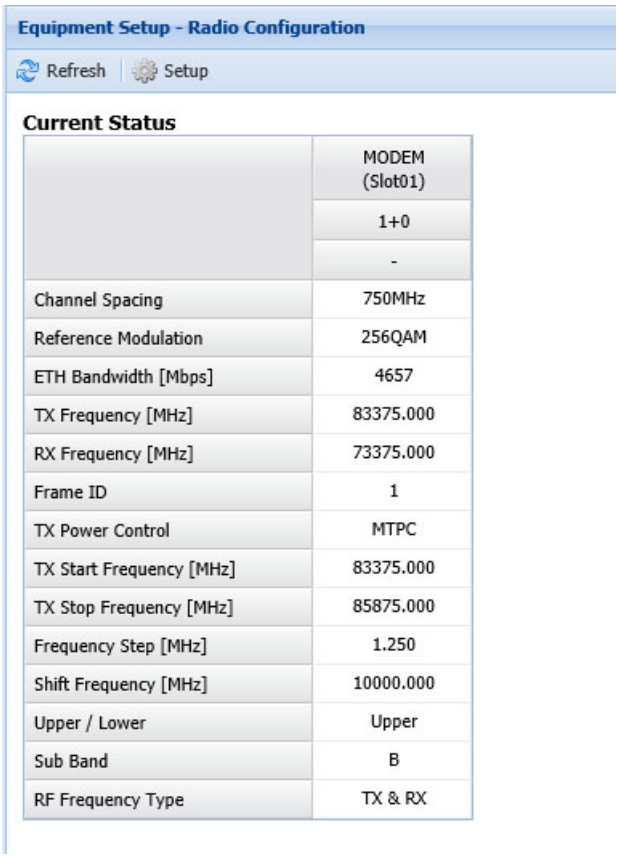
3. Follow steps 3 to 8 in ***3.1.3.3 Detailed Configuration steps – NE1 and NE2***.

3.4.3.4 Detailed Configuration steps - NE3 and NE4

Procedure 3-8

1. Follow step 1 in ***3.1.3.4 Detailed Configuration steps – NE3 and NE4***.
2. Configure CS/Reference Modulation for the MODEM RF1. Refer ***4.3 Radio Configuration in Set Network and System Provisioning*** for details.

Figure 3-56 Radio Configuration Window



3. Follow steps 3 to 7 in ***3.1.3.4 Detailed Configuration steps – NE3 and NE4***.

3.4.4 Alarm and Troubleshooting:

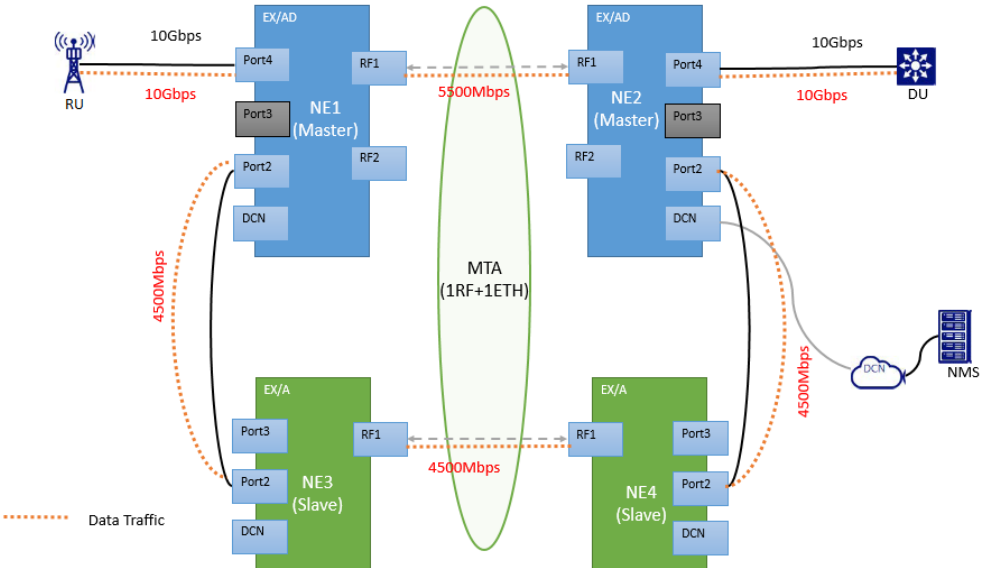
Once the topology configuration is complete, check for below possible alarms.

1. ETH-BN LOC
2. ETH LOS
3. Multi Traffic Aggregation Link
4. Multi Traffic Aggregation Setting Mismatch

To Clear the Alarms, refer to ***5.5 Trouble Clearing in Operation and Maintenance*** for details.

3.4.5 Use Case Verification

Figure 3-57 Data Traffic Flow



1. Verify the counters in ETH RMON Report on Slave [NE3 and NE4] Port02 for traffic taken through relay link. Refer ***3.3.3 ETH RMON Report in Operation and Maintenance*** for details.

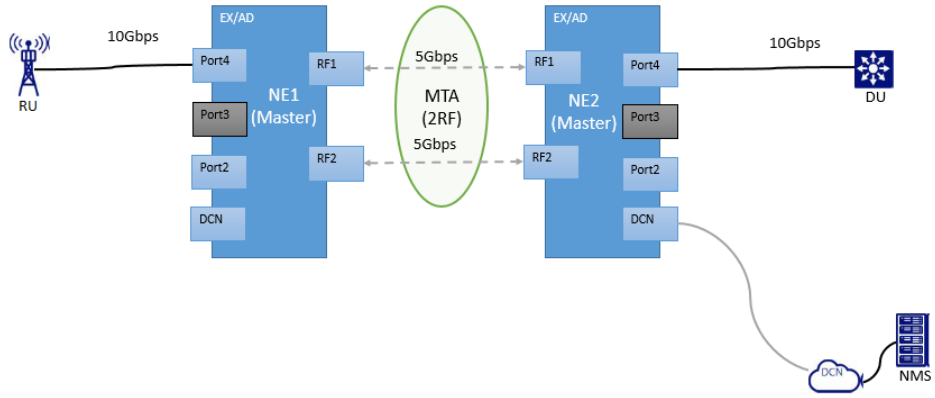
2. Verify the counters in ETH RMON Report on receiving end Master [NE2] Port04 for the entire traffic aggregated back from MTA ports. Refer ***3.3.3 ETH RMON Report in Operation and Maintenance*** for details.

3.5 Use case 5 - MTA with 2 MODEMs only

3.5.1 Scenario briefing

This section explains a typical user scenario to bring up a MTA topology with 2 MODEMs only. Below topology represent Multi Traffic Aggregation of two Wireless link only. Data Traffic of 10 Gbps flows between the RU and DU through the MTA link.

3.5.2 Topology



3.5.3 Step by Step Configuration

This section contains the step by step procedure to bring up the above topology.

3.5.3.1 Steps Summary - NE1 and NE2

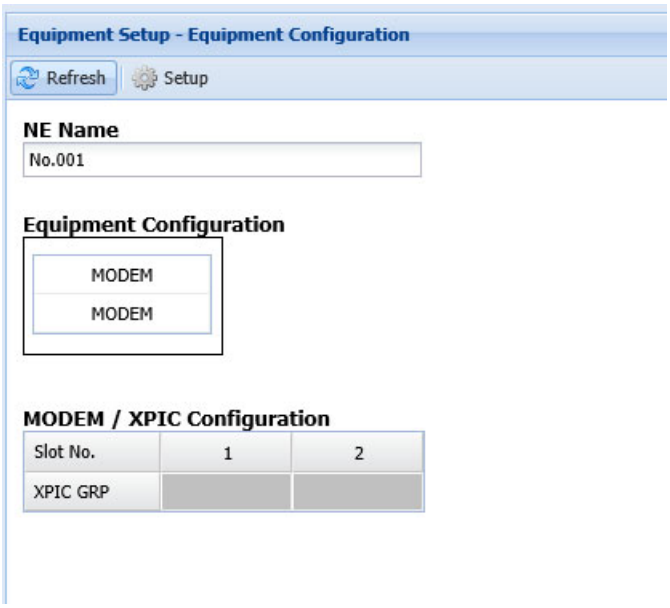
1. Register MODEM RF1, RF2.
2. Configure CS/Reference Modulation for the MODEM RF1, RF2.
3. Configure ETH port Port4 as 10G port.
4. Create user traffic VLAN (VLAN X).
5. Associate user traffic VLAN to ETH Port4 and MODEM Ports RF1 and RF2.
6. Create MTA GRP with MODEM Ports RF1, RF2.

3.5.3.2 Detailed Configuration steps - NE1 and NE2

Procedure 3-9

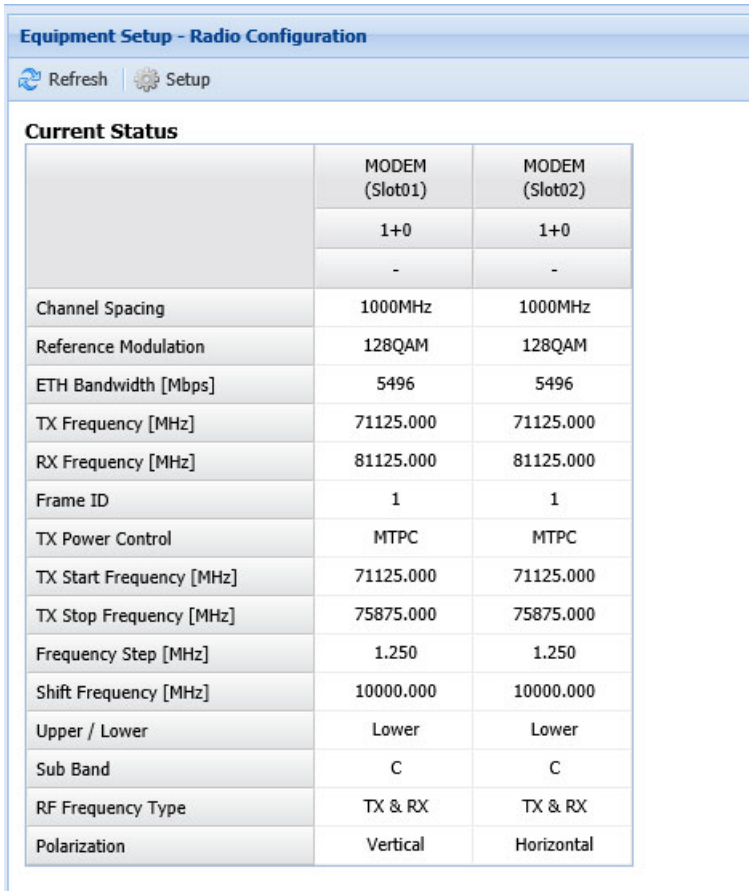
1. Register MODEM RF1, RF2. Refer ***4.2 Equipment Configuration in Set Network and System Provisioning*** for details.

Figure 3-58 Equipment Configuration Window



2. Configure CS/Reference Modulation for the MODEM RF1, RF2. Refer ***4.3 Radio Configuration in Set Network and System Provisioning*** for details.

Figure 3-59 Radio Configuration Window



	MODEM (Slot01)	MODEM (Slot02)
	1+0	1+0
	-	-
Channel Spacing	1000MHz	1000MHz
Reference Modulation	128QAM	128QAM
ETH Bandwidth [Mbps]	5496	5496
TX Frequency [MHz]	71125.000	71125.000
RX Frequency [MHz]	81125.000	81125.000
Frame ID	1	1
TX Power Control	MTPC	MTPC
TX Start Frequency [MHz]	71125.000	71125.000
TX Stop Frequency [MHz]	75875.000	75875.000
Frequency Step [MHz]	1.250	1.250
Shift Frequency [MHz]	10000.000	10000.000
Upper / Lower	Lower	Lower
Sub Band	C	C
RF Frequency Type	TX & RX	TX & RX
Polarization	Vertical	Horizontal

3. Configure ETH port Port4 as 10G port. Refer ***4.3 ETH Port Setting in Set Network and System Provisioning*** for details.

