ETX-204A
Carrier Ethernet Demarcation Device
Version 2.2


ETX-204A
Carrier Ethernet Demarcation Device
Version 2.2
Installation and Operation Manual

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For further information contact RAD at the address below or contact your local distributor.

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</tbody>
</table>

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RAD warrants to DISTRIBUTOR that the hardware in the ETX-204A to be delivered hereunder shall be free of defects in material and workmanship under normal use and service for a period of twelve (12) months following the date of shipment to DISTRIBUTOR.

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This Agreement shall be construed and governed in accordance with the laws of the State of Israel.

**Product Disposal**

To facilitate the reuse, recycling and other forms of recovery of waste equipment in protecting the environment, the owner of this RAD product is required to refrain from disposing of this product as unsorted municipal waste at the end of its life cycle. Upon termination of the unit’s use, customers should provide for its collection for reuse, recycling or other form of environmentally conscientious disposal.
General Safety Instructions

The following instructions serve as a general guide for the safe installation and operation of telecommunications products. Additional instructions, if applicable, are included inside the manual.

Safety Symbols

This symbol may appear on the equipment or in the text. It indicates potential safety hazards regarding product operation or maintenance to operator or service personnel.

Danger of electric shock! Avoid any contact with the marked surface while the product is energized or connected to outdoor telecommunication lines.

Protective ground: the marked lug or terminal should be connected to the building protective ground bus.

Some products may be equipped with a laser diode. In such cases, a label with the laser class and other warnings as applicable will be attached near the optical transmitter. The laser warning symbol may be also attached.

Please observe the following precautions:

- Before turning on the equipment, make sure that the fiber optic cable is intact and is connected to the transmitter.
- Do not attempt to adjust the laser drive current.
- Do not use broken or unterminated fiber-optic cables/connectors or look straight at the laser beam.
- The use of optical devices with the equipment will increase eye hazard.
- Use of controls, adjustments or performing procedures other than those specified herein, may result in hazardous radiation exposure.

ATTENTION: The laser beam may be invisible!

In some cases, the users may insert their own SFP laser transceivers into the product. Users are alerted that RAD cannot be held responsible for any damage that may result if non-compliant transceivers are used. In particular, users are warned to use only agency approved products that comply with the local laser safety regulations for Class 1 laser products.

Always observe standard safety precautions during installation, operation and maintenance of this product. Only qualified and authorized service personnel should carry out adjustment, maintenance or repairs to this product. No installation, adjustment, maintenance or repairs should be performed by either the operator or the user.
Handling Energized Products

General Safety Practices

Do not touch or tamper with the power supply when the power cord is connected. Line voltages may be present inside certain products even when the power switch (if installed) is in the OFF position or a fuse is blown. For DC-powered products, although the voltages levels are usually not hazardous, energy hazards may still exist.

Before working on equipment connected to power lines or telecommunication lines, remove jewelry or any other metallic object that may come into contact with energized parts.

Unless otherwise specified, all products are intended to be grounded during normal use. Grounding is provided by connecting the mains plug to a wall socket with a protective ground terminal. If a ground lug is provided on the product, it should be connected to the protective ground at all times, by a wire with a diameter of 18 AWG or wider. Rack-mounted equipment should be mounted only in grounded racks and cabinets.

Always make the ground connection first and disconnect it last. Do not connect telecommunication cables to ungrounded equipment. Make sure that all other cables are disconnected before disconnecting the ground.

Some products may have panels secured by thumbscrews with a slotted head. These panels may cover hazardous circuits or parts, such as power supplies. These thumbscrews should therefore always be tightened securely with a screwdriver after both initial installation and subsequent access to the panels.

Connecting AC Mains

Make sure that the electrical installation complies with local codes.

Always connect the AC plug to a wall socket with a protective ground.

The maximum permissible current capability of the branch distribution circuit that supplies power to the product is 16A (20A for USA and Canada). The circuit breaker in the building installation should have high breaking capacity and must operate at short-circuit current exceeding 35A (40A for USA and Canada).

Always connect the power cord first to the equipment and then to the wall socket. If a power switch is provided in the equipment, set it to the OFF position. If the power cord cannot be readily disconnected in case of emergency, make sure that a readily accessible circuit breaker or emergency switch is installed in the building installation.

In cases when the power distribution system is IT type, the switch must disconnect both poles simultaneously.

Connecting DC Power

Unless otherwise specified in the manual, the DC input to the equipment is floating in reference to the ground. Any single pole can be externally grounded.

Due to the high current capability of DC power systems, care should be taken when connecting the DC supply to avoid short-circuits and fire hazards.

Make sure that the DC power supply is electrically isolated from any AC source and that the installation complies with the local codes.
The maximum permissible current capability of the branch distribution circuit that supplies power to the product is 16A (20A for USA and Canada). The circuit breaker in the building installation should have high breaking capacity and must operate at short-circuit current exceeding 35A (40A for USA and Canada).

Before connecting the DC supply wires, ensure that power is removed from the DC circuit. Locate the circuit breaker of the panel board that services the equipment and switch it to the OFF position. When connecting the DC supply wires, first connect the ground wire to the corresponding terminal, then the positive pole and last the negative pole. Switch the circuit breaker back to the ON position.

A readily accessible disconnect device that is suitably rated and approved should be incorporated in the building installation.

If the DC power supply is floating, the switch must disconnect both poles simultaneously.

## Connecting Data and Telecommunications Cables

Data and telecommunication interfaces are classified according to their safety status.

The following table lists the status of several standard interfaces. If the status of a given port differs from the standard one, a notice will be given in the manual.

<table>
<thead>
<tr>
<th>Ports</th>
<th>Safety Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>SELV</td>
<td>SELV (SELV)</td>
</tr>
<tr>
<td>V.11, V.28, V.35, V.36, RS-530, X.21, 10 BaseT, 100 BaseT, Unbalanced E1, E2, E3, STM, DS-2, DS-3, S-Interface ISDN, Analog voice E&amp;M</td>
<td>Safety Extra Low Voltage: Ports which do not present a safety hazard. Usually up to 30 VAC or 60 VDC.</td>
</tr>
<tr>
<td>xDSL (without feeding voltage), Balanced E1, T1, Sub E1/T1</td>
<td>TNV-1 Telecommunication Network Voltage-1: Ports whose normal operating voltage is within the limits of SELV, on which overvoltages from telecommunications networks are possible.</td>
</tr>
<tr>
<td>FXS (Foreign Exchange Subscriber)</td>
<td>TNV-2 Telecommunication Network Voltage-2: Ports whose normal operating voltage exceeds the limits of SELV (usually up to 120 VDC or telephone ringing voltages), on which overvoltages from telecommunication networks are not possible. These ports are not permitted to be directly connected to external telephone and data lines.</td>
</tr>
<tr>
<td>FXO (Foreign Exchange Office), xDSL (with feeding voltage), U-Interface ISDN</td>
<td>TNV-3 Telecommunication Network Voltage-3: Ports whose normal operating voltage exceeds the limits of SELV (usually up to 120 VDC or telephone ringing voltages), on which overvoltages from telecommunication networks are possible.</td>
</tr>
</tbody>
</table>

Always connect a given port to a port of the same safety status. If in doubt, seek the assistance of a qualified safety engineer.

Always make sure that the equipment is grounded before connecting telecommunication cables. Do not disconnect the ground connection before disconnecting all telecommunications cables.

Some SELV and non-SELV circuits use the same connectors. Use caution when connecting cables. Extra caution should be exercised during thunderstorms.
When using shielded or coaxial cables, verify that there is a good ground connection at both ends. The grounding and bonding of the ground connections should comply with the local codes.

The telecommunication wiring in the building may be damaged or present a fire hazard in case of contact between exposed external wires and the AC power lines. In order to reduce the risk, there are restrictions on the diameter of wires in the telecom cables, between the equipment and the mating connectors.

**Caution**  
To reduce the risk of fire, use only No. 26 AWG or larger telecommunication line cords.

**Attention**  
Pour réduire les risques d'incendie, utiliser seulement des conducteurs de télécommunications 26 AWG ou de section supérieure.

Some ports are suitable for connection to intra-building or non-exposed wiring or cabling only. In such cases, a notice will be given in the installation instructions.

Do not attempt to tamper with any carrier-provided equipment or connection hardware.

**Electromagnetic Compatibility (EMC)**

The equipment is designed and approved to comply with the electromagnetic regulations of major regulatory bodies. The following instructions may enhance the performance of the equipment and will provide better protection against excessive emission and better immunity against disturbances.

A good ground connection is essential. When installing the equipment in a rack, make sure to remove all traces of paint from the mounting points. Use suitable lock-washers and torque. If an external grounding lug is provided, connect it to the ground bus using braided wire as short as possible.

The equipment is designed to comply with EMC requirements when connecting it with unshielded twisted pair (UTP) cables. However, the use of shielded wires is always recommended, especially for high-rate data. In some cases, when unshielded wires are used, ferrite cores should be installed on certain cables. In such cases, special instructions are provided in the manual.

Disconnect all wires which are not in permanent use, such as cables used for one-time configuration.

The compliance of the equipment with the regulations for conducted emission on the data lines is dependent on the cable quality. The emission is tested for UTP with 80 dB longitudinal conversion loss (LCL).

Unless otherwise specified or described in the manual, TNV-1 and TNV-3 ports provide secondary protection against surges on the data lines. Primary protectors should be provided in the building installation.

The equipment is designed to provide adequate protection against electro-static discharge (ESD). However, it is good working practice to use caution when connecting cables terminated with plastic connectors (without a grounded metal hood, such as flat cables) to sensitive data lines. Before connecting such cables, discharge yourself by touching ground or wear an ESD preventive wrist strap.
FCC-15 User Information

This equipment has been tested and found to comply with the limits of the Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the Installation and Operation manual, may cause harmful interference to the radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Canadian Emission Requirements

This Class A digital apparatus meets all the requirements of the Canadian Interference-Causing Equipment Regulation.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Warning per EN 55022 (CISPR-22)

<table>
<thead>
<tr>
<th>Warning</th>
<th>This is a class A product. In a domestic environment, this product may cause radio interference, in which case the user will be required to take adequate measures.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avertissement</td>
<td>Cet appareil est un appareil de Classe A. Dans un environnement résidentiel, cet appareil peut provoquer des brouillages radioélectriques. Dans ces cas, il peut être demandé à l'utilisateur de prendre les mesures appropriées.</td>
</tr>
<tr>
<td>Achtung</td>
<td>Das vorliegende Gerät fällt unter die Funkstörgrenzwertklasse A. In Wohngebieten können beim Betrieb dieses Gerätes Rundfunkstörungen auftreten, für deren Behebung der Benutzer verantwortlich ist.</td>
</tr>
</tbody>
</table>
Mise au rebut du produit

Afin de faciliter la réutilisation, le recyclage ainsi que d'autres formes de récupération d'équipement mis au rebut dans le cadre de la protection de l'environnement, il est demandé au propriétaire de ce produit RAD de ne pas mettre ce dernier au rebut en tant que déchet municipal non trié, une fois que le produit est arrivé en fin de cycle de vie. Le client devrait proposer des solutions de réutilisation, de recyclage ou toute autre forme de mise au rebut de cette unité dans un esprit de protection de l'environnement, lorsqu'il aura fini de l'utiliser.

Instructions générales de sécurité

Les instructions suivantes servent de guide général d'installation et d'opération sécurisées des produits de télécommunications. Des instructions supplémentaires sont éventuellement indiquées dans le manuel.

Symboles de sécurité

Ce symbole peut apparaître sur l'équipement ou dans le texte. Il indique des risques potentiels de sécurité pour l'opérateur ou le personnel de service, quant à l'opération du produit ou à sa maintenance.

Avertissement

Danger de choc électrique ! Evitez tout contact avec la surface marquée tant que le produit est sous tension ou connecté à des lignes externes de télécommunications.

Mise à la terre de protection : la cosse ou la borne marquée devrait être connectée à la prise de terre de protection du bâtiment.
Certains produits peuvent être équipés d’une diode laser. Dans de tels cas, une étiquette indiquant la classe laser ainsi que d’autres avertissements, le cas échéant, sera jointe près du transmetteur optique. Le symbole d’avertissement laser peut aussi être joint.

Veuillez observer les précautions suivantes :
• Avant la mise en marche de l’équipement, assurez-vous que le câble de fibre optique est intact et qu’il est connecté au transmetteur.
• Ne tentez pas d’ajuster le courant de la commande laser.
• N’utilisez pas des câbles ou connecteurs de fibre optique cassés ou sans terminaison et n’observez pas directement un rayon laser.
• L’usage de périphériques optiques avec l’équipement augmentera le risque pour les yeux.
• L’usage de contrôles, ajustages ou procédures autres que celles spécifiées ici pourrait résulter en une dangereuse exposition aux radiations.

ATTENTION : Le rayon laser peut être invisible !

Les utilisateurs pourront, dans certains cas, insérer leurs propres émetteurs-récepteurs Laser SFP dans le produit. Les utilisateurs sont avertis que RAD ne pourra pas être tenu responsable de tout dommage pouvant résulter de l’utilisation d’émetteurs-récepteurs non conformes. Plus particulièrement, les utilisateurs sont avertis de n’utiliser que des produits approuvés par l’agence et conformes à la réglementation locale de sécurité laser pour les produits laser de classe 1.

Respectez toujours les précautions standards de sécurité durant l’installation, l’opération et la maintenance de ce produit. Seul le personnel de service qualifié et autorisé devrait effectuer l’ajustage, la maintenance ou les réparations de ce produit. Aucune opération d’installation, d’ajustage, de maintenance ou de réparation ne devrait être effectuée par l’opérateur ou l’utilisateur.

### Manipuler des produits sous tension

**Règles générales de sécurité**

Ne pas toucher ou altérer l’alimentation en courant lorsque le câble d’alimentation est branché. Des tensions de lignes peuvent être présentes dans certains produits, même lorsque le commutateur (s’il est installé) est en position OFF ou si le fusible est rompu. Pour les produits alimentés par CC, les niveaux de tension ne sont généralement pas dangereux mais des risques de courant peuvent toujours exister.

Avant de travailler sur un équipement connecté aux lignes de tension ou de télécommunications, retirez vos bijoux ou tout autre objet métallique pouvant venir en contact avec les pièces sous tension.

Sauf s’il en est autrement indiqué, tous les produits sont destinés à être mis à la terre durant l’usage normal. La mise à la terre est fournie par la connexion de la fiche principale à une prise murale équipée d’une borne protectrice de mise à la terre. Si une cosse de mise à la terre est fournie avec le produit, elle devrait être connectée à tout moment à une mise à la terre de protection par un conducteur de diamètre 18 AWG ou plus. L’équipement monté en châssis ne devrait être monté que sur des châssis et dans des armoires mises à la terre.

Branchez toujours la mise à la terre en premier et débranchez-la en dernier. Ne branchez pas des câbles de télécommunications à un équipement qui n’est pas mis à la terre. Assurez-vous que tous les autres câbles sont débranchés avant de déconnecter la mise à la terre.
**Connexion au courant du secteur**

Assurez-vous que l'installation électrique est conforme à la réglementation locale.

Branchez toujours la fiche de secteur à une prise murale équipée d'une borne protectrice de mise à la terre.

La capacité maximale permissible en courant du circuit de distribution de la connexion alimentant le produit est de 16A (20A aux Etats-Unis et Canada). Le coupe-circuit dans l'installation du bâtiment devrait avoir une capacité élevée de rupture et devrait fonctionner sur courant de court-circuit dépassant 35A (40A aux Etats-Unis et Canada).

Branchez toujours le câble d'alimentation en premier à l'équipement puis à la prise murale. Si un commutateur est fourni avec l'équipement, fixez-le en position OFF. Si le câble d'alimentation ne peut pas être facilement débranché en cas d'urgence, assurez-vous qu'un coupe-circuit ou un disjoncteur d'urgence facilement accessible est installé dans l'installation du bâtiment.

Le disjoncteur devrait déconnecter simultanément les deux pôles si le système de distribution de courant est de type IT.

**Connexion d'alimentation CC**

Sauf s'il en est autrement spécifié dans le manuel, l'entrée CC de l'équipement est flottante par rapport à la mise à la terre. Tout pôle doit être mis à la terre en externe.

A cause de la capacité de courant des systèmes à alimentation CC, des précautions devraient être prises lors de la connexion de l'alimentation CC pour éviter des courts-circuits et des risques d'incendie.

Assurez-vous que l'alimentation CC est isolée de toute source de courant CA (secteur) et que l'installation est conforme à la réglementation locale.

La capacité maximale permissible en courant du circuit de distribution de la connexion alimentant le produit est de 16A (20A aux Etats-Unis et Canada). Le coupe-circuit dans l'installation du bâtiment devrait avoir une capacité élevée de rupture et devrait fonctionner sur courant de court-circuit dépassant 35A (40A aux Etats-Unis et Canada).

Avant la connexion des câbles d'alimentation en courant CC, assurez-vous que le circuit CC n'est pas sous tension. Localisez le coupe-circuit dans le tableau desservant l'équipement et fixez-le en position OFF. Lors de la connexion de câbles d'alimentation CC, connectez d'abord le conducteur de mise à la terre à la borne correspondante, puis le pôle positif et en dernier, le pôle négatif. Remettez le coupe-circuit en position ON.

Un disjoncteur facilement accessible, adapté et approuvé devrait être intégré à l'installation du bâtiment.

Le disjoncteur devrait déconnecter simultanément les deux pôles si l'alimentation en courant CC est flottante.
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Chapter 7. Configuring Typical Applications

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Appendix A. Connection Data

Appendix B. Operation, Administration, and Maintenance (OAM)
Chapter 1
Introduction

1.1 Overview

ETX-204A is a carrier Ethernet demarcation device owned and operated by the service provider and installed at the customer premises, delivering SLA-based Ethernet business services to the customer premises over native Ethernet access. In addition, it functions as a mobile demarcation device (MDD), efficiently managing mobile broadband traffic between the IP NodeB/ LTE eNodeB and the network core with SLA assurance.

Furthermore, incorporating RAD's SyncToP platform of synchronization and timing over packet feature set, ETX-204A utilizes standard technologies such as 1588v2 and Synchronous Ethernet to ensure highly accurate traffic delivery in packet-based mobile backhaul networks.

The device delivers Ethernet E-line services (EPL and EVPL) and is MEF 9 and MEF 14 certified.

Incoming customer traffic is classified and mapped according to port-based (all-in-one) bundling or by user port and CE VLAN-ID, VLAN priority, DSCP, IP precedence, MAC, IP address, and Ethertype. This offers operators the flexibility to differentiate services using different kinds of classification methods, police the traffic, and enforce SLA per service.

ETX-204A supports powerful bandwidth profiles such as CIR/CBS and EIR/EBS for differentiated Ethernet services and includes comprehensive Ethernet OAM (Operation, Administration, and Maintenance) functionality together with SLA monitoring.

Two Ethernet network ports as well as up to four Ethernet subscriber ports use SFP/UTP combo ports that can operate as fiber optic SFP-based interfaces or electrical RJ-45 interfaces.

The SFP/UTP combo ports are FE/GbE auto detecting and can accommodate a wide range of Fast Ethernet and Gigabit Ethernet SFP transceivers, allowing service providers to seamlessly connect customers located at different distances from the device.

The network ports support 1:1 or LAG link aggregation. At the physical layer, ETX-204A supports autonegotiation and fault propagation.

The unit can be managed via a local terminal port, via a dedicated out-of-band Ethernet port, or via a user or network port.
Device Options

Several versions of the unit are available, offering different combinations of Ethernet ports and enclosures.

- **Network ports** – Up to two SFP/UTP combo ports that can act as SFP-based fiber optic or 10/100/1000BaseT electrical. Port 2 can be configured as a network or user port.

- **User ports** – Up to four SFP/UTP combo ports that can act as SFP-based fiber optic or 10/100/1000BaseT electrical, or up to five if port 2 is configured as a user port.

The network/user SFP ports are FE/GbE auto detecting.

- **Enclosure** – Metal, 8.4” or 17.4”. For the allowed storage and operating temperature range, refer to *Technical Specifications.*

*Note* The SFP/UTP combo ports operate in SFP-preferred mode. If an SFP is inserted then the interface functions as an SFP-based fiber optic interface, otherwise it functions as an electrical RJ-45 interface.

Applications

ETX-204A delivers Ethernet services as defined by the MEF standards, as well as cellular backhauling.

*Figure 1-1. E-Node B/LTE Backhauling*
Figure 1-2. EPL Service

Figure 1-3. EVPL Service
Features

Service Types
ETX-204A provides port- and flow-based services.

Port-Based Service
In a typical port-based (all-to-one bundling) application ETX-204A receives different services via different user ports (Figure 1-4). This method achieves clearer service separation, it does not require any marking for CoS, and provides straightforward SLA measurement.

Flow-Based Service
In a typical flow-based application different services are assigned to different Ethernet flows received by the same user port (Figure 1-5). This provides a cheaper, more scalable solution, with a possibility of mixing different service types.

Service Level Agreement (SLA) Monitoring
ETX-204A is an effective tool for measuring the Service Level Agreement parameters, such as Frame Delay, Frame Delay Variance (jitter), Frame Loss and Availability.

Flow Classification
The ingress user traffic is mapped to the Ethernet flows using the following list of per-port classification criteria. In the classifications, VLAN refers to the service provider (outer) VLAN, previously referred to as SP-VLAN, while inner VLAN refers to the Customer Entity VLAN, previously referred to as CE-VLAN.

- Port-based (All to one bundling)
ETX-204A supports up to 270 Ethernet flows. Flows are unidirectional.

**Tagging and Marking**

ETX-204A supports several options for marking and tagging.

You can perform the following marking actions:
- Overwrite inner or outer VLAN with a new value
- Overwrite inner or outer VLAN p-bit with a new value.

You can perform the following tagging actions:
- Add (push) outer VLAN, with p-bit value that can be copied from the original value or set to a new value. When you add a new VLAN, the original outer VLAN becomes the inner VLAN.
- Remove (pop) outer VLAN and p-bit. When you remove a VLAN, the inner VLAN becomes the outer VLAN.
- Add (push) inner VLAN, with p-bit value that can be copied from the original value or set to a new value
- Remove (pop) inner VLAN and p-bit.

Only certain combinations of actions on the outer and inner VLAN are allowed. Refer to *Chapter 4* for details on the permitted combinations of actions.
Quality of Service (QoS)

Different service types require different levels of QoS to be provided end-to-end. QoS can be defined per subscriber as well as per flow. QoS has three aspects: rate limitation, traffic shaping, and traffic prioritization.

A single policer can be applied per flow, or a policer aggregate can be applied to a group of up to five flows. The policers operate according to the dual token bucket mechanism (CIR+CBS, EIR+EBS). A special mechanism compensates for Layer 1 headers. Traffic can be limited to the line rate or the data rate.

In addition, ETX-204A features unique p-bit re-marking capabilities that assign color-specific p-bit values to Ethernet frames at network ingress to ensure metering continuity across the Metro Ethernet network. User traffic that was marked “Yellow” according to the CIR/EIR parameters by the device QoS engine is assigned a new p-bit value to signal its status and priority, so that it is dropped first by 802.1Q and 802.1ad network elements in the event of congestion. This is especially useful in color-blind as well as color-aware networks with no “discard eligible” (“yellow”) marking.

![Diagram of Policing and Hierarchical Scheduling/Shaping](image)

Traffic Prioritization

Once traffic is classified to a flow, it can be mapped to Strict (Strict Priority) queues or WFQ (Weighted Fair Queues):

- **Strict.** The data flow set to the highest priority is transmitted first. If this data flow stops, all tasks at lower priorities move up by one priority level. For example, the data flow set to the second-highest priority is then transmitted at the highest priority.

- **WFQ.** Allows different scheduling priorities to statistically multiplex data flows with different shares on the service. Each data flow has a separate FIFO queue. A link transmitting at a data rate \( R \) all non-empty data flows \( N \) are served simultaneously according to the assigned share \( w \) each at an average rate of \( R/(w_1 + w_2 + w_3 + \ldots + w_N) \). If one data flow stops, the remaining data flows each receive a larger share \( w \).
The WRED mechanism ensures that queues are not congested and high-priority traffic is maintained. Each queue is assigned a WRED profile for which you can configure the thresholds and probability to suit your needs.

![Figure 1-7. Queue Structure](image)

Level 0 contains up to 30 queue blocks. Each block has eight queues and its own scheduling (Strict and WFQ). For each queue block in level 0, there is a queue in level 1 that represents the scheduling between the queue blocks in level 0. Flows can be bound to each queue block in level 0.

**Queue Mapping and Marking**

The queue mapping functionality associates the user priorities with queue numbers (CoS).

The marking functionality maps the user priority to the SP priority, according to p-bit/DSCP/IP precedence. The marking can also be done according to color (green and/or yellow) in addition to user priority.

The queue mapping and marking functionality is bound to each flow. For every port, a queue mapping can be done for one type of user priority classification.

**Hierarchical Scheduling and Shaping Per Flow**

Every flow has its own queues and scheduler. ETX-204A supports up to 30 queue blocks per queue group. There are 30 available queues for the network ports and eight available queues for the user ports. Flows that are in the direction user port to network port can be bound to one of 30 queues, and flows that are in the direction network port to user port can be bound to one of eight queues.

**Handling the Traffic Flow**

Table 1-1 provides an overview of the traffic handling stages. Refer also to Figure 1-6 for an overview of policing and hierarchical scheduling/shaping.
**Table 1-1. Traffic Handling Stages**

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<tr>
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<th>Description</th>
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<td>Classifying traffic such as email traffic, content streaming, large document transmission, etc.</td>
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<td>Policer per Flow or Group of Flows</td>
<td>Policing the traffic within the flow or group of flows</td>
</tr>
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<td>CoS/Services</td>
<td>Dividing the services using a 3-bit field, specifying a priority value between 0 (signifying best-effort) and 7 (signifying priority real-time data)</td>
</tr>
<tr>
<td>Queues</td>
<td>‘Storing’ data that is transmitted according to the CoS level specified</td>
</tr>
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<td>Rate Limitation/ Shaping</td>
<td>Ensuring that traffic is shaped to the desired rate</td>
</tr>
<tr>
<td>Scheduling</td>
<td>Scheduling and ‘regulating’ traffic</td>
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<tr>
<td>Editing and Marking</td>
<td>Adding or removing VLAN IDs, as well as marking the priority on the outer VLAN header</td>
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</table>

**Ethernet OAM**

ETX-204A provides OAM to monitor and troubleshoot an Ethernet network and quickly detect failures. Two OAM types are provided:

- **CFM OAM** *(End-to-end OAM)* based on IEEE 802.1ag-D8 and Y.1731 for continuity check, non-intrusive loopback, and performance management.
- **EFM OAM** *(Link OAM)* according to IEEE 802.3-2005 *(formerly IEEE 802.3ah)* for remote management and fault indication, including remote loopback, dying gasp, and MIB parameter retrieval.

**Jumbo Frames and Egress MTU**

ETX-204A supports large frames of up to 12 Kbytes. The egress MTU can be defined per port.

**Link Redundancy**

The unit features network link redundancy in a LAG architecture that supports the LACP protocol according to 802.3-2005. Dual homing technology in a 1:1 architecture allows ETX-204A to be connected to two different upstream devices. Link redundancy is available if two ports are configured as network ports.

**L2CP Handling**

ETX-204A can be configured to pass through Layer-2 control frames *(including other vendors’ L2CP frames)* across the network, to peer-supported protocols *(IEEE 802.3-2005)*, or to discard L2CP frames.
Fault Propagation

The unit provides the following types of fault propagation:

- Network-to-user fault propagation mechanism on the port and OAM CFM levels – When fault propagation is enabled, the user port shuts itself down or an OAM CFM indication of failure is sent when a link failure is detected at the network port or when an OAM CFM indication of failure is received.

- User-to-network fault propagation mechanism on the port and OAM CFM levels – When fault propagation is enabled, the network port shuts itself down or an OAM CFM indication of failure is sent when a link failure is detected at the user port or an OAM CFM indication of failure is received.

Management

ETX-204A can be managed as follows:

- Local management via ASCII terminal connected to the V.24/RS-232 DCE control port.

- Local management via dedicated out of band (OOB) management port.

- Remote management via a network or user port using Telnet SSH or RADview, RAD’s SNMP-based management system. ETX-204A supports the SNMP version 3 entity, providing secure access to the device by authenticating and encrypting packets transmitted over the network.

Management can be performed by creating a flow to/from the host port, thus enabling QoS on the management traffic. Management can be configured to use untagged or tagged frames.

Command Line Interface

You can create databases and scripts of commonly used commands and easily apply them to multiple units in your infrastructure using RAD’s new command line interface.

Security

To ensure client-server communication privacy and correct user authentication, ETX-204A supports the security protocols listed below:

- SNMPv3
- RADIUS (client authentication only)
- SSH for Secure Shell communication session.
**Syslog**

The syslog protocol is a client/server-type protocol, featuring a standard for forwarding log messages in an IP network and supports up to four syslog servers at present. A syslog sender sends a small text message of less than 1024 bytes to the syslog receiver. Syslog messages are sent via UDP in cleartext.

**DHCP Client**

When enabled, the DHCP client of ETX-204A requests an IP address, IP mask, and default gateway from the DHCP server.

**SFTP**

SFTP (Secure File Transfer Protocol) is supported, to provide secure encrypted file transfer using SSH.

**Statistics Collection**

ETX-204A collects performance statistics for the physical layers of the network/user ports, Ethernet flows, OAM CFM, and Radius.

In addition, ETX-204A provides Rmon Statistics based on RFC 2819. In this scenario, ETX-204A can send reports when one of the defined counters rises above or drops below specified thresholds within the sampling period of time. These reports can be sent as SNMP traps to defined network management stations and/or written to the event log.

**Synchronous Ethernet Timing**

The unit’s SyncTo™ suite includes clock recovery using IEEE 1588v2 Precision Timing Protocol, Synchronous Ethernet (Sync-E), and a built-in input/output clock interface. The device can use Sync-E to receive the clock from the network, or can transparently forward via 1588v2 with accurate timestamps.

ETX-204A supports up to two clock sources, which can be the user/network Ethernet ports or the station clock. The timing subsystem automatically selects the best timing source to use for synchronization. The Ethernet ports can transmit SSM messages and distribute (in downstream direction) the quality of the currently selected clock.

**Network Time Protocol**

The Network Time Protocol (NTP) provides the means of synchronizing all managed elements across the network to a reliable clock source provided by multiple servers. ETX-204A supports the client side of the NTP v.3 (RFC 1305).

**Diagnostic Tools**

ETX-204A offers several types of diagnostic procedures:

- Ping test – Check IP connectivity by pinging remote IP hosts.
• Trace route – Quickly trace a route from ETX-204A to any other network device

• Loopback tests:
  - Layer-1 loopback performed at the PHY of the physical ports. When the loopback is active the data forwarded to a port is looped from the Tx path to the Rx path, disrupting the traffic. This loopback cannot pass through Ethernet bridges.
  - Layer-2/Layer-3 loopback on flows with optional MAC and/or IP address swapping. When the loopback is active, ETX-204A can exchange the source and destination MAC/IP addresses of the incoming packets. This loopback passes through Ethernet bridges and routers, and does not disrupt traffic flows that are not being tested.
1.2 What's New in This Version

The following features have been added for Version 2.2:

- Full support for SyncE clock transfer per G.8262 including clock selection mechanism
- 1588v2 end-to-end transparent clock support between all ETH ports
- Color re-marking to change the VLAN priority according to the SLA commitment (packet color)
- Dying gasp for AC/DC power supply – Unit sends IEEE 802.3-2005 dying gasp message and trap when power fails
- RMON support per port (RFC 2819): etherStatsTable and alarm group are supported
- Inband management bridging allows management through user port, Reducing need for separate management port
- Bidirectional fault propagation based on CFM OAM messages
- OAM-EFM (IEEE 802.3-2005) active mode – Power failure at a remote unit is propagated to the management system via the nearest ETX-204A
- Ethernet OAM loopback per IEEE 802.3-2005 on a single segment (point-to-point)
- Temperature monitoring:
  - The temperature of the unit can be displayed
  - Temperature threshold can be configured
  - Abnormal device temperature is reported.
- Double VLAN mapping (CE-VLAN + SP-VLAN) allowed for management flows and flows user - > network
- Commands added: clear-statistics, show version
- OAM CFM dynamic package (higher limits on number of allowed MDs and MAs, dynamic MEP allocation, destination NEs)
- Port being tested indicated by operational status displayed by show summary
- SNTP multiple servers
- Temperature-hardened version available in 8.4” in addition to 17.4” unit
- Trap masking available for all traps
- Trap synchronization
- WRED profiles
- Option for 24V DC power supply.
1.3 Physical Description

*Figure 1-9* shows a 3D view of an 8.4-inch ETX-204A unit and a 17.4-inch ETX-204A unit.

The front panels include network and user Ethernet ports. The 17.4-inch enclosure includes a dual power supply at the front panel as well. On 8.4-inch units, a single power supply is located on the rear panel. The ETX-204A interface connections are described in greater detail in *Chapter 2.*
1.4 Technical Specifications

**Network Interface**  
*Number of Ports*  
Up to 2 SFP/UTP combo ports. The second port can be configured as a network or user port.

*Type*  
Fast or Gigabit Ethernet

*Fiber Optic Specifications and Ranges*  
See SFP Transceivers data sheet

*Electrical Operation Mode*  
10/100/1000 Mbps, full duplex, autonegotiation, MDI/MDIX

**User Interface**  
*Number of Ports*  
Up to 4 SFP/UTP combo ports. If the second network port is configured as a user port, there are five user ports.

*Type*  
Fast or Gigabit Ethernet

*Fiber Optic Specifications and Ranges*  
See SFP Transceivers data sheet

*Electrical Operation Mode*  
10/100/1000 Mbps

Full duplex, autonegotiation, MDI/MDIX

**Station Clock**  
*Bit Rate*  
2.048 MHz/2.048 Mbps (E1)

*Line Code*  
AMI/HDB3

*Nominal Impedance*  
120Ω balanced

75Ω unbalanced (via adapter cable)

*Connector*  
RJ-45 shielded

**Standards Compliance**  
*IEEE*  
802.3, 802.3u, 802.1d, 802.1q, 802.1p, 802.3-2005 (relevant parts), 802.3-2005, 802.1ag-D8

*MEF*  
MEF 6 (E-Line – EPL and EVPL), MEF 9, MEF 10, MEF 14

*ITU-T*  
G.8262, Y.1731

**Ethernet Flows**  
*Number of Flows*  
270

**Management**  
*Local*  
Via dedicated terminal port; V.24/RS-232 DCE; 9.6, 19.2, 38.4, 57.6, 115.2 kbps; DB-9 female connector
**Inband**
Via one of the Ethernet ports

**Out-of-band**
Via dedicated management port

**Indicators**
- **PWR (green)**: Power status
- **TST/ALM (red)**: Alarm and loopback status
- **NET 1, NET 2, USER 3–6 (green)**: Link/activity status of the network/user port
- **Station clock port (green)**: Clock port status

**Power**
- **AC**: 100–240 VAC, 50/60 Hz, single power supply
- **DC**: 48V (-48 to 72 VDC), single power supply
- **24DC**: 24V (20 to 32VDC), single power supply
- **ACR**: 100–240 VAC, 50/60 Hz, dual power supply
- **DCR**: 48V (-48 to 72 VDC), dual power supply
- **24DCR**: 24V (20 to 32VDC), dual power supply

**Power Consumption**: 15W

**Physical**
- **Height**: 43.7 mm (1.7 in)
- **Width**: 215 mm (8.4 in)
- **Depth**: 300 mm (11.8 in)
- **Weight**: 2.4 kg (5.2 lb)

**Physical (ETX-204A/H)**
- **Height**: 43.7 mm (1.7 in)
- **Width**: 440 mm (17.4 in)
- **Depth**: 240 mm (9.5 in)
- **Weight**: 3.1 kg (6.8 lb)

**Environment**
- **Temperature**: ETX-204A: 0°C to 50°C (32°F to 122°F)
  ETX-204A/H: -20 to 65°C (-4 to 149°F)
- **Humidity**: Up to 90%, non-condensing
Chapter 2

Installation and Setup

This chapter describes installation and setup procedures for the ETX-204A unit. After installing the unit, refer to Chapter 3 for the operating instructions. If a problem is encountered, refer to Chapter 5 for test and diagnostic instructions.

Internal settings, adjustment, maintenance, and repairs may be performed only by a skilled technician who is aware of the hazards involved.

Always observe standard safety precautions during installation, operation, and maintenance of this product.

2.1 Site Requirements and Prerequisites

The ETX-204A device is intended for installation on desktop, 19" racks, and walls. The following mounting kits are available from RAD:

- RM-35 for mounting one or two regular ETX-204A units in a 19" rack
- RM-34 for mounting one temperature-hardened ETX-204A unit in a 19" rack
- WM-35 for mounting one regular ETX-204A unit on a wall
- WM-34 for mounting one temperature-hardened ETX-204A unit on a wall.

AC-powered units should be installed within 1.5 m (5 ft) of an easily-accessible grounded AC outlet capable of furnishing the voltage in accordance with the nominal supply voltage.

DC-powered units require a -48 VDC power source, which must be adequately isolated from the main supply.

Refer also to the sections describing connections of AC and DC mains at the beginning of the manual.

Allow at least 90 cm (36 in) of frontal clearance for operating and maintenance accessibility. Allow at least 10 cm (4 in) clearance at the rear of the unit for signal lines and interface cables.

The ambient operating temperature of ETX-204A is 0 to 50°C (32 to 122°F) and the ambient temperature range of ETX-204A/H is -40 to 65°C (-40 to 149°F), both at a relative humidity of up to 90%, non-condensing.
2.2 Package Contents

The ETX-204A package includes the following items:

- One ETX-204A unit
- Matching SFP module(s) (if ordered)
- AC power cord or DC connection kit
- Optional accessories included if ordered:
  - CBL-DB9F-DB9M-STR, control port cable
  - RM-35 rack-mount kit for regular ETX-204A unit or RM-34 rack-mount kit for temperature-hardened ETX-204A unit (if ordered)
  - WM-35 wall-mount kit for regular ETX-204A unit or WM-34 wall-mount kit for temperature-hardened ETX-204A unit (if ordered).

2.3 Mounting the Unit

ETX-204A is designed for installation as a desktop unit. It can also be mounted in a 19" rack or on a wall.

- For rack mounting instructions, refer to the associated installation kit manual.
- For wall mounting instructions, refer to the associated installation kit manual.
- If ETX-204A is to be used as a desktop unit, place and secure the unit on a stable, non-movable surface.

Refer to the clearance and temperature requirements in Site Requirements and Prerequisites.

2.4 Installing SFP Modules

ETX-204A uses SFP modules with LC fiber optic connectors. The unit has SFP/UTP combo ports that operate as fiber optic SFP-based interfaces when SFPs are inserted.

Third-party SFP optical transceivers must be agency-approved, complying with the local laser safety regulations for Class I laser equipment.

⚠️ Warning

- To install the SFP modules:
  - Lock the wire latch of each SFP module by lifting it up until it clicks into place, as illustrated in Figure 2-1.

Note

Some SFP models have a plastic door instead of a wire latch.
1. Carefully remove the dust covers from the SFP slot.

2. Insert the rear end of SFP into the socket, and push slowly backwards to mate the connectors until the SFP clicks into place. If you feel resistance before the connectors are fully mated, retract the SFP using the wire latch as a pulling handle, and then repeat the procedure.

3. Remove the protective rubber caps from the SFP modules.

To remove the SFP module:

1. Disconnect the fiber optic cables from the SFP module.

2. Unlock the wire latch by lowering it downwards (as opposed to locking).

3. Hold the wire latch and pull the SFP module out of the Ethernet port.

Caution

Do not remove the SFP while the fiber optic cables are still connected, as this may result in mechanical and/or functional damage. For example the SFP module clip on the module and in the socket may be chipped (mechanical issue) or the redundancy network port switching process may not be properly completed (functional issue).

2.5 Connecting to Ethernet Equipment

ETX-204A is connected to the Ethernet equipment via the SFP portion of the combo port designated GbE or the UTP portion designated 10/100/1000BT according to the relevant hardware configuration. Refer to Appendix A for the RJ-45 connector pinout. The instructions below are illustrated using a sample configuration with a regular (8.4”) ETX-204A enclosure.

To connect to the Ethernet equipment with fiber optic interface:

- Connect ETX-204A to the Ethernet equipment using a standard fiber optic cable terminated with an LC connector.
2.6 Connecting to External Clock Source

ETX-204A is connected to an external clock source via a dedicated station clock port, an RJ-45 connector designated EXT-CLK. The station clock port can be connected to a balanced or unbalanced clock source. Refer to Appendix A for the connector pinout.
ETX-204A Ver. 2.2
Connecting to ASCII Terminal

ETX-204A is connected to an ASCII terminal via a 9-pin D-type female connector designated CONTROL. Refer to Appendix A for the connector pinout.

Figure 2-5. CONTROL Connector

To connect to an ASCII terminal:
1. Connect the male 9-pin D-type connector of CBL-DB9F-DB9M-STR straight cable available from RAD to the CONTROL connector.
2. Connect the other end of the CBL-DB9F-DB9M-STR cable to an ASCII terminal.

Caution
Terminal cables must have a frame ground connection. Use ungrounded cables when connecting a supervisory terminal to a DC-powered unit with floating

Connecting to a Balanced Clock Source

To connect ETX-204A to a balanced clock source:
- Connect the station clock port to the clock source using a shielded standard UTP cable terminated with an RJ-45 connector.

Connecting to an Unbalanced Clock Source

To connect to equipment with an unbalanced interface, it is necessary to convert the RJ-45 connector to a pair of BNC female connectors, in order to receive the clock signal via one of the connectors and transmit the signal via the other.

RAD offers a suitable adapter cable, CBL-RJ45/2BNC/E1/X, with an RJ-45 connector at one end and two BNC female connectors at the other end. For this particular cable, the receiving BNC connector is green and the transmitting BNC connector is red.

To connect ETX-204A to an unbalanced clock source:
1. Connect the RJ-45 connector of the adapter cable to the station clock port.
2. Connect the external clock source to the receiving BNC connector of the adapter cable.
3. Connect the transmitting BNC connector of the adapter cable to the equipment that should receive the clock signal.
ground. Using improper terminal cable may result in damage to the supervisory terminal port.

## 2.8 Connecting to Management Port

ETX-204A is connected to remote network management stations via the dedicated Ethernet management port, an 8-pin RJ-45 connector designated MNG-ETH. Refer to Appendix A for the connector pinout.

*To connect to an NMS:*

- Connect ETX-204A to an Ethernet switch.

**Note**

*In order to provide protection against surges, use shielded cables when connecting to the MNG-ETH port.*

![Figure 2-6: Ethernet Management Connector](image)
2.9 Connecting to Power

Regular units are available with AC or DC power supply. For the exact specs, refer to Technical Specifications in Chapter 1.

Before connecting or disconnecting any cable, the protective ground terminals of this unit must be connected to the protective ground conductor of the mains (AC or DC) power cord. If you are using an extension cord (power cable) make sure it is grounded as well.

Any interruption of the protective (grounding) conductor (inside or outside the instrument) or disconnecting of the protective ground terminal can make this unit dangerous. Intentional interruption is prohibited.

Refer also to the sections describing connections of AC and DC power at the beginning of the manual.

Connecting to AC Power

AC power should be supplied via a 1.5 m (5 ft) standard power cable terminated by a standard 3-prong socket. A cable is provided with the unit.

To connect AC power:

1. Connect the power cable to the power connector on the ETX-204A rear panel.
2. Connect the power cable to the mains outlet.
   The unit turns on automatically once connected to the mains.

Connecting to DC Power

Terminal block connectors with adapters are available for DC power supplies.

To connect DC power:

- Refer to the Terminal Block Connector DC Power Supply Connection supplement for instructions on wiring the DC adapters. This supplement can be found at the end of this manual.

Note The power connectors of regular units are located at the rear while the power connectors of temperature-hardened units are located at the front.
Chapter 3

Operation

This chapter:

• Explains power-on and power-off procedures
• Provides a detailed description of the front panel controls and indicators and their functions
• Lists alternative methods of the product configuration, explaining the ASCII terminal management application and CLI (Command Line Interface).

For a detailed explanation of parameters, see Chapter 4.

3.1 Turning On the Unit

➢ To turn on ETX-204A:
  • Connect the power cord to the mains.
    The PWR indicator lights up and remains lit as long as ETX-204A receives power.

ETX-204A requires no operator attention once installed, with the exception of occasional monitoring of front panel indicators. Intervention is only required when ETX-204A must be configured to its operational requirements, or diagnostic tests are performed.
3.2 Indicators

The unit’s LEDs are located on the front panel (see Figure 3-1). Table 3-1 lists the functions of the ETX-204A LED indicators.

![Figure 3-1. Front Panel](image)

**Table 3-1. LEDs and Controls**

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>PWR</td>
<td>Green LED</td>
<td>ON – Power is ON</td>
</tr>
<tr>
<td>TST/ALM</td>
<td>Red LED</td>
<td>ON – One of the Ethernet links is down</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blinking – Diagnostic loopback is active</td>
</tr>
<tr>
<td>LINK/ACT 1, 2, 3, 4, 5, 6</td>
<td>Green LEDs</td>
<td>ON – Corresponding Ethernet link is OK</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blinking – Data is being transmitted or received on the corresponding Ethernet link</td>
</tr>
<tr>
<td>LINK/ACT EXT-CLK</td>
<td>Green LEDs</td>
<td>ON – Station clock port is connected</td>
</tr>
<tr>
<td>LINK/ACT MNG-ETH</td>
<td>Green LEDs</td>
<td>ON – Management Ethernet link is OK</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blinking – Data is being transmitted or received on the management Ethernet link</td>
</tr>
</tbody>
</table>

*Note* The number of network ports and user ports and the corresponding number of LEDs depend on the hardware configuration.

3.3 Configuration and Management Alternatives

Once installed, there are no special operating procedures for ETX-204A. The unit operates automatically after it has started up. The unit’s operational status can be constantly monitored.

ETX-204A can be managed via the following ports and applications:

- Local management via an ASCII terminal connected to the RS-232 port. Usually, preliminary configuration of the system parameters is performed via ASCII terminal. Once the ETX-204A host IP parameters are set, you can access it via Telnet SSH or SNMP for further configuration.
- Remote inband management via user or network port or out-of-band via the dedicated management port. Remote management is via Telnet or SNMP.
Alternatively, you can manage ETX-204A via a third-party SNMP-based NMS. Refer to Chapter 5 for a trap list.

The following functions are supported by the ETX-204A management software:

- Viewing system information
- Modifying configuration and mode of operation, including setting system default values and resetting the unit
- Monitoring ETX-204A performance
- Initiating connectivity tests
- Uploading and downloading software and configuration files.

**Working with Terminal**

ETX-204A has a V.24/RS-232 asynchronous DCE port, designated CONTROL and terminated in a 9-pin D-type female connector. The control port continuously monitors the incoming data stream and immediately responds to any input string received through this port.

➢ **To start a terminal control session:**

1. Make sure all ETX-204A cables and connectors are properly connected.
2. Connect ETX-204A to a PC equipped with an ASCII terminal emulation application (for example, HyperTerminal). Refer to Chapter 2 for details on connecting to the control port.
3. Start the PC terminal emulation (in Windows XP: Select Start > All Programs > Accessories > Communications > HyperTerminal to create a new terminal connection).

   The HyperTerminal application opens, and the Connection Description dialog box is displayed.
4. Enter a name for the connection.
5. Select an icon to represent the terminal connection, or leave the default icon selected.
6. Click <OK>.

The Connect To dialog box is displayed.
7. Select a PC COM port to be used to communicate with ETX-204A, and click <OK>.

The COM Properties dialog box is displayed.

![COM1 Properties Dialog Box](image)

8. Configure the communication port parameters as follows:
   - Bits per second: 9,600
   - Data bits: 8
   - Parity: None
   - Stop bits: 1
   - Flow control: None.

9. Click <OK> to close the COM Properties dialog box.

HyperTerminal is now ready for communication with the unit.

**Note**

*It is not necessary to set the emulation type.*

10. Power-up ETX-204A.

ETX-204A boots up. When the startup process is completed, you are prompted to press <ENTER> to receive the login prompt.
11. Press <ENTER> until you receive the login prompt. Refer to Logging In for details on logging in.
Logging In

To prevent unauthorized modification of the operating parameters, ETX-204A supports two access levels:

- **Superuser** can perform all the activities supported by the ETX-204A management facility, including defining new users.

- **User** access rights (**full control** or **read only**) are defined by the superuser. Users are not allowed to create new users.

**Note**

*It is recommended to change default passwords to prevent unauthorized access to the unit.*

➢ To enter as superuser:

1. At the User prompt (user>), Enter `su` and press `<Enter>`. The Password prompt (password>) appears.

2. Enter `1234` as password and press `<Enter>`. The base prompt `ETX-204A#` appears.

**Superuser** allows you to configure all parameters of ETX-204A and to change the `su` and `user` passwords.
To enter as User:

1. Enter **user** as user name and press `<Enter>`.  
2. Enter **1234** as password and press `<Enter>`.  

The base prompt **ETX-204A#** appears.

**Using the CLI**

The CLI consists of commands organized in a tree structure, starting at the base prompt **ETX-204A#**. The base prompt is the device name, which can be configured in the system level (refer to Configuring Device Information in Chapter 4). By default the device name is ETX-204A.

Commands that are not global are available only at their specific tree location. To find out what commands are available at the current location, type `?`. For a list of the commands and their levels, refer to Command Tree.

To navigate down the tree, type the name of the next level. The prompt then reflects the new location, followed by `#`. To navigate up, use the global command `exit`. To navigate all the way up to the root, type `exit all`.

At the prompt, one or more level names separated by a space can be typed, followed (or not) by a command. If only level names are typed, navigation is performed and the prompt changes to reflect the current location in the tree. If the level names are followed by a command, the command is executed, but no navigation is performed and the prompt remains unchanged.

**Note**

To use show commands without navigating, type `show` followed by the level name(s) followed by the rest of the show command.

In the following example, the levels and command were typed together and therefore no navigation was performed, so the prompt has not changed.

| ETX-204A# | configure port ethernet 1 loopback local  
| ETX-204A# | show configure port ethernet 1 loopback  
| Loopback : Local Forever  
| ETX-204A# |

*Figure 3-7. Commands Without Level Navigation*
In the following example, the levels were typed separately and the navigation is reflected by the changing prompt.

```
ETX-204A#
ETX-204A# configure
ETX-204A>config# port
ETX-204A>config>port# ethernet 1
ETX-204A>config>port>eth(1)# loopback local
ETX-204A>config>port>eth(1)# show loopback
Loopback : Local Forever
ETX-204A>config>port>eth(1)#
```

**Figure 3-8. Commands With Level Navigation**

**Note**

*Level names are abbreviated in the prompt.*

You can type only as many letters of the level or command as required by the system to identify the level or command, for example you can enter `config manag` to navigate to the `management` level.

In addition to being the default prompt, the `#` symbol also indicates a static entity (such as a port) or already configured entity. The `$` symbol indicates a new dynamic entity (such as a flow) that takes several commands to configure. The dynamic entity is created as inactive. After the configuration is completed, it is activated by using the `no shutdown` command, as shown in the following example.

```
ETX-204A#
ETX-204A# configure flows flow flow1
ETX-204A>config>flows>flow(flow1)$ ingress-port ethernet 3
ETX-204A>config>flows>flow(flow1)$ egress-port ethernet 1 queue 1 block 0/1
ETX-204A>config>flows>flow(flow1)$ classifier Classifier1
ETX-204A>config>flows>flow(flow1)$ no shutdown
ETX-204A>config>flows>flow(flow1)$exit
ETX-204A>config>flows#
```

**Figure 3-9. Creating and Activating Flow**

The `shutdown` command is also used to deactivate/disable a hardware element (such as a port), while `no shutdown` enables/activates it.

CLI commands have the following basic format:

```
command [parameter]{ value1 | value2 | ... | valuen } [ optional parameter <value> ]
```

where:

- `{} ` Indicates that one of the values must be selected
- `[ ]` Indicates an optional parameter
- `<>` Indicates a value to be typed by user according to parameter requirements
The following keys are available at any time:

- `?` Lists all commands available at the current level
- `<Tab>` Command autocomplete
- `↑` Displays the previous command
- `↓` Displays the next command
- `<Backspace>` Deletes character
- `<Ctrl-C>` Interrupts current command
- `<Ctrl-Z>` Logs out

The following commands are available at any level:

- `echo [text-to-echo]` Echoes the specified text
- `exec <file-name> [echo]` Executes a file, optionally echoing the commands
- `help [hotkeys] [globals]` Displays general help, or optionally just the hotkeys and/or global commands
- `history` Displays the command history for the current session (by default the history contains the last 10 commands)
- `info [detail]` Displays information on the current configuration
- `tree [detail]` Displays all lower command levels and commands accessible from the current context level

CLI commands can be gathered into text files called scripts. They can be created using a text editor, by recording the user commands or by saving the current configuration. The scripts can be imported from and exported to RAD devices via file transfer protocols.

**Command Tree**

At the CLI root, the following categories are available:

- `configure`
- `file`
- `admin`
- `root`
- `global-commands`

Each category is detailed in the tables below.
### Table 3-2. Commands in the configure category

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>configure</td>
<td>Enter configure level</td>
</tr>
<tr>
<td></td>
<td>chassis</td>
</tr>
<tr>
<td></td>
<td>show environment</td>
</tr>
<tr>
<td></td>
<td>temperature-threshold</td>
</tr>
<tr>
<td></td>
<td>system</td>
</tr>
<tr>
<td></td>
<td>name</td>
</tr>
<tr>
<td></td>
<td>contact</td>
</tr>
<tr>
<td></td>
<td>location</td>
</tr>
<tr>
<td></td>
<td>tftp</td>
</tr>
<tr>
<td></td>
<td>clear-event-log</td>
</tr>
<tr>
<td></td>
<td>clear-cpu-utilization</td>
</tr>
<tr>
<td></td>
<td>show device-information</td>
</tr>
<tr>
<td></td>
<td>show inventory-table</td>
</tr>
<tr>
<td></td>
<td>show event-log</td>
</tr>
<tr>
<td></td>
<td>show time</td>
</tr>
<tr>
<td></td>
<td>show cpu-utilization</td>
</tr>
<tr>
<td></td>
<td>show buffers</td>
</tr>
<tr>
<td></td>
<td>inventory</td>
</tr>
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<td></td>
</tr>
</tbody>
</table>
### Command Description

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>syslog</td>
<td>Configure syslog entities</td>
</tr>
<tr>
<td>address</td>
<td>Configure target address of syslog server</td>
</tr>
<tr>
<td>shutdown</td>
<td>Enable/disable logging of syslog entity</td>
</tr>
<tr>
<td>facility</td>
<td>Configure facility of device</td>
</tr>
<tr>
<td>severity-level</td>
<td>Configure severity level of device</td>
</tr>
<tr>
<td>port</td>
<td>Configure UDP port number</td>
</tr>
<tr>
<td>show statistics</td>
<td>Display syslog statistics</td>
</tr>
<tr>
<td>clock</td>
<td>Enter clock level</td>
</tr>
<tr>
<td>station</td>
<td>Enter station level (station is an E1/2MHz source for synchronization)</td>
</tr>
<tr>
<td>shutdown</td>
<td>Enable or disable station clock</td>
</tr>
<tr>
<td>tx-clock-source</td>
<td>Set station timing to be derived from internal system or E1/2MHz external source</td>
</tr>
<tr>
<td>interface-type</td>
<td>Set interface type</td>
</tr>
<tr>
<td>line-code</td>
<td>Set line code</td>
</tr>
<tr>
<td>rx-sensitivity</td>
<td>Set receiver sensitivity</td>
</tr>
<tr>
<td>domain</td>
<td>Enter domain level</td>
</tr>
<tr>
<td>sync-network-type</td>
<td>Set synchronization network type</td>
</tr>
<tr>
<td>quality</td>
<td>Set quality of clock</td>
</tr>
<tr>
<td>max-frequency-deviation</td>
<td>[Not supported in Ver. 2.2]</td>
</tr>
<tr>
<td>mode</td>
<td>Set clock mode</td>
</tr>
<tr>
<td>force</td>
<td>Force selection of a particular clock source</td>
</tr>
<tr>
<td>manual</td>
<td>Manually select a particular clock source</td>
</tr>
<tr>
<td>clear</td>
<td>Cancel previously issued force or manual command</td>
</tr>
<tr>
<td>clear-statistics</td>
<td>Clear statistics for clock sources</td>
</tr>
<tr>
<td>source</td>
<td>Enter clock source level</td>
</tr>
<tr>
<td>priority</td>
<td>Set priority</td>
</tr>
<tr>
<td>quality-level</td>
<td>Set quality level</td>
</tr>
<tr>
<td>wait-to-restore</td>
<td>Define amount of time that a previously failed synchronization source must be fault free in order to be considered available</td>
</tr>
<tr>
<td>hold-off</td>
<td>Define amount of time that signal failure must be active before it is transmitted</td>
</tr>
<tr>
<td>clear-wait-to-restore</td>
<td>Cancel the wait-to-restore timer of a clock source</td>
</tr>
<tr>
<td>show status</td>
<td>Display status</td>
</tr>
<tr>
<td>Command</td>
<td>Description</td>
</tr>
<tr>
<td>------------------------------</td>
<td>-------------------------------------------------------</td>
</tr>
<tr>
<td>show statistics</td>
<td>Display statistics</td>
</tr>
<tr>
<td>show status</td>
<td>Display status</td>
</tr>
<tr>
<td>management</td>
<td>Configure management parameters</td>
</tr>
<tr>
<td>user</td>
<td>Create/delete user</td>
</tr>
<tr>
<td>show users</td>
<td>Display users</td>
</tr>
<tr>
<td>host</td>
<td>Configure host parameters</td>
</tr>
<tr>
<td>dhcp</td>
<td>Enable or disable DHCP</td>
</tr>
<tr>
<td>ip-address</td>
<td>Configure host IP address</td>
</tr>
<tr>
<td>default-gateway</td>
<td>Configure IP address of default gateway</td>
</tr>
<tr>
<td>arp-timeout</td>
<td>Configure ARP timeout</td>
</tr>
<tr>
<td>show status</td>
<td>Display host status</td>
</tr>
<tr>
<td>snmp</td>
<td>Configure SNMP parameters</td>
</tr>
<tr>
<td>community</td>
<td>Configure SNMP read, write, and trap community</td>
</tr>
<tr>
<td>trap-mask</td>
<td>Mask specific alarm traps to all network managers</td>
</tr>
<tr>
<td>trap-delay</td>
<td>Configure delay for sending trap</td>
</tr>
<tr>
<td>snmp-engine-id-string</td>
<td>Text, administratively assigned. Maximum remaining length 27</td>
</tr>
<tr>
<td>snmpv3</td>
<td>Enable or disable SNMPv3</td>
</tr>
<tr>
<td>show snmpv3 information</td>
<td>Display SNMPv3 information</td>
</tr>
<tr>
<td>user</td>
<td>Configure SNMPv3 user</td>
</tr>
<tr>
<td>shutdown</td>
<td>Activate or deactivate SNMPv3 user</td>
</tr>
<tr>
<td>authentication</td>
<td>Configure authentication for SNMPv3 user</td>
</tr>
<tr>
<td>privacy</td>
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<tr>
<td>clear-statistics</td>
<td>Clear statistics for the flow</td>
</tr>
<tr>
<td>show test</td>
<td>Display flow test status</td>
</tr>
<tr>
<td>protection</td>
<td>Configure link protection</td>
</tr>
<tr>
<td>ethernet-group</td>
<td>Define Ethernet group</td>
</tr>
</tbody>
</table>
### Command Description

- **bind**: Add/remove protection and working ports
- **shutdown**: Activate or deactivate Ethernet group
- **oper-mode**: Define protection mode as 1-to-1 or manual
- **revertive**: Define whether port recovery mode is revertive (traffic switched back to the primary port after it recovers)
- **wait-to-restore**: Define time between recovery and resumption of transmission
- **tx-down-duration-upon-flip**: Define period of time that failed link stops transmitting to report the failure
- **force-active-port**: Define if port is forced to be active
- **show status**: Display protection status
- **terminal**: Configure control port parameters
- **baud-rate**: Define control port data rate
- **timeout**: Define security timeout
- **length**: Define number of rows to display

### Table 3-3. Commands in the file category

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>file</td>
<td>Enter file level</td>
</tr>
<tr>
<td>copy</td>
<td>Copy files</td>
</tr>
<tr>
<td>swap</td>
<td>Swap files</td>
</tr>
<tr>
<td>delete</td>
<td>Delete file</td>
</tr>
<tr>
<td>dir</td>
<td>Displays files in base directory</td>
</tr>
<tr>
<td>show version</td>
<td>Display active, main, and backup software file versions, dates, and times</td>
</tr>
</tbody>
</table>

### Table 3-4. Commands in the admin category

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>admin</td>
<td>Administrative commands</td>
</tr>
<tr>
<td>reboot</td>
<td>Restart the device</td>
</tr>
<tr>
<td>factory-default</td>
<td>Reset the device to factory defaults</td>
</tr>
<tr>
<td>user-default</td>
<td>Reset the device to user defaults</td>
</tr>
</tbody>
</table>
### Table 3-5. Commands in the root category

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>clear-statistics</td>
<td>Clear statistics for Ethernet ports, flows, and OAM services</td>
</tr>
</tbody>
</table>

### Table 3-6. Commands in the global-commands category

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>global-commands</td>
<td>Global commands can be typed at any level</td>
</tr>
<tr>
<td></td>
<td>exit Return to previous level in the commands hierarchy</td>
</tr>
<tr>
<td></td>
<td>tree Display the commands hierarchy from current context</td>
</tr>
<tr>
<td></td>
<td>help Display help</td>
</tr>
<tr>
<td></td>
<td>history Display commands history</td>
</tr>
<tr>
<td></td>
<td>echo Echo the text that is typed in</td>
</tr>
<tr>
<td></td>
<td>exec Execute a file</td>
</tr>
<tr>
<td></td>
<td>logout Log out this system</td>
</tr>
<tr>
<td></td>
<td>info Print configuration info</td>
</tr>
<tr>
<td></td>
<td>ping Verify the reachability of a remote host</td>
</tr>
<tr>
<td></td>
<td>save Save user configuration</td>
</tr>
<tr>
<td></td>
<td>trace-route Determine the route to a destination address</td>
</tr>
</tbody>
</table>

### Working with RADview

RADview-EMS is a user-friendly and powerful SNMP-based element management system (EMS), used for planning, provisioning and managing heterogeneous networks. RADview-EMS provides a dedicated graphical user interface (GUI) for monitoring RAD products via their SNMP agents. RADview-EMS for ETX-204A is bundled in the RADview-EMS package for PC (Windows-based) or Unix.