Figure 3-60 ETH Port Setting (Main - Port04) Window

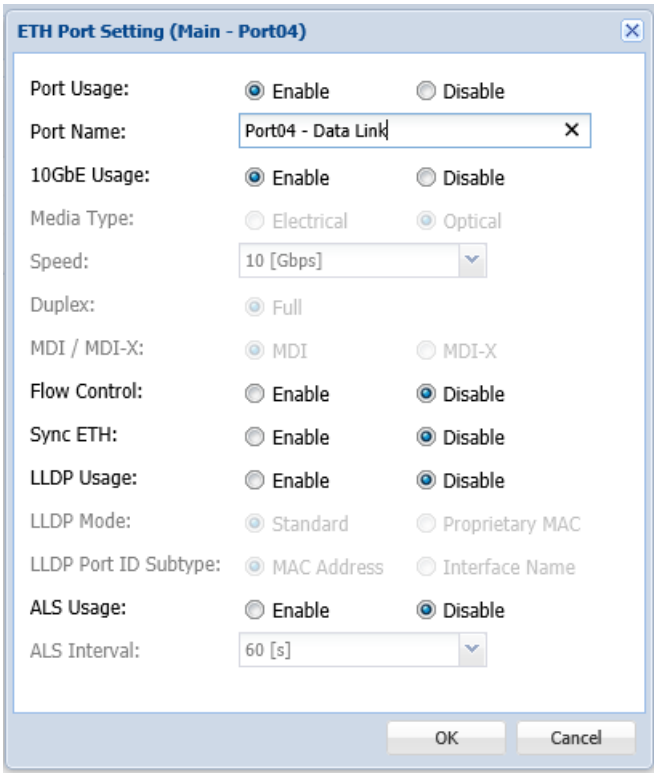


Figure 3-61 ETH Port Setting Window (1/2: on the leftmost)

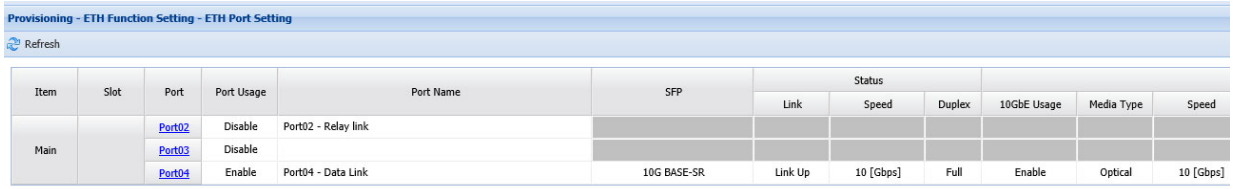
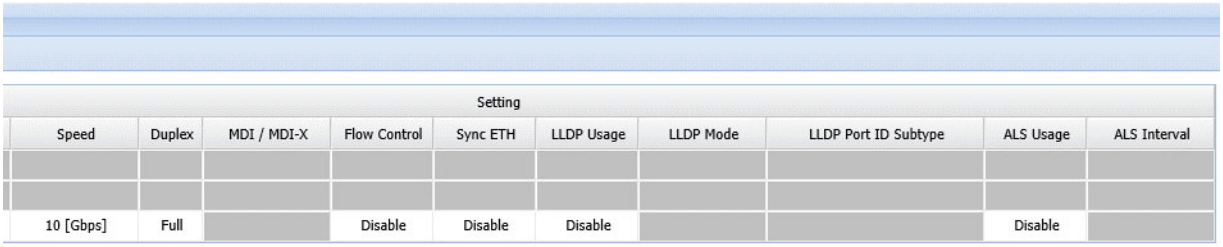
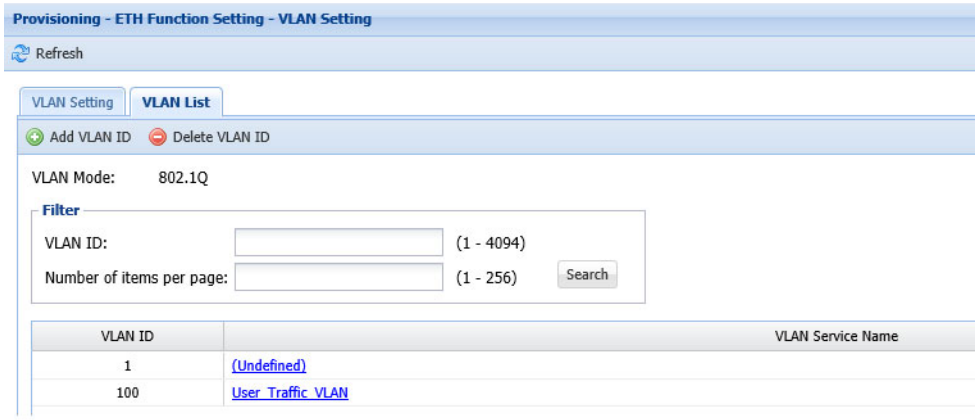


Figure 3-62 ETH Port Setting Window (2/2: on the rightmost)



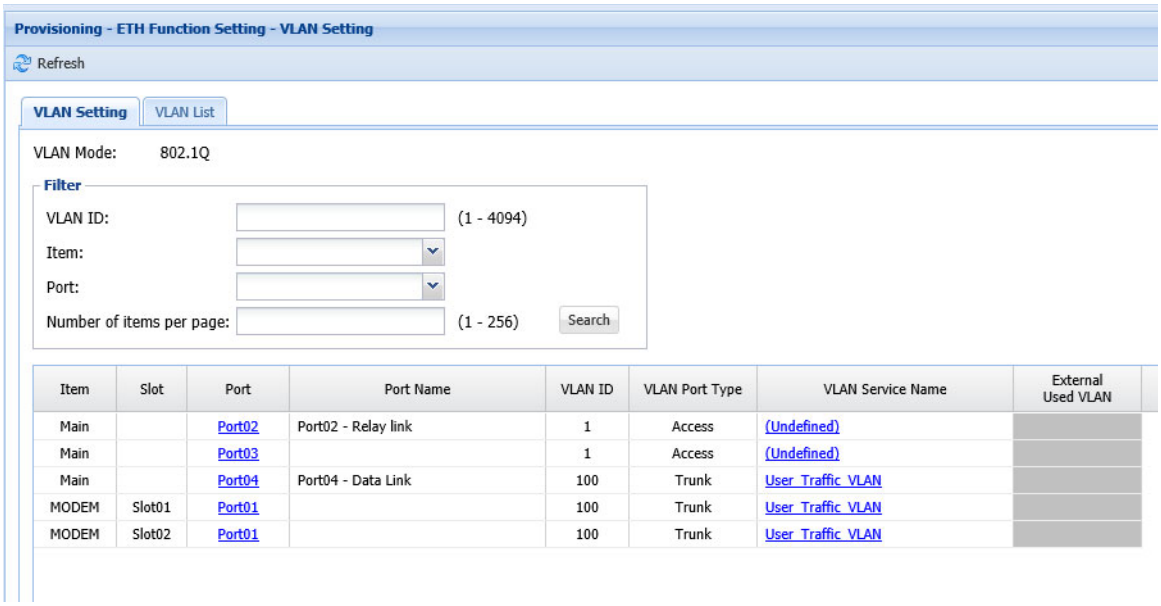
4. Create user traffic VLAN (VLAN X). Refer ***9.4.1 Add VLAN/S-VLAN ID in Set Network and System Provisioning*** for details.

Figure 3-63 VLAN Setting Window



5. Associate user traffic VLAN to ETH Port4 and MODEM Ports RF1 and RF2. Refer ***9.4.4 VLAN Setting (802.1Q Mode) in Set Network and System Provisioning*** for details.

Figure 3-64 VLAN Setting Window



6. Create MTA GRP with MODEM Ports RF1, RF2. Refer ***8.2.3 Add Multi LAG in Set Network and System Provisioning*** for details.

Figure 3-65 Multi LAG Setting Window

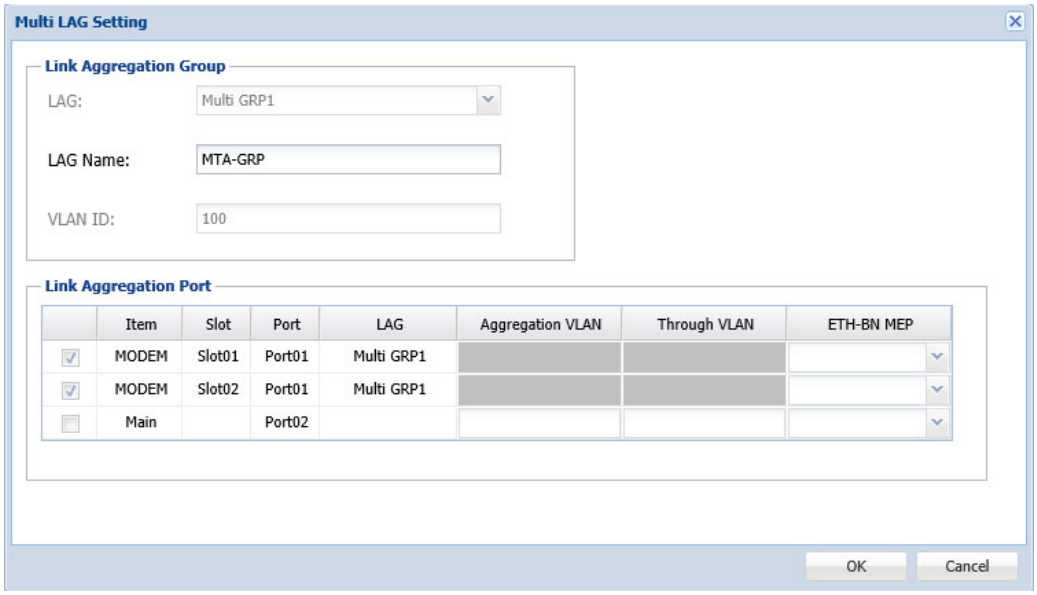
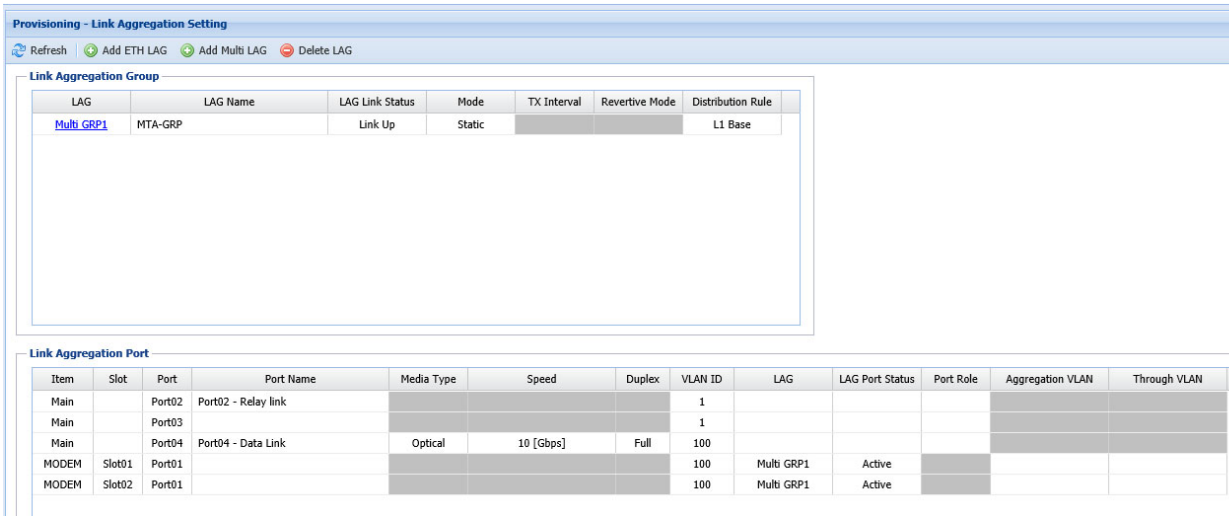


Figure 3-66 Link Aggregation Setting Window



3.5.4 Alarm and Troubleshooting:

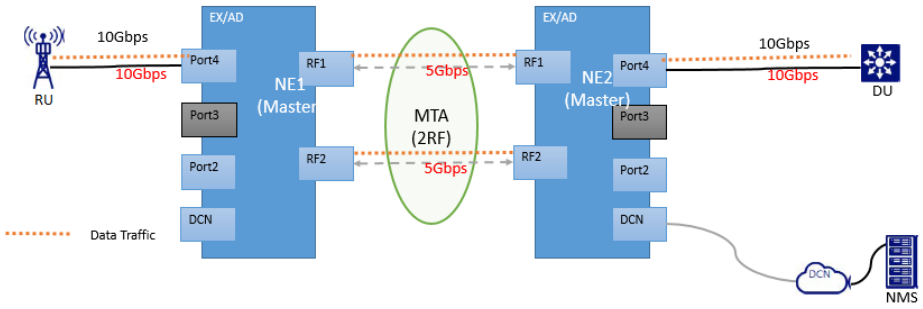
Once the topology configuration is complete, check for below possible alarms.

1. ETH LOS
2. Multi Traffic Aggregation Link
3. Multi Traffic Aggregation Setting Mismatch

To Clear the Alarms, refer to ***5.5 Trouble Clearing in Operation and Maintenance*** for details.

3.5.5 Use Case Verification

Figure 3-67 Data Traffic Flow



1. Verify the counters in ETH RMON Report on sending end Master [NE1] for traffic taken through Wireless link [Multi GRP]. Refer to ***3.3.3 ETH RMON Report in Operation and Maintenance***.