For more details about this network management software, and for detailed instructions on how to install, set up, and use RADview, contact your local RAD partner or refer to the RADview-EMS User's Manual at the RAD website.
3.4 Startup

Configuration Files

The following files contain configuration settings:

- **factory-default** – Contains the manufacturer default settings
- **running-config** – Contains the current configuration that is different from the default configuration
- **startup-config** – Contains saved non-default user configuration. This file is not automatically created. You can use the `save` or `copy` command to create it.
- **user-default-config** – Contains default user configuration. This file is not automatically created. You can use the `copy` command to create it.
- **main-sw** – Contains the active software image.

Refer to Chapter 4 for details on file operations.

---

**Note**

The `save` command is used to save the user configuration. Some commands that reset the device also erase the saved user configuration by copying another file to it before the reset. Refer to Figure 3-10 for details.

---

![Figure 3-10. Commands That Reset Device/Copy Configuration Files](image)

Loading Sequence

At startup, the device boots from the `startup-config` file, or the `user-default` file, or the `factory-default` file, in the sequence shown in Figure 3-11. If none of these files exist, the device boots using hard-coded defaults.

If the loading of `startup-config` or the `user-default` file fails, the file is deleted, the loading failure event is written in the event log, and the device reboots. After the reboot the device again attempts to load configuration files in the sequence shown in Figure 3-11.

To display the parameter values after startup, use the `info [detail]` command.
3.5 Using a Custom Configuration File

In large deployments, often a central network administrator sends configuration scripts to the remote locations and all that remains for the local technician to do is to replace the IP address in the script or other similar minor changes (using any text editor), and then download the file to the device.

To download the configuration file, use the copy command, as explained in Chapter 4. It is recommended to copy the file to both startup-config and the user-default file.

After downloading the configuration file, the unit must be reset in order to execute the file. After the unit completes its startup, the custom configuration is complete.

Figure 3-11. Loading Sequence
3.6 Turning Off the Unit

➢ To power off the unit:
  • Remove the power cord from the power source.
Chapter 4

Configuration

This chapter lists the commands used to configure ETX-204A and explains their parameters.

This chapter includes the following sections:

- Management Connectivity
- Ethernet Ports
- Network Interface Redundancy
- Quality of Service (QoS)
- Flows
- Ethernet OAM
- Clock Selection
- Fault Propagation
- Date and Time
- Syslog
- Configuring Temperature Threshold
- Clearing Device Statistics
- Working with the Inventory
- Displaying Environment
- Displaying Software Versions
- Displaying CPU and Memory Utilization
- File Operations
- Saving Configuration
- Reset.

For a list of commands and their context, refer to Chapter 3.

Note

When you enter a level that causes the creation of a dynamic entity, $ is displayed at the end of the prompt until you exit the entity level. The next time you enter the entity level, # is displayed at the end of the prompt. For the purposes of illustration, # is usually shown at the end of the prompts in this chapter. Examples of dynamic entities include QoS profiles and OAM CFM entities.
4.1 Management Connectivity

Usually, initial configuration of the management parameters is performed via ASCII terminal. Once the ETX-204A host IP parameters have been set and the management flows to/from the host have been defined, it is possible to access it via Telnet or RADview for operation configuration. Perform the following steps in order to configure ETX-204A for management:

- Configuring the Host IP Settings
- Configuring Device Information
- Configuring for SNMP Management
- Controlling Management Access
- Configuring User Access.

Configuring the Host IP Settings

ETX-204A can be managed by a network management station, located on the LAN and connected to one of the unit’s Ethernet ports. In order to establish a proper connection, it is necessary to configure the host IP address, the subnet mask and a default gateway. In addition, for management you must define flows between the host and network port with the following conditions (see Configuring Management Flows for an example of defining management flows):

- The flow to the host should use classification untagged, or tagged with the management VLAN if applicable
- The flow from the host should forward all traffic (classification “all”), with push action of the management VLAN and priority if applicable
- The flows to/from the host can also use classification VLAN + inner VLAN.

You can obtain the host IP parameters via DHCP if enabled, otherwise you can configure the host IP parameters manually.

Working with DHCP

To facilitate integration of a new device into a DHCP IP network, if DHCP is enabled then ETX-204A requests IP host parameters from the DHCP server upon booting up. ETX-204A is shipped with the DHCP client enabled.

To enable IP connectivity in DHCP mode, make sure that the relevant port has been made accessible.

Disabling DHCP

To disable the DHCP client:

1. Navigate to configure management host 1.

   The config>mngmnt>host(1)# prompt is displayed.

Note When you navigate to the host context you provide a host index that is always 1.
2. Enter `no dhcp`.

   ETX-204A resets the host IP address to `0.0.0.0`, while preserving the IP mask and default gateway values. Telnet/SSH connections to ETX-204A are terminated. The unit is not accessible via Internet until you manually configure an IP address and default gateway, unless you entered a default IP address previously with the `dhcp` command.

**Enabling DHCP**

To enable DHCP, remove the defined host IP address and default gateway, then enable DHCP:

- To enable the DHCP client and acquire IP parameters:
  1. Navigate to `configure management host 1`.

     The `config>mngmnt>host(1)#` prompt is displayed.

  2. Enter the following commands:

     - `no ip-address`
     - `no default-gateway`.

     The IP address and mask are set to `0.0.0.0`, and the default gateway is removed.


     ETX-204A starts broadcasting requests for an IP address. When the DHCP server is found, ETX-204A receives from it all necessary host IP parameters. If specified, a default IP address is associated with ETX-204A in the event the DHCP server is unavailable.

     **Note**  
     *When the IP address lease is about to expire, the DHCP client automatically requests a lease extension.*

**Setting Host IP Parameters**

You can enter the host IP address and default gateway manually when DHCP is disabled. You can also specify the ARP timeout:

- To define the IP parameters manually:
  1. Navigate to `configure management host 1`.

     The `config>mngmnt>host(1)#` prompt is displayed.

     **Note**  
     *When you navigate to the host context, you provide a host index that is always 1.*

  2. Enter all necessary commands according to the tasks listed below.
### Configuring Device Information

The ETX-204A management software allows you to assign a name to the unit, add its description, specify its location to distinguish it from the other devices installed in your system, and assign a contact person.

> To configure device information:

1. Navigate to `configure system`.
   - The `config>system#` prompt is displayed.

2. Enter the necessary commands according to the tasks listed below.

<table>
<thead>
<tr>
<th>Task</th>
<th>Command</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assigning device name</td>
<td><code>name &lt;device-name&gt;</code></td>
<td>The device name has unlimited length, but if you enter a name with more than 20 characters, the prompt displays only the first 20 characters followed by 0. For example, this command that defines a 25-character device name: ETX-204A# config sys name ETXETXETXETXETX-204A12345 results in this prompt that shows the first 20 characters, followed by 0: ETXETXETXETXETX-204A0#</td>
</tr>
<tr>
<td>Specifying location</td>
<td><code>location &lt;device-location&gt;</code></td>
<td></td>
</tr>
<tr>
<td>Specifying contact person</td>
<td><code>contact &lt;contact-person&gt;</code></td>
<td></td>
</tr>
<tr>
<td>Displaying device information, MAC address, and amount of time device has been running</td>
<td><code>show device-information</code></td>
<td></td>
</tr>
</tbody>
</table>
For example:

➢ To configure device information:
  • Device name – ETX-204A-HAC
  • Location – floor-8
  • Contact – Engineer-1.

```
ETX-204A# configure system
ETX-204A>config>system# name ETX-204A-HAC
ETX-204A-HAC >config>system# location floor-8
ETX-204A-HAC >config>system# contact Engineer-1
ETX-204A-HAC >config>system# show device-information
```

<table>
<thead>
<tr>
<th>Description</th>
<th>ETH NTU: Boot: 1.10, Hw: 0.0, Main Sw: 2.2, Back-up Sw: 2.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>ETX-204A-HAC</td>
</tr>
<tr>
<td>Location</td>
<td>floor-8</td>
</tr>
<tr>
<td>Contact</td>
<td>Engineer-1</td>
</tr>
<tr>
<td>MAC Address</td>
<td>00-20-D2-30-CC-9D</td>
</tr>
<tr>
<td>Sysup Time</td>
<td>000:00:04:10</td>
</tr>
</tbody>
</table>

**Configuring for SNMP Management**

If you intend to manage ETX-204A via SNMPv1, you have to specify the SNMP read, write, and trap communities (SNMPv3 must be disabled). If you wish to use SNMPv3, you have to ensure that it is enabled, then specify the necessary parameters.

Refer to Setting SNMP Communities for details on setting the communities, or to Configuring SNMPv3 for details on setting SNMPv3 parameters.

**Note**

To check if SNMPv3 is enabled or disabled, navigate to `configure management snmp` and type `info detail`, then locate the line in the output that contains either `snmpv3` (SNMPv3 is enabled) or `no snmpv3` (SNMPv3 is not enabled). To enable or disable SNMPv3, refer to Enabling or Disabling SNMPv3.

**SNMP Default Configuration**

The following is the default configuration of the SNMP parameters:

- SNMPv3 not enabled
- SNMP engine ID set to device MAC address
- Read community = "public"
- Write community = "private"
- Trap community = "public"
- Following traps masked: link-up-down, login-successful-failed
- Following trap not masked: power-failure
- No delay in sending traps.
**Enabling or Disabling SNMPv3**

➢ **To enable SNMPv3:**

1. Navigate to `configure management snmp`. The `config>mngmnt>snmp#` prompt is displayed.

2. Type `snmpv3`.

   SNMPv3 is enabled, and SNMPv3 commands are available. The manager list is deleted.

**Note** *If the SNMP management access is set to managers only, the ETX-204A device is not accessible from NMS stations due to the manager list being deleted. To prevent this, you should change the SNMP management access to allow access by all before enabling SNMPv3. Refer to Controlling Management Access for details on changing management access.*

➢ **To disable SNMPv3:**

1. Navigate to `configure management snmp`. The `config>mngmnt>snmp#` prompt is displayed.

2. Type `no snmpv3`.

   SNMPv3 is disabled, and the commands for setting SNMPv1 communities are available.

**Setting SNMP Communities**

To establish a proper management link when working with SNMPv1, you have to specify the SNMP read, write, and trap communities.

**Note** *The read, write, and trap communities cannot be set if SNMPv3 is enabled. Refer to Enabling or Disabling SNMPv3 for the procedure to disable it.*

You can specify the community with read-only authorization, the community with write authorization, and the community to which ETX-204A sends traps.

➢ **To configure ETX-204A communities:**

1. Navigate to `configure management snmp`. The `config>mngmnt>snmp#` prompt is displayed.

2. To specify the communities, enter:

   ```
   community [read <read-community>] [write <write-community>] [trap <trap-community>].
   ```

**SNMPv3 Default Configuration**

The following is the default configuration of the SNMPv3 parameters (refer to Configuring SNMPv3 Parameters for explanations of the parameters):

- SNMP engine ID set to device MAC address
- View named “internet” providing access to IETF MIBs and IEEE MIBs
• View named “restricted” providing access to part of IETF MIBs and IEEE MIBs
• View named “STD_v1” providing access to IETF MIBs and IEEE MIBs, excluding part of SNMPv3 MIB
• User named "initial", with security level no authentication and no privacy
• Group for SNMPv3 named "initial":
  ▪ Security levels: no authentication and no privacy, authentication and no privacy, authentication and privacy
  ▪ User: “initial”
  ▪ Views for read/write/notify: "internet".
• Group for SNMPv1 named “v1_read”:
  ▪ Security level: no authentication and no privacy
  ▪ Read view = “STD_v1”
  ▪ Write view = “”
  ▪ Notify view = “internet”
• Group for SNMPv1 named “v1_write”:
  ▪ Security level: no authentication and no privacy
  ▪ Read view = “STD_v1”
  ▪ Write view = “STD_v1”
  ▪ Notify view = “internet”
• Group for SNMPv1 named “v1_trap”:
  ▪ Security level: no authentication and no privacy
  ▪ Read view = “”
  ▪ Write view = “”
  ▪ Notify view = “internet”.
• Target named “OAM_1”:
  ▪ Target parameter set = "SNMPv1Param"
  ▪ Tag: “traps”
• Notifications with tag “unmasked” for following traps: agnPowerFailureTrap, agnStatusChangeTrap, agnUploadDataTrap, authenticationFailure, coldStart, ethOamCfmDefectCondition, failedLogin, fallingAlarm, linkDown, linkUp, prtStatusChangeTrap, risingAlarm, successfulLogin, tftpStatusChangeTrap, warmStart
• No delay in sending traps.

Configuring SNMPv3 Parameters

ETX-204A supports SNMP version 3, providing secure SNMP access to the device by authenticating and encrypting packets transmitted over the network.

The SNMPv3 manager application in RADview-EMS provides a user-friendly GUI interface to configure SNMPv3 parameters. If you intend to use it, you must first
use the device CLI to create users with the required encryption method and security level, as the application can create users based only on existing users; the new user has the same encryption method, and the same security level or lower. The ETX-204A default configuration provides only one standard user named “initial” with no encryption and the lowest security level (refer to SNMPv3 Default Configuration for details).

Follow this procedure to configure SNMPv3:

1. Set SNMP engine ID if necessary
2. Add users, specifying authentication protocol and privacy protocol
3. Add groups, specifying security level and protocol
4. Connect users to groups
5. Add notification entries with assigned traps and tags
6. Configure target parameter sets to be used for targets
7. Configure targets (SNMPv3 network management stations to which ETX-204A should send trap notifications), specifying target parameter sets and notification tags
8. If there are devices working with SNMPv1, add communities that work with SNMPv1.

Note The SNMPv3 parameters can be set only when SNMPv3 is enabled (refer to Enabling or Disabling SNMPv3 for the procedure to enable it).

➢ To configure SNMPv3 parameters:

1. Navigate to configure management snmp.
   The config>mngmnt>snmp# prompt is displayed.
2. Enter all necessary commands according to the tasks listed below.

Note When you enter password parameters, they should contain at least eight characters.

<table>
<thead>
<tr>
<th>Task</th>
<th>Command</th>
<th>Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting SNMP engine ID, as MAC address or IP address or string</td>
<td>snmp-engine-id mac [ &lt;mac-address&gt; ] snmp</td>
<td></td>
<td>If you use the mac option and don't specify the MAC address, the SNMP engine ID is set to the device MAC address</td>
</tr>
<tr>
<td></td>
<td>snmp-engine-id ipv4 [ &lt;ip-address&gt; ]</td>
<td></td>
<td>If you use the ipv4 option and don't specify the IP address, the SNMP engine ID is set to the device IP address</td>
</tr>
</tbody>
</table>
### Task

<table>
<thead>
<tr>
<th>Configuring user</th>
<th>Command</th>
<th>Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>user &lt;security-name&gt;</td>
<td>snmp</td>
<td>user &lt;security-name&gt; { md5-auth [ {des</td>
<td>none} ] }</td>
</tr>
<tr>
<td>user &lt;security-name&gt;</td>
<td>snmp</td>
<td>user &lt;security-name&gt; { sha-auth [ {des</td>
<td>none} ] }</td>
</tr>
<tr>
<td>user &lt;security-name&gt;</td>
<td>snmp</td>
<td>user &lt;security-name&gt; { none-auth }</td>
<td></td>
</tr>
</tbody>
</table>

#### Setting user authentication password and optional key for changes

<table>
<thead>
<tr>
<th>Setting user authentication password and optional key for changes</th>
<th>Command</th>
<th>Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>authentication</td>
<td>snmp&gt;user</td>
<td>authentication { password &lt;password&gt; }</td>
<td>Using no authentication disables authentication protocol</td>
</tr>
<tr>
<td></td>
<td></td>
<td>authentication { key &lt;key-change&gt; }</td>
<td></td>
</tr>
</tbody>
</table>

#### Setting user privacy password and optional key for changes

<table>
<thead>
<tr>
<th>Setting user privacy password and optional key for changes</th>
<th>Command</th>
<th>Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>privacy</td>
<td>snmp&gt;user</td>
<td>privacy { password &lt;password&gt; }</td>
<td>Using no privacy disables privacy protocol</td>
</tr>
<tr>
<td></td>
<td></td>
<td>privacy { key &lt;key-change&gt; }</td>
<td></td>
</tr>
</tbody>
</table>

#### Administratively enabling user

<table>
<thead>
<tr>
<th>Administratively enabling user</th>
<th>Command</th>
<th>Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>no shutdown</td>
<td>snmp&gt;user</td>
<td></td>
<td>• You must define the authentication and privacy method before you can enable the user, unless the user was defined with no authentication (none-auth)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Using shutdown disables the user.</td>
</tr>
</tbody>
</table>

#### Configuring group

<table>
<thead>
<tr>
<th>Configuring group</th>
<th>Command</th>
<th>Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>access-group &lt;group-name&gt;</td>
<td>snmp</td>
<td>access-group &lt;group-name&gt; { any</td>
<td>snmpv1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>{ no-auth-no-priv</td>
<td>auth-no-priv</td>
</tr>
</tbody>
</table>

#### Setting read view of group

<table>
<thead>
<tr>
<th>Setting read view of group</th>
<th>Command</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>read-view &lt;read-view-name&gt;</td>
<td>snmp&gt;group</td>
<td></td>
</tr>
</tbody>
</table>

#### Setting write view of group

<table>
<thead>
<tr>
<th>Setting write view of group</th>
<th>Command</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>write-view &lt;write-view-name&gt;</td>
<td>snmp&gt;group</td>
<td></td>
</tr>
</tbody>
</table>

#### Setting notify view of group

<table>
<thead>
<tr>
<th>Setting notify view of group</th>
<th>Command</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>notify-view &lt;notify-view-name&gt;</td>
<td>snmp&gt;group</td>
<td></td>
</tr>
</tbody>
</table>

#### Administratively enabling group

<table>
<thead>
<tr>
<th>Administratively enabling group</th>
<th>Command</th>
<th>Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>no shutdown</td>
<td>snmp&gt;group</td>
<td></td>
<td>Using shutdown disables the group</td>
</tr>
<tr>
<td>Task</td>
<td>Command</td>
<td>Level</td>
<td>Comments</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------</td>
<td>-------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Connecting security name to group (e.g. connecting user or community for SNMPv1 to group) | `security-to-group
{ any | snmpv1 | snmpv2c | usm }`<br>`sec-name <security-name>` | `snmp` | Using `no security-to-group` removes security-to-group entity          |
<p>| Specifying group to which to connect security name                   | <code>group-name &lt;group-name&gt;</code>                                               |       |                                                                         |
| Administratively enabling security-to-group entity                   | <code>no shutdown</code>                                                          |       | Using <code>shutdown</code> disables the security-to-group entity                  |
| Configuring notification                                             | <code>notify &lt;notify-name&gt;</code>                                                 | <code>snmp&gt;</code>|                                                                         |
| Assigning trap to notification                                       | <code>bind { agnPowerFailureTrap | agnStatusChangeTrap | agnUploadDataTrap | tftpStatusChangeTrap | prtStatusChangeTrap | agnFanFailureTrap | successfulLogin | failedLogin | agnTempThresholdTrap | authenticationFailure | coldStart | warmStart | linkDown | linkUp | risingAlarm | fallingAlarm | dot3OamOperStatusChange | dot3OamPeerEvent | agnDyingGaspTrap | csmDomainStateChange | csmDomainStationStateChange | csmSourceStatusChange | ethOamCfmDefectCondition }</code> | <code>snmp&gt;notify</code> | You can assign more than one trap to a notification, in separate commands |
| Assigning tag to notification, to be used to identify the notification entry when configuring target | <code>tag &lt;tag-value&gt;</code>                                                      |       |                                                                         |
| Administratively enabling notification                               | <code>no shutdown</code>                                                          |       |                                                                         |
| Configuring set of target parameters                                 | <code>target-params &lt;target-param-name&gt;</code>                                    | <code>snmp</code>| Using <code>no target-params</code> removes target parameters                    |</p>
<table>
<thead>
<tr>
<th>Task</th>
<th>Command</th>
<th>Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specifying message processing model (SNMP version) to be used when generating SNMP messages for the set of target parameters</td>
<td>message-processing-model { snmpv1</td>
<td>snmpv2c</td>
<td>snmpv3 }</td>
</tr>
<tr>
<td>Specifying SNMP version to be used when generating SNMP messages for the set of target parameters</td>
<td>version { any</td>
<td>snmpv1</td>
<td>snmpv2c</td>
</tr>
<tr>
<td>Specifying user on whose behalf SNMP messages are to be generated for the set of target parameters</td>
<td>security [ name &lt;security-name&gt; ] [ level { no-auth-no-priv</td>
<td>auth-no-priv</td>
<td>auth-priv } ]</td>
</tr>
<tr>
<td>Administratively enabling target parameters</td>
<td>no shutdown</td>
<td>snmp&gt;target</td>
<td>Using shutdown disables target parameters</td>
</tr>
<tr>
<td>Configuring target</td>
<td>target &lt;target-name&gt;</td>
<td>snmp</td>
<td>Using no target removes target</td>
</tr>
<tr>
<td>Specifying set of target parameters for target</td>
<td>target-params &lt;target-param-name&gt;</td>
<td>snmp&gt;target</td>
<td></td>
</tr>
<tr>
<td>Assigning tag(s) to target (the tag(s) must be defined in notification entries)</td>
<td>tag-list &lt;tag&gt;</td>
<td>snmp&gt;target</td>
<td>If you specify more than one tag, you must enclose the list with square brackets, however if you are specifying just one tag the brackets are optional</td>
</tr>
<tr>
<td>Specifying target address as IP address or OAM port</td>
<td>address udp-domain &lt;ip-address&gt; address oam-domain &lt;oam-port&gt;</td>
<td>snmp&gt;target</td>
<td></td>
</tr>
<tr>
<td>Administratively enabling target</td>
<td>no shutdown</td>
<td>snmp&gt;target</td>
<td>Using shutdown disables target</td>
</tr>
<tr>
<td>Configuring community</td>
<td>community &lt;community-identification&gt;</td>
<td>snmp</td>
<td></td>
</tr>
<tr>
<td>Configuring name</td>
<td>name &lt;community-string&gt;</td>
<td>snmp&gt;community</td>
<td></td>
</tr>
<tr>
<td>Configuring security name</td>
<td>sec-name &lt;security-name&gt;</td>
<td>snmp&gt;community</td>
<td></td>
</tr>
</tbody>
</table>
Task | Command | Level | Comments
---|---|---|---
Administratively enabling community | no shutdown | snmp> community | Using shutdown disables community
Displaying SNMPv3 information, such as the number of times the SNMPv3 engine has booted, and how long since the last boot | show snmpv3 information | snmp |

For example:

- **To create SNMPv3 user and connect it to group:**
  - User named “MD5_priv”:
    - Security level – MD5 authentication, DES privacy
  - Group named “SecureGroup”:
    - All security levels
    - Contains set of views named "internet" (from default configuration).

```
ETX-204A# configure management snmp
ETX-204A(config-mgmt)>snmp# user MD5_priv md5-auth des
ETX-204A(config-mgmt)>snmp>user(MD5_priv)$ privacy password MD54321
ETX-204A(config-mgmt)>snmp>user(MD5_priv)$ authentication password MD54321
ETX-204A(config-mgmt)>snmp>user(MD5_priv)$ no shutdown
ETX-204A(config-mgmt)>snmp>user(MD5_priv)$ exit
ETX-204A(config-mgmt)>snmp# access-group SecureGroup usm no-auth-no-priv
ETX-204A(config-mgmt)>snmp>access-group(SecureGroup usm no-auth-no-priv)$ read-view internet
ETX-204A(config-mgmt)>snmp>access-group(SecureGroup usm no-auth-no-priv)$ write-view internet
ETX-204A(config-mgmt)>snmp>access-group(SecureGroup usm no-auth-no-priv)$ notify-view internet
ETX-204A(config-mgmt)>snmp>access-group(SecureGroup usm no-auth-no-priv)$ no shutdown
ETX-204A(config-mgmt)>snmp>access-group(SecureGroup usm no-auth-no-priv)$ exit
ETX-204A(config-mgmt)>snmp# access-group SecureGroup usm auth-no-priv
ETX-204A(config-mgmt)>snmp>access-group(SecureGroup usm auth-no-priv)$ read-view internet
ETX-204A(config-mgmt)>snmp>access-group(SecureGroup usm auth-no-priv)$ write-view internet
ETX-204A(config-mgmt)>snmp>access-group(SecureGroup usm auth-no-priv)$ notify-view internet
ETX-204A(config-mgmt)>snmp>access-group(SecureGroup usm auth-no-priv)$ no shutdown
ETX-204A(config-mgmt)>snmp>access-group(SecureGroup usm auth-no-priv)$ exit
ETX-204A(config-mgmt)>snmp# access-group SecureGroup usm auth-priv
ETX-204A(config-mgmt)>snmp>access-group(SecureGroup usm auth-priv)$ read-view internet
ETX-204A(config-mgmt)>snmp>access-group(SecureGroup usm auth-priv)$ write-view internet
ETX-204A(config-mgmt)>snmp>access-group(SecureGroup usm auth-priv)$ notify-view internet
ETX-204A(config-mgmt)>snmp>access-group(SecureGroup usm auth-priv)$ no shutdown
ETX-204A(config-mgmt)>snmp>access-group(SecureGroup usm auth-priv)$ exit
ETX-204A(config-mgmt)>snmp# security-to-group usm sec-name MD5_priv
ETX-204A(config-mgmt)>snmp>security-to-group(usm MD5_priv)$ group-name SecureGroup
ETX-204A(config-mgmt)>snmp>security-to-group(usm MD5_priv)$ no shutdown
ETX-204A(config-mgmt)>snmp>security-to-group(usm MD5_priv)$ exit
ETX-204A(config-mgmt)>snmp#```
To create notifications:

- Notification named “TrapData”:
  - Tag = “Data”
  - Bound to agnStatusChangeTrap, agnUploadDataTrap.
- Notification named “TrapPower”:
  - Tag = “Power”
  - Bound to agnPowerFailureTrap, coldStart.

```
ETX-204A# configure management snmp
ETX-204A>config>mngmnt>snmp# notify TrapData
ETX-204A>config>mngmnt>snmp>notify(TrapData)$ tag Data
ETX-204A>config>mngmnt>snmp>notify(TrapData)$ bind agnStatusChangeTrap
ETX-204A>config>mngmnt>snmp>notify(TrapData)$ bind agnUploadDataTrap
ETX-204A>config>mngmnt>snmp>notify(TrapData)$ no shutdown
ETX-204A>config>mngmnt>snmp>notify(TrapData)$ exit
ETX-204A>config>mngmnt>snmp# notify TrapPower
ETX-204A>config>mngmnt>snmp>notify(TrapPower)$ tag Power
ETX-204A>config>mngmnt>snmp>notify(TrapPower)$ bind agnPowerFailureTrap
ETX-204A>config>mngmnt>snmp>notify(TrapPower)$ bind coldStart
ETX-204A>config>mngmnt>snmp>notify(TrapPower)$ no shutdown
ETX-204A>config>mngmnt>snmp>notify(TrapPower)$ exit
ETX-204A>config>mngmnt>snmp#
```

To create target parameters and target:

- Target parameters named “TargParam1”:
  - Message processing model SNMPv3
  - version USM
  - User “MD5_priv”
  - Security level authentication and privacy
- Target named “TargNMS1”:
  - Target parameters “TargParam1”
  - Tag list = “Data”, “Power”
  - IP address 192.5.4.3.
To create communities, target parameters, and target for devices in network that are working with SNMPv1:

- **Community “read”**:  
  - Name: “public”  
  - Security name: “v1_read (defined in default configuration).”

- **Community “write”**:  
  - Name: “public”  
  - Security name: “v1_write (defined in default configuration).”

- **Community “trap”**:  
  - Name: “trapcom”  
  - Security name: “v1_trap (defined in default configuration).”

- **Target parameters named “snmpv1”**:  
  - Message processing model SNMPv1  
  - Version SNMPv1  
  - Security name: “v1_trap”  
  - Security: level no authentication and no privacy

- **Target named “TargNMS1”**:  
  - Target parameters “snmpv1”  
  - Tag list = “unmasked”  
  - IP address 192.5.6.7.
To display SNMPv3 information:

```
ETX-204A# configure management snmp
ETX-204A> config>mngmnt>snmp# show snmpv3 information
SNMPv3            : enable
Boots             : 2
Boots Time (sec)  : 102
EngineID          : 800000a4030020d2202416
ETX-204A>config>mngmnt>snmp#
```

Configuring Network Managers

You can define the network management stations to which the SNMPv1 agent of ETX-204A sends traps, and from which ETX-204A can be managed. You can define up to ten managers. When you define a network manager, you can define a single IP address or an IP address and mask that specify a subnet from which ETX-204A can be managed.

Traps are sent only to a single IP address, not to a subnet. You can temporarily prevent a manager station from receiving traps by masking the network manager.
Configuring Management Subnets

➢ To add a management subnet:

1. Navigate to the management context (`config>mngmnt`).
2. Enter
   ```
   manager <ip-address>/<ip-mask>
   ```
   The parameter `ip-mask` is a decimal number that specifies the number of high-order consecutive bits set to 1 in the mask. For example, to specify IP mask 255.255.255.0, use 24 as the value for `ip-mask`.
   You must provide a valid combination of IP address and IP mask such that the result of masking the IP address with the IP mask is the IP address. In other words, the IP address and the mask should have the same number of low-order consecutive bits set to 0.

   Examples of defining a management subnet:
   ```
   manager 192.178.1.0/24
   manager 192.178.1.240/28
   manager 192.178.1.252/30
   ```

➢ To remove a management subnet:

- In the management context (`config>mngmnt`), enter
  ```
  no manager <ip-address>/<ip-mask>
  ```

Configuring Network Manager Stations

➢ To add a network manager:

1. Navigate to the management context (`config>mngmnt`).
2. Enter
   ```
   manager <ip-address>/32
   ```
3. To mask traps to the network manager, enter `trap-mask`
4. To define a UDP port to send SNMPv1 traps to the network manager, enter
   ```
   udp-port snmp-trap-port <udp port number>
   ```
   The default is port 162.

➢ To remove a network manager:

1. To delete a manager, in the management context (`config>mngmnt`), enter
   ```
   no manager <ip-address>/<ip-mask>
   ```
2. To delete all managers, enter `no manager`.

Masking Traps to Network Managers

You can mask traps to a network manager to prevent it from receiving any traps.

**Note**

*You can also mask a trap or traps to prevent sending the trap(s) to all management stations. For details refer to Chapter 5.*
To mask all traps to a specific network manager:

1. Navigate to `configure management manager(<manager-ip-address>/32)`.
   
   The `config>mngmnt>manager(<manager-ip-address>/32)#` prompt is displayed.

2. Enter `trap-mask`.
   
   Traps are not sent to the specified network manager.

   **Note** To unmask traps to the network manager, enter `no trap-mask`.

### Controlling Management Access

You can enable or disable access to the ETX-204A management system via Telnet, SSH, or SNMP applications. By disabling Telnet, SSH, or SNMP, you prevent unauthorized access to the system when security of the ETX-204A IP address has been compromised. When Telnet, SSH, and SNMP are disabled, ETX-204A can be managed via an ASCII terminal only. In addition, you can limit access to the device to only the defined management stations.

Table 4-1 lists management access implementation, according to the defined management access and whether network managers are defined.

To configure management access:

- At the `configure management access` prompt enter the necessary commands according to the tasks listed below.

<table>
<thead>
<tr>
<th>Task</th>
<th>Command</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allowing Telnet access</td>
<td><code>telnet [managers-only]</code></td>
<td>Typing <code>no telnet</code> blocks access by Telnet</td>
</tr>
<tr>
<td><strong>Note:</strong> If you want to allow Telnet access by managers only, you must enter the command to block Telnet access.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Allowing SSH (Secure Shell) access | `ssh [managers-only]`     | Typing `no ssh` blocks access by SSH |
| **Note:** If you want to allow SSH access by managers only, you must first enter the commands to block Telnet and SSH access. |

| Allowing SNMP access           | `snmp [managers-only]`     | Typing `no snmp` blocks access by SNMP |
| **Note:** If you want to allow SNMP access by managers only, you must first enter the command to block SNMP access. |
### Table 4-1. Management Access Implementation

<table>
<thead>
<tr>
<th>Access Method</th>
<th>Mode</th>
<th>Allowed to Access ETX-204A</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Network Manager(s) Defined</td>
</tr>
<tr>
<td>Telnet Access</td>
<td>Enable</td>
<td>Anybody</td>
</tr>
<tr>
<td></td>
<td>Disable</td>
<td>Nobody</td>
</tr>
<tr>
<td></td>
<td>Managers Only</td>
<td>Only defined network managers</td>
</tr>
<tr>
<td>SSH Access (Secure Shell)</td>
<td>Enable</td>
<td>Anybody</td>
</tr>
<tr>
<td></td>
<td>Disable</td>
<td>Nobody</td>
</tr>
<tr>
<td></td>
<td>Managers Only</td>
<td>Only defined network managers</td>
</tr>
<tr>
<td>SNMP Access</td>
<td>Enable</td>
<td>Anybody</td>
</tr>
<tr>
<td></td>
<td>Disable</td>
<td>Nobody</td>
</tr>
<tr>
<td></td>
<td>Managers Only</td>
<td>Only defined network managers</td>
</tr>
</tbody>
</table>

### Defining the Access Policy

ETX-204A’s access policy allows configuring authentication protocols using the Radius server. The user authentication is performed according to the selected order. If the first authentication method is not available or the user is not found, the next selected method is used.

To define the access policy:

1. Navigate to the Access context (`config>mngmnt>access`).
2. To configure the first and second levels of authentication, do the following:
   - To use the locally stored database, enter `auth-policy 1st-level local`.
   - To use the authentication database stored on the Radius server, enter `auth-policy 1st-level radius 2nd-level local`.

### Note
- The 2nd level can be configured only if the 1st level is set to `radius`.
- If the 2nd level is set to `none`, ETX-204A is available via only the 1st level.
- Special rules apply to `su` (Superuser). If `su` does not exist in the Radius server database or the system looses the connection to the Radius server, ETX-204A uses the local authentication database to authenticate the user if the 2nd level is set to `local`.
Working with RADIUS

Configuring RADIUS Server Parameters

ETX-204A provides connectivity to up to four RADIUS authentication servers. You have to specify access parameters such as assigning RADIUS server IDs, specifying the associated server IP addresses and the number of retries, etc.

- To define RADIUS server parameters:
  1. Navigate to the Radius context (config>mngmnt>radius) and enter the desired server sequence number (server ID) from 1 to 4:
     server <server-id>.
     The system switches to the context of the specified server (config>mngmnt>radius>server(<server-id>))
  2. To associate the sequence number with the Radius server’s IP address, enter:
     address <ip-address>
     Possible IP addresses range from 1.1.1.1 to 255.255.255.255.
  3. To specify a shared secret between client and server, enter:
     key <free text>
     The shared secret is a secret key consisting of free text known to the client and the server for encryption.
  4. To specify the maximum number of authentication retries at the Radius server, enter:
     retry <number-of-retries>
     Up to 10 retries are possible. The default is 2.
  5. To specify the timeout, enter:
     timeout <seconds>
     Up to 5 seconds are possible. The default is 2 seconds.
  6. To specify the logical port to be used by the authentication protocol, enter:
     auth-port <udp-port-number>
     You can choose a port between 1 and 65535. The default is 1812.
  7. To exit the server context, enter exit.

- To shut down a Radius server:
  - Navigate to the specific server ID context (config>mngmnt>radius>server(<server-id>)) and enter shutdown.

- To activate a Radius server:
  - Navigate to the specific server ID context (config>mngmnt>radius>server(<server-id>)) and enter no shutdown.
Displaying RADIUS Statistics

To display RADIUS statistics:

- At the RADIUS context (config>mngmnt>radius), enter **show statistics**.

RADIUS statistics appear as shown in **Figure 4-1**.

```
ETX-204A>config>mngmnt>radius# show statistics
Server1     Server2     Server3     Server4
---------------------------------------------------------------
Access Requests : 0   0   0   0
Access Retransmits : 0   0   0   0
Access Accepts : 0   0   0   0
Access Rejects : 0   0   0   0
Access Challenges : 0   0   0   0
Malformed Response : 0   0   0   0
Bad Authenticators : 0   0   0   0
Pending Requests : 0   0   0   0
Timeouts : 0   0   0   0
Unknown Types : 0   0   0   0
Packets Dropped : 0   0   0   0
```

**Figure 4-1. Radius Statistics**

Configuring Control Port Parameters

ETX-204A embedded software enables you to configure the serial port parameters, which include specifying the data rate, security timeout, and length of the screen from which you are accessing the device.

To define the control port parameters:

1. Navigate to the terminal context (config>terminal)
2. Enter the desired data rate:
   ```
   baud-rate { 9600bps | 19200bps | 38400bps | 57800bps | 115200bps }
   ```
   The default data rate is 9,600 bps.
3. To specify that there is no security timeout, enter:
   ```
   timeout forever
   ```
4. To specify a security timeout, enter:
   ```
   timeout limited <minutes>
   ```
   The timeout value can be 0–60. The default is 10 minutes.
5. To specify the number of rows to display, enter:
   ```
   length <number-of-rows>
   ```
   The number of rows can be 0, to indicate no limit on the number of lines displayed, or 20.
Configuring User Access

ETX-204A management software allows you to define new users, their management and access rights. Only superusers (su) can create new users, the regular users are limited to changing their current passwords, even if they were given full management and access rights.

You can specify a user’s password as a text string or as a hashed value, that you obtain by using `info` to display user data.

### Notes
- User passwords are stored in a database so that the system can perform password verification when a user attempts to log in. To preserve confidentiality of system passwords, the password verification data is typically stored after a one-way hash function is applied to the password, in combination with other data. When a user attempts to log in by entering a password, the same function is applied to the entered value and the result is compared with the stored value.
- A cryptographic hash function is a deterministic procedure that takes an arbitrary block of data and returns a fixed-size bit string, the (cryptographic) hash value, such that any change to the data changes the hash value.

➤ To add a new user:

1. Make sure that you are logged on as superuser (su).
2. Navigate to the Management context (`config>mngmnt`).
3. Define a new user:
   ```
   user <name> [ level { su | tech | user } ] [[ password <password> [hash] ]
   ```

   For example:
   ```
   ETX-204A# configure management
   ETX-204A>config>mngmnt# user staff level su password 1234
   # Password is encrypted successfully
   ETX-204A>config>mngmnt#
   ```

➤ To define a new user:
- User name = staff
- User password = 1234.

➤ To add a new user with a hashed password:

1. Define a new user with a text password.
2. Use `info` to display the password hash value.
3. Define another user with the hashed password from the `info` output.

   The second user can log in with the text password defined in **step 1**.

   For example:

   ➤ To add a new user with a hashed password:
   - User name = staff1
- User password = 4222
- User name = staff2
- User password = hash of 4222 (user staff2 can log in with password 4222).

```
ETX-204A# configure management
ETX-204A>config>mngmnt# user staff1 level user password 4222
# Password is encrypted successfully
ETX-204A>config>mngmnt# info
   user "staff1" level user password
   "3fda26f8cfe4123dcdad0c1bc89ed1e7997acef" hash
   user "su"

```

```
ETX-204A>config>mngmnt# user staff2 level user password
3fda26f8cfe4123dcdad0c1bc89ed1e7997acef hash
ETX-204A>config>mngmnt# info
   user "staff1" level user password
   "3fda26f8cfe4123dcdad0c1bc89ed1e7997acef" hash
   user "staff2" level user password
   "3fda26f8cfe4123dcdad0c1bc89ed1e7997acef" hash
   user "su"

```

```
ETX-204A>config>mngmnt# logout
exiting cli
ETX-204A>config>mngmnt#

CLI session is closed

user>staff2
password>****

➢ To delete an existing user:
  - At the Management context (config>mngmnt), enter no <user-name>.
    The specified user is deleted.

➢ To view all connected users:
  - At the Management context (config>mngmnt), enter show users.
    A list of all connected users is displayed, showing their access level, the type of connection, and the IP address from which they are connected.
For example:

```
ETX-204A# configure management
ETX-204A>config>mngmnt# show users
User            Access Level  Source      IP-address
su              SU            Terminal    172.4.3.3
ETX-204A>config>mngmnt#
```

### 4.2 Ethernet Ports

ETX-204A has two network ports and up to four user ports that are SFP/UTP combo ports.

The second network port can be configured as a user port. The following table shows how to refer to the ports when configuring them with CLI commands.

<table>
<thead>
<tr>
<th>Port</th>
<th>Port Number on Unit</th>
<th>Port in CLI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net</td>
<td>1</td>
<td>Ethernet 1</td>
</tr>
<tr>
<td>Net/User</td>
<td>2</td>
<td>Ethernet 2</td>
</tr>
<tr>
<td>User</td>
<td>3</td>
<td>Ethernet 3</td>
</tr>
<tr>
<td>User</td>
<td>4</td>
<td>Ethernet 4</td>
</tr>
<tr>
<td>User</td>
<td>5</td>
<td>Ethernet 5</td>
</tr>
<tr>
<td>User</td>
<td>6</td>
<td>Ethernet 6</td>
</tr>
<tr>
<td>MNG-ETH</td>
<td>-</td>
<td>Ethernet 101</td>
</tr>
</tbody>
</table>

The following parameters can be configured for the Ethernet ports:

- Port name
- Autonegotiation (10/100/1000BaseT and 1000BaseX ports)
- Maximum advertised capability for autonegotiation procedure
- Data rate and duplex mode, when autonegotiation is disabled
- Administrative status
- Network or user functional mode (second network interface only)
- DHCP request sent when port is activated
- Tag Ethernet Type
- Egress MTU
- Queue group profile
- L2CP handling
• Enable/disable transmitting of Synchronization Status Message (SSM) with quality identifier that can be used to select the highest synchronization level incoming reference signal
• Link OAM EFM (IEEE 802.3-2005) – Refer to Configuring OAM EFM
• Loopback – Refer to Testing Ethernet Ports.

Configuring Ethernet Port Parameters

➢ To configure the Ethernet port parameters:

1. Navigate to configure port ethernet <port-num> to select the Ethernet port to configure.

   The config>port>eth(<port-num>)# prompt is displayed.

2. Enter all necessary commands according to the tasks listed below.

<table>
<thead>
<tr>
<th>Task</th>
<th>Command</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enabling autonegotiation</td>
<td>auto-negotiation [{sfp</td>
<td>rj45}]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If neither sfp nor rj45 is specified, the command applies to both modes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Note: You can configure different values for the SFP and RJ-45 modes.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The device works with the values that apply according to whether an SFP is inserted.</td>
</tr>
<tr>
<td>Setting maximum advertised capability</td>
<td>max-capability {10-full-duplex</td>
<td>If neither sfp nor rj45 is specified, the command applies to both modes</td>
</tr>
<tr>
<td>(highest traffic handling capability to</td>
<td>100-full-duplex</td>
<td>1000-full-duplex</td>
</tr>
<tr>
<td>be advertised during the autonegotiation</td>
<td></td>
<td>10-full-duplex – 10baseT full duplex</td>
</tr>
<tr>
<td>process)</td>
<td></td>
<td>100-full-duplex – 100baseT full duplex</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1000-full-duplex – 1000base T full duplex</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1000-x-full-duplex – 1000baseX full duplex</td>
</tr>
<tr>
<td></td>
<td></td>
<td>For fiber optic ports, permanently set to 1000-x-full-duplex</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Note: This parameter applies only if autonegotiation is enabled.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>You can configure different values for the SFP and RJ-45 modes. The device works with the values that apply according to whether an SFP is inserted.</td>
</tr>
<tr>
<td>Task</td>
<td>Command</td>
<td>Comments</td>
</tr>
<tr>
<td>------</td>
<td>---------</td>
<td>----------</td>
</tr>
</tbody>
</table>
| Setting data rate and duplex mode of the Ethernet port, when autonegotiation is disabled | `speed-duplex {10-full-duplex | 100-full-duplex | 1000-full-duplex | 1000-x-full-duplex } [[sfp | rj45]]` | If neither `sfp` nor `rj45` is specified, the command applies to both modes.  
`10-full-duplex` - 10baseT full duplex  
`100-full-duplex` - 100baseT full duplex  
`1000-full-duplex` - 1000base T full duplex  
`1000-x-full-duplex` - 1000baseX full duplex  
For fiber optic ports, permanently set to `1000-x-full-duplex` |
| Notes: | | |
| • This parameter applies only to RJ-45 copper ports when autonegotiation is disabled | | |
| • You can configure different values for the SFP and RJ-45 modes. The device works with the values that apply according to whether an SFP is inserted | | |
| • Do not assign `1000-full-duplex` in SFP mode (do not use the command: `speed-duplex 1000-full-duplex sfp`). | | |
| Setting the VLAN tagged frame ETH II frame Ethertype (tag protocol identifier) | `tag-ethernet-type <0x0000-0xFFFF>` | |
| Note: Relevant only for network ports if the egress action is set to adding an SP tag. | | |
| Associating a queue group profile with the port | `queue-group profile <queue-group-profile-name>` | |
| Note: You can associate a network port with a queue group profile containing up to 31 queue blocks, but a user port can be associated only with a queue group profile containing a single queue block. | | |
| Associating a Layer-2 control processing profile with the port | `l2cp profile <l2cp-profile-name>` | |
| • If Ethernet port 2 is configured as a network port, then whenever you assign an L2CP profile to one of the network ports it is automatically assigned to the other network port. | | |
| • If you intend to enable LACP (LAG) or link OAM on the port, the associated L2CP profile must specify peer action for MAC 0x02 | | |
## Chapter 4  Configuration Installation and Operation Manual

### 4-26 Ethernet Ports ETX-204A Ver. 2.2

<table>
<thead>
<tr>
<th>Task</th>
<th>Command</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specifying conditions for sending DHCP request</td>
<td>dhcp-request {normal</td>
<td>when-up}</td>
</tr>
</tbody>
</table>

| Setting maximum frame size to transmit (frames above the specified size are discarded) | egress-mtu <64–12288> | |

| Enabling transmitting of clock availability and quality via SSM | tx-ssm | Using no before tx-ssm disables SSM egress. |

| Administratively enabling port | no shutdown | Using shutdown disables the port. |

### Setting Second Network Interface as Network or User Port

You can change the functional mode of the second network interface from network to user port and vice versa. If it functions as a user port, then redundancy is not possible.

**Note**  
When you change the functional mode, all flows related to the port are deleted.

- **To change the functional mode of the second network interface:**
  1. Navigate to `configure port ethernet 2`.  
     The `config>port>eth(2)#` prompt is displayed.
  2. Enter the command to change the functional mode:
     - To change to user port, enter `functional-mode user`.  
     - To change to network port, enter `functional-mode network`.  
     The functional mode of the port is changed.

For example:

- **To change the second network interface functional mode to user port:**

  ```
  ETX-204A# configure port ethernet 2
  ETX-204A>config>port>eth(2)# functional-mode user
  ETX-204A#
  ```

### Configuring the Layer 2 Control Processing

ETX-204A can be configured to pass through Layer-2 Control frames (including other vendors’ L2CP frames) across the network, to peer supported protocols, or to discard the L2CP frames. You can perform protocol tunneling, with MAC address swap.
You can create up to six profiles to define the handling of Layer-2 Control Protocol traffic. You then assign the required profile to an Ethernet port (refer to Configuring Ethernet Port Parameters).

Note

The L2CP profile for Ethernet ports that have SSM transmitting enabled must be configured to peer MAC 01-80-c2-00-00-02.

Default Layer 2 Control Processing Profile

ETX-204A provides a default L2CP profile named L2cpDefaultProfile, configured as follows:

- For MAC hex byte 0x00 through 0xff, action = tunnel
- Default action = tunnel.

Adding Layer 2 Control Processing Profiles

To add an L2CP profile:

1. Navigate to configure port.
   The config>port# prompt is displayed.
2. Type 12cp-profile <l2cp-profile-name>.
   An L2CP profile with the specified name is created and the config>port>12cp-profile(<l2cp-profile-name>)$ prompt is displayed. The new profile is configured by default as described in Default Layer 2 Control Processing Profile.
3. Configure the L2CP profile as needed (refer to Configuring Layer 2 Control Processing Profiles).

For example:

To add L2CP profile named layer2ctrl1:

```
ETX-204A# configure port
ETX-204A>config>port# 12cp-profile layer2ctrl1
ETX-204A>config>port>12cp-profile(layer2ctrl1)$
```

Deleting Layer 2 Control Processing Profiles

You can delete an L2CP profile only if it is not assigned to any port.

To delete an L2CP profile:

1. Navigate to configure port.
   The config>port# prompt is displayed.
2. Type no 12cp-profile <l2cp-profile-name>.
   The L2CP profile with the specified name is deleted if it is not assigned to any port.
For example:

To delete L2CP profile named layer2ctrl1:

```
ETX-204A# configure port
ETX-204A>config>port# no l2cp-profile layer2ctrl1
ETX-204A>config>port#
```

### Configuring Layer 2 Control Processing Profiles

To configure an L2CP profile:

1. Navigate to `configure port l2cp <l2cp-profile-name>` to select the L2CP profile to configure.

   The `config>port>l2cp-profile(<l2cp-profile-name>)#` prompt is displayed.

2. Specify the L2CP action for a MAC address:

```
mac <hex-byte> {discard|tunnel|peer}
```

   - The `<hex-byte>` parameter is the last byte of the control protocol MAC.
   - The actions are as follows:
     - Discard – L2CP frames are discarded.
     - Tunnel – L2CP frames are forwarded across the network as ordinary data
     - Peer – ETX-204A peers with the user equipment to run the protocol. L2CP frames are forwarded to the ETX-204A CPU. Unidentified L2CP frames are forwarded across the network as ordinary data.

3. Specify the default action for undefined control protocols:

```
default {discard|tunnel}
```

4. Choose a protocol or specify no protocol:

```
protocol {stp|vtp|cdp|lldp|pvstp}
tunnel mac-change [<mac-address>]
no protocol {stp|vtp|cdp|lldp|pvstp}.
```

**Note**  
The MAC swap option is available only for protocols: vtp, stp, cdp, and pvstp.

### Displaying Ethernet Port Status

You can display the following:

- Summary information showing the status and speed of all Ethernet ports
- Status and configuration of an individual Ethernet port.

To display the status of all Ethernet ports:

- At the prompt `config>port#`, enter `show summary`.

The port status and speeds of the Ethernet ports are displayed. If a port is being tested via the `loopback` command, it is indicated in the operational status.
For example:

```
ETX-204A# configure port
ETX-204A>config>port# show summary
<table>
<thead>
<tr>
<th>Port</th>
<th>Number</th>
<th>Name</th>
<th>Admin</th>
<th>Oper</th>
<th>Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fast Eth</td>
<td>1</td>
<td>ETH 1</td>
<td>Up</td>
<td>Up</td>
<td>100000000</td>
</tr>
<tr>
<td>Fast Eth</td>
<td>2</td>
<td>ETH 2</td>
<td>Up</td>
<td>Testing</td>
<td>10000000</td>
</tr>
<tr>
<td>Fast Eth</td>
<td>3</td>
<td>ETH 3</td>
<td>Up</td>
<td>Up</td>
<td>100000000</td>
</tr>
<tr>
<td>Ethernet</td>
<td>101</td>
<td>MNG-ETH</td>
<td>Up</td>
<td>Up</td>
<td>100000000</td>
</tr>
</tbody>
</table>
ETX-204A>config>port#```

➤ To display status of an Ethernet port:

- At the prompt `config>port>eth(<port-num>)#`, enter `show status`.

  The Ethernet port status parameters are displayed.

For example:

➤ To display the status of Ethernet port 1:

```
ETX-204A# configure port ethernet 1
ETX-204A>config>port>eth(1)# show status
Name                  : ETH 1
Administrative Status : Up
Operation Status      : Up
Connector Type        : Combo RJ45+SFP Out RJ45 Active
Auto Negotiation      : Other
Speed And Duplex      : 10 Full Duplex
MAC Address           : 00-20-D2-30-CC-9D
EFM Status   : Disabled
ETX-204A>config>port>eth(1)#```

Testing Ethernet Ports

The physical layer runs at the PHY of the ports. When the loopback is active the data forwarded to a port is looped from the Tx path to the Rx path.

The loopback can be one of the following types:

- Local – Loopback is closed towards the user interface (Figure 4-2)
- Remote – Loopback is closed towards the network interface (Figure 4-3).

![Figure 4-2. Local Loopback](image)
To run a physical layer loopback test:

1. Navigate to `configure port ethernet <port-num>` to select the Ethernet port to test.

   The `config>port>eth(<port-num>)#` prompt is displayed.

2. Enter `loopback {local|remote} [duration <0–3600>]`.

   The duration is in seconds. Entering 0 or not specifying the duration disables the timer, e.g. the loopback runs forever until you disable it.

   While the test is running, entering `show summary` at the `port` level displays the port’s operational status as `Testing` (refer to Displaying Ethernet Port Status).

3. To end the loopback test, enter `no loopback`.

Displaying Ethernet Port Statistics

You can display statistics for the Ethernet ports, as well as L2CP statistics. The sampling interval for the Ethernet port statistics can be configured.

Setting Sampling Interval for Port Statistics

The sampling interval can be configured from one to 30 minutes. The default is 15 minutes.

To set the sampling interval:

- At the prompt `config>port>eth(<port-num>)#`, enter `rate-sampling-window <1–30>`.

  The sampling interval is set to the specified number of minutes.

Displaying Port Statistics

To display the Ethernet port statistics:

- At the prompt `config>port>eth(<port-num>)#`, enter `show statistics`.