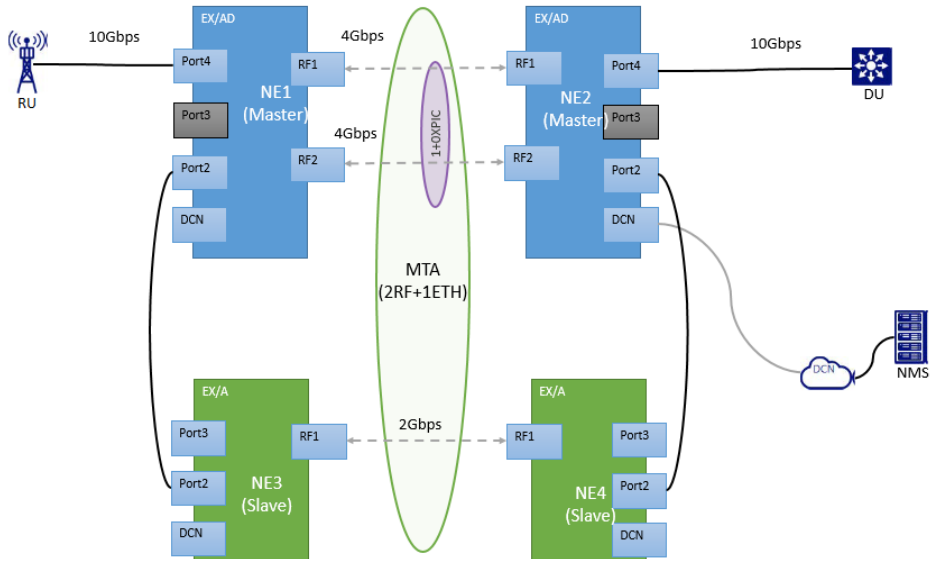
2. Verify the counters in ETH RMON Report on receiving end Master [NE4] Port04 for the entire traffic received through Wireless link [Multi GRP] and transmitted to DU. Refer to ***3.3.3 ETH RMON Report in Operation and Maintenance***.

3.6 Use case 6 - MTA Slave Node Reset during FW upgrade

3.6.1 Scenario briefing

This section explains a typical user scenario of MTA topology with 2 MODEM (with XPIC) and 1 ETH port and the traffic flow when the Slave node is reset with TX mute enabled on the Slave MODEM. Below topology represent Multi Traffic Aggregation of two Wireless and one Wired link. Data Traffic of 10 Gbps flows between the RU and DU through the MTA link.

3.6.2 Topology



3.6.3 Step by Step Configuration

This section contains the step by step procedure to bring up the above topology.

3.6.3.1 Steps Summary - NE1 and NE2

1. Follow steps 1 to 8 in ***3.1.3.1 Steps Summary - NE1 and NE2***.

3.6.3.2 Steps Summary - NE3 and NE4

1. Follow steps 1 to 7 in ***3.1.3.2 Steps Summary - NE3 and NE4***.

3.6.3.3 Detailed Configuration steps - NE1 and NE2

Procedure 3-10

1. Follow steps 1 to 8 in ***3.1.3.3 Detailed Configuration steps – NE1 and NE2***.

3.6.3.4 Detailed Configuration steps - NE3 and NE4

Procedure 3-11

1. Follow steps 1 to 7 in ***3.1.3.4 Detailed Configuration steps – NE3 and NE4***.

3.6.4 Alarm and Troubleshooting:

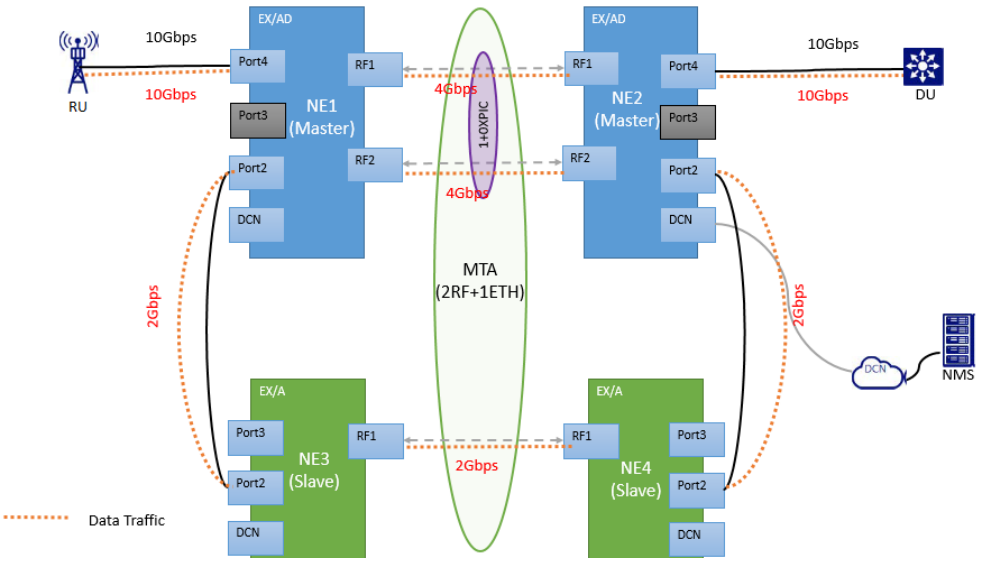
Once the topology configuration is complete, check for below possible alarms.

1. ETH-BN LOC
2. ETH LOS
3. Multi Traffic Aggregation Link
4. Multi Traffic Aggregation Setting Mismatch

To Clear the Alarms, refer to ***5.5 Trouble Clearing in Operation and Maintenance*** for details.

3.6.5 Use Case Verification

Figure 3-68 Data Traffic Flow



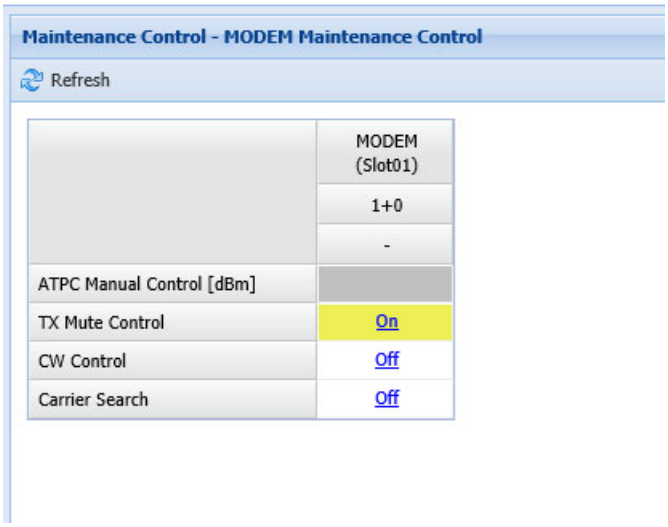
1. Verify the counters in ETH RMON Report on Slave [NE3 and NE4] Port02 for traffic taken through relay link. Refer ***3.3.3 ETH RMON Report in Operation and Maintenance*** for details.

2. Verify the counters in ETH RMON Report on receiving end Master [NE2] Port04 for the entire traffic aggregated back from MTA ports. Refer ***3.3.3 ETH RMON Report in Operation and Maintenance*** for details.

3. Enable TX Mute on NE3 MODEM RF1. Refer ***4.5.2 TX Mute Control in Operation and Maintenance*** for details.

Figure 3-69 MODEM Maintenance Control Window

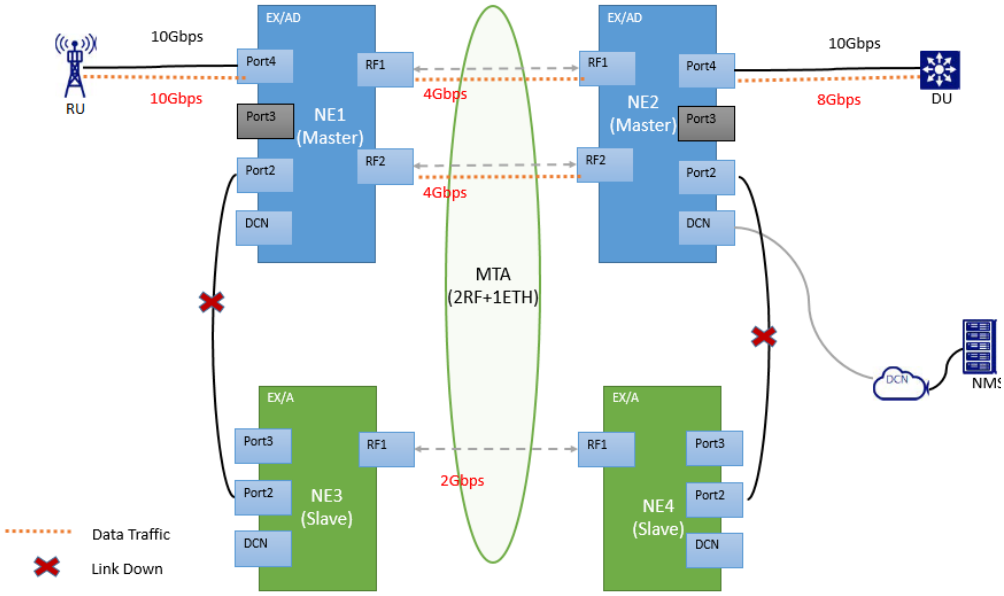
Figure 3-70 MODEM Maintenance Control Window



4. Perform FW Upgrade on the Slave Node NE3. Refer to ***4.9.2.1 Update Program File - BB Firmware in Operation and Maintenance*** for details.

5. Verify the counters in ETH RMON Report on receiving end Masters [NE2] that traffic is received only from the MTA Direct Link. Refer ***3.3.3 ETH RMON Report in Operation and Maintenance*** for details.

Figure 3-71 Data Traffic Flow when Slave Node NE3 is Reset



6. Verify the ETH-BN (RX) in MEP is “0” during NE3 is down for FW upgrade.

Figure 3-72 ETH OAM Setting Window (1/2: on the leftmost)

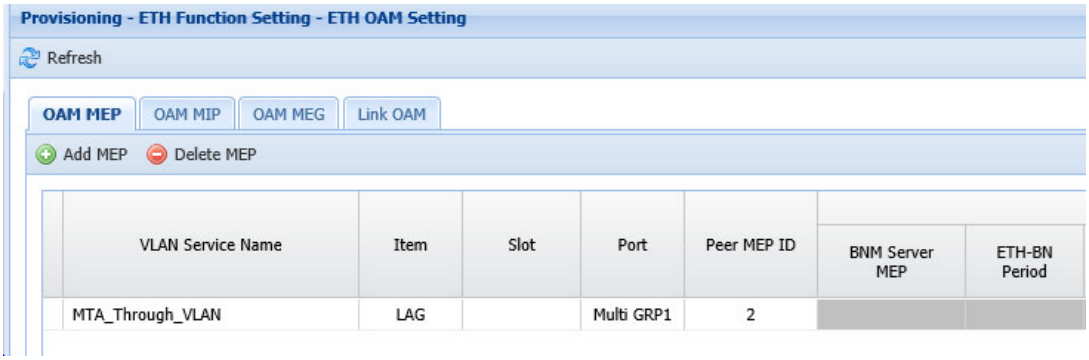
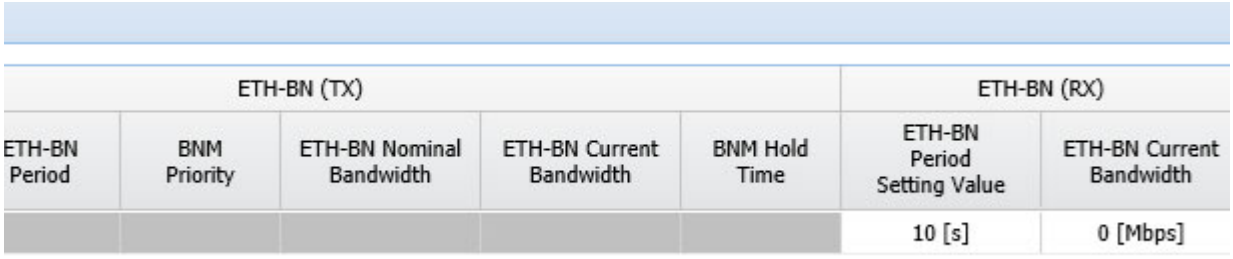
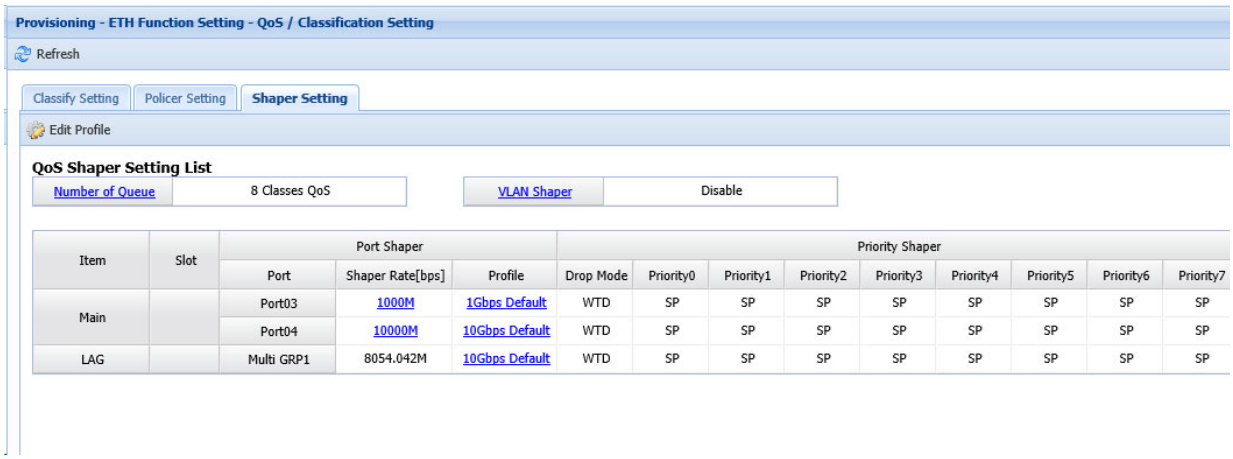


Figure 3-73 ETH OAM Setting Window (2/2: on the rightmost)



7. Verify the QOS Shaper Rate of the MTA GRP is updated with Wireless link ETH Bandwidth only as NE3 is down for FW upgrade.