  Ethernet port statistics are displayed. The counters are described in Table 4-3.
For example:

- To display the statistics for Ethernet port 2:

  ```
  ETX-204A# configure port ethernet 2
  ETX-204A>config>port>eth(2)# show statistics
  Rates Sampling Window
  --------------------------------------------------------------
  Window Size [Min.] : 15
  Window Remain Time [Min.] : 0
  Running
  --------------------------------------------------------------
  Rx                Tx
  Total Frames : 0          5257039970304
  Total Octets : 0          0
  Total Frames/Sec : 0       0
  Total Bits/Sec : 0         0
  Min. Bits/Sec : 0         0
  Max. Bits/Sec : 0         0
  Unicast Frames : 0         0
  Multicast Frames : 0      1224
  Broadcast Frames : 0       0
  Error Frames : 0          --
  L2CP Discarded : 0        --
  OAM Discarded : 0         --
  Unknown Protocol Discarded : 0 --
  CRC Errors : 0           --
  CRC Errors/Sec : 0        --
  Jabber Errors : 0         --
  Oversize Frames : 0       0
  64 Octets : 0             0
  65-127 Octets : 0         0
  128-255 Octets : 0        0
  256-511 Octets : 0        0
  512-1023 Octets : 0       0
  1024-1528 Octets : 0      0
  1519-2047 Octets : 0      0
  2048-Max Octets : 0       0
  ETX-204A>config>port>eth(2)#
  ```

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Window Size [Min.]</td>
<td>Interval for sampling statistics, user-configurable</td>
</tr>
<tr>
<td></td>
<td>(see Setting Sampling Interval for Port Statistics)</td>
</tr>
<tr>
<td>Window Remain Time [Min.]</td>
<td>Amount of time remaining in statistics sampling window</td>
</tr>
<tr>
<td>Total Frames</td>
<td>Total number of frames received/transmitted</td>
</tr>
<tr>
<td>Total Octets</td>
<td>Total number of bytes received/transmitted</td>
</tr>
<tr>
<td>Total Frames/Sec</td>
<td>Number of frames received/transmitted per second</td>
</tr>
</tbody>
</table>
### Parameter Description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Bits/Sec</td>
<td>Number of bits received/transmitted per second</td>
</tr>
<tr>
<td>Min. Bits/Sec</td>
<td>Minimum number of bits received/transmitted per second</td>
</tr>
<tr>
<td>Max. Bits/Sec</td>
<td>Maximum number of bits received/transmitted per second</td>
</tr>
<tr>
<td>Unicast Frames</td>
<td>Total number of unicast frames received/transmitted</td>
</tr>
<tr>
<td>Multicast Frames</td>
<td>Total number of multicast frames received/transmitted</td>
</tr>
<tr>
<td>Broadcast Frames</td>
<td>Total number of broadcast frames received/transmitted</td>
</tr>
<tr>
<td>Error Frames</td>
<td>Total number of frames with errors received</td>
</tr>
<tr>
<td>L2CP Discarded</td>
<td>Total number of L2CP frames discarded</td>
</tr>
<tr>
<td>OAM Discarded</td>
<td>Total number of OAM frames discarded</td>
</tr>
<tr>
<td>Unknown Protocol Discarded</td>
<td>Total number of frames with unknown protocol discarded</td>
</tr>
<tr>
<td>CRC Errors</td>
<td>Total number of frames received that are an integral number of octets in length, but do not pass the Frame Check Sequence (FCS) check. This count does not include frames received with Frame-Too-Long or Frame-Too-Short error.</td>
</tr>
<tr>
<td>CRC Errors/Sec</td>
<td>Number of frames per second received that are an integral number of octets in length, but do not pass the Frame Check Sequence (FCS) check. This count does not include frames received with Frame-Too-Long or Frame-Too-Short error.</td>
</tr>
<tr>
<td>Jabber Errors</td>
<td>Total number of frames received with jabber errors</td>
</tr>
<tr>
<td>Oversize Frames</td>
<td>Total number of oversized frames received/transmitted</td>
</tr>
<tr>
<td>64 Octets</td>
<td>Total number of received/transmitted 64-byte packets</td>
</tr>
<tr>
<td>65–127 Octets</td>
<td>Total number of received/transmitted 65–127-byte packets</td>
</tr>
<tr>
<td>128–255 Octets</td>
<td>Total number of received/transmitted 128–255-byte packets</td>
</tr>
<tr>
<td>256–511 Octets</td>
<td>Total number of received/transmitted 256–511-byte packets</td>
</tr>
<tr>
<td>512–1023 Octets</td>
<td>Total number of received/transmitted 512–1023-byte packets</td>
</tr>
<tr>
<td>1024–1528 Octets</td>
<td>Total number of received/transmitted 1024–1528-byte packets</td>
</tr>
<tr>
<td>1519–2047 Octets</td>
<td>Total number of received/transmitted 1519–2047-byte packets</td>
</tr>
<tr>
<td>2048-Max Octets</td>
<td>Total number of received/transmitted packets with 2048 bytes and up to maximum</td>
</tr>
</tbody>
</table>

### Displaying Layer-2 Control Processing Statistics

To display the Layer-2 control processing statistics for an Ethernet port:

- At the prompt `config>port>eth(<port-num>)#`, enter `show l2cp-statistics`.  
  L2CP statistics are displayed for the specified port, showing the number of encapsulated and decapsulated packets for each protocol.
For example:

➢ To display the L2CP statistics for Ethernet port 3:

```
ETX-204A# configure port ethernet 3
ETX-204A>config>port>eth(3)# show l2cp-statistics

<table>
<thead>
<tr>
<th>Protocol</th>
<th>Encapsulated</th>
<th>Decapsulated</th>
</tr>
</thead>
<tbody>
<tr>
<td>STP</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>CDP</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>VTP</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>LLDP</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>PVSTP</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

ETX-204A>config>port>eth(3)#
```

Clearing Statistics

➢ To clear the statistics for an Ethernet port:

- At the prompt `config>port>eth(<port-num>)#`, enter `clear-statistics`.

  The statistics for the specified port are cleared.

➢ To clear the L2CP statistics for an Ethernet port:

- At the prompt `config>port>eth(<port-num>)#`, enter `clear-l2cp-statistics`.

  The L2CP statistics for the specified port are cleared.

### 4.3 Network Interface Redundancy

Two network interfaces operate redundant to each other, either as a single logical link (LAG) or two separate links (1:1).

- **Link aggregation (LAG) mode according to IEEE 802.3-2005.** In this mode, both ports receive traffic at the same time and one port transmits. If the transmitting port fails, ETX-204A switches to the standby link. Both network ports must be enabled. If activated, LACP control frames are periodically transmitted in order to locate failures as they occur.

- **1:1 bidirectional protection (redundancy) mode.** In this mode, only one port is active at a time to carry traffic. If it fails, the second port takes over. The recovery mode (revertive or non-revertive) and the restoration time in revertive mode can be selected according to the application requirements.

![Figure 4-4. Link Aggregation between a Switch and ETX-204A](image)
When deciding whether to operate with LAG or protection, you can consider the following if protection without LACP is acceptable in your application:

- **Protection** – You can configure parameters such as revertive/non-revertive mode, the restoration time in revertive mode, forcing active link, etc., but the switchover time to the standby link is longer than for LAG.
- **LAG** – The switchover time to the standby link is shorter than for protection, but you can’t configure the parameters mentioned above.

### Link Aggregation

The two Gigabit Ethernet ports can be operated as a single logical interface, using link aggregation in accordance with IEEE 802.3-2005. The two ports must be connected to the same switch/router, as shown in *Figure 4-5.*

The equipment connected to the GbE ports must use compatible switching criteria for redundancy to be available:

- For networks using Layer 2 switching – The criterion is signal loss.
- For networks using Layer 3 routing – The router must support IEEE 802.3-2005 or other link aggregation protocol that views the aggregated link as a single logical interface.

*Figure 4-5. Network Link Aggregation Redundancy Mode*

Using link aggregation inherently provides redundancy, because if one of the GbE ports fails, the other can continue transferring traffic. Failure of a link is detected by sensing the loss of valid signals, or receiving a failure report via Link Aggregation Control Protocol (LACP) if applicable, in which case all traffic is sent through the other link.

### 1:1 Bidirectional Redundancy

As an alternative to link aggregation, the two ETX-204A network ports can be configured for 1:1 bidirectional mode. With this mode, two topologies can be used:

- Connection of both ports to the same switch/router, as shown in *Figure 4-5.*
- Connection of the ports to different switch/routers, as illustrated in *Figure 4-6.* The main advantage of this topology is its higher availability, because each port can be routed along a different path through the network. This topology is also referred to as dual homing.
With 1:1 bidirectional redundancy mode, at any time only one of the ports is actively carrying traffic, and the other port serves as the backup port. A RAD proprietary redundancy algorithm, based on loss of GbE signal, is used to detect line failure. The protection switching (flipping) time is less than 1 second. It also depends on the network “relearning” time or aging.

The recovery mode after protection switching can be selected in accordance with the application requirements:

- Non-revertive mode – ETX-204A does not automatically flip back after the failed port returns to normal operation, but only when the currently used port fails, or after a manual flip command.
- Revertive mode – ETX-204A flips back to the original port when it returns to normal operation. Flipping back can be delayed by specifying a restoration time, during which alarms are ignored. As a result, ETX-204A starts evaluating the criteria for protection switching (flipping) only after the restoration time expires, thereby ensuring that another flip cannot occur before the specified time expires.

**Configuring LAG**

This section explains how to define a link aggregation group (LAG) and enable link aggregation control protocol (LACP). ETX-204A supports one LAG.

**Note**  
In order to enable LACP for the LAG, the ports bound to the LAG must be associated with an L2CP profile that specifies peer action for MAC 0x02.

**To configure the LAG:**

1. Navigate to `configure port lag 1`.  
   The `config>port>lag(1)#` prompt is displayed.
2. Enter all necessary commands according to the tasks listed below.

<table>
<thead>
<tr>
<th>Task</th>
<th>Command</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assigning an admin key to the LAG to indicate the port speed</td>
<td>`admin-key {giga-ethernet</td>
<td>fast-ethernet}`</td>
</tr>
<tr>
<td>Adding a port to the LAG</td>
<td>`bind {ethernet</td>
<td>giga-ethernet</td>
</tr>
<tr>
<td>Task</td>
<td>Command</td>
<td>Comments</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>-------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Enabling LACP and setting LACP parameters: operation mode (active or passive) and time to wait before sending LACP frames (long or short) | `lacp [tx-activity {active | passive}] [tx-speed {long | short}]` | **tx-activity:**
|                                                                      |                                           | active – LAG interface periodically transmits LACP frames (LACPDUs) to all links with LACP enabled
|                                                                      |                                           | passive – LAG interface does not initiate the LACP exchange, but replies to received LACPDUs.
|                                                                      |                                           | **tx-speed:**
|                                                                      |                                           | short – Three seconds
|                                                                      |                                           | long – 90 seconds.
|                                                                      |                                           | Defaults:
|                                                                      |                                           | • If you type `lacp` without specifying `tx-activity`, it is set to `active`
|                                                                      |                                           | • If you type `lacp` without specifying `tx-speed`, it is set to `short`.
|                                                                      |                                           | Typing `no lacp` disables LACP protocol |
| Assigning value used to build a LAG ID, which determines aggregation precedence. If there are two partner devices competing for the same LAG, LACP compares the LAG IDs for each grouping of ports. The LAG with the lower LAG ID is given precedence and allowed to use the LAG. | `sys-priority <0–65535>`                  |                                                                          |
### Assigning method of distributing traffic within LAG

<table>
<thead>
<tr>
<th>Task</th>
<th>Command</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assigning method of distributing traffic within LAG</td>
<td>`distribution-method {src-mac</td>
<td>dest-mac</td>
</tr>
<tr>
<td>src-mac</td>
<td>Packets are distributed according to their source MAC addresses</td>
<td></td>
</tr>
<tr>
<td>dest-mac</td>
<td>Packets are distributed according to their destination MAC addresses</td>
<td></td>
</tr>
<tr>
<td>src-or-dest-mac</td>
<td>Packets are distributed according to their source or destination MAC addresses</td>
<td></td>
</tr>
<tr>
<td>src-and-dest-mac</td>
<td>Packets are distributed according to their source and destination MAC addresses</td>
<td></td>
</tr>
<tr>
<td>src-ip</td>
<td>Packets are distributed according to their source IP addresses</td>
<td></td>
</tr>
<tr>
<td>dest-ip</td>
<td>Packets are distributed according to their destination IP addresses</td>
<td></td>
</tr>
<tr>
<td>src-dest-mac-ip</td>
<td>Packets are distributed according to their source and destination MAC and IP addresses</td>
<td></td>
</tr>
<tr>
<td>round-robin</td>
<td>Packets are distributed evenly across all of the links</td>
<td></td>
</tr>
<tr>
<td>source-port</td>
<td>Packets are distributed according to their source port</td>
<td></td>
</tr>
</tbody>
</table>

### Administratively enabling LAG

<table>
<thead>
<tr>
<th>Task</th>
<th>Command</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administratively enabling LAG</td>
<td><code>no shutdown</code></td>
<td>Using <code>shutdown</code> disables the LAG</td>
</tr>
</tbody>
</table>

### Displaying LAG member status

<table>
<thead>
<tr>
<th>Task</th>
<th>Command</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Displaying LAG member status</td>
<td><code>show members-status</code></td>
<td></td>
</tr>
</tbody>
</table>

### Displaying LAG member statistics

<table>
<thead>
<tr>
<th>Task</th>
<th>Command</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Displaying LAG member statistics</td>
<td><code>show members-statistics</code></td>
<td></td>
</tr>
</tbody>
</table>

For example:

- **To define LAG 1:**
  - L2CP profile mac2peer, with mac0x02 set to peer action
  - LAG members – Ethernet ports 1 and 2, with assigned L2CP profile mac2peer
  - LACP operation mode – Active
  - LACP timeout – Short
  - Distribution method – Source port
  - System priority – 40,000.
ETX-204A##configure port l2cp-profile mac2peer  
ETX-204A##config>port>l2cp-profile(mac2peer)$ mac 0x02 peer  
ETX-204A##config>port>l2cp-profile(mac2peer)$ exit  
ETX-204A##config>port# eth 1 l2cp profile mac2peer  
ETX-204A##config>port# eth 2 l2cp profile mac2peer  
ETX-204A##config>port# lag 1  
ETX-204A##config>port>lag(1)$ admin-key giga-ethernet  
ETX-204A##config>port>lag(1)$ bind ethernet 1  
ETX-204A##config>port>lag(1)$ bind ethernet 2  
ETX-204A##config>port>lag(1)$ lACP tx-activity active tx-speed short  
ETX-204A##config>port>lag(1)$ distribution-method source-port  
ETX-204A##config>port>lag(1)$ sys-priority 40000  
ETX-204A##config>port>lag(1)$ no shutdown  
ETX-204A##config>port>lag(1)##

To display the status of the LAG members:

ETX-204A##config>port  
ETX-204A##config>port>lag 1  
ETX-204A##config>port>lag(1)# show members-status  

<table>
<thead>
<tr>
<th>Actor Port Number</th>
<th>Partner Port Number</th>
<th>Actor Collecting</th>
<th>Partner Collecting</th>
<th>Actor Distributing</th>
<th>Partner Distributing</th>
<th>Actor Synchronized</th>
<th>Partner Synchronized</th>
<th>Actor System ID</th>
<th>Partner System ID</th>
<th>Actor System Priority</th>
<th>Partner System Priority</th>
<th>Actor Operational Key</th>
<th>Partner Operational Key</th>
<th>Actor Tx Activity</th>
<th>Partner Tx Activity</th>
<th>Actor Timeout</th>
<th>Partner Timeout</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>0020D230CC9D</td>
<td>0000000000000</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Active</td>
<td>Passive</td>
<td>Short</td>
<td>Long</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>0020D230CC9D</td>
<td>0000000000000</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Active</td>
<td>Passive</td>
<td>Short</td>
<td>Long</td>
</tr>
</tbody>
</table>

ETX-204A##config>port>lag(1)#
To display LAG statistics:

```
ETX-204A#configure port lag 1
ETX-204A>config>port>lag(1)# show members-statistics
LACP
-----------------------------------------------------------------------------
Port Number               : 1
Rx LACP Frames            : 0
Rx Marker Frames          : 0
Rx Marker response Frames : 0
Rx Unknown Frames         : 0
Rx Illegal Frames         : 0
Tx LACP Frames            : 1
Tx Marker Frames          : 0
Tx Marker response Frames : 0
-----------------------------------------------------------------------------
Port Number               : 2
Rx LACP Frames            : 0
Rx Marker Frames          : 0
Rx Marker response Frames : 0
Rx Unknown Frames         : 0
Rx Illegal Frames         : 0
Tx LACP Frames            : 1
Tx Marker Frames          : 0
Tx Marker response Frames : 0
ETX-204A>config>port>lag(1)#
```

**Configuring Link Protection**

Configuring a 1:1 protection requires defining an Ethernet group.

- **To define an Ethernet group:**
  - At the Protection context (`config>protection`), enter `ethernet-group <group id>`.
    
    The system switches to the context of the specified Ethernet group (`config>protection>eth-group(<group id>)`).

- **To define the operation mode:**
  - At the Ethernet Group context (`config>protection>eth-group(<group id>)`), enter `oper-mode {1-to-1|manual}`.

- **To add/remove protection and working ports – in manual mode:**
  - At the Ethernet Group context (`config>protection>eth-group(<group id>)`), enter `bind ethernet primary <port>`
  
  - To remove protection and working ports, enter `no bind ethernet primary`
To add/remove protection and working ports – in 1-to-1 mode:

- At the Ethernet Group context
  \(\text{[config>protection>eth-group(<group id>)]}\), enter
  \text{bind ethernet [primary <port>] [secondary <port>]}

- To remove protection and working ports, enter
  \text{no bind ethernet primary}
  \text{no bind ethernet secondary}

To define the port recovery mode as revertive:

- At the Ethernet Group context
  \(\text{[config>protection>eth-group(<group id>)]}\), enter
  \text{revertive.}
  Traffic is switched back to the primary port after it recovers.

To define the port recovery mode as non-revertive:

- At the Ethernet Group context
  \(\text{[config>protection>eth-group(<group id>)]}\), enter
  \text{no revertive.}
  Traffic continues being transmitted over the secondary port after the primary port recovers.

To define the time between recovery and resumption of transmission

- At the Ethernet Group context
  \(\text{[config>protection>eth-group(<group id>)]}\), enter
  \text{wait-to-restore <seconds>}.  
  The primary port resumes transmitting traffic once the specified time has been restored and the specified time has elapsed. You can choose between 1 and 720 seconds.

To define the period of time that the failed link stops transmitting to report the failure:

- At the Ethernet Group context
  \(\text{[config>protection>eth-group(<group id>)]}\), enter
  \text{tx-down-duration-upon-flip <seconds>}.  
  The secondary port resumes transmitting after the specified ‘reporting’ time. You may specify a time in the range between 0 and 30 seconds. This function is useful if there is no autonegotiation between the link end points.

To force a port to transmit:

- At the Ethernet Group context
  \(\text{[config>protection>eth-group(<group id>)]}\), enter
  \text{force-active-port ethernet <port>}.  
  The specified port is set to be active. You can choose the primary port (1) or the secondary port (2).

  - **Port 1.** Port 1 is configured as a permanently active link. Even if port 1 fails, the traffic is not switched to the standby port.
Port 2. Port 2 is configured as a permanently active link. Even if port 2 fails, the traffic is not switched to the standby port.

To specify that neither of the ports is forced to remain active, enter `no force-active-port`

To display the Ethernet group status:
- At the EthernetGroup context
  
  ```
  (config>protection>eth-group(<group id>)), enter `show status`.
  ```

  The Ethernet group status parameters are displayed.

---

### 4.4 Quality of Service (QoS)

The ETX-204A Quality of Service (QoS) parameters include the following profiles:
- Queue map profiles
- Marking profiles
- Bandwidth profiles
- Queue block profiles
- Queue group profiles.

These profiles can be applied to the traffic flows to ensure the desired flow prioritization.

#### Configuring Queue Mapping Profiles

Queue mapping profiles (formerly referred to as CoS profiles) are used to convert the following user priorities into internal priority queues (classes of service). ETX-204A supports up to 12 queue mapping profiles.

- **p-bit**, when the ingress traffic is prioritized according to the 802.1p requirements
- **ip-dscp**, when the ingress traffic is prioritized according to DSCP
- **ip-precedence**, when the ingress traffic is prioritized according to IP precedence.

For each profile, you have to define the queue mapping to map the user priority values to the internal CoS values. The internal queues are combined into a queue profile, which can be assigned to a queue block.

#### Default Configuration

**Default Queue Mapping Profile**

ETX-204A provides a default queue mapping profile named CosProfile1, which can be used when the ingress traffic is prioritized according to the 802.1p requirements. It is defined with classification p-bit, and the following mappings:

- Map p-bit 0 to queue 7
• Map p-bit 1 to queue 6
• Map p-bit 2 to queue 5
• Map p-bit 3 to queue 4
• Map p-bit 4 to queue 3
• Map p-bit 5 to queue 2
• Map p-bit 6 to queue 1
• Map p-bit 7 to queue 0.

**Default Configuration for IP Precedence Classification**

When a new queue mapping profile is created with classification IP precedence, it contains the following mappings:

• Map p-bit 0 to queue 7
• Map p-bit 1 to queue 6
• Map p-bit 2 to queue 5
• Map p-bit 3 to queue 4
• Map p-bit 4 to queue 3
• Map p-bit 5 to queue 2
• Map p-bit 6 to queue 1
• Map p-bit 7 to queue 0.

**Default Configuration for DSCP Classification**

When a new queue mapping profile is created with classification DSCP, it contains the following mappings:

• Map p-bit 0 to queue 7
• Map p-bit 1 to queue 6
• Map p-bit 2 to queue 5
• Map p-bit 3 to queue 4
• Map p-bit 4 to queue 3
• Map p-bit 5 to queue 2
• Map p-bit 6 to queue 1
• Map p-bit 7 through 63 to queue 0.

**Adding Queue Mapping Profiles**

When you create a queue mapping profile, you specify the name and the classification method (p-bit, IP precedence, or DSCP).

➤ **To add a queue mapping profile:**

1. Navigate to `configure qos`.
   
   The `config>qos#` prompt is displayed.
2. Type `queue-map-profile <queue-map-profile-name> classification {p-bit|ip-precedence|ip-dscp}`.

   A queue mapping profile with the specified name and classification method is created and the following prompt is displayed:
   `config>qos>queue-map-profile(<queue-map-profile-name>)$`. The mappings for the new profile are configured by default as described in *Default Configuration*.

3. Configure the queue profile mappings as described in *Configuring Queue Mappings*.

### Configuring Queue Mappings

1. Navigate to `config qos queue-map-profile <queue-map-profile-name>` to select the queue mapping profile to configure.

   The following prompt is displayed:
   `config>qos>queue-map-profile(<queue-map-profile-name>)#`.

2. Map the user priorities to queue IDs as necessary:

   - Classification p-bit or IP precedence:
     
     ```
     map <0-7> to-queue <0-7>
     ```

   - Classification DSCP:
     
     ```
     map <0-63> to-queue <0-7>.
     ```

For example:

- To create and configure a queue mapping profile named QMapPbit with classification p-bit:

  ```
  • Map priority 0 to queue 3
  • Map priority 4 and 6 to queue 2.
  ```
To create and configure a queue mapping profile named QMapIPprec with classification IP precedence:

- Map priority 2 and 3 to queue 3.

```
ETX-204A# configure qos queue-map-profile QMapIPprec classif ip-precedence
ETX-204A>config>qos> queue-map-profile(QMapIPprec)$ map 2 to 3
ETX-204A>config>qos> queue-map-profile(QMapIPprec)$ map 3 to 3
ETX-204A>config>qos> queue-map-profile(QMapIPprec)$ info detail
  map  0 to-queue  7
  map  1 to-queue  6
  map  2..4 to-queue  3
  map  5 to-queue  2
  map  6 to-queue  1
  map  7 to-queue  0
```

To create and configure a queue mapping profile named QMapDSCP with classification DSCP:

- Map priority 7 to queue 6
- Map priority 55 to queue 4
- Map priority 63 to queue 5.

```
ETX-204A# configure qos queue-map-profile QMapDSCP classif ip-dscp
ETX-204A>config>qos> queue-map-profile(QMapDSCP)$ map 7 to 6
ETX-204A>config>qos> queue-map-profile(QMapDSCP)$ map 55 to 4
ETX-204A>config>qos> queue-map-profile(QMapDSCP)$ map 63 to 5
ETX-204A>config>qos> queue-map-profile(QMapDSCP)$ info detail
  map  0 to-queue  7
  map  1 to-queue  6
  map  2 to-queue  5
  map  3 to-queue  4
  map  4 to-queue  3
  map  5 to-queue  2
  map  6 to-queue  1
  map  7 to-queue  6
  map  8..54 to-queue  0
  map  55 to-queue  4
  map  56..62 to-queue  0
  map  63 to-queue  5
```

**Configuring Marking Profiles**

Marking profiles map the P-bit, IP precedence, or DSCP classifications to the egress priority tags. The marking can also be done per color (green and/or yellow), to support color re-marking. ETX-204A supports up to 12 marking profiles, with up to four color-aware profiles.

To define a non color-aware marking profile and assign a priority mark to it:

1. Navigate to the qos context (`config>qos`).
2. Define a marking profile and assign a classification and a method to it:
marking-profile <marking-profile-name>
[classification {p-bit|ip-precedence|ip-dscp|tos}]
[method p-bit]

3. Map the user priority to a priority marking value (0–7 for p-bit and IP precedence, 0–63 for the other priority types):

mark <0-7> to <0-7>
mark <0-63> to <0-7>.

To define a color-aware marking profile and assign a priority mark to it:

1. Navigate to the qos context (config>qos).

2. Define a color-aware marking profile and assign a classification and a method to it:

marking-profile <marking-profile-name>
[classification {p-bit|ip-precedence|ip-dscp} [method p-bit]
color-aware green-yellow

3. Map the packet color and user priority to a priority marking value (0–7 for p-bit and IP precedence, 0–63 for the other priority types):

mark <0-7> {all|green|yellow} to <0-7>
mark <0-63> {all|green|yellow} to <0-63>.

**Note**

If DSCP classification is used, then only up to eight green-yellow combinations are available. A green-yellow combination consists of all the priorities that mark to a particular value for green, and to a particular value for yellow. For example, this is a combination that marks to 1 for green and 2 for yellow:

mark 2 green to 1
mark 2 yellow to 2
mark 3 green to 1
mark 3 yellow to 2
mark 4 green to 1
mark 4 yellow to 2
mark 5 green to 1
mark 5 yellow to 2

This is a combination that marks to 0 for green and for yellow, as output by info command:

mark 0..11 green to 0
mark 13..63 green to 0
mark 0..19 yellow to 0
mark 21..63 yellow to 0

ETX-204A provides a default marking profile named MarkingProfile1, which can be used when the ingress traffic is prioritized according to the 802.1p requirements. It is defined with classification p-bit and method p-bit, and the following markings:

- P-bit 0 => priority 0
- P-bit 1 => priority 1
- P-bit 2 => priority 2
- P-bit 3 => priority 3
• P-bit 4 => priority 4
• P-bit => priority 5
• P-bit => priority 6
• P-bit => priority 7.

Configuring Bandwidth Profiles

ETX-204A supports the following bandwidth profiles:
• Shaper profile – Applied to queue group blocks
• Policer profile – Applied to flows
• Policer aggregate – Specifies policer profile to apply to a group of up to five traffic flows.

Note: You cannot assign the same name to a shaper profile and a policer profile.

You can control the egress bandwidth utilization by defining the committed information rate and committed burst size in shaper and policer profiles. You can also define the excessive information rate and the excessive burst size in policer profiles.

CIR: Defines the Committed Information Rate (CIR) for the current profile. The CIR specifies a bandwidth with committed service guarantee (“green bucket” rate).

CBS: Defines the Committed Burst Size (CBS) for the current profile. The CBS specifies the maximum guaranteed burst size (“green bucket” size).

EIR: Defines the Excess Information Rate (EIR). The EIR specifies an extra bandwidth with no service guarantee (“yellow bucket” rate).

EBS: Defines the Excess Burst Size (EBS). The EBS specifies the extra burst with no service guarantee (“yellow bucket” size).

Compensation: You can specify the amount of bytes that the shaper or policer can compensate for the layer 1 overhead (preamble and IFG) and the overhead for the added VLAN header in case of stacking.

Default Bandwidth Profiles

ETX-204A provides default bandwidth profiles, as specified in the following table.

<table>
<thead>
<tr>
<th>Profile Type</th>
<th>Shaper</th>
<th>Policer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profile Name</td>
<td>Shaper1</td>
<td>Policer1</td>
</tr>
<tr>
<td>cir</td>
<td>1,000,000</td>
<td>0</td>
</tr>
<tr>
<td>cbs</td>
<td>32,767</td>
<td>0</td>
</tr>
<tr>
<td>eir</td>
<td>-</td>
<td>1,000,000</td>
</tr>
<tr>
<td>ebs</td>
<td>-</td>
<td>32,767</td>
</tr>
<tr>
<td>compensation</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Profile Type | Shaper | Policer
-------------|--------|--------
traffic-type |- | all |

**Configuring Shaper Profiles**

You can define up to 30 shaper profiles.

**Adding Shaper Profiles**

1. Navigate to `configure qos`.
   
   The `config>qos#` prompt is displayed.

2. Type `shaper-profile <shaper-profile-name>`.
   
   A shaper profile with the specified name is created and the `config>qos>shaper-profile(<shaper-profile-name>)$` prompt is displayed. The new shaper profile parameters (except for name) are configured by default as described in *Default Bandwidth Profiles*.

3. Configure the shaper profile as described in *Configuring Shaper Profile Parameters*.

**Configuring Shaper Profile Parameters**

To configure shaper profiles:

1. Navigate to `configure qos shaper-profile <shaper-profile-name>` to select the shaper profile to configure.
   
   The `config>qos>shaper-profile(<shaper-profile-name>)#$` prompt is displayed.

2. Enter all necessary commands according to the tasks listed below.

<table>
<thead>
<tr>
<th>Task</th>
<th>Command</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specifying the CIR (kbps) and CBS (bytes) bandwidth limits</td>
<td><code>bandwidth cir &lt;0-100000&gt; cbs &lt;0-32767&gt;</code></td>
<td>Typing <code>no bandwidth</code> removes the bandwidth limits</td>
</tr>
</tbody>
</table>

*Note: The CIR granularity is 128 kbps. If you specify a CIR that is not a multiple of 128 kbps, the device rounds it down, for example if you specify 260 kbps then the device operates as if you specified 256 kbps.*

Specifying the compensation (bytes) | `compensation <0-63>` |

For example:

1. To create and configure a shaper profile named Shap2:
   
   - CIR = 99,968 Kbps
   - CBS = 32,000 bytes
   - Compensation = 48.
### Configuring Policer Profiles

You can define up to 60 policer profiles, except if at least one policer profile has total CIR + EIR greater than 133 Mbps, then no more than 16 policer profiles can be defined.

### Adding Policer Profiles

1. Navigate to `configure qos`.
   - The `config>qos#` prompt is displayed.
2. Type `policer-profile <policer-profile-name>`.
   - A policer profile with the specified name is created and the following prompt is displayed:
     `config>qos>policer-profile(<policer-profile-name>)$`.
   - The new policer profile parameters (except for name) are configured by default as described in Default Bandwidth Profiles.
3. Configure the policer profile as described in Configuring Policer Profile Parameters.

### Configuring Policer Profile Parameters

1. Navigate to `configure qos policer-profile <policer-profile-name>` to select the policer profile to configure.
   - The `config>qos>policer-profile(<policer-profile-name>)#` prompt is displayed.
2. Enter all necessary commands according to the tasks listed below.

<table>
<thead>
<tr>
<th>Task</th>
<th>Command</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specifying the CIR (kbps), CBS (bytes), EIR (kbps), and EBS (bytes) bandwidth limits</td>
<td><code>bandwidth cir &lt;0–1000000&gt; cbs &lt;0–32767&gt;</code></td>
<td>Typing <code>no bandwidth</code> removes the bandwidth limits</td>
</tr>
<tr>
<td>Specifying the compensation (bytes)</td>
<td><code>compensation &lt;0–63&gt;</code></td>
<td></td>
</tr>
<tr>
<td>Specifying the traffic type</td>
<td><code>traffic-type all</code></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**

- The CIR+EIR granularity is 32 kbps up to 130 Mbps, and 512 kbps up to 1 Gbps. If the sum of CIR and EIR does not fit this granularity, the device rounds down. You can use `info detail` to see the rounded-down values.
- The CBS should be greater than the maximum frame size.
For example:

- **To create and configure a policer profile named Policer4:**
  - CIR = 80,000 Kbps
  - CBS = 28,000 bytes
  - EIR = 90,000
  - EBS = 20,000 bytes
  - Compensation = 56.

  The EIR 90,000 is rounded by the device as shown below in the `info detail` output, due to the granularity of 512 kbps when the CIR + EIR is greater than 130 Mbps.

```
ETX-204A# configure qos policer-profile Policer4
ETX-204A>config>qos>policer-profile(Policer4)$ bandwidth cir 80000 cbs 28000 eir 90000 ebs 20000
ETX-204A>config>qos>policer-profile(Policer4)$ compensation 56
ETX-204A>config>qos>policer-profile(Policer4)$ info detail
  bandwidth cir 80000 cbs 28000 eir 89984 ebs 20000
  traffic-type all
  compensation 56
```

### Configuring Policer Aggregates

You can define up to 30 policer aggregates that specify a policer profile to apply to a group of up to five flows. This is useful if you want to set bandwidth limits that are divided among more than one flow.

#### Default Configuration

When a policer aggregate is created, it has the following configuration:

- No assigned policer profile
- No assigned flows
- Rate sampling window (interval for sampling the associated flow statistics) set to 15 minutes.

#### Adding Policer Aggregates

1. Navigate to `configure qos`.
   
   The `config>qos#` prompt is displayed.

2. Type `policer-aggregate <policer-aggregate-name>`.
   
   A policer aggregate with the specified name is created and the `config>qos>policer-aggregate(<policer-aggregate-name>)$` prompt is displayed. The new policer aggregate parameters are configured by default as described in *Default Configuration*.

3. Configure the policer aggregate as described in *Configuring Policer Aggregate Parameters*.  

**Configuring Policer Aggregate Parameters**

1. Navigate to `configure qos policer-aggregate <policer-aggregate-name>` to select the policer aggregate to configure.

   The following prompt is displayed:
   `config>qos>policer-aggregate(<policer-aggregate-name>)#`

2. Enter all necessary commands according to the tasks listed below.

   **Note**

   You assign the flows to the policer aggregate in the flow level (refer to Configuring Flows for details).

---

<table>
<thead>
<tr>
<th>Task</th>
<th>Command</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assigning policer profile</td>
<td><code>policer profile &lt;policer-profile-name&gt;</code></td>
<td></td>
</tr>
<tr>
<td>Specifying rate sampling window (minutes)</td>
<td><code>rate-sampling-window &lt;1–30&gt;</code></td>
<td></td>
</tr>
<tr>
<td>Displaying the associated flows</td>
<td><code>show flows</code></td>
<td></td>
</tr>
<tr>
<td>Displaying statistics for the associated flows</td>
<td><code>show statistics running</code></td>
<td></td>
</tr>
<tr>
<td>Clearing the statistics for the associated flows</td>
<td><code>clear-statistics</code></td>
<td></td>
</tr>
</tbody>
</table>

---

**Configuring Queue Block Profiles**

In order to facilitate congestion management, you can sort traffic by applying queue block profiles to queue block entities. A queue block profile contains entries for queues 0–7, with the following parameters:

- Scheduling method:
  - Strict – High-priority queues that are always serviced first. If a lower-priority queue is being serviced and a packet enters a higher queue, that queue is serviced immediately.
  - WFQ (weighted fair queuing) – If one port does not transmit, its unused bandwidth is shared by the ‘transmitting’ queues according to the assigned weight.

In configurations with Strict and WFQ queues, the WFQ frames are transmitted only after the transmission of frames associated with the Strict queues is completed.

**Note**

If one of the internal queues is configured to WFQ, queues with a higher queue ID cannot be configured to Strict.

- Depth (queue length), in bytes.

**Note**

A queue block has 1 MB available, therefore the sum of the depths of its eight queues must be no greater than 1 MB.
Default Queue Block Profile

ETX-204A provides a default queue block profile named DefaultQueue1, which defines queues 0–7 as follows:

- Scheduling method: WFQ, with weight set to 100
- Depth: 50,000.

Adding Queue Block Profiles

You can define up to 32 queue block profiles.

To add a queue block profile:
1. Navigate to configure qos.
   The config>qos# prompt is displayed.
2. Type queue-block-profile <q-blk-profile-name>.
   A queue block profile with the specified name is created and the config>qos>queue-block-profile(<q-blk-profile-name>)$ prompt is displayed. The queues for the new profile are configured by default as described in Default Queue Block Profile.
3. Configure the queue block profile as described in Configuring Queue Block Profile Parameters.

Configuring Queue Block Profile Parameters

To configure a queue block profile:
1. Navigate to config qos queue-block-profile <q-blk-profile-name> to select the queue block profile to configure.
   The config>qos>queue-block-profile(<q-blk-profile-name>)# prompt is displayed.
2. Perform the following for each queue that you wish to configure:
   a. To configure a queue, enter queue <q-ID>.
   The following prompt is displayed: config>qos>queue-block-profile(<q-blk-profile-name>)>queue(<q-ID>)#.
   b. Enter all necessary commands according to the tasks listed below.
   c. Type exit to return to the queue block profile context.

<table>
<thead>
<tr>
<th>Task</th>
<th>Command</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting scheduling method</td>
<td>scheduling { strict</td>
<td>wfq &lt;weight&gt;}</td>
</tr>
<tr>
<td>Specifying queue depth</td>
<td>depth &lt;0–1048576&gt;</td>
<td></td>
</tr>
</tbody>
</table>

For example:

To create and configure a queue block profile named QBlockProf1:
- Queue 0 set to strict scheduling and depth 500,000
- Queue 1 set to strict scheduling and depth 200,000
• Queue 7 set to WFQ scheduling with weight 75.

```
ETX-204A# configure qos queue-block-profile QBlockProf1
ETX-204A>config>qos>queue-block-profile(QBlockProf1)$ queue 0
ETX-204A>config>qos>queue-block-profile(QBlockProf1)>queue(0)$ scheduling strict
ETX-204A>config>qos>queue-block-profile(QBlockProf1)>queue(0)$ depth 500000
ETX-204A>config>qos>queue-block-profile(QBlockProf1)>queue(0)$ exit
ETX-204A>config>qos>queue-block-profile(QBlockProf1)# queue 1
ETX-204A>config>qos>queue-block-profile(QBlockProf1)>queue(1)# scheduling strict
ETX-204A>config>qos>queue-block-profile(QBlockProf1)>queue(1)# depth 200000
ETX-204A>config>qos>queue-block-profile(QBlockProf1)>queue(1)# exit
ETX-204A>config>qos>queue-block-profile(QBlockProf1)# queue 7
ETX-204A>config>qos>queue-block-profile(QBlockProf1)>queue(7)# scheduling wfq 75
ETX-204A>config>qos>queue-block-profile(QBlockProf1)>queue(7)#
```

### Configuring Queue Group Profiles

In order to facilitate congestion management, you can sort traffic by applying one queue group profile per network or user port. You can define up to eight queue group profiles per ETX-204A unit.

### Adding Queue Group Profiles

➤ To add a queue group profile:

1. Navigate to `configure qos`.
   
   The `config>qos#` prompt is displayed.

2. Type `queue-group-profile <q-grp-profile-name>`.
   
   A queue group profile with the specified name is created and the `config>qos>queue-group-profile(<q-grp-profile-name>)$` prompt is displayed.

3. Configure the queue group profile as described in *Configuring Queue Group Profile Parameters*.

### Configuring Queue Group Profile Parameters

➤ To configure a queue group profile:

1. Navigate to `config qos queue-group-profile <q-grp-profile-name>` to select the queue group profile to configure.
   
   The `config>qos>queue-group-profile(<q-grp-profile-name>)#` prompt is displayed.

2. Select a queue block in level 0 or 1 to configure:
   
   `queue-block 0/1-31`
   
   `queue-block 1/1`

   The following prompt is displayed:
   
   `config>qos>queue-group-profile(<q-grp-profile-name>)>queue-block(<level/ID>)#`.  

---

**Quality of Service (QoS)**

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3. Enter all necessary commands according to the tasks listed below.

4. If you wish to configure another queue block, type `exit` to return to the queue group profile context, and start again at step 2.

<table>
<thead>
<tr>
<th>Task</th>
<th>Command</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assigning a name to the queue block</td>
<td><code>name &lt;name&gt;</code></td>
<td></td>
</tr>
<tr>
<td>Assigning a queue block profile</td>
<td><code>profile &lt;queue-block-profile-name&gt;</code></td>
<td>Note: Only for queue blocks in level 0</td>
</tr>
<tr>
<td>Assigning a shaper profile</td>
<td><code>shaper profile &lt;shaper-profile-name&gt;</code></td>
<td>Note: Only for queue blocks in level 0</td>
</tr>
</tbody>
</table>

**Note**

Normally there is no need for you to enter the `bind` command. When you add a queue block in level 0 to the profile, `bind` is done automatically.

You cannot use the `bind` command if the queue group contains a single queue block in level 0.

### Configuring WRED Profiles

The WRED mechanism defines the probability of dropping yellow packets depending on the current queue usage. This avoids traffic congestion and ensures the forwarding of green packets. You can configure the following:

- Minimum threshold – Defines the queue usage at which the WRED mechanism starts to drop yellow packets
- Maximum threshold – Defines the queue usage above which the WRED mechanism drops all yellow packets
- Probability – Determines the percentage of packets to be dropped when the queue usage reaches the maximum threshold

There are eight WRED profiles available, named WREDProfile0 through WREDProfile7. They are bound to the queues automatically: WREDProfile0 is bound to queue 0, WREDProfile1 is bound to queue 1, etc. You cannot delete the WRED profiles, and you cannot add more WRED profiles. The binding of the profiles to the queues is set and cannot be changed, but you can change the profile parameters. You can view the assignment of WRED profiles to queues via the `info` command.

**Note**

The WRED mechanism is activated only when you use a policer profile with EIR set to a nonzero value.

To configure WRED profiles:

1. Navigate to `configure qos` and type `wred-profile WREDProfile<n>` where `n` is 0 through 7.

   The `config>qos>wred-profile(WREDProfile<n>)#` prompt is displayed.
2. Enter:
\[
\text{color yellow min } \text{min-threshold} \text{ max } \text{max-threshold} [\text{probability } \text{max-probability}].
\]
- min-threshold – Queue usage minimum threshold in percentage, 0–100
- max-threshold – Queue usage maximum threshold in percentage, 0–100
- max-probability – Percentage of packets to be dropped when the queue usage reaches the maximum limit.

*Note* You can configure the parameters for the color yellow only.

### 4.5 Flows

ETX-204A supports up to 270 unidirectional Ethernet flows, which can be used to provide E-line or E-LAN service delivery over Metro Ethernet networks. Each Ethernet flow is unidirectional and connects two ports.

This section explains how to define the flows according to specific criteria such as VLAN. You can use classifier profiles to specify the criteria for flows. The classification is per port and is applied to the ingress port of the flow.

Classifications that apply to the same port are allowed in the combinations shown in *Table 4-5*. The priority shown is used to determine which classification is used if incoming packets for the port fit the criteria of more than one classification. Priority 4 is the lowest, priority 1 is the highest. NNI indicates ingress network port, UNI indicates ingress user port.

You can perform marking and tagging actions on the outer and inner VLAN such as adding, replacing, or removing, as well as marking with p-bit. Only certain combinations of actions on the outer and inner VLAN are allowed. If no action is performed for the outer VLAN, then for the inner VLAN there must be no action performed. *Table 4-6* shows valid action combinations on ingress frame tags and the resulting egress frame tags and p-bits, according to whether the ingress frame is untagged, contains one VLAN, or is double-tagged. Any combination not shown in the table is not supported.

In the descriptions, VLAN refers to the service provider (outer) VLAN, previously referred to as SP-VLAN, while inner VLAN refers to the Customer Entity VLAN, previously referred to as CE-VLAN.
### Table 4-5. Classification Combinations

<table>
<thead>
<tr>
<th>Classification</th>
<th>Other classifications allowed on same ingress port</th>
<th>Range</th>
<th>Max number ranges</th>
<th>Priority</th>
<th>NNI/UNI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unclassified (all-to-one bundling)</td>
<td>VLAN</td>
<td>-</td>
<td>1</td>
<td>4</td>
<td>Both</td>
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<tr>
<td></td>
<td>VLAN + IP precedence</td>
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<td>VLAN + DSCP</td>
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<td>VLAN + VLAN priority</td>
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<td>VLAN + Non-IP</td>
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<td></td>
<td>VLAN priority</td>
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<td>IP precedence</td>
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<td>DSCP</td>
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<td>Source MAC address</td>
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<td></td>
<td>Destination MAC address</td>
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<td>Source IP address</td>
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<td>Destination IP address</td>
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<td>Non-IP</td>
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<td>Ethertype</td>
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<td></td>
<td>Untagged</td>
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<tr>
<td>VLAN</td>
<td>VLAN + VLAN priority</td>
<td>0–4094</td>
<td>5</td>
<td>3</td>
<td>Both</td>
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<tr>
<td>See Note 1</td>
<td>VLAN + IP precedence</td>
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<td>VLAN + DSCP</td>
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<td>VLAN + source MAC address</td>
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<td>VLAN + destination IP address</td>
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<td>VLAN + inner VLAN</td>
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<td>VLAN + VLAN priority + inner VLAN</td>
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<td>VLAN + Ethertype</td>
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<td>Source MAC address</td>
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<tr>
<td>VLAN + VLAN priority</td>
<td>VLAN</td>
<td>0–4094</td>
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<td>Both</td>
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<tr>
<td>See Note 1</td>
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<td>VLAN + destination IP address</td>
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<td>VLAN + inner VLAN</td>
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<td>VLAN + Ethertype</td>
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<td>Source MAC address</td>
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<td>Destination MAC address</td>
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<td>Destination IP address</td>
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<td>Unclassified</td>
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<td>Ethertype</td>
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<td></td>
<td>Untagged</td>
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<tr>
<td>Classification</td>
<td>Other classifications allowed on same ingress port</td>
<td>Range</td>
<td>Max number ranges</td>
<td>Priority</td>
<td>NNI/UNI</td>
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</tr>
<tr>
<td>VLAN + IP precedence</td>
<td>VLAN Source MAC address Destination MAC address Source IP address Destination IP address Unclassified Ethertype Non-IP Untagged</td>
<td>0–4094 + 0–7</td>
<td>5</td>
<td>2</td>
<td>Both</td>
</tr>
<tr>
<td>VLAN + DSCP</td>
<td>VLAN Source MAC address Destination MAC address Source IP address Destination IP address Unclassified Ethertype Non-IP Untagged</td>
<td>0–4094 + 0–63</td>
<td>5</td>
<td>2</td>
<td>Both</td>
</tr>
<tr>
<td>VLAN + source MAC address</td>
<td>VLAN VLAN + VLAN priority VLAN + inner VLAN VLAN + VLAN priority + inner VLAN</td>
<td>0–4094 + MAC address</td>
<td>One VLAN value + one MAC value (range not allowed for MAC)</td>
<td>2</td>
<td>Both</td>
</tr>
<tr>
<td>VLAN + destination MAC address</td>
<td>VLAN VLAN + VLAN priority VLAN + inner VLAN VLAN + VLAN priority + inner VLAN</td>
<td>0–4094 + MAC address</td>
<td>One VLAN value + one MAC value (range not allowed for MAC)</td>
<td>2</td>
<td>Both</td>
</tr>
<tr>
<td>VLAN + source IP address</td>
<td>VLAN VLAN + VLAN priority VLAN + inner VLAN VLAN + inner VLAN + VLAN priority</td>
<td>0–4094 + IP address</td>
<td>One VLAN value + one IP address value (range not allowed for IP address)</td>
<td>2</td>
<td>Both</td>
</tr>
<tr>
<td>VLAN + destination IP address</td>
<td>VLAN VLAN + VLAN priority VLAN + inner VLAN VLAN + inner VLAN + VLAN priority</td>
<td>0–4094 + IP address</td>
<td>One VLAN value + one IP address value (range not allowed for IP address)</td>
<td>2</td>
<td>Both</td>
</tr>
<tr>
<td>Classification</td>
<td>Other classifications allowed on same ingress port</td>
<td>Range</td>
<td>Max number ranges</td>
<td>Priority</td>
<td>NNI/UNI</td>
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</tr>
<tr>
<td>VLAN + inner VLAN</td>
<td>VLAN, VLAN + VLAN priority, VLAN + source MAC address, VLAN + destination MAC address, VLAN + source IP address, VLAN + destination IP address, VLAN + Ethertype</td>
<td>Single value for VLAN and range for inner VLAN</td>
<td>5 (for inner range)</td>
<td>3</td>
<td>Both</td>
</tr>
<tr>
<td>VLAN + VLAN priority + inner VLAN</td>
<td>VLAN, VLAN + inner VLAN, VLAN + source MAC address, VLAN + destination MAC address, VLAN + source IP address, VLAN + destination IP address, VLAN + Ethertype</td>
<td>Single value for VLAN and range for inner VLAN</td>
<td>5 (for inner range)</td>
<td>3</td>
<td>Both</td>
</tr>
<tr>
<td>VLAN + non-IP</td>
<td>Unclassified, VLAN, VLAN + IP precedence, VLAN + DSCP, Source MAC address, Destination MAC address, Source IP address, Destination IP address, Ethertype, Untagged</td>
<td>0–4094</td>
<td>5</td>
<td>1</td>
<td>Both</td>
</tr>
<tr>
<td>VLAN + Ethertype</td>
<td>VLAN, VLAN + VLAN priority, VLAN + source VLAN</td>
<td>Ethertype + 0–4094</td>
<td>One Ethertype value with one VLAN value</td>
<td>2</td>
<td>Both</td>
</tr>
<tr>
<td>VLAN priority</td>
<td>Unclassified, Source MAC address, Destination MAC address, Source IP address, Destination IP address, Ethertype, Untagged</td>
<td>0–7</td>
<td>5</td>
<td>2</td>
<td>Both</td>
</tr>
<tr>
<td>IP precedence</td>
<td>Unclassified, Source MAC address, Destination MAC address, Source IP address, Destination IP address, Non-IP, Ethertype</td>
<td>0–7</td>
<td>5</td>
<td>2</td>
<td>Both</td>
</tr>
<tr>
<td>Classification</td>
<td>Other classifications allowed on same ingress port</td>
<td>Range</td>
<td>Max number of ranges</td>
<td>Priority</td>
<td>NNI/UNI</td>
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</tr>
<tr>
<td>DSCP</td>
<td>Unclassified Source MAC address Destination MAC address Source IP address Destination IP address Non-IP Ethertype</td>
<td>0–63</td>
<td>5</td>
<td>2</td>
<td>Both</td>
</tr>
<tr>
<td>Source MAC address</td>
<td>VLAN VLAN priority VLAN + VLAN priority VLAN + IP precedence VLAN + DSCP VLAN + Non-IP IP precedence DSCP Unclassified Non-IP Untagged</td>
<td></td>
<td>MAC address</td>
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<td>Both</td>
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<tr>
<td>Destination MAC address</td>
<td>VLAN VLAN priority VLAN + VLAN priority VLAN + IP precedence VLAN + DSCP VLAN + Non-IP IP precedence DSCP Unclassified Non-IP Untagged</td>
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<td>MAC address</td>
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<td>Both</td>
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<tr>
<td>Source IP address</td>
<td>VLAN VLAN priority VLAN + VLAN priority VLAN + IP precedence VLAN + DSCP VLAN + Non-IP IP precedence DSCP Unclassified Non-IP Untagged</td>
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<td>Other classifications allowed on same ingress port</td>
<td>Range</td>
<td>Max number ranges</td>
<td>Priority</td>
<td>NNI/UNI</td>
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</tr>
<tr>
<td><strong>Destination IP address</strong></td>
<td>VLAN, VLAN priority, VLAN + VLAN priority, VLAN + IP precedence, VLAN + DSCP, VLAN + Non-IP, IP precedence, DSCP, Unclassified, Non-IP, Untagged</td>
<td>IP address</td>
<td>Single value (range not allowed)</td>
<td>1</td>
<td>Both</td>
</tr>
<tr>
<td><strong>Non-IP</strong></td>
<td>Unclassified, VLAN + IP precedence, VLAN + DSCP, Source MAC address, Destination MAC address, Source IP address, Destination IP address</td>
<td>–</td>
<td>1</td>
<td>1</td>
<td>Both</td>
</tr>
<tr>
<td><strong>Ethertype</strong></td>
<td>Unclassified, VLAN, VLAN priority, VLAN + VLAN priority, VLAN + IP precedence, VLAN + DSCP, VLAN + non-IP, IP precedence, DSCP, Non-IP, Untagged</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Both</td>
</tr>
<tr>
<td><strong>Untagged</strong></td>
<td>Unclassified, VLAN, VLAN priority, VLAN + VLAN priority, Source MAC address, Destination MAC address, Source IP address, Destination IP address, Ethertype</td>
<td>–</td>
<td>1</td>
<td>2</td>
<td>Both</td>
</tr>
</tbody>
</table>
**Note 1** If you combine the classifications VLAN and VLAN + VLAN priority, the VLANs must be different.

For example, the following combination is not allowed:
- VLAN 100
- VLAN 100 + p-bit 5.

The following combination is allowed:
- VLAN 100
- VLAN 200 + p-bit 5.

You can achieve the combination VLAN 100 and VLAN 100 + p-bit 5 via the following:
- VLAN 100 + p-bit 0–4, 6–7
- VLAN 100 + p-bit 5.

### Table 4-6. Valid VLAN Action Combinations

<table>
<thead>
<tr>
<th>Action on: Egress VLAN(s) and P-bit(s) for Ingress Frame Types:</th>
<th>Outer VLAN</th>
<th>Inner VLAN</th>
<th>Untagged</th>
<th>One VLAN (X)</th>
<th>Double VLANs (X and Y)</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>None</td>
<td>Untagged</td>
<td>X</td>
<td>X, Y</td>
<td></td>
</tr>
<tr>
<td>Pop</td>
<td>Mark with VLAN A</td>
<td>Not applicable – unsupported</td>
<td>Not applicable – unsupported</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Pop</td>
<td>Pop</td>
<td>Not applicable – unsupported</td>
<td>Not applicable – unsupported</td>
<td>Untagged</td>
<td></td>
</tr>
<tr>
<td>Push VLAN A</td>
<td>None</td>
<td>A</td>
<td>A, X</td>
<td>A, X, Y</td>
<td></td>
</tr>
<tr>
<td>Push VLAN A</td>
<td>Mark with VLAN B</td>
<td>A</td>
<td>A, B</td>
<td>A, B, Y</td>
<td></td>
</tr>
<tr>
<td>Push VLAN A</td>
<td>Mark with p-bit D</td>
<td>A</td>
<td>A, X + p-bit D</td>
<td>A, X + p-bit D, Y</td>
<td></td>
</tr>
<tr>
<td>Push VLAN A</td>
<td>Mark with profile F</td>
<td>A</td>
<td>A, X + p-bit according to F</td>
<td>A, X + p-bit according to F, Y</td>
<td></td>
</tr>
<tr>
<td>Push VLAN A, mark with profile E</td>
<td>Push VLAN B, mark with p-bit D</td>
<td>A + p-bit according to E, B + p-bit D</td>
<td>A + p-bit according to E, B + p-bit D, X</td>
<td>A + p-bit according to E, B + p-bit D, X, Y</td>
<td></td>
</tr>
<tr>
<td>Action on:</td>
<td>Egress VLAN(s) and P-bit(s) for Ingress Frame Types:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outer VLAN</td>
<td>Inner VLAN</td>
<td>Untagged</td>
<td>One VLAN (X)</td>
<td>Double VLANs (X and Y)</td>
<td></td>
</tr>
<tr>
<td>Push VLAN A. mark with profile E</td>
<td>Push VLAN B. mark with profile F</td>
<td>A + p-bit according to E, B + p-bit according to F</td>
<td>A + p-bit according to E, B + p-bit according to F, X</td>
<td>A + p-bit according to E, B + p-bit according to F, X, Y</td>
<td></td>
</tr>
<tr>
<td>Mark with VLAN A</td>
<td>None</td>
<td>Untagged</td>
<td>A</td>
<td>A, Y</td>
<td></td>
</tr>
<tr>
<td>Mark with VLAN A</td>
<td>Mark with p-bit D</td>
<td>Not applicable – unsupported</td>
<td>Not applicable – unsupported</td>
<td>A, Y + p-bit D</td>
<td></td>
</tr>
<tr>
<td>Mark with p-bit C</td>
<td>Mark with p-bit D</td>
<td>Not applicable – unsupported</td>
<td>Not applicable – unsupported</td>
<td>X+ p-bit C, Y + p-bit D</td>
<td></td>
</tr>
<tr>
<td>Mark with VLAN A + p-bit</td>
<td>Mark with p-bit D</td>
<td>Not applicable – unsupported</td>
<td>Not applicable – unsupported</td>
<td>A + p-bit, Y + p-bit D</td>
<td></td>
</tr>
<tr>
<td>Mark with VLAN A + profile E</td>
<td>Mark with VLAN B +p-bit D</td>
<td>Not applicable – unsupported</td>
<td>Not applicable – unsupported</td>
<td>A + p-bit according to E, B +p-bit D</td>
<td></td>
</tr>
</tbody>
</table>

*Note 1: When an inner marking profile is used, it is applied to the outer p-bits.*

**Defining Classifier Profiles**

You can define up to 64 classifier profiles to apply to flows to ensure the desired flow classification.

1. Navigate to the flows context (`config>flows`).
2. Define a classifier profile and assign a name to it:
   ```
   classifier-profile <profile-name> match-any
   ```
   The system switches to the context of the classifier profile (`config>flows>classifier-profile(<profile-name>)`).
3. Specify the criteria for the classifier profile:
   ```
   [no] match [ vlan <X>..<Y> ] [ inner-vlan <X>..<Y> ]
   [ p-bit <X>..<Y> ] [ inner-p-bit <X>..<Y> ]
   [ ip-precedence <X>..<Y> ] [ ip-dscp <X>..<Y> ] [tos <X>..<Y>]
   [src-mac <src-mac-low>] [to-src-mac <src-mac-high>]
   [dst-mac <dst-mac-low>] [to-dst-mac <dst-mac-high>]
   [src-ip <src-ip-low>] [to-src-ip <src-ip-high>]
   ```
Example:

<table>
<thead>
<tr>
<th>Specification</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>dst-ip</td>
<td>Destination IP</td>
</tr>
<tr>
<td>to-dst-ip</td>
<td>Destination IP</td>
</tr>
<tr>
<td>ether-type</td>
<td>Ethernet type</td>
</tr>
<tr>
<td>untagged</td>
<td>Untagged</td>
</tr>
<tr>
<td>non-ip</td>
<td>Non-IP</td>
</tr>
<tr>
<td>all</td>
<td>All</td>
</tr>
</tbody>
</table>

Examples:

Specify VLAN 100 to VLAN 150: `match vlan 100..150`
Specify VLAN 20 and inner VLAN 30: `match vlan 20 inner-vlan 30`
Specify unclassified: `match all`
Specify Ethertype 0x8912: `match ether-type 0x8912`

4. When you have completed specifying the criteria, enter `exit` to exit the classifier profile context.

### Configuring Flows

To create a flow:

1. Navigate to the flows context (`config>flows`).
2. Define a flow and assign a name to it:
   ```
   flow <flow-name>
   ```
   The system switches to the respective flow context (`config>flows>flow(<flow-name>)`)
3. Associate the flow with a classifier profile:
   ```
   classifier <classifier-profile-name>
   ```
   Up to three flows can be associated with one classifier profile.
4. Associate the flow with a policer profile or policer aggregate:
   ```
   policer profile <policer-profile-name>
   policer aggregate <policer-aggregate-name>
   ```
   Up to five flows can be associated with one policer aggregate.
5. Specify the ingress port as the host port or an Ethernet port:
   ```
   ingress-port host
   ingress-port ethernet <port>
   ```
6. Specify the egress port as the host port or an Ethernet port, and define its queues:
   ```
   egress-port host [queue <queue-id>]
   egress-port host [queue-map-profile <profile-name>]
   egress-port ethernet <port> [queue <queue-id>]
   [block <block-id>]
   ```
   ```
   egress-port ethernet <port> [queue-map-profile <profile-name>]
   [block <block-id>]
   ```

Note: If a queue mapping profile is used, it must be compatible with the classification criteria of the flow, e.g. if the classification is according to DSCP then the queue mapping should not be according to p-bit.
7. Define marking actions for the flow such as overwriting the VLAN ID or inner VLAN ID or setting the priority:
   a. Enter the marking context:
      `mark all`
   b. Specify marking actions. You can perform the following actions:
      - Overwrite VLAN ID with a new value:
        `vlan <vlan-value>`
      - Overwrite inner VLAN ID with a new value:
        `inner-vlan <inner-vlan-value>`
      - Specify p-bit to set priority for outer VLAN of flow:
        `p-bit <p-bit-value>`
      - Specify marking profile to set priority for outer VLAN of flow:
        `marking-profile <marking-profile-name>`
      - Specify p-bit to set priority for inner VLAN of flow:
        `inner-p-bit <inner-p-bit-value>`
      - Specify marking profile for inner VLAN of flow:
        `inner-marking-profile <inner-marking-profile-name>`.