Figure 3-74 QoS / Classification Setting Window

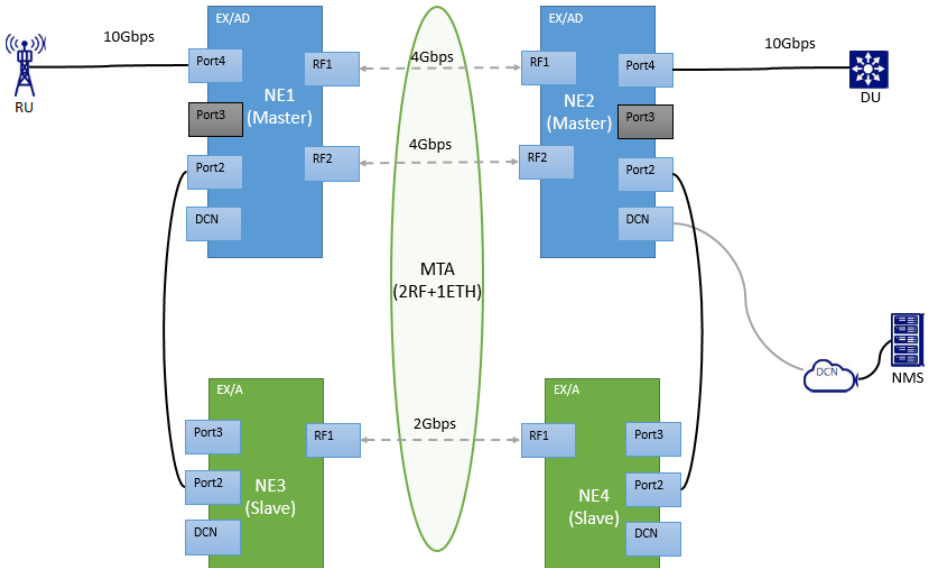


3.7 Use case 7 - MTA with LLF

3.7.1 Scenario briefing

This section explains a typical user scenario of MTA topology with 2 MODEM and 1 ETH port and the traffic flow when LLF configured on MTA GRP. Below topology represent Multi Traffic Aggregation of two Wireless and one Wired link. Data Traffic of 10 Gbps flows between the RU and DU through the MTA link.

3.7.2 Topology



3.7.3 Step by Step Configuration

This section contains the step by step procedure to bring up the above topology.

3.7.3.1 Steps Summary - NE1 and NE2

1. Follow steps 1 to 7 in ***3.1.3.1 Steps Summary - NE1 and NE2***.
2. Create LLF Group with Trunk port as MODEM RF1 and Edge port as Port4.
3. Create MTA GRP with MODEM Ports RF1, RF2 and ETH Port2, assign Aggregation VLAN, Through VLAN and choose MEP Index created in Step 7 from drop-down menu.

3.7.3.2 Steps Summary - NE3 and NE4

1. Follow steps 1 to 7 in ***3.1.3.2 Steps Summary - NE3 and NE4***.

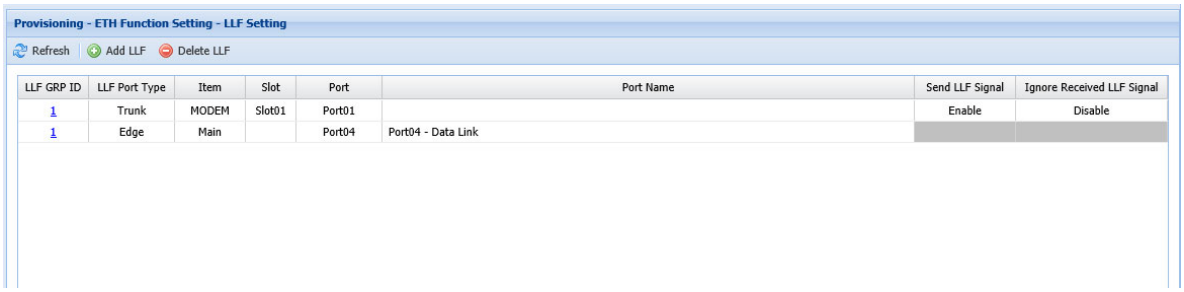
3.7.3.3 Detailed Configuration steps - NE1 and NE2

Procedure 3-12

1. Follow steps 1 to 7 in ***3.1.3.3 Detailed Configuration steps – NE1 and NE2***.

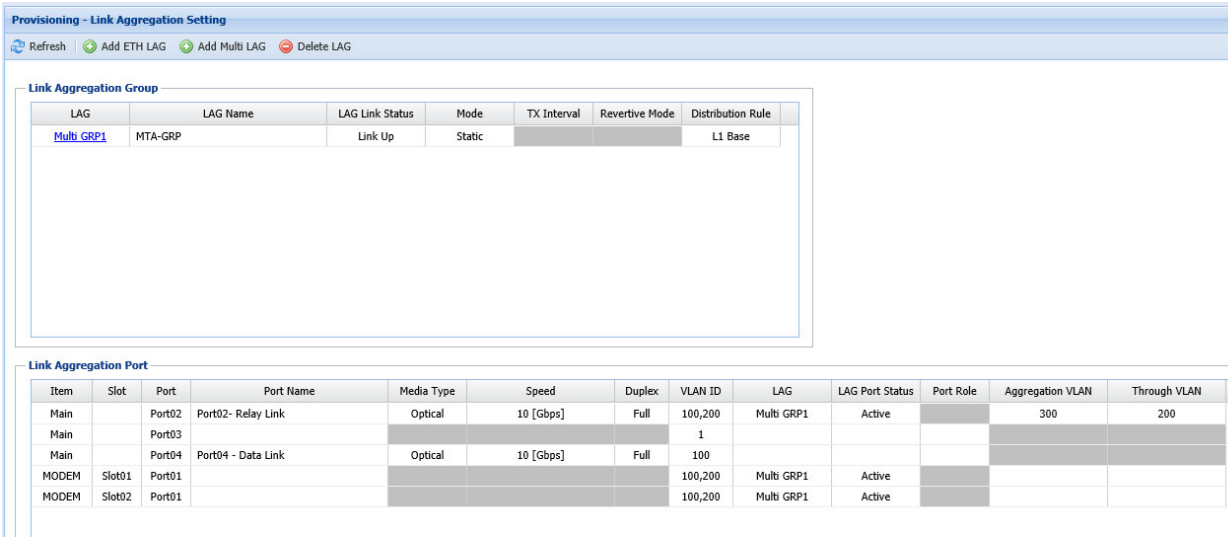
2. Create LLF Group with Trunk port as MODEM RF1 and Edge port as Port4. Refer ***9.15.1 Add LLF Group in Set Network and System Provisioning*** for details.

Figure 3-75 LLF Setting Window



3. Create MTA GRP with MODEM Ports RF1, RF2 and ETH Port2, assign Aggregation VLAN, Through VLAN and choose MEP Index created in Step 7 from drop-down menu. Refer ***8.2.3 Add Multi LAG in Set Network and System Provisioning*** for details.

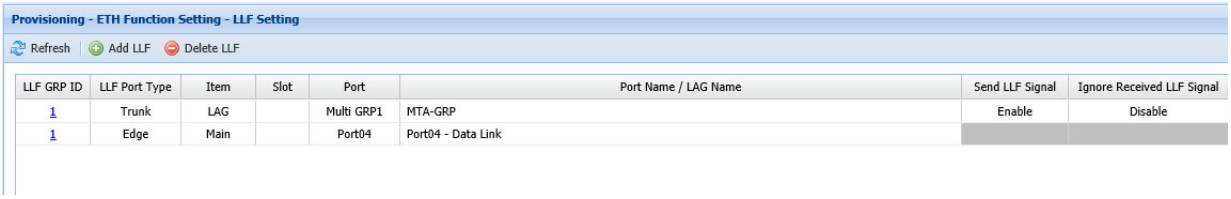
Figure 3-76 Link Aggregation Setting Window



Condition 3-7

- *At the time of creating MTA setting, Multi group logical interface will take over the configuration of VLAN, ETH-OAM, QOS, Static FDB, RSTP/MSTP, LLF and PTP-BC of the least MODEM port associated in the MTA group as shown below.*

  The LLF created with MODEM RF1 in ***Figure 3-85 Equipment Mode Setting Window*** *is taken over by MTA GRP in below figure.*



LLF GRP ID	LLF Port Type	Item	Slot	Port	Port Name / LAG Name	Send LLF Signal	Ignore Received LLF Signal
1	Trunk	LAG		Multi GRP1	MTA-GRP	Enable	Disable
1	Edge	Main		Port04	Port04 - Data Link		

NOTE: *MTA operates with other features like ETH-OAM, QOS, FDB, RSTP/MSTP, PTP-BC in the same way.*

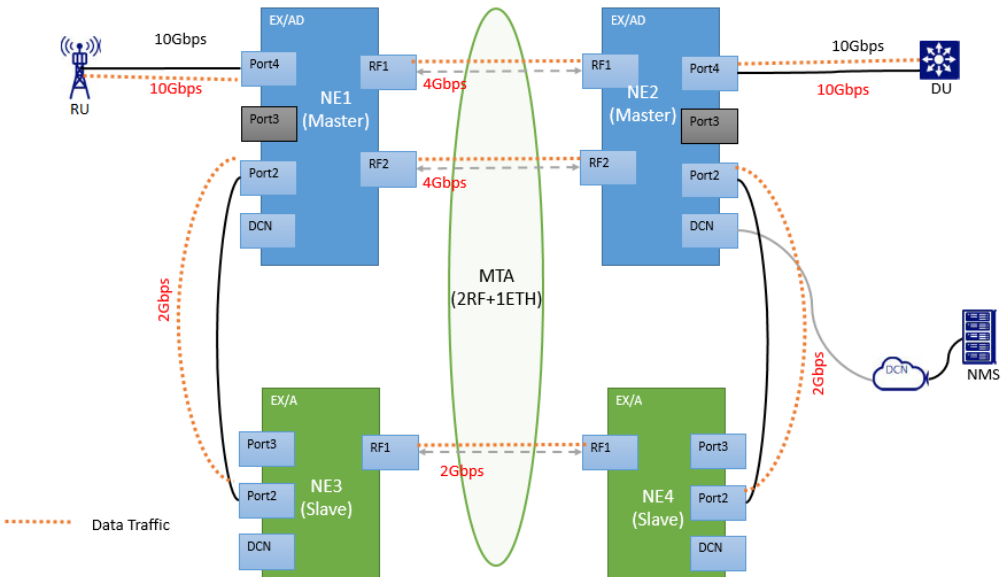
3.7.3.4 Detailed Configuration steps - NE3 and NE4

Procedure 3-13

1. Follow steps 1 to 7 in ***3.1.3.4 Detailed Configuration steps – NE3 and NE4***.

3.7.4 Use Case Verification

Figure 3-77 Data Traffic Flow



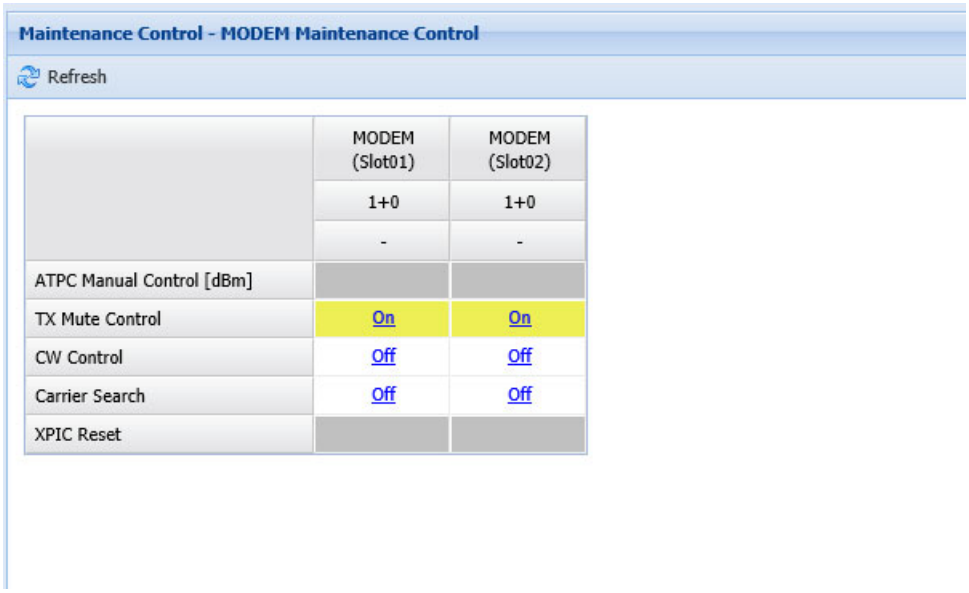
1. Verify the counters in ETH RMON Report on Slave [NE2 and NE4] Port02 for traffic taken through relay link. Refer ***3.3.3 ETH RMON Report in Operation and Maintenance*** for details.

2. Verify the counters in ETH RMON Report on receiving end Master [NE2] Port04 for the entire traffic aggregated back from MTA ports. Refer ***3.3.3 ETH RMON Report in Operation and Maintenance*** for details.