   Note
   
   *If a marking profile is used, it must be compatible with the classification criteria of the flow, e.g. if the flow classification is according to DSCP then the marking classification should not be according to p-bit.*

   *If a color-aware marking profile is applied for the outer VLAN of a flow, then if marking is applied to the inner VLAN, either the same color-aware marking profile must be used for the inner VLAN, or a non-color-aware marking profile must be used for the inner VLAN.*

   c. Exit the marking context and return to the flow context:
      `exit`

8. Specify VLAN tag actions (removing or adding VLAN IDs with p-bit values) for the flow. You can perform the following actions:
   - Add VLAN ID with p-bit set to specific value, and optionally add inner VLAN ID with p-bit set to specific value:
     `vlan-tag push vlan <sp-vlan> p-bit fixed <fixed-p-bit>`
     `[inner-vlan <inner-sp-vlan> p-bit fixed <inner-fixed-p-bit>]`
   - Add VLAN ID with p-bit set to specific value, and optionally add inner VLAN ID with p-bit set via marking profile:
     `vlan-tag push vlan <sp-vlan> p-bit fixed <fixed-p-bit>`
     `[inner-vlan <inner-sp-vlan> p-bit profile <inner-marking-profile-name>]`
   - Add VLAN ID with p-bit set to specific value, and optionally add inner VLAN ID with p-bit set by copying from the incoming frame:
Flows ETX-204A Ver. 2.2

4-64 Flows

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- Add VLAN ID with p-bit set via marking profile, and optionally add inner VLAN ID with p-bit set to specific value:

  ```
  vlan-tag push vlan <sp-vlan> p-bit profile <marking-profile-name>
  [inner-vlan <inner-sp-vlan> p-bit fixed <inner-fixed-p-bit>]
  ```

- Add VLAN ID with p-bit set via marking profile, and optionally add inner VLAN ID with p-bit set via marking profile:

  ```
  vlan-tag push vlan <sp-vlan> p-bit profile <marking-profile-name>
  [inner-vlan <inner-sp-vlan> p-bit profile <inner-marking-profile-name>]
  ```

- Add VLAN ID with p-bit set via marking profile, and optionally add inner VLAN ID with p-bit set by copying from the incoming frame:

  ```
  vlan-tag push vlan <sp-vlan> p-bit profile <marking-profile-name>
  [inner-vlan <inner-sp-vlan> p-bit copy]
  ```

- Add VLAN ID with p-bit set by copying from the incoming frame, and optionally add inner VLAN ID with p-bit set to specific value:

  ```
  vlan-tag push vlan <sp-vlan> p-bit copy
  [inner-vlan <inner-sp-vlan> p-bit fixed <inner-fixed-p-bit>]
  ```

- Add VLAN ID with p-bit set by copying from the incoming frame, and optionally add inner VLAN ID with p-bit set via marking profile:

  ```
  vlan-tag push vlan <sp-vlan> p-bit copy
  [inner-vlan <inner-sp-vlan> p-bit profile <inner-marking-profile-name>]
  ```

- Add VLAN ID with p-bit set by copying from the incoming frame, and optionally add inner VLAN ID with p-bit set by copying from the incoming frame:

  ```
  vlan-tag push vlan <sp-vlan> p-bit copy
  [inner-vlan <inner-sp-vlan> p-bit copy]
  ```

- Remove VLAN ID, and optionally remove inner VLAN ID:

  ```
  vlan-tag pop vlan [inner-vlan]
  ```

- Remove pushing of inner VLAN:

  ```
  no vlan-tag [push inner-vlan]
  ```

9. To discard traffic transmitted via the flow, enter **drop**

10. Activate the flow (the flow is created as inactive by default):

    ```
    no shutdown
    ```

**Note**

You can activate a flow only if it is associated with at least a classifier profile, ingress port, and egress port.
**Configuring Management Flows**

This section provides an example of configuring management flows for out-of-band management via the Ethernet management port, tagged with management VLAN 105.

You can set up the following flows:

- The flow to the host forwards frames from the management VLAN
- The flow from the host forwards all frames, adding the management VLAN and priority.

**To configure the flow to the host:**

1. Set up a classifier profile to forward frames from VLAN 105:

   ```
   ETX-204A# configure flows
   ETX-204A>config>flows# classifier-profile v105 match-any
   ETX-204A>config>flows>classifier-profile(v105)$ match vlan 105
   ETX-204A>config>flows>classifier-profile(v105)$ exit all
   ETX-204A#
   ```

2. Set up a flow using the previously defined classifier profile, with ingress at the Ethernet management port and egress at the host:

   ```
   ETX-204A# configure flows
   ETX-204A>config>flows# flow fh_in
   ETX-204A>config>flows>flow(fh_in)$ no policer
   ETX-204A>config>flows>flow(fh_in)$ classifier v105
   ETX-204A>config>flows>flow(fh_in)$ ingress-port ethernet 101
   ETX-204A>config>flows>flow(fh_in)$ egress-port host queue 1
   ETX-204A>config>flows>flow(fh_in)$ no shutdown
   ETX-204A>config>flows>flow(fh_in)$ exit all
   ETX-204A#
   ```

**To configure the flow from the host:**

1. Set up a classifier profile to forward all frames:

   ```
   ETX-204A# configure flows
   ETX-204A>config>flows# classifier-profile mng_all match-any
   ETX-204A>config>flows>classifier-profile(mng_all)$ match all
   ETX-204A>config>flows>classifier-profile(mng_all)$ exit all
   ETX-204A#
   ```

2. Set up a flow using the previously defined classifier profile, with ingress at the host and egress at the Ethernet management port, and pushing VLAN 105 with p-bit 6:

   ```
   ETX-204A# configure flows
   ETX-204A>config>flows# flow fh_out
   ETX-204A>config>flows>flow(fh_out)$ classifier mng_all
   ETX-204A>config>flows>flow(fh_out)$ ingress-port host
   ETX-204A>config>flows>flow(fh_out)$ egress-port ethernet 101
   ETX-204A>config>flows>flow(fh_out)$ vlan-tag push vlan 105 p-bit fixed 6
   ETX-204A>config>flows>flow(fh_out)$ no shutdown
   ETX-204A>config>flows>flow(fh_out)$ exit all
   ETX-204A#
   ```
Testing Flows

You can run application layer loopbacks on a flow, with exchange of source and destination MAC addresses or IP addresses of incoming packets. This applies to all the data associated with the flow.

To run an application layer loopback test:
1. Create a flow with the ingress port equal to the egress port.
2. Switch to the context of the above flow (config>flows>flow flow-name)
3. Enter: test [{mac-swap|ip-swap}] [duration <seconds>] [ttl-force <ttl>].

The flow is activated, and the TEST LED is turned on. The test runs for the duration specified. If 0 is specified for the duration, the test runs until it is stopped manually.

![Note](image)

Regardless of whether the mac-swap or ip-swap option is specified, if there is an IP header in the frames, then both MAC and IP address are swapped, otherwise only the MAC is swapped.

To end the test:
1. Switch to the context of the flow that has the test running (config>flows>flow(flow-name))
2. Enter: no test.

Displaying Flow Statistics

You can display the number of forwarded and discarded packets and bytes for a flow.

![Note](image)

Refer to Configuring Policer Aggregate Parameters for information on displaying statistics for flows associated with policer aggregates.

To display the statistics for a flow:
- At the relevant flow context (config>flows>flow(flow-id)), enter show statistics running.
  
  Flow statistics are displayed.

To clear the statistics for a flow:
- At the relevant flow context (config>flows>flow(flow-id)), enter clear-statistics.
  
  The statistics for the flow are cleared.
4.6 Ethernet OAM

Configuring OAM CFM (Connectivity Fault Management)

ETX-204A provides the functions listed below for operation, administration, and maintenance (OAM) in packet-switched networks:

- Continuity check
- Non-intrusive loopback, used to detect loss of bidirectional continuity.
- Performance measurements (per service).

The device supports:

- Up to 64 maintenance domains (MDs)
- Up to 64 maintenance associations (MAs)
- Up to 64 maintenance endpoints (MEPs). Up to eight MEPs can be configured for an MA.
- Up to 100 remote MEPs. Up to 100 remote MEPs can be configured for a MEP.
- Up to 100 services. Up to eight services can be configured for a MEP.

*Note* The above limits are subject to the limit of 300 received PPS (packets per second).

To configure OAM CFM:

- Navigate to the CFM (Connectivity Fault Management) context (`config>oam>cfm`) and specify the MAC address for operation and maintenance:
  
  multicast-addr `<mac-address>`
  
  Default: 0180C2000030

Configuring Maintenance Domains

To configure a maintenance domain (MD):

1. Navigate to the OAM CFM (Connectivity Fault Management) context (`config>oam>cfm`).
2. Specify the ID of the maintenance domain (MD):

   maintenance-domain `<1-64>`

   This creates a new maintenance domain or opens an existing one. The system switches to the specified maintenance domain context (`config>oam>cfm>md(<mdid>)`).
When a maintenance domain is created, the following parameters are automatically set by default:

- Name (string format) – “MD<mdid>”, for example the default name for maintenance domain 1 is “MD1”
- Maintenance domain level – 3
- Standard OAM protocol (no proprietary-cc).

3. If required, set the name of the maintenance domain:

```plaintext
name string <md-name-string>
name dns <md-name-string>
name mac-and-uint <md-name-mac> <md-name-uint>
no name
```

The following apply to the maintenance domain name:

- Maximum length of `md-name-string` is 43 characters
- The maximum combined length of `md-name-string` and `ma-name-string` (maintenance association name) is 48 characters
- Format `mac-and-uint` - Specify `md-name-mac` as `xx-xx-xx-xx-xx-xx`, and `md-name-uint` as an unsigned integer decimal number (0–65535)
- If prestandard OAM protocol is being used, the maintenance domain must have no name (use command `no name`).

4. If required, set the maintenance domain level:

```plaintext
md-level <0–7>
```

Default: 3

**Note** If prestandard OAM protocol is being used, the only allowed value for the maintenance domain level is 3.

5. Set the type of OAM protocol for the MD if necessary:

- To use standard OAM protocol, enter:
  ```plaintext
  no proprietary-cc
  ```
- To use prestandard OAM protocol, enter:
  ```plaintext
  proprietary-cc
  ```

Default: Standard OAM protocol (no proprietary-cc)

**Note** The MD name must be set to `no name` and the level to 3 before you can set the protocol to prestandard.

To delete an existing maintenance domain:

1. Navigate to the OAM CFM (Connectivity Fault Management) context (`config>oam>cfm`).
2. Enter:

```plaintext
no maintenance-domain <1–64>
```
The maintenance domain is deleted.

**Configuring Maintenance Associations**

To configure a maintenance association (MA):

1. At the Maintenance Domain context (`config>oam>cfd>md(<mdid>)`), specify the ID of the maintenance association:

   ```
   maintenance-association <1–64>
   ```

   This creates a new maintenance association or opens an existing one. The system switches to the specified maintenance association context (`config>oam>cfd>md(<mdid>)>ma(<maid>)`).

   When a maintenance association is created, the following parameters are automatically set by default:
   - **Name (string format)** – “MA<maid>”, for example the default name for maintenance association 1 is “MA1”
   - **Continuity check interval** – 1 second.

2. If required, set the name of the maintenance association (MA):

   ```
   name string <ma-name-string>
   name primary-vid <ma-name-vid>
   name uint <ma-name-uint>
   name icc <ma-name-icc>
   ```

   The following apply to the maintenance association name:
   - Maximum length of `ma-name-string` is 45 characters
   - The maximum combined length of `md-name-string` and `ma-name-string` is 48 characters
   - Format `primary-vid` – Specify `md-name-vid` as 1–4094
   - Format `uint` – Specify `ma-name-uint` as an unsigned integer decimal number (0–65535)
   - If prestandard OAM protocol is being used, the maintenance domain must have no name (use command `no name`).

3. If required, set the continuity check interval:

   ```
   ccm-interval {100ms|1s|10s|1min|10min}
   ```

To delete an existing maintenance association:

1. Navigate to the context of the maintenance domain that contains the maintenance association (`config>oam>cfd>md(<mdid>)`).

2. Enter:

   ```
   no maintenance-association <1–64>
   ```

   The maintenance association is deleted.
Configuring Maintenance Endpoints

You can associate a classifier profile or VLAN with a maintenance endpoint (MEP).

**Note**
For every MEP you must configure a flow with the same classification as the MEP, in the direction NNI to UNI.

To configure maintenance endpoints:

1. At the Maintenance Association context
   
   \{(config>oam>cfm>md(<mdid>))>ma(<maid>))\}, define a maintenance endpoint and assign an ID to it:

   \texttt{mep <1–8191>}

   This creates a new maintenance endpoint or opens an existing one. The system switches to the specified maintenance endpoint context \{(config>oam>cfm>md(<mdid>))>ma(<maid>))>mep(<mepid>)\}.

   **Note**
   When a maintenance endpoint is created, the following parameters are automatically set by default:
   
   - Destination address type - multicast
   - Initiate continuity check messages (CCM)
   - CCM priority – 0.

2. To associate the maintenance endpoint (MEP) with a classifier profile or VLAN, enter:

   \texttt{classification profile <profile-name> queue <queue-id> block <queue-block-id>}
   
   \texttt{classification profile <profile-name> queue-mapping <queue-map-profile-name> block <queue-block-id>}
   
   \texttt{classification vlan <vlan-id> queue <queue-id> block <queue-block-id>}
   
   \texttt{classification vlan <vlan-id> queue-mapping <queue-map-profile-name> block <queue-block-id>}

   **Note**
   You can associate more than one MEP to the same VLAN if the MEPs belong to MDs with different levels.

3. Define the MAC address type sent in OAM continuity check messages (CCM) and performance measurement messages (PM) The MAC address can be either the standard multicast or a user-defined unicast address:

   \texttt{dest-addr-type [ccm {unicast|multicast}] [pm {unicast|multicast}]}

   Default: multicast for CCM messages, unicast for PM messages
If more than one remote MEP ID has been defined for the MEP and you change the destination address type from multicast to unicast, all remote MEP IDs are deleted except for the lowest remote MEP ID.

- If more than one remote MEP ID has been defined for the MEP and you change the CCM destination address type from multicast to unicast, all remote MEP IDs are deleted except for the lowest remote MEP ID.
- If the MAC address type for PM messages is unicast, then the MAC address for the transmission of PM messages is determined by the configuration of the destination NE. If a remote MAC address is configured for the destination NE, that MAC is used. Otherwise if a remote MEP ID is configured for the destination NE, the remote MAC address is learned from CCM messages. Refer to Configuring Destination NEs for details.

4. If you defined unicast MAC address type for CCM messages with the `dest-addr-type` command, you have to define a unicast MAC address:

   `dest-mac-addr <xx-xx-xx-xx-xx-xx>`

5. To define the remote MEP ID with which the MEP communicates, enter:

   `remote-mep <1–8191>`

   **Note**
   The MEP ID and the Remote MEP ID must be different. You can define up to five remote MEPs for the local MEP if standard OAM protocol is being used for the MD and the destination address type is multicast, otherwise you can define only one remote MEP.

6. To activate the MEP, enter `no shutdown`. To deactivate the MEP, enter `shutdown`.

   ➤ To configure continuity check message initiation and priority:
   - To enable initiating continuity check messages, at the MEP context (`config>oam>cfm>md(<mdid>)>ma(<maid>)>mep(<mepid>)`), enter `ccm-initiate`
     By default, initiating continuity check messages is enabled for the MEP.
   - To disable initiating continuity check messages, enter `no ccm-initiate`
   - To specify the priority of CCMs and LTMs transmitted by the MEP, enter `ccm-priority <0–7>`
     Default: 0

   ➤ To configure the continuity verification:
   - At the Maintenance Endpoint context (`config>oam>cfm>md(<mdid>)>ma(<maid>)>mep(<mepid>)`), enter:
     `continuity-verification {cc-based|lb-based}`
     Default: cc-based
     This parameter is visible only in prestandard mode and can be configured only if `ccm-initiate` is enabled as explained above. Use `lb-based` only for RAD proprietary OAM functionality.
To check the maintenance endpoint status:

- At the Maintenance Endpoint context
  
  \[
  \text{[\text{config}>\text{oam}>\text{cfm}>\text{md(<mdid>)}]>\text{ma(<maid>)}]>\text{mep(<mepid>)}}, \text{ enter show status}
  \]

```plaintext
ETX-204A>config>oam>cfm>md(1)>ma(1)>mep(1)# show status
Port Type : Ethernet
Port Index : 1
Classification Profile : Classifier1
Priority   : 0
MD Name    : MD1
MA Name    : MA1
Cross Connect Status : OK

Remote MEP  Remote MEP Address     Operational Status
-----------------------------------------------------------
      2   00-20-D2-2C-97-A9           OK
```

*Figure 4-7. Displaying Maintenance Endpoint Status*

To check the remote maintenance endpoint status:

- At the Maintenance Endpoint context
  
  \[
  \text{[\text{config}>\text{oam}>\text{cfm}>\text{md(<mdid>)}]>\text{ma(<maid>)}]>\text{mep(<mepid>)}}, \text{ enter show remote-mep <remote-mep-id> status}
  \]

```plaintext
ETX-204A>config>oam>cfm>md(1)>ma(1)>mep(1)# show remote mep 2 status
Remote MEP Address : 00-20-D2-2C-97-A9
Operational Status : OK
```

*Figure 4-8. Displaying Remote Maintenance Endpoint Status*

To send OAM loopback messages:

- To send LBM messages to a remote MEP, at the Maintenance Endpoint context \{\text{[config}>\text{oam}>\text{cfm}>\text{md(<mdid>)}]>\text{ma(<maid>)}]>\text{mep(<mepid>))}\}:
  
  - To specify remote MEP by MAC address, enter:
    \[
    \text{lbm address <xx-xx-xx-xx-xx-xx> repeat <1-50>}
    \]
  
  - To specify remote MEP by ID, enter:
    \[
    \text{lbm remote-mep <remote-mep-id> repeat <1-50>}
    \]

- To check the OAM loopback results:
  
  - At the Maintenance Endpoint context
    
    \[
    \text{[\text{config}>\text{oam}>\text{cfm}>\text{md(<mdid>)}]>\text{ma(<maid>)}]>\text{mep(<mepid>))}}, \text{ enter show lbm-results}
    \]

To send OAM link trace messages:

- To send link trace messages to a remote MEP, at the Maintenance Endpoint context \{\text{[config}>\text{oam}>\text{cfm}>\text{md(<mdid>)}]>\text{ma(<maid>)}]>\text{mep(<mepid>))}\}:
  
  - To specify remote MEP by MAC address, enter:
    \[
    \text{linktrace address <xx-xx-xx-xx-xx-xx> [ttl <1-64>]}
    \]
• To specify remote MEP by ID, enter:
  `linktrace remote-mep <remote-mep-id> [ttl <1-64>]`

• To check the OAM link trace results:
  • At the Maintenance Endpoint context
    `(config>oam>cfm>md(<mdid>)>ma(<maid>)>mep(<mepid>))`, enter
    `show linktrace-results`

  ▶ To delete an existing maintenance endpoint:
    1. Navigate to the context of the maintenance association that contains the
       maintenance endpoint `(config>oam>cfm>md(<mdid>)>ma(<maid>))`.
    2. Enter:
       `no mep <1–8191>

       The maintenance endpoint is deleted.

*Note*  You can remove a maintenance endpoint regardless of whether it contains
services.

**Configuring Maintenance Endpoint Services**

You can configure up to eight services on a MEP, corresponding to each p-bit. Only one service is allowed if the classifier profile associated with the MEP is
according to p-bit.

▶ To configure services for a maintenance endpoint:

  1. At the Maintenance Endpoint context
     `(config>oam>cfm>md(<mdid>)>ma(<maid>)>mep(<mepid>))`, enter:
        `service <1–8>

        The system switches to the specified service context `(config>oam>cfm>
md(<mdid>)>ma(<maid>)>mep(<mepid>)>service(<serviceid>))`.

  2. To specify delay threshold, enter:
     `delay-threshold <1–1000>

     Default: 1`

  3. To specify delay variation threshold, enter:
     `delay-var-threshold <1–1000>

     Default: 1`

  4. To associate this service with a p-bit, enter:
     `classification priority-bit <0–7>

     Only one service can be defined on each p-bit.
     Default: 0.`

  5. Define the interval for performance measurement messages, to be used by all
     remote NEs defined for service:
     `interval {100ms | 1s | 10s |1min | 10min}`
Default: 1s

6. To activate the service, enter `no shutdown`. To deactivate the service, enter `shutdown`.

**Note** You can activate a service only if the corresponding MEP is active.

### Configuring Destination NEs

You can configure up to 100 destination NEs for a service.

For performance measurement it is necessary to know the exact address of the destination NE. You can configure the remote MAC address of the NE or ETX-204A can learn it from the CCM messages.

If the remote MAC address is not configured and needs to be learned, performance measurement messages are sent only after the address is learned.

**To configure destination NEs:**

1. At the service context
   ```
   (config)>oam>cfm>md(<mdid>)>ma(<maid>)>mep(<mepid>)>
   service(<serviceid>), enter:
   dest-ne <1–100>
   ```
   The system switches to the specified destination NE context
   ```
   (config)>oam>cfm>md(<mdid>)>ma(<maid>)>mep(<mepid>)>
   service(<serviceid>)>dest-ne(<dest-neid>)
   ```

2. To define the MAC address or remote MEP ID of the destination NE, enter:
   ```
   remote {mac-addr <mac-address> | mepid <remote-mep-id> }
   ```
   **Note** If you define a remote MEP ID, ETX-204A must learn the remote MAC address before performance measurement messages can be sent.

3. To enable the performance measurement of the destination NE, enter:
   ```
   pm {single-ended-loss | two-way-delay}
   ```

4. To disable some or all of the performance measurement of the destination NE, enter:
   ```
   no pm [{single-ended-loss | two-way-delay}]
   ```

### Configuring OAM CFM Service Event Reporting

In addition to the regular OAM statistics collection, ETX-204A supports proactive SLA measurements per OAM service, as per RMON-based RFC 2819. The device sends reports when one of the counters rises above or drops below the set thresholds within the specified sampling period of time. These reports can be sent as SNMP traps to the defined network management stations, or written to the event log.

The following counters can be monitored:

- **Frame Loss Ratio** – Total number of lost OAM frames divided by total number of transmitted OAM frames since the service was activated
- **Frames Above Delay** – Number of frames that exceeded delay threshold
• Frames Above Delay Variation – Number of frames below or equal delay threshold
• Unavailability Ratio – Total number of unavailable seconds divided by elapsed time since service was activated.

➤ To configure the event reporting for a service:

1. Navigate to the CFM fault context (`config>fault>cfm`).
2. Specify the service and event for which you wish to configure event reporting:
   ```plaintext
   service md <mdid> ma <maid> mep <mepid> service <serviceid> 
   {loss-ratio|above-delay|above-delay-var|unavailability-ratio}
   ```
   The system switches to the CFM fault context of the specified service (`config>fault>cfm>service(serviceid)`).
3. To define the type of event reporting for the event, enter:
   ```plaintext
   frames-report [event {none|log|trap|logandtrap}] 
   [rising-threshold <rising-threshold>] [falling-threshold <falling-threshold>] [sampling-interval <value>]
   ```
   - Sampling interval value must be at least double rising threshold
   - Rising threshold must be greater than falling threshold.

4. To cancel event reporting for the service, in the CFM fault context of the specified service (`config>fault>cfm>service(serviceid)`) enter:
   ```plaintext
   no frames-report
   ```

### Table 4-7. Service Event Reporting Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Possible Values</th>
</tr>
</thead>
</table>
| event     | Specifies the type of event reporting | none – The event is not reported  
<pre><code>        |                               | log – The event is reported via the event log                                  |
</code></pre>
<p>|           |                               | trap – An SNMP trap is sent to report the event                                 |
|           |                               | logandtrap – The event is reported via the event log and an SNMP trap           |</p>
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Possible Values</th>
</tr>
</thead>
</table>
| rising-threshold       | A value above this threshold within the sampling interval for the particular event is considered as rising event occurred                                                                                                                                                                                                                           | • For events *above-delay* or *above-delay-var*: 1–60  
• For events *loss-ratio* or *unavailability-ratio*: 1e-3, 1e-4, 1e-5, 1e-6, 1e-7, 1e-8, 1e-9, 1e-10  
• For events *above-delay* or *above-delay-var*: 1–60  
• For events *loss-ratio* or *unavailability-ratio*: 1e-3, 1e-4, 1e-5, 1e-6, 1e-7, 1e-8, 1e-9, 1e-10 |
| falling-threshold      | A value below this threshold within the sampling interval for the particular event is considered as falling event occurred                                                                                                                                                                                                                           | • For events *above-delay* or *above-delay-var*: 1–60  
• For events *loss-ratio* or *unavailability-ratio*: 1e-3, 1e-4, 1e-5, 1e-6, 1e-7, 1e-8, 1e-9, 1e-10  
• For events *above-delay* or *above-delay-var*: 1–60  
• For events *loss-ratio* or *unavailability-ratio*: 1e-3, 1e-4, 1e-5, 1e-6, 1e-7, 1e-8, 1e-9, 1e-10 |
| sampling-interval      | Specifies the interval in seconds over which the data is sampled and compared with the rising and falling thresholds                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

### Displaying OAM CFM Statistics

You can display end-to-end performance monitoring data for the OAM services and destination NEs.

ETX-204A measures performance in fixed 15-minute intervals. It also stores performance data for the last 24 hours (96 intervals).

You can view the following types of statistics for services:

- **Running** - OAM statistics collected since the service was activated
- **Day** - OAM statistics for the last 24 hours, or the amount of time since the service was activated, if less than 24 hours.
- **Interval** - OAM statistics for the current interval or a selected interval. You can select an interval only if it has already ended since the service was activated.

When a service is first activated, you can view statistics for only the current interval. The statistics data is shown for the time elapsed since the beginning of the interval. When the current interval ends, it becomes interval 1 and you
can select it for viewing interval statistics. After each interval ends, you can select it for viewing interval statistics.

You can view the following types of statistics for destination NEs:

- Running - OAM statistics collected since performance measurement of the NE started
- Day - OAM statistics for the last 24 hours
- Interval - OAM statistics for the current interval or a selected interval.

To display the OAM CFM statistics for a service:

1. Navigate to the level corresponding to the OAM service for which you wish to view the statistics:
   ```
   configure oam cfm maintenance-domain <mdid>
   maintenance-association <maid> mep <mepid>
   service <serviceid>)
   ```
   The following prompt is displayed:
   ```
   config>oam>cfm>md(<mdid>)>ma(<maid>)>mep(<mepid>)>service <serviceid>)#
   ```

2. Enter all necessary commands according to the tasks listed below.

   **Note**
   The service for which you wish to view the statistics must be active. If the service is not active, the commands to view statistics are not recognized.