3. Enable TX Mute on MODEM RF1 and MODEM RF2 on NE1. Refer ***4.5.2 TX Mute Control in Operation and Maintenance*** for details.

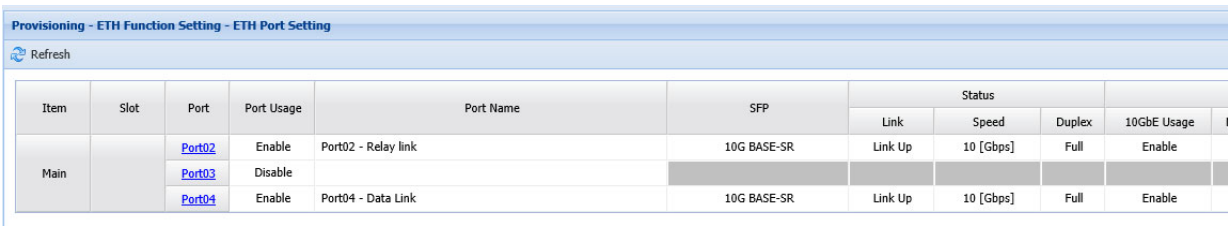
Figure 3-78 MODEM Maintenance Control Window

Figure 3-79 MODEM Maintenance Control Window



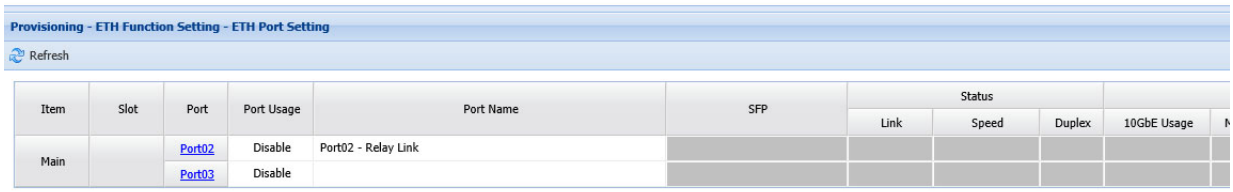
4. Verify the edge port Port4 [LLF GRP] link is still up as the MTA Member port Port2 is still up and traffic flows end to end through the Relay Link [through Slave Nodes].

Figure 3-80 ETH Port Setting Window



5. Disable port Port2 on Slave node NE3.

Figure 3-81 ETH Port Setting Window



6. Verify Edge port Port4 is down on both Master Nodes [NE1 and NE2] and there is no traffic flow end to end as all the MTA members are down now.

Figure 3-82 ETH Port Setting Window [In NE1]

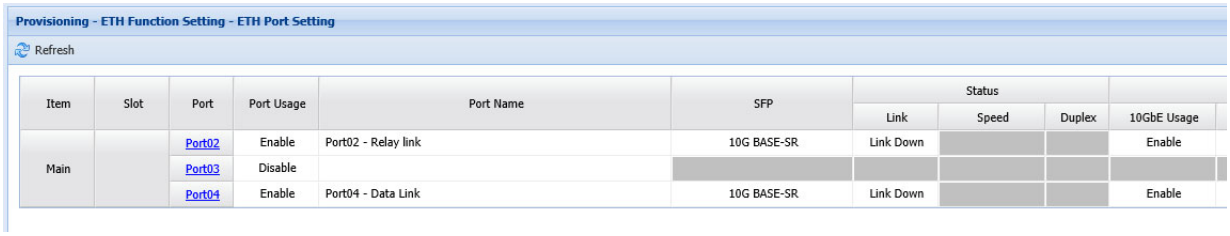


Figure 3-83 ETH Port Setting Window [In NE2]

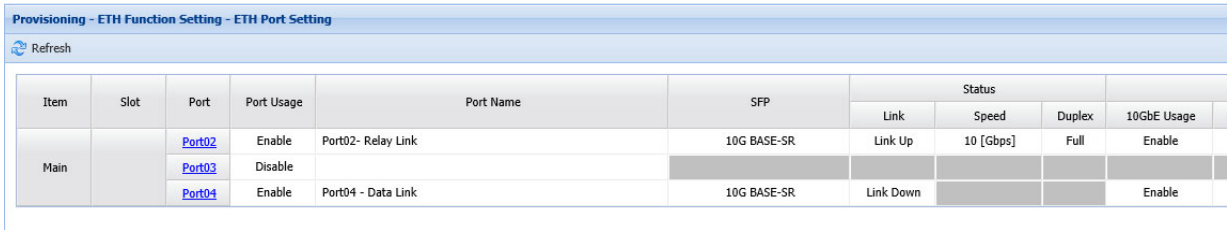
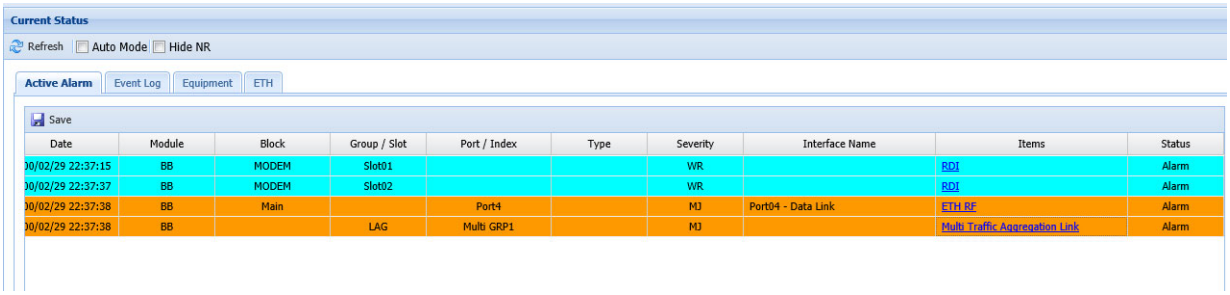


Figure 3-84 Alarm on NE1 and NE2 due to MTA link down

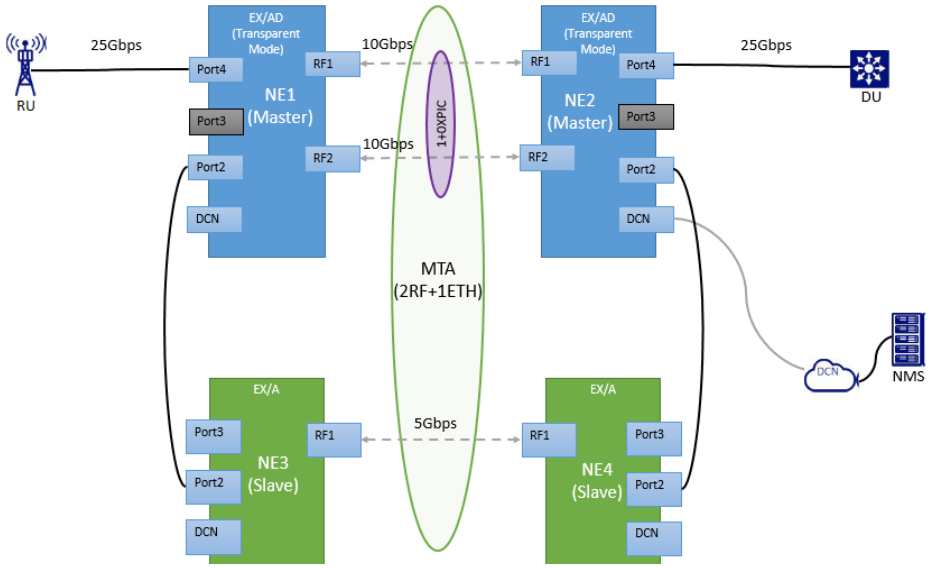


3.8 Use case 8 - MTA [2 MODEM (XPIC) and 1 ETH port] in Transparent Mode

3.8.1 Scenario briefing

This section explains a typical user scenario to bring up a MTA topology with Equipment in Transparent Mode. Below topology represent Multi Traffic Aggregation of two Wireless and one Wired link. Data Traffic of 25 Gbps flows between the RU and DU through the MTA link.

3.8.2 Topology



3.8.3 Step by Step Configuration

This section contains the step by step procedure to bring up the above topology.

3.8.3.1 Steps Summary - NE1 and NE2

1. Configure Equipment Forwarding Mode as Transparent Mode.
2. Register MODEM RF1, RF2 and enable XPIC configuration.
3. Configure Radio (XPIC) to set CS/Reference Modulation for the MODEM RF1, RF2.
4. Configure ETH port Port2 as 10G port and Port4 as 25G port.

5. Create MTA GRP with MODEM Ports RF1, RF2 and ETH Port2, assign Aggregation VLAN (VLAN X).
6. Create Through VLAN (VLAN Y) in 'VLAN List'.
7. Associate Through VLAN to MTA GRP in 'VLAN Setting'.
8. Create MEG with ETH-CCM enable, ETH-BN Rx-enable.
9. Create MEP on MTA GRP using Through VLAN.
10. Associate MEP Index created in Step 9 and Through VLAN created in step 6 in Link Aggregation Setting.

3.8.3.2 Steps Summary - NE3 and NE4

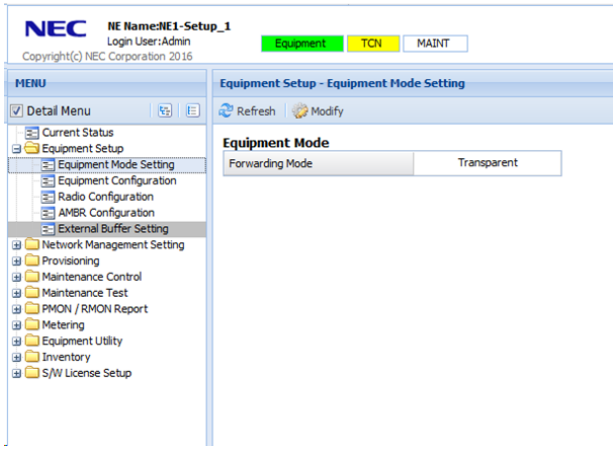
1. Register MODEM RF1.
2. Configure Radio to set CS/Reference Modulation for the MODEM RF1.
3. Configure ETH port Port2 as 10G port.
4. Create VLAN IDs same as Through VLAN (VLAN Y) and Aggregation VLAN (VLAN X) in Master (NE1 and NE2).
5. Associate VLAN X and VLAN Y to ETH Port2 and VLAN X to MODEM Port RF1".
6. Create MEG with ETH-CCM enable, ETH-BN Tx-enable, BNM Server MEP as MODEM RF1.
7. Create MEP on ETH Port2 using Through VLAN.

3.8.3.3 Detailed Configuration steps - NE1 and NE2

Procedure 3-14

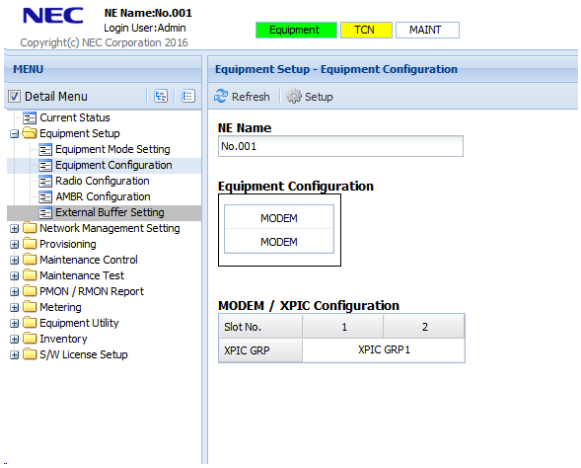
1. Configure Equipment Forwarding Mode as Transparent Mode. Refer ***4.2.2 Set Equipment Mode in Set Network and System Provisioning*** for details.

Figure 3-85 Equipment Mode Setting Window



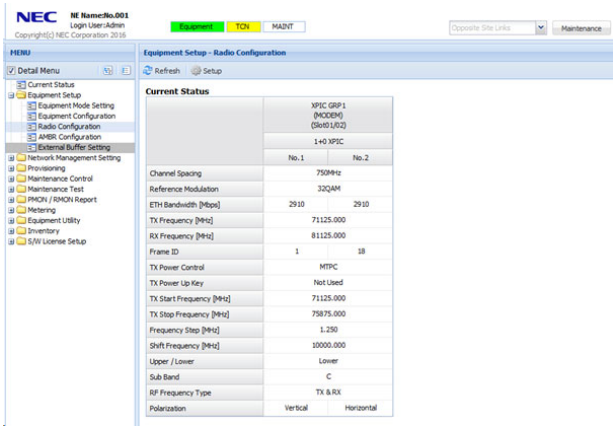
2. Register MODEM RF1, RF2 and enable XPIC configuration. Refer ***4.3 Equipment Configuration in Set Network and System Provisioning*** for details.

Figure 3-86 Equipment Configuration Window



3. Configure Radio (XPIC) to set CS/Reference Modulation for the MODEM RF1, RF2. Refer ***4.4 Radio Configuration in Set Network and System Provisioning*** for details.

Figure 3-87 Radio Configuration Window



4. Configure ETH port Port2 as 10G port and Port4 as 25G port. Refer ***9.3 ETH Port Setting in Set Network and System Provisioning*** for details.

Figure 3-88 ETH Port Setting (Main - Port02) Window

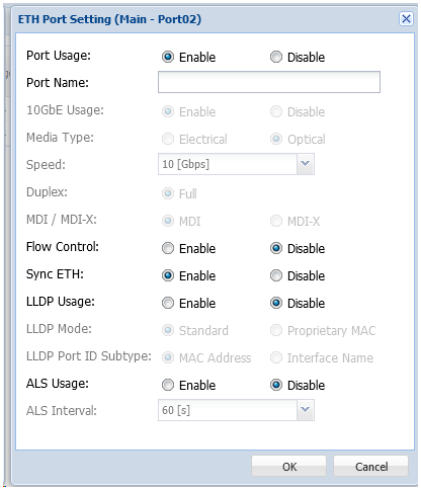


Figure 3-89 ETH Port Setting (Main - Port04) Window

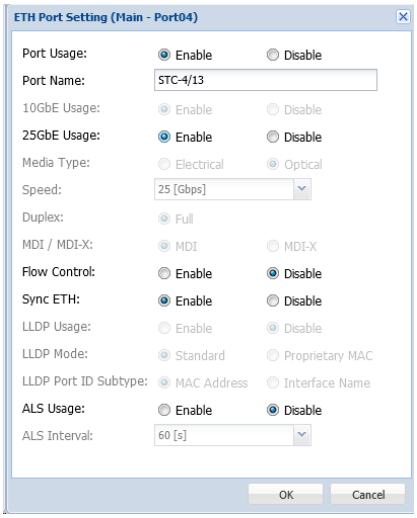


Figure 3-90 ETH Port Setting Window (1/3: on the leftmost)

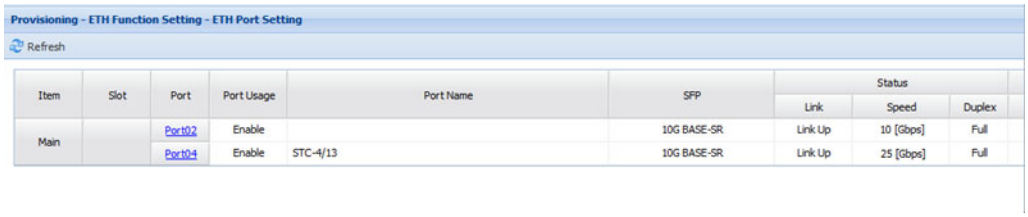


Figure 3-91 ETH Port Setting Window (2/3: on the middle)

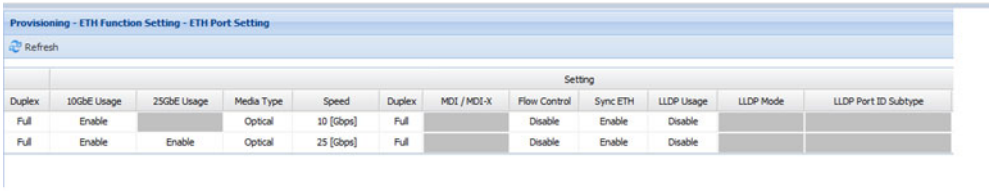
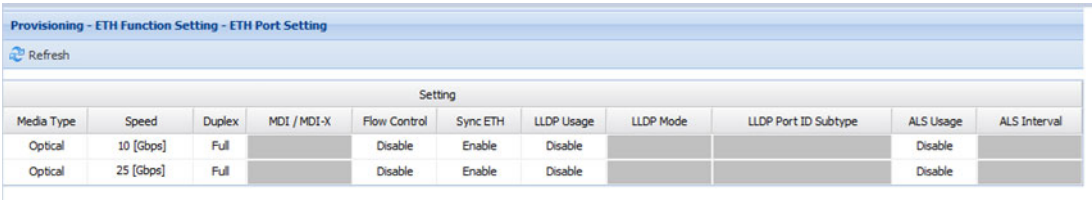


Figure 3-92 ETH Port Setting Window (3/3: on the rightmost)



5. Create MTA GRP with MODEM Ports RF1, RF2 and ETH Port2, assign Aggregation VLAN (VLAN X). Refer ***8.2.3 Add Multi LAG in Set Network and System Provisioning*** for details.

Figure 3-93 Multi LAG Setting Window

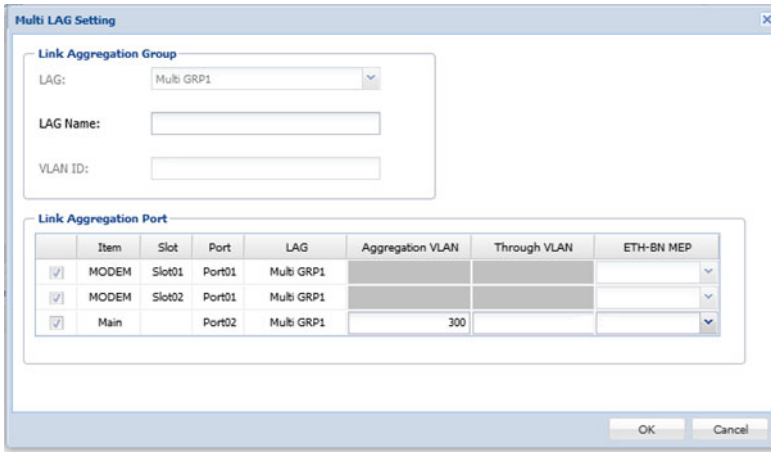
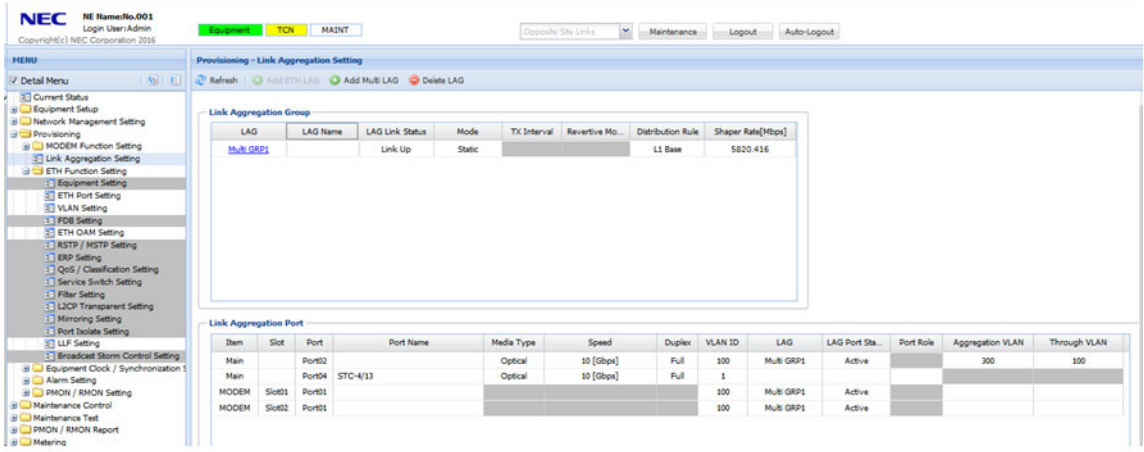
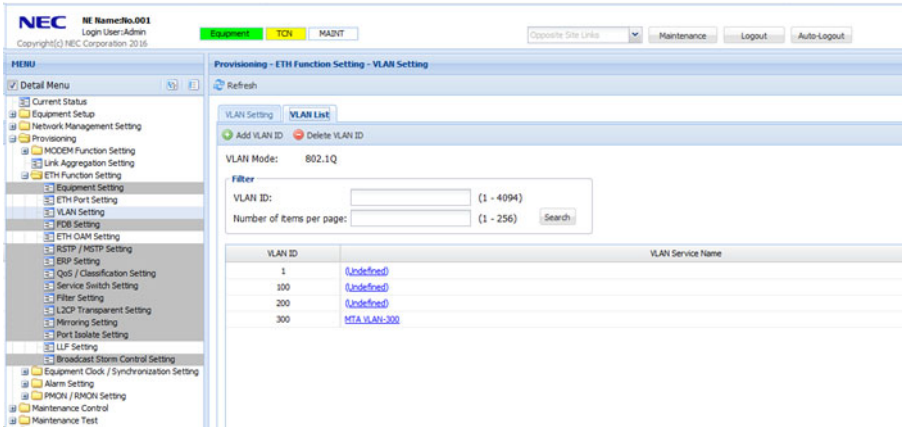


Figure 3-94 Link Aggregation Setting Window



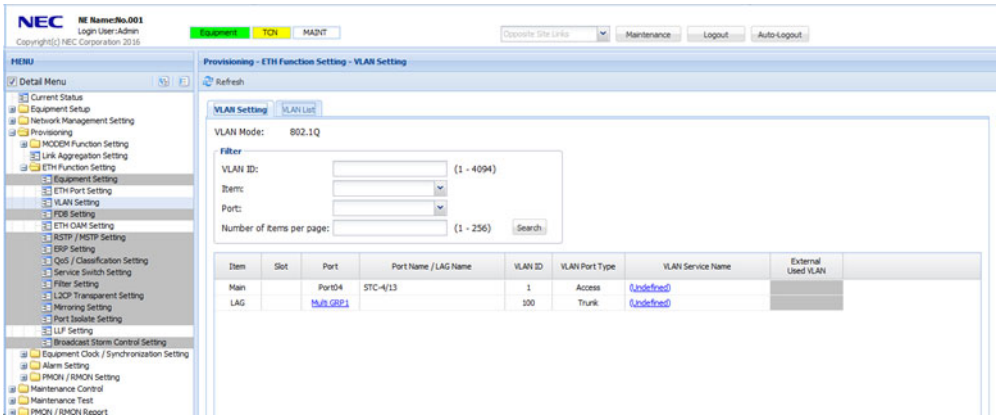
6. Create Through VLAN (VLAN Y) in 'VLAN List'. Refer ***9.4.1 Add VLAN/S-VLAN ID in Set Network and System Provisioning*** for details.

Figure 3-95 VLAN Setting Window



7. Associate Through VLAN to MTA GRP in 'VLAN Setting'. Refer ***9.4.4 VLAN Setting (802.1Q Mode) in Set Network and System Provisioning*** for details.

Figure 3-96 VLAN Setting Window



8. Create MEG with ETH-CCM enable, ETH-BN Rx-enable. Refer ***9.6.1.1 Add MEG Index in Set Network and System Provisioning*** for details.

Figure 3-97 OAM MEG Setting (Modify) Window

9. Create MEP on MTA GRP using Through VLAN. Refer ***9.6.2.1 Add MEP Index in Set Network and System Provisioning*** for details.

Figure 3-98 OAM MEP Setting (Modify) Window

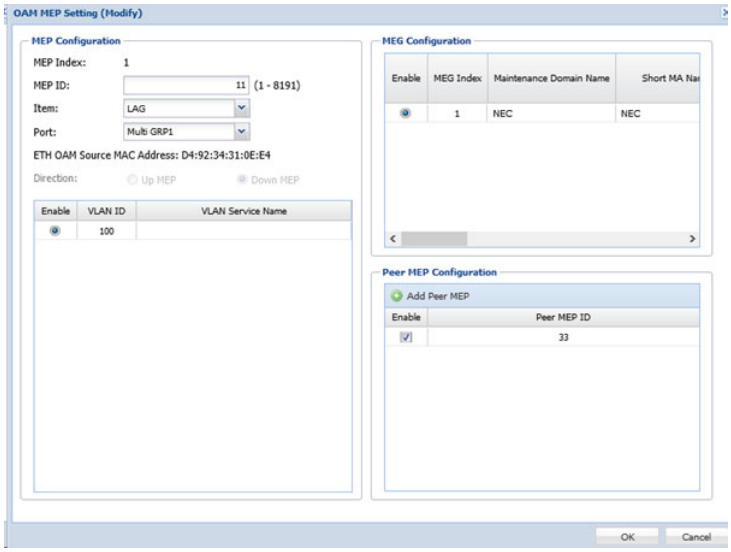
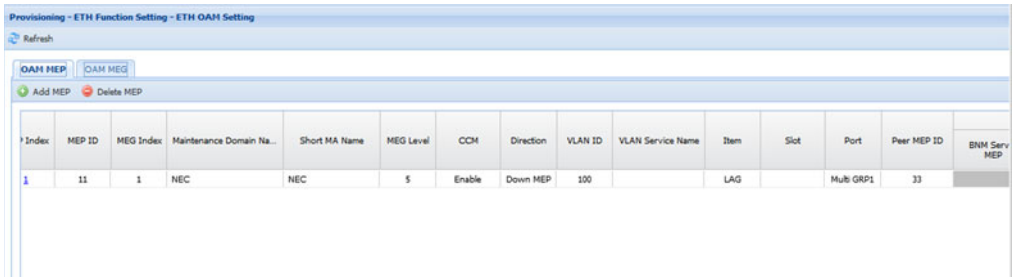
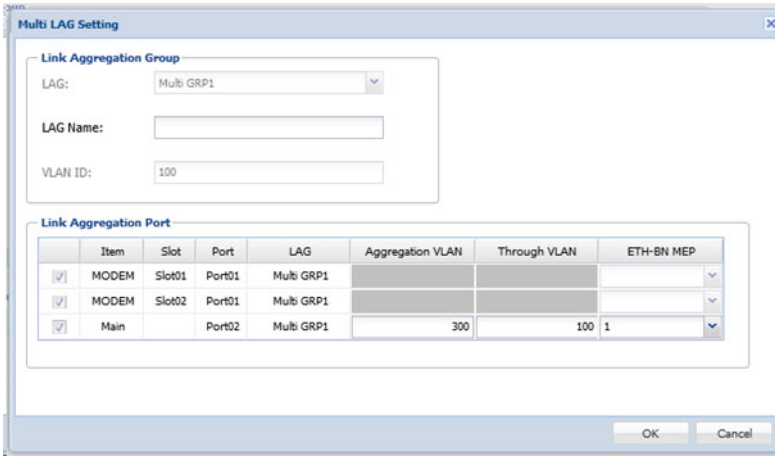


Figure 3-99 ETH OAM Setting Window



10. Associate MEP Index created in Step 9 and Through VLAN created in step 6 in Link Aggregation Setting. Refer ***8.2.4 Modify Multi LAG in Set Network and System Provisioning*** for details.

Figure 3-100 Multi LAG Setting Window

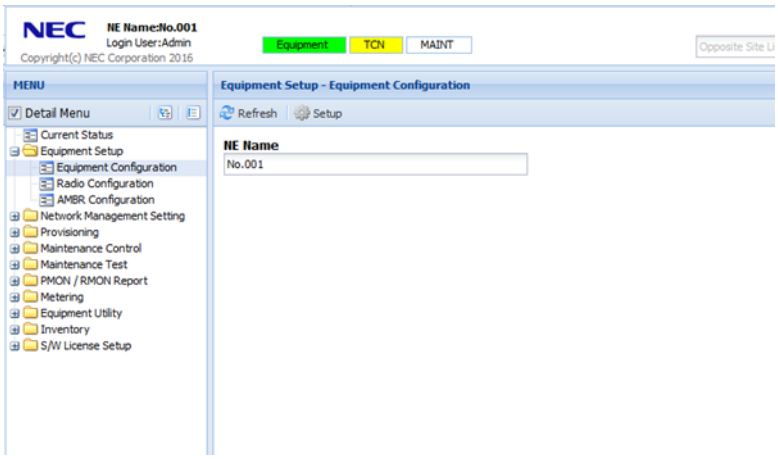


3.8.3.4 Detailed Configuration steps - NE3 and NE4

Procedure 3-15

1. Register MODEM RF1. Refer ***4.2 Equipment Configuration in Set Network and System Provisioning*** for details.

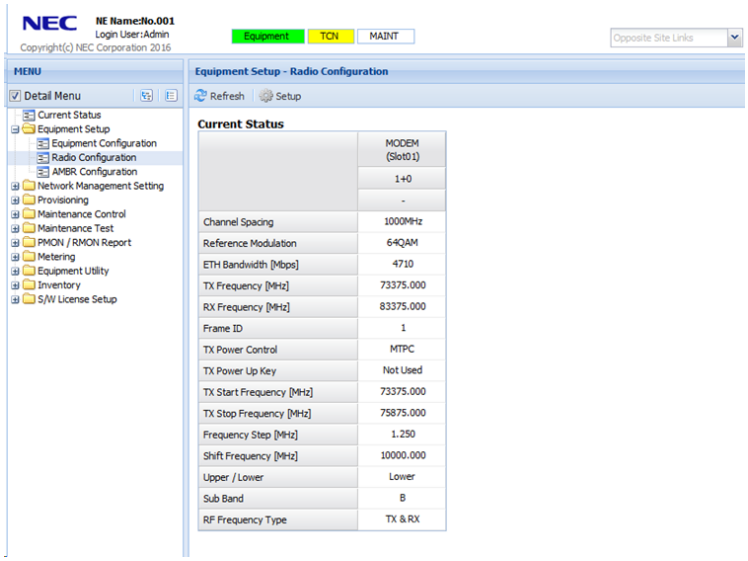
Figure 3-101 Equipment Configuration Window



NOTE: *Slave node used is EX/A, hence MODEM registration is not required.*

2. Configure Radio to set CS/Reference Modulation for the MODEM RF1. Refer ***4.3 Equipment Configuration and 4.4 AMBR Configuration in Set Network and System Provisioning*** for details.

Figure 3-102 Radio Configuration Window



3. Configure ETH port Port2 as 10G port. Refer ***9.3 ETH Port Setting in Set Network and System Provisioning*** for details.

Figure 3-103 ETH Port Setting (Main - Port02) Window

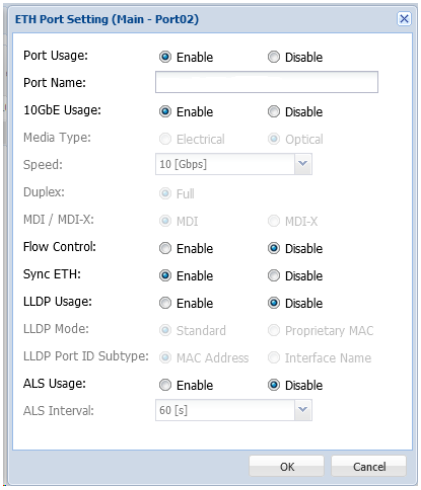


Figure 3-104 ETH Port Setting Window (1/2: on the leftmost)

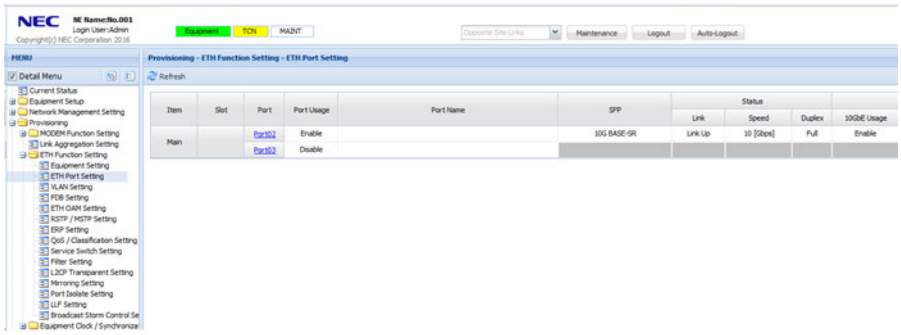
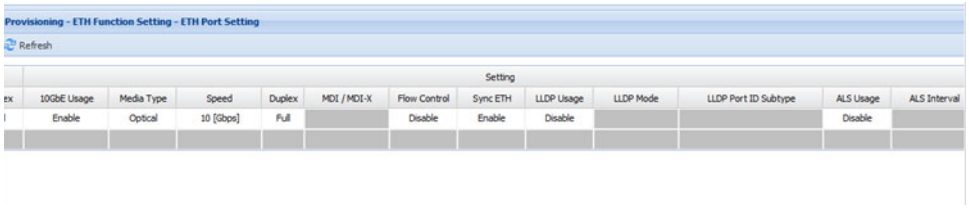
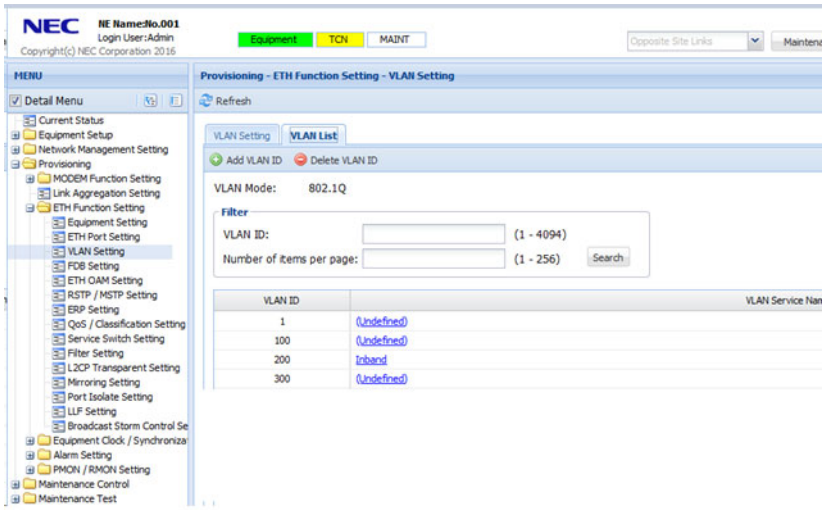


Figure 3-105 ETH Port Setting Window (2/2: on the rightmost)



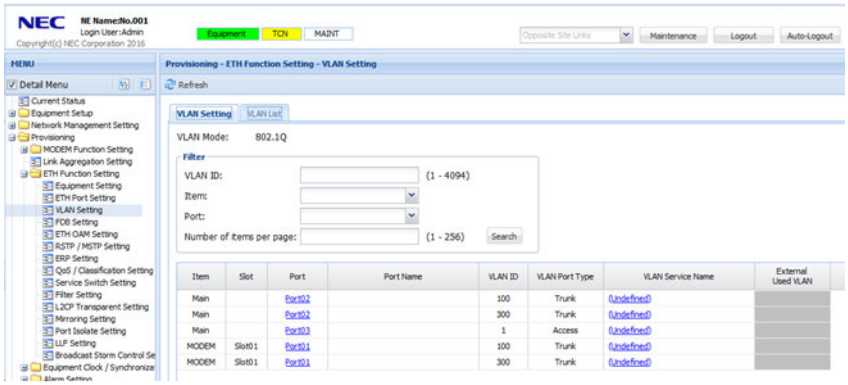
4. Create VLAN IDs same as Through VLAN (VLAN Y) and Aggregation VLAN (VLAN X) in Master (NE1 and NE2). Refer ***9.4.1 Add VLAN/S-VLAN ID in Set Network and System Provisioning*** for details.

Figure 3-106 VLAN Setting Window



5. Associate VLAN X and VLAN Y to ETH Port2 and VLAN X to MODEM Port RF1. Refer ***9.4.4 VLAN Setting (802.1Q Mode) in Set Network and System Provisioning*** for details.

Figure 3-107 VLAN Setting Window



6. Create MEG with ETH-CCM enable, ETH-BN Tx-enable, BNM Server MEP as MODEM RF1. Refer ***9.6.1.1 Add MEG Index in Set Network and System Provisioning*** for details.

Figure 3-108 OAM MEG Setting (Modify) Window

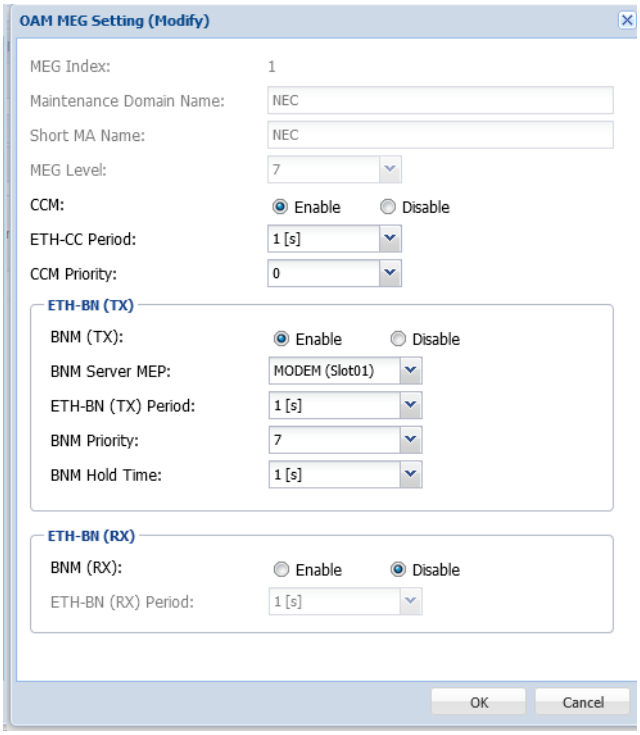
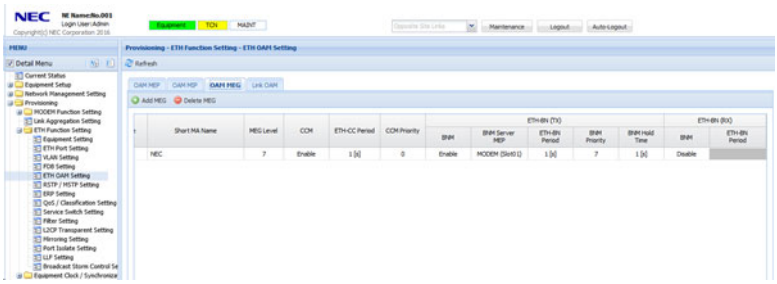


Figure 3-109 VLAN Setting Window



7. Create MEP on ETH Port2 using Through VLAN. Refer ***9.6.2.1 Add MEP Index in Set Network and System Provisioning*** for details.

Figure 3-110 OAM MEP Setting (Modify) Window

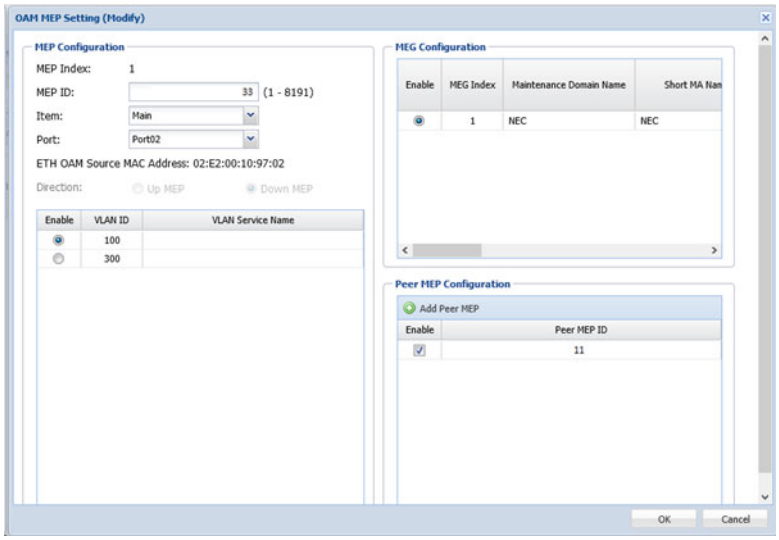


Figure 3-111 ETH OAM Setting - OAM MEP

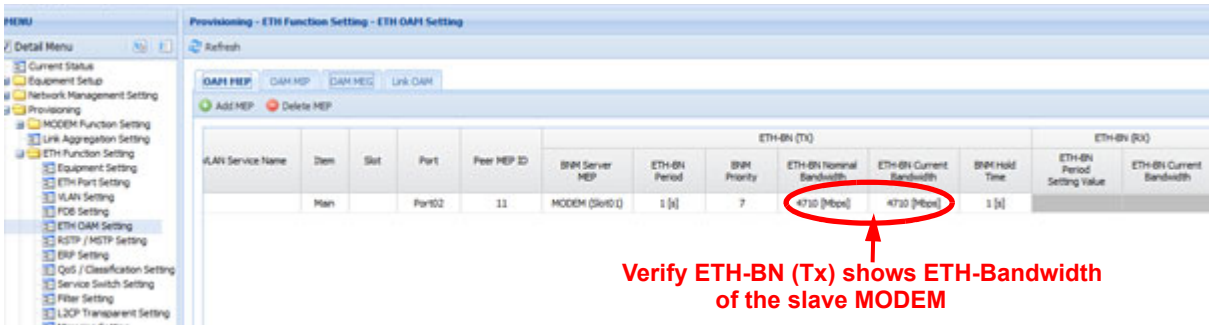


Figure 3-112 ETH OAM Setting - OAM MEP [on the rightmost on NE1]

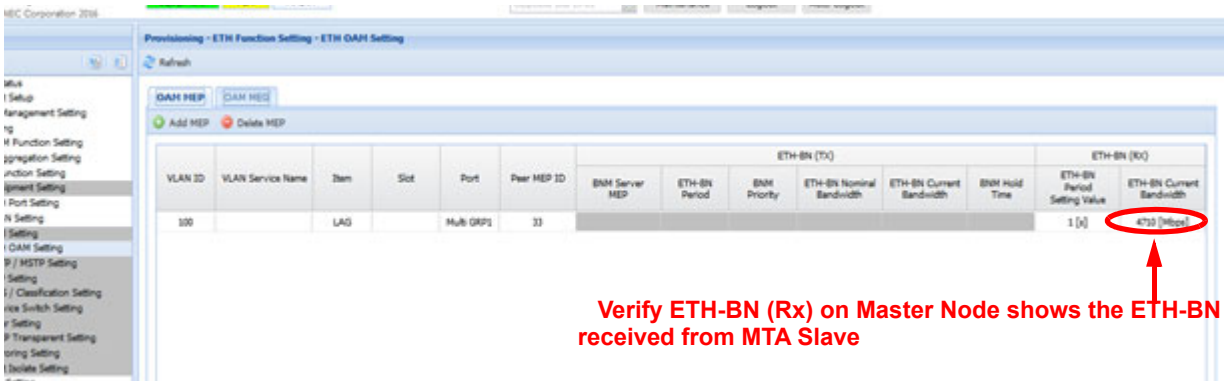
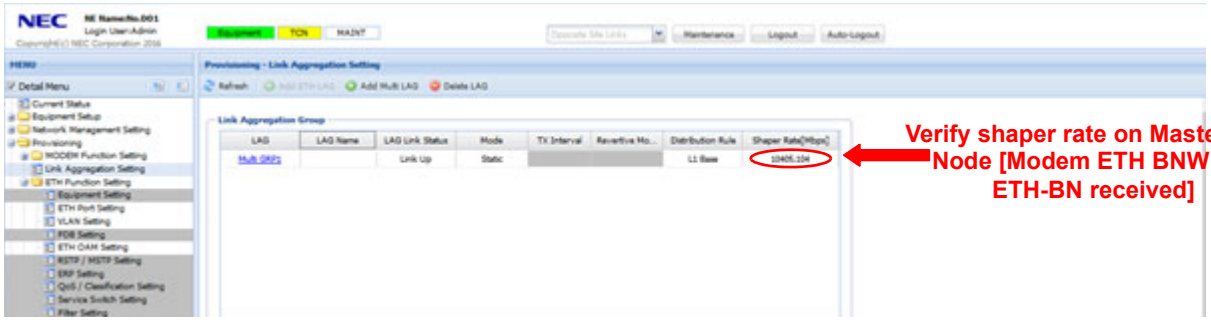


Figure 3-113 Link Aggregation Setting



3.8.4 Alarm and Troubleshooting:

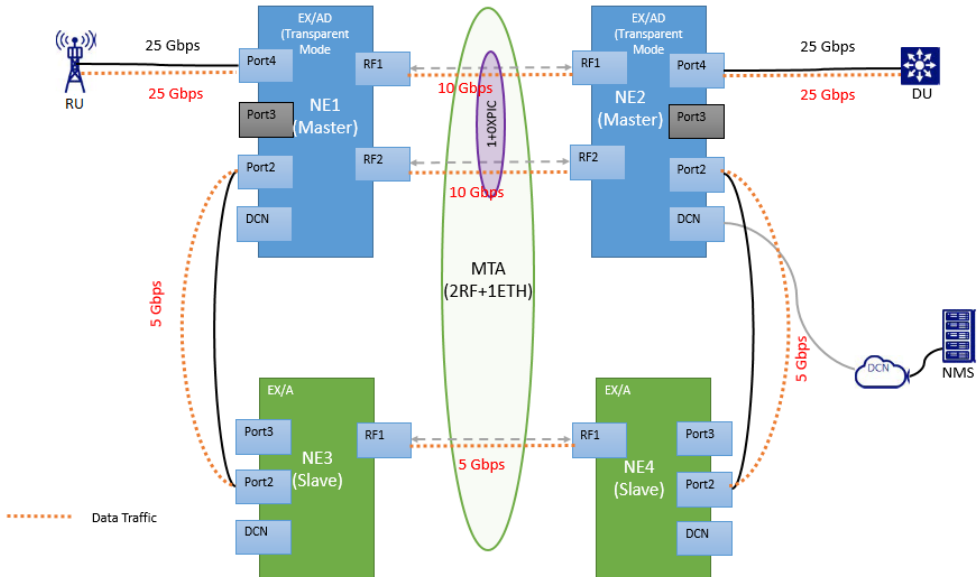
Once the topology configuration is complete, check for below possible alarms.

1. ETH-BN LOC
2. ETH LOS
3. Multi Traffic Aggregation Link
4. Multi Traffic Aggregation Setting Mismatch
5. Forwarding Mode Setting Mismatch

To Clear the Alarms, refer to ***5.5 Trouble Clearing in Operation and Maintenance*** for details.

3.8.5 Use Case Verification

Figure 3-114 Data Traffic Flow

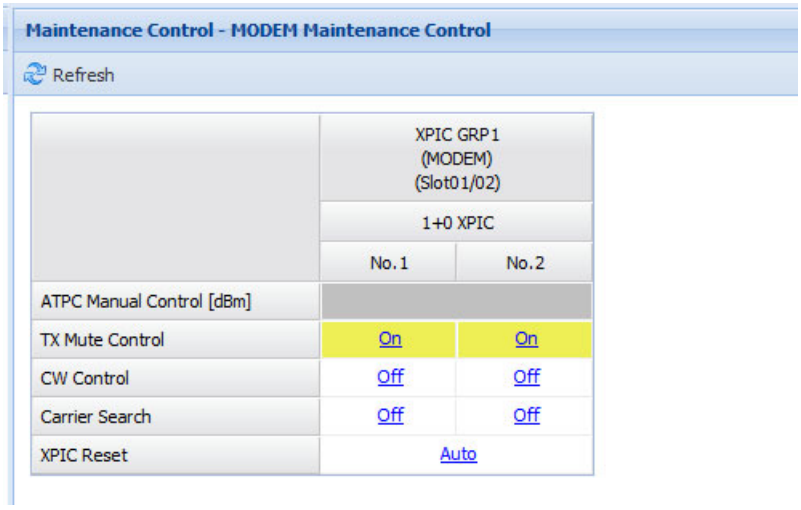


1. Verify the counters in ETH RMON Report on Slave [NE2 and NE4] Port02 for traffic taken through relay link. Refer ***3.3.3 ETH RMON Report in Operation and Maintenance*** for details.

2. Verify the counters in ETH RMON Report on receiving end Master [NE4] Port04 for the entire traffic aggregated back from MTA ports. Refer ***3.3.3 ETH RMON Report in Operation and Maintenance*** for details.

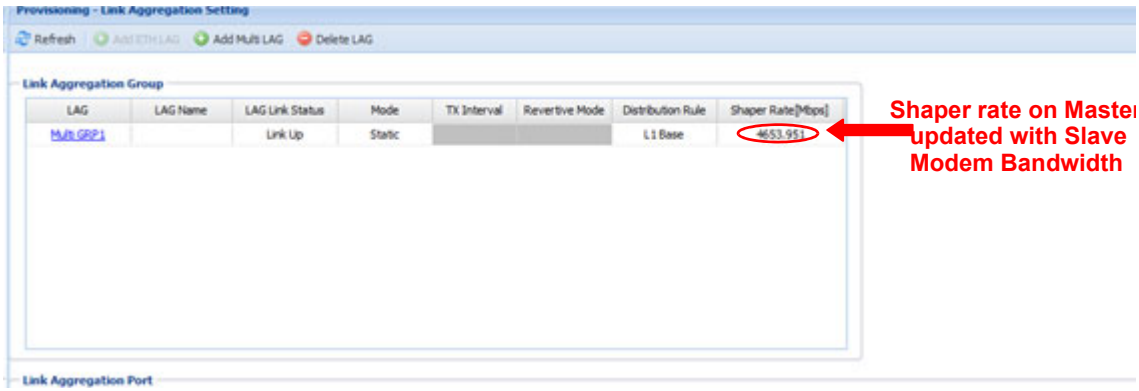
3. Perform TX Mute on MODEM RF1 and MODEM RF2 on sender end Master [NE1].

Figure 3-115 MODEM Maintenance Control Window



4. Verify the QOS shaper on Master got updated with Slave Modem Bandwidth received via ETH-BNM.

Figure 3-116 Link Aggregation Setting Window



5. Verify the counters in ETH RMON Report on Slave [NE3 and NE4] Port02 and MODEM RF1 for traffic taken through relay link.

3.9 Other Example Topologies

Figure 3-117 MTA Topology with VR4 as Slave

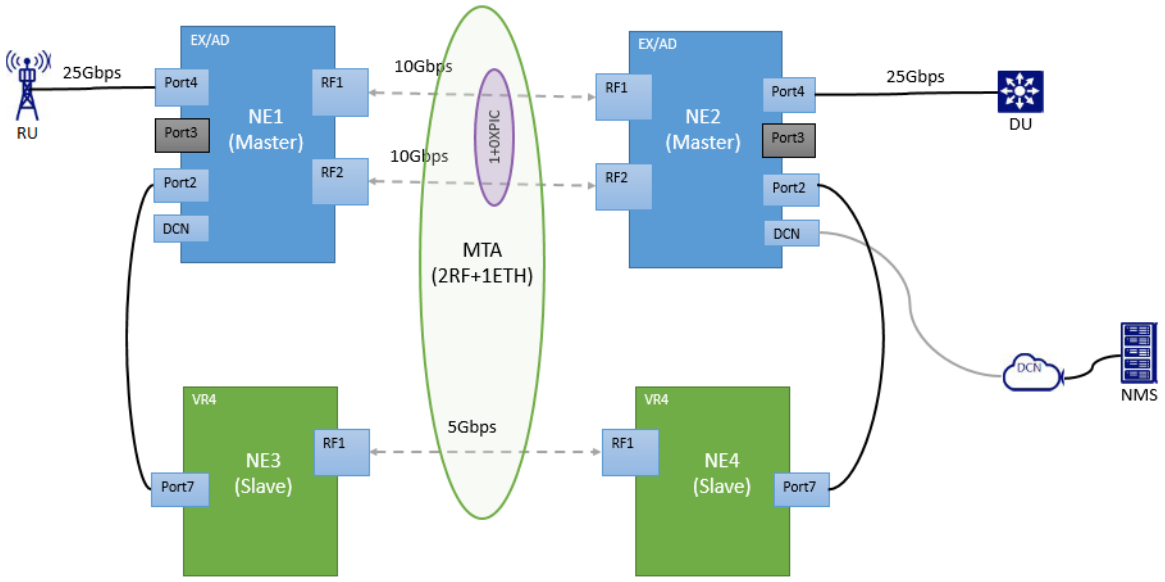


Figure 3-118 MTA Topology with iXA as Slave