<table>
<thead>
<tr>
<th>Task</th>
<th>Command</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viewing running statistics</td>
<td><code>show statistics running</code></td>
<td>The statistics are displayed as listed in Table 4-8</td>
</tr>
<tr>
<td>Viewing statistics for the current interval</td>
<td><code>show statistics current</code></td>
<td>The statistics for the current interval are displayed as listed in Table 4-9</td>
</tr>
</tbody>
</table>
| Viewing the statistics for a selected interval | `show statistics interval <interval-num>` | - Allowed values for `interval-num`: 1–96  
- The statistics for the selected interval are displayed as listed in Table 4-9  
- If you specified an interval that has not yet ended since the service was activated, a message is displayed that the interval doesn’t exist. |
| Viewing statistics for the past 24 hours, or the amount of time since the service was activated if less than 24 hours | `show statistics day` | The statistics for the day are displayed as listed in Table 4-9 |
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Task | Command | Comments
--- | --- | ---
Viewing running statistics, statistics for the current interval, statistics for all intervals, and day statistics | show statistics all | The statistics are displayed as listed in Table 4-8 and Table 4-9

Viewing statistics for all intervals | show statistics all-intervals | The statistics are displayed as listed in Table 4-9

Clearing the statistics for the service | clear-statistics | All statistics data for the service are cleared, including the stored interval data, except for the elapsed time since the start of the current 15-minute interval

To display the OAM CFM statistics for a destination NE:

1. Navigate to the level corresponding to the destination NE for which you wish to view the statistics:
   ```
   configure oam cfm maintenance-domain <mdid>
   maintenance-association <maid> mep <mepid>
   service <serviceid> dest-ne <dest-ne-index>.
   ```
   The following prompt is displayed:
   ```
   config>oam>cfm>md(<mdid>)>ma(<maid>)>mep(<mepid>)>service(<serviceid>)>dest-ne(<dest-ne-index>)#.
   ```

2. Enter all necessary commands according to the tasks listed below.

<table>
<thead>
<tr>
<th>Task</th>
<th>Command</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viewing running statistics</td>
<td>show statistics running</td>
<td>The statistics are displayed as listed in Table 4-8 and Table 4-10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Task</th>
<th>Command</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viewing statistics for the current interval</td>
<td>show statistics current</td>
<td>The statistics for the current interval are displayed as listed in Table 4-9 and Table 4-10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Task</th>
<th>Command</th>
<th>Comments</th>
</tr>
</thead>
</table>
| Viewing the statistics for a selected interval | show statistics interval <interval-num> | - Allowed values for `interval-num`: 1–96  
- The statistics for the selected interval are displayed as listed in Table 4-9 and Table 4-10  
- If you specified an interval that has not yet ended since the corresponding service was activated, a message is displayed that the interval doesn’t exist. |
<table>
<thead>
<tr>
<th>Task</th>
<th>Command</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viewing statistics for a day</td>
<td>show statistics day</td>
<td>The statistics for the past 24 hours are displayed as listed in Table 4-9 and Table 4-10</td>
</tr>
<tr>
<td>Viewing running statistics, statistics for the current interval,</td>
<td>show statistics all</td>
<td>The statistics are displayed as listed in Table 4-8 and Table 4-9</td>
</tr>
<tr>
<td>statistics for all intervals, and day statistics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Viewing statistics for all intervals</td>
<td>show statistics all-intervals</td>
<td>The statistics are displayed as listed in Table 4-9</td>
</tr>
<tr>
<td>Clearing the statistics for the destination NE</td>
<td>clear-statistics</td>
<td>All statistics data for the destination NE are cleared, including the stored interval data, except for the elapsed time since the start of the current 15-minute interval</td>
</tr>
</tbody>
</table>

Table 4-8. OAM Running Statistic Counters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmitted Frames</td>
<td>Total number of OAM frames transmitted since the service was activated</td>
</tr>
<tr>
<td>Near End Frames Loss</td>
<td>Total number of OAM frames lost from remote MEP to local MEP since the service was activated</td>
</tr>
<tr>
<td>Near End Frames Loss Ratio</td>
<td>Total number of OAM frames lost from remote MEP to local MEP, divided by total number of transmitted OAM frames since the service was activated</td>
</tr>
<tr>
<td>Far End Frames Loss</td>
<td>Total number of OAM frames lost from local MEP to remote MEP since the service was activated</td>
</tr>
<tr>
<td>Far End Frames Loss Ratio</td>
<td>Total number of OAM frames lost from local MEP to remote MEP, divided by total number of transmitted OAM frames since the service was activated</td>
</tr>
<tr>
<td>Elapsed Time</td>
<td>Time (in seconds) elapsed since the service was activated</td>
</tr>
<tr>
<td>Unavailable Seconds</td>
<td>Total number of unavailable seconds since the service was activated</td>
</tr>
<tr>
<td>Unavailable Ratio</td>
<td>Total number of unavailable seconds divided by elapsed time</td>
</tr>
<tr>
<td>Frames Above Delay</td>
<td>Number of frames that exceeded delay threshold</td>
</tr>
<tr>
<td>Frames Above Delay Variation</td>
<td>Number of frames below or equal delay threshold</td>
</tr>
<tr>
<td>Current Delay</td>
<td>Current delay of frames</td>
</tr>
<tr>
<td>Current Delay Variation</td>
<td>Current delay variation</td>
</tr>
</tbody>
</table>

Table 4-9. OAM Interval and Day Statistic Counters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interval</td>
<td>Number of selected interval (relevant only when displaying statistics for a selected interval)</td>
</tr>
<tr>
<td>Parameter</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Above Delay Threshold</td>
<td>Number of frames that exceeded delay threshold</td>
</tr>
<tr>
<td>Below Delay Threshold</td>
<td>Number of frames below or equal delay threshold</td>
</tr>
<tr>
<td>Above Delay Var Threshold</td>
<td>Number of frames that exceeded delay variation threshold</td>
</tr>
<tr>
<td>Below Delay Var Threshold</td>
<td>Number of frames below or equal delay variation threshold</td>
</tr>
<tr>
<td>Transmitted Frames</td>
<td>Total number of OAM frames transmitted in the interval or day</td>
</tr>
<tr>
<td>Near End Frames Loss</td>
<td>Number of frames lost from remote MEP to local MEP</td>
</tr>
<tr>
<td>Far End Frames Loss</td>
<td>Number of frames lost from local MEP to remote MEP</td>
</tr>
<tr>
<td>Min Round Trip Delay</td>
<td>Minimum round trip delay (in mseconds) calculated in the interval (or up to elapsed time in current interval)</td>
</tr>
<tr>
<td>Max Round Trip Delay</td>
<td>Maximum round trip delay (in mseconds) calculated in the interval (or up to elapsed time in current interval)</td>
</tr>
<tr>
<td>Avg Round Trip Delay</td>
<td>Average round trip delay (in mseconds) calculated in the interval (or up to elapsed time in current interval)</td>
</tr>
<tr>
<td>Max Round Trip Delay Var</td>
<td>Maximum delay variation (in mseconds) calculated in the interval (or up to elapsed time in current interval)</td>
</tr>
<tr>
<td>Avg Round Trip Delay Var</td>
<td>Average delay variation (in mseconds) calculated in the interval (or up to elapsed time in current interval)</td>
</tr>
<tr>
<td>Elapsed Time</td>
<td>Time (in seconds) elapsed since the start of the current interval (relevant only when displaying statistics for current interval)</td>
</tr>
<tr>
<td>Unavailable Seconds</td>
<td>Total number of unavailable seconds for which the service was unavailable in the interval or day</td>
</tr>
</tbody>
</table>

Table 4-10. OAM Statistic Counters for Destination NEs

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmitted LMMs</td>
<td>Transmitted loss measurement messages</td>
</tr>
<tr>
<td>Transmitted DMMs</td>
<td>Transmitted delay measurement messages</td>
</tr>
<tr>
<td>Transmitted LMRs</td>
<td>Transmitted loss measurement replies</td>
</tr>
<tr>
<td>Transmitted DMRs</td>
<td>Transmitted delay measurement replies</td>
</tr>
<tr>
<td>Received LMMs</td>
<td>Received loss measurement messages</td>
</tr>
<tr>
<td>Received DMMs</td>
<td>Received delay measurement messages</td>
</tr>
<tr>
<td>Received LMRs</td>
<td>Received loss measurement replies</td>
</tr>
<tr>
<td>Received DMRs</td>
<td>Received delay measurement replies</td>
</tr>
</tbody>
</table>

Configuring OAM EFM

ETX-204A can act as the active or passive side in an IEEE 802.3-2005 application. There are two available OAM EFM descriptors. By default OAM EFM descriptor 1 is configured as passive. If you need an OAM EFM descriptor for an active interface you can configure OAM EFM descriptor 2 as active.
When link OAM (EFM) is enabled for a port, you can view its status by displaying the port status (show status). You can also display the OAM (EFM) parameters and OAM (EFM) statistics.

➢ To configure OAM EFM descriptor:
1. Navigate to configure oam efm.
   The config>oam>efm# prompt is displayed.
2. Enter:
   descriptor 2 active.

Note: You cannot configure OAM EFM descriptor 1.

➢ To configure link OAM (EFM) for Ethernet ports:
1. Navigate to configure port ethernet <port-num>.
   The config>port>eth(<port-num>)# prompt is displayed.
2. Enter all necessary commands according to the tasks listed below.

<table>
<thead>
<tr>
<th>Task</th>
<th>Command</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enabling link OAM (EFM)</td>
<td>efm descriptor &lt;1–2&gt;</td>
<td>The EFM descriptor must exist before you can assign it to a port</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Note</strong>: In order for link OAM (EFM) to function properly, the relevant Ethernet port must be associated with an L2CP profile that specifies peer action for MAC 0x02.</td>
</tr>
<tr>
<td>Disabling link OAM (EFM)</td>
<td>no efm</td>
<td></td>
</tr>
<tr>
<td>Displaying link OAM (EFM)</td>
<td>show oam-efm</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Note</strong>: Allowed only if link OAM (EFM) is enabled</td>
</tr>
<tr>
<td>Displaying link OAM (EFM)</td>
<td>show oam-efm-statistics</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Note</strong>: Allowed only if link OAM (EFM) is enabled</td>
</tr>
</tbody>
</table>
For example:

➢ To display the link OAM (EFM) status for Ethernet port 1:

```
ETX-204A# configure port ethernet 1
ETX-204A>config>port>eth(1)# show oam-efm
Administrative Status : Enabled
Operational Status    : Link Fault
Loopback Status       : Off

Information
---------------------------------------------------------------
<table>
<thead>
<tr>
<th></th>
<th>Local</th>
<th>Remote</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode</td>
<td>Passive</td>
<td>--</td>
</tr>
<tr>
<td>MAC Address</td>
<td>00-20-D2-30-CC-9D</td>
<td>--</td>
</tr>
<tr>
<td>PDU Size</td>
<td>1518</td>
<td>--</td>
</tr>
<tr>
<td>Unidirectional</td>
<td>Not Supported</td>
<td>--</td>
</tr>
<tr>
<td>Variables</td>
<td>Not Supported</td>
<td>--</td>
</tr>
<tr>
<td>Events</td>
<td>Not Supported</td>
<td>--</td>
</tr>
<tr>
<td>Loopback</td>
<td>Not Supported</td>
<td>--</td>
</tr>
<tr>
<td>Vendor OUI</td>
<td>0x0020D2</td>
<td>--</td>
</tr>
</tbody>
</table>
```

```
ETX-204A>config>port>eth(1)#
```

### 4.7 Clock Selection

ETX-204A supports one clock domain with up to two clock sources. The sources can be network/user Ethernet ports or the station clock. The timing subsystem automatically selects the best timing source to use for synchronization.

#### Configuring the Clock Domain

The domain parameters include the synchronization network type and the timing quality level.

The synchronization network type identifies the type of synchronization network connections and the synchronization level. Each synchronization network connection is provided by one or more synchronization link connections, each supported by a synchronized PDH trail, SDH multiplex section trail, or 802.3 physical media trail.

The synchronization network types are:

1. Option I (Europe)
2. Option II (USA)
3. Option III (Japan)

You can define the timing quality level of the domain and source, or work without quality level. The supported quality levels are according to the synchronization network type, as shown in the following tables. The quality levels are shown in order of highest quality level to lowest quality level.
### Table 4-11. Option I Quality Levels

<table>
<thead>
<tr>
<th>Quality Level</th>
<th>Description</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRC</td>
<td>Timing source is Primary Reference Clock as defined in Recommendation G.811</td>
<td>Highest</td>
</tr>
<tr>
<td>SSU-A</td>
<td>Timing source is Type I or V Synchronization Supply Unit (SSU) clock as defined in Recommendation G.812</td>
<td></td>
</tr>
<tr>
<td>SSU-B</td>
<td>Timing source is Type VI Synchronization Supply Unit (SSU) clock as defined in Recommendation G.812</td>
<td></td>
</tr>
<tr>
<td>SEC</td>
<td>Timing source is Synchronous Equipment Clock as defined in Recommendation G.813 or G.8262, Option I</td>
<td></td>
</tr>
<tr>
<td>DNU</td>
<td>Do Not Use – This signal should not be used for synchronization</td>
<td>Lowest</td>
</tr>
</tbody>
</table>

### Table 4-12. Option II Quality Levels

<table>
<thead>
<tr>
<th>Quality Level</th>
<th>Description</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRS</td>
<td>Timing source is Primary Reference Source clock as defined in Recommendation G.811</td>
<td>Highest</td>
</tr>
<tr>
<td>STU</td>
<td>Synchronization Traceability Unknown – Timing signal does not carry a quality level indication of the source</td>
<td></td>
</tr>
<tr>
<td>ST2</td>
<td>Timing source is Stratum 2 clock as defined in Recommendation G.812, Type II</td>
<td></td>
</tr>
<tr>
<td>TNC</td>
<td>Timing source is Transit Node Clock as defined in Recommendation G.812, Type V</td>
<td></td>
</tr>
<tr>
<td>ST3E</td>
<td>Timing source is Stratum 3E clock as defined in Recommendation G.812, Type III</td>
<td></td>
</tr>
<tr>
<td>ST3</td>
<td>Timing source is Stratum 3 clock as defined in Recommendation G.812, Type IV</td>
<td></td>
</tr>
<tr>
<td>SMC</td>
<td>Timing source is SONET/Ethernet self-timed clock as defined in Recommendation G.813 or G.8262, Option II</td>
<td></td>
</tr>
<tr>
<td>ST4</td>
<td>Timing source is Stratum 4 free-running clock (applicable only to 1.5 Mbit/s signals)</td>
<td></td>
</tr>
<tr>
<td>PROV</td>
<td>Provisionable by the network operator</td>
<td></td>
</tr>
<tr>
<td>DUS</td>
<td>Don’t Use for Sync – This signal should not be used for synchronization</td>
<td>Lowest</td>
</tr>
</tbody>
</table>

### Table 4-13. Option III Quality Levels

<table>
<thead>
<tr>
<th>Quality Level</th>
<th>Description</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNK</td>
<td>Timing source is unknown</td>
<td>Highest</td>
</tr>
</tbody>
</table>
Quality Level | Description                                                                 | Rank |
-------------|------------------------------------------------------------------------------|------|
SEC          | Timing source is Synchronous Equipment Clock as defined in Recommendation G.813 or G.8262, Option I |      |
DNU          | Do Not Use – This signal should not be used for synchronization               | Lowest |

By default, if a timing card is installed in the unit a clock domain entry is created with the following configuration:

- Synchronization network type 1
- Quality DNU
- Mode auto (clock selection mechanism functions normally).

➢ To configure the clock domain:

1. Navigate to **configure system clock domain 1**.
   
The `config>system>clock>domain(1)`# prompt is displayed.
2. Enter all necessary commands according to the tasks listed below.

<table>
<thead>
<tr>
<th>Task</th>
<th>Command</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting synchronization network type</td>
<td>`sync-network-type { 1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Type 2 – USA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Type 3 – Japan</td>
</tr>
<tr>
<td><strong>Note:</strong> When you change the synchronization network type, you have to redefine the clock sources.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Setting quality of clock</td>
<td>`quality min-level-station { prc</td>
<td>ssu-a</td>
</tr>
<tr>
<td><strong>Note:</strong> The quality values are according to the synchronization network type defined for the domain (refer to Table 4-11 to Table 4-13).</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>`quality min-level-station { prs</td>
<td>stu</td>
</tr>
<tr>
<td></td>
<td>`quality min-level-station { unk</td>
<td>sec</td>
</tr>
<tr>
<td>Setting clock mode</td>
<td>`mode { auto</td>
<td>free-run }`</td>
</tr>
<tr>
<td>Forcing selection of a particular clock source when the sources have different quality levels</td>
<td><code>force &lt;source-id&gt;</code></td>
<td></td>
</tr>
<tr>
<td>Task</td>
<td>Command</td>
<td>Comments</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>-----------------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>Manually selecting a particular clock source in the following conditions:</td>
<td><code>manual &lt;source-id&gt;</code></td>
<td></td>
</tr>
<tr>
<td>• No quality is defined for the clock domain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• The sources have the same qualities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• The sources have different priorities.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Canceling previously issued force or manual command</td>
<td><code>clear</code></td>
<td></td>
</tr>
<tr>
<td>Adding clock source (refer to Configuring the Clock Sources)</td>
<td><code>source &lt;src-id&gt; rx-port ethernet &lt;port-num&gt;</code></td>
<td></td>
</tr>
<tr>
<td></td>
<td><code>source &lt;src-id&gt; station 1</code></td>
<td></td>
</tr>
<tr>
<td>Configuring clock source (refer to Configuring the Clock Sources)</td>
<td><code>source &lt;src-id&gt;</code></td>
<td>Typing <code>no source &lt;src-id&gt;</code> deletes the source</td>
</tr>
<tr>
<td>Displaying status</td>
<td><code>show status</code></td>
<td></td>
</tr>
<tr>
<td>Clearing statistics for clock sources</td>
<td><code>clear-statistics</code></td>
<td></td>
</tr>
</tbody>
</table>

### Configuring the Clock Sources

You can define up to two clock sources for the domain. The sources can be Ethernet ports or the station clock.

When a clock source is created, its default configuration is the following (refer to the task list below for explanations of the parameters):

- Priority = 2
- Wait-to-restore = five minutes (300 seconds)
- Hold-off = 300 milliseconds.

To add a clock source:

1. Navigate to `configure system clock domain 1`.
   
   The `config>system>clock>domain(1)#` prompt is displayed.

2. Type one of the following, according to whether the clock source port is an Ethernet port or the station clock:

   - `source <1-2> rx-port ethernet <port-num>`
   - `source <1-2> station 1`

   The clock source is created and the `config>system>clock>domain(1)>source(<1-2>)$` prompt is displayed.
3. Enter all necessary commands according to the tasks listed below the following procedure.

To configure a clock source for which the port has been defined:

1. Navigate to `configure system clock domain 1`.
   
   The `config>system>clock>domain(1)#` prompt is displayed.

2. Type `source <1–2>` to select the source to configure.
   
   The `config>system>clock>domain(1)>source(<1–2>)#` prompt is displayed.

3. Enter all necessary commands according to the tasks listed below.

<table>
<thead>
<tr>
<th>Task</th>
<th>Command</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting priority</td>
<td><code>priority &lt;1–2&gt;</code></td>
<td>Note: <em>Priority 1 is the highest.</em></td>
</tr>
<tr>
<td>Setting quality level</td>
<td>`quality-level { prc</td>
<td>ssu-a</td>
</tr>
<tr>
<td>Notes:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• If no quality is defined for the domain, this command is not available.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• The quality level values are according to the synchronization network type defined for the domain (refer to Table 4-11 to Table 4-13).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Defining amount of time (in seconds) that a previously failed synchronization source must be fault free in order to be considered available</td>
<td><code>wait-to-restore &lt;0–720&gt;</code></td>
<td></td>
</tr>
<tr>
<td>Defining amount of time (in milliseconds) that signal failure must be active before it is transmitted</td>
<td><code>hold-off &lt;300–1800&gt;</code></td>
<td></td>
</tr>
<tr>
<td>Canceling the wait-to-restore timer of a clock source. This is useful if a timing source fault is cleared and you want the source to be immediately available.</td>
<td><code>clear-wait-to-restore</code></td>
<td></td>
</tr>
<tr>
<td>Displaying status</td>
<td><code>show status</code></td>
<td></td>
</tr>
<tr>
<td>Displaying statistics</td>
<td><code>show statistics</code></td>
<td></td>
</tr>
</tbody>
</table>
Configuring the Station Clock

The station clock is an E1/2MHz port that can be used for synchronization. You can set the station clock timing to be based on the internal system clock or recovered from the received signal.

To configure the station clock:

1. Navigate to `configure system clock station 1`.
   The `config>system>clock>station(1)#` prompt is displayed.
2. Enter all necessary commands according to the tasks listed below.

<table>
<thead>
<tr>
<th>Task</th>
<th>Command</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting clock timing to be</td>
<td>`tx-clock-source {system</td>
<td>loopback-timing}`</td>
</tr>
<tr>
<td>based on internal system</td>
<td></td>
<td>loopback-timing – Timing based on E1/2MHz external source</td>
</tr>
<tr>
<td>or external source</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Setting interface type</td>
<td>`interface-type e1 [{balanced</td>
<td>unbalanced}]`</td>
</tr>
<tr>
<td>Note: You can configure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>the interface type only if</td>
<td></td>
<td></td>
</tr>
<tr>
<td>the station clock is</td>
<td></td>
<td></td>
</tr>
<tr>
<td>administratively disabled</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(shutdown).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Setting line code</td>
<td>`line-code { ami</td>
<td>hdb3 }`</td>
</tr>
<tr>
<td>Note: You can configure</td>
<td></td>
<td><code>hdb3</code> – Referred to as High Density Bipolar of order 3, this code is a telecommunication line code based on AMI and used in E1 lines</td>
</tr>
<tr>
<td>the line code only if the</td>
<td></td>
<td></td>
</tr>
<tr>
<td>interface type is E1 and</td>
<td></td>
<td></td>
</tr>
<tr>
<td>the station clock is</td>
<td></td>
<td></td>
</tr>
<tr>
<td>administratively disabled</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(shutdown).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Setting receiver sensitivity</td>
<td>`rx-sensitivity {short-haul</td>
<td>long-haul}`</td>
</tr>
<tr>
<td>to adjust the signal’s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>capability to reach</td>
<td></td>
<td></td>
</tr>
<tr>
<td>destinations close by or</td>
<td></td>
<td></td>
</tr>
<tr>
<td>farther away</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Administratively enabling</td>
<td><code>no shutdown</code></td>
<td>Using <code>shutdown</code> disables the station clock</td>
</tr>
<tr>
<td>station clock</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.8 Fault Propagation

You can enable fault propagation to be triggered by failure detection on a network/user interface, which causes a user-configurable action (such as deactivation or OAM CFM failure message sent) to be performed on a
user/network interface. You can enable fault propagation in the network-to-user or user-to-network direction, for a pair of interfaces that can be two Ethernet ports, two MEPs, or an Ethernet port and a MEP.

You can define the following when you enable fault propagation for a pair of interfaces:

- **Trigger:**
  - If interface where failure is detected is Ethernet port:
    - LOS – Link down detected
  - If interface where failure is detected is MEP:
    - OAM CFM LOC – Loss of continuity detected
    - OAM CFM RDI – Remote defect indication detected
    - OAM CFM Interface status TLV – Remote port failure detected

- **Action to take when fault propagation is triggered:**
  - If interface where action is performed is Ethernet port:
    - Interface-deactivation
  - If interface where action is performed is MEP:
    - Send OAM CFM interface status TLV to indicate failure.

- **Wait-to-restore time** – The time period before enabling the shut-down interface or ceasing to send OAM CFM interface status once the failed interface has been restored.

### Default Configuration

By default, no fault propagation is configured. When you configure fault propagation for a particular interface pair, the default configuration is as follows:

- No trigger defined for fault detection
- No action defined to be performed when fault is detected
- Wait-to-restore time = 0.

### Configuring Fault Propagation

Follow this procedure to configure fault propagation:

1. Add a fault propagation entry for a pair of interfaces
2. Configure the fault propagation parameters for the entry:
   a. Specify the trigger(s)
   b. Specify the action
   c. Specify the wait-to-restore time if you do not want the default value 0.

### Adding Fault Propagation Entry

To add fault propagation for a pair of interfaces:

1. Navigate to **configure fault**.
2. Type the command:
   \texttt{fault-propagation <from-interface> to <to-interface>} and enter
   the desired interfaces, as shown in Table 4-14.

   A prompt is displayed:
   \texttt{config>fault>fp(<from-interface>/to/<to-interface>)\$}.

3. Configure the fault propagation parameters as needed (refer to \textit{Configuring Fault Propagation Parameters}).

<table>
<thead>
<tr>
<th>Table 4-14. Fault Propagation Command Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>From Interface</td>
</tr>
<tr>
<td>MEP</td>
</tr>
<tr>
<td>Ethernet port</td>
</tr>
<tr>
<td>MEP</td>
</tr>
<tr>
<td>Ethernet port</td>
</tr>
</tbody>
</table>

\textbf{Configuring Fault Propagation Parameters}

\begin{itemize}
  \item To configure fault propagation parameters:
  \begin{enumerate}
    \item Navigate to \texttt{configure fault fault-propagation <from-interface> to <to-interface>} to select the fault propagation entry to configure.
    A prompt is displayed:
    \texttt{config>fault>fp(<from-interface>/to/<to-interface>)#}
    
    \item Enter all necessary commands according to the tasks listed below.
  \end{enumerate}
\end{itemize}

<table>
<thead>
<tr>
<th>Task</th>
<th>Command</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specifying the trigger[s]</td>
<td>\texttt{trigger { los</td>
<td>oam-cfm-loc</td>
</tr>
<tr>
<td>\textbf{Note:} \textit{The los trigger is allowed only if the from-interface is an Ethernet port. The OAM CFM triggers are allowed only if the from-interface is a MEP.}</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specifying the action to take when fault propagation is triggered</td>
<td>\texttt{action-on-group { interface-deactivation</td>
<td>oam-cfm-if-status-tlv }}</td>
</tr>
<tr>
<td>\textbf{Note:} \textit{The interface-deactivation action is allowed only if the to-interface is an Ethernet port. The oam-cfm-if-status-tlv action is allowed only if the to-interface is a MEP.}</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specifying the wait-to-restore time</td>
<td>\texttt{wait-to-restore &lt;seconds&gt;}</td>
<td>The range is 0–3600</td>
</tr>
</tbody>
</table>
For example:

➤ To enable fault propagation:

- From Ethernet port 4
- To MEP 3 in maintenance association 3 in maintenance domain 2 (this example assumes the MEP has been created)
- Trigger: LOS
- Action: Send OAM CFM interface status TLV
- Wait-to-restore time = 120 seconds.

```
ETX-204A# config fault
ETX-204A>config>fault# fault-propagation port ethernet 4 to mep 2 3 3
ETX-204A>config>fault>fp(port/ethernet/4/to/mep/2/3/3)$ trigger los
ETX-204A>config>fault>fp(port/ethernet/4/to/mep/2/3/3)$ action-on-g oam-cfm-if-stat
ETX-204A>config>fault>fp(port/ethernet/4/to/mep/2/3/3)$ wait-to-restore 120
ETX-204A>config>fault>fp(port/ethernet/4/to/mep/2/3/3)$ info detail
  action-on-group  oam-cfm-if-status-tlv
  trigger  los
  no trigger  oam-cfm-loc
  no trigger  oam-cfm-if-status-tlv
  no trigger  oam-cfm-rdi
  wait-to-restore  120
```

➤ To enable fault propagation:

- From Ethernet port 1
- To Ethernet port 3
- Trigger: LOS
- Action: Shut down Ethernet port
- Wait-to-restore time = 90 seconds.

```
ETX-204A# config fault
ETX-204A>config>fault# fault-propagation port ethernet 1 to port ethernet 3
ETX-204A>config>fault>fp(port/ethernet/1/to/port/ethernet/3)$ trigger los
ETX-204A>config>fault>fp(port/ethernet/1/to/port/ethernet/3)$ action interface-deact
ETX-204A>config>fault>fp(port/ethernet/1/to/port/ethernet/3)$ wait-to-restore 90
ETX-204A>config>fault>fp(port/ethernet/1/to/port/ethernet/3)$ info detail
  action-on-group  interface-deactivation
  trigger  los
  no trigger  oam-cfm-loc
  no trigger  oam-cfm-if-status-tlv
  no trigger  oam-cfm-rdi
  wait-to-restore  90
```

ETX-204A>config>fault>fp(port/ethernet/4/to/mep/2/3/3)$
To enable fault propagation:
- From MEP 1 in maintenance association 1 in maintenance domain 1 (this example assumes the MEP has been created)
- To MEP 2 in maintenance association 2 in maintenance domain 1 (this example assumes the MEP has been created)
- Trigger: Any OAM CFM error
- Action: Send OAM CFM interface status TLV
- Wait-to-restore time = 300 seconds.

```bash
ETX-204A# config fault
ETX-204A>config>fault# fault-propagation mep 1 1 1 to mep 1 2 2
ETX-204A>config>fault>fp(mep/1/1/1/to/mep/1/2/2)$ trigger oam-cfm-loc
ETX-204A>config>fault>fp(mep/1/1/1/to/mep/1/2/2)$ trigger oam-cfm-rdi
ETX-204A>config>fault>fp(mep/1/1/1/to/mep/1/2/2)$ trigger oam-cfm-if-status-tl
ETX-204A>config>fault>fp(port/ethernet/4/to/mep/2/3/3)$ action-on-g oam-cfm-if-status-tlv
ETX-204A>config>fault>fp(port/ethernet/4/to/mep/2/3/3)$ wait-to-restore 300
ETX-204A>config>fault>fp(port/ethernet/4/to/mep/2/3/3)$ info detail
  action-on-group  oam-cfm-if-status-tlv
  no trigger  los
  trigger  oam-cfm-loc
  trigger  oam-cfm-if-status-tlv
  trigger  oam-cfm-rdi
  wait-to-restore  300
```

Disabling Fault Propagation

To disable fault propagation for a pair of interfaces:
1. Navigate to configure fault.
2. Type the command:
   ```bash
   no fault-propagation <from-interface> to <to-interface>
   ```
   to select the interfaces for which to disable fault propagation.

   The specified fault propagation is disabled.

4.9 Date and Time

You can set the date and time for the ETX-204A internal real-time clock or receive the NTP server clock signal.

Setting the Date and Time

To set the date and time:
1. Navigate to the Date-Time context (config>system>date-and-time).
2. Specify the desired date format:
   For example: date-format yyyy-mm-dd.
3. Enter the date:
   Example: `date 2008-07-21`

4. Enter the time:
   Example: `time 11:30:22`

5. Enter the time zone relative to GMT, the current Greenwich main time:
   Example: `zone gmt 11:30`

### Displaying the Date and Time

- To display the date and time:
  - From the system context (`config>system`), enter `show time`

### Working with SNTP

This section explains how to receive the clock signal from NTP servers in the network. ETX-204A can synchronize with up to ten servers, sending NTP requests to the servers at user-defined intervals.

You can set one of the active SNTP servers as the preferred server, so that ETX-204A sends NTP requests to the preferred server. If there is no preferred server or if the preferred server does not answer, then ETX-204A sends NTP requests to any enabled servers.

### Default Configuration

The default configuration of the SNTP parameters is:
- No SNTP servers defined
- Polling interval set to 15 minutes.

When an SNTP server is defined, its default configuration is:
- IP address set to 0.0.0.0
- Not preferred
- Administratively disabled (shutdown).

### Configuring SNTP Parameters

- To configure SNTP parameters:
  1. Navigate to `config system date-and-time snntp`.
     The `config>system>date-time#` prompt is displayed.
  2. Enter all necessary commands according to the tasks listed below.
### Defining SNTP Servers

To define an SNTP server:

1. Navigate to `config system date-and-time sntp`.
   
   The `config>system>date-time#` prompt is displayed.

2. Type `server <server-id>` to define an SNTP server with ID `<server-id>`.
   
   The following prompt is displayed: `config>system>date-time>sntp>server (<server-id>)$`. The SNTP server parameters are configured by default as described in Default Configuration.

3. Configure the SNTP server parameters as needed, as described in Configuring SNTP Server Parameters.

### Configuring SNTP Server Parameters

To configure SNTP server parameters:

1. Navigate to `config system date-and-time sntp`.
   
   The `config>system>date-time#` prompt is displayed.

2. Type `server <server-id>` to select the SNTP server to configure.
   
   The following prompt is displayed: `config>system>date-time>sntp>server (<server-id>)#`. 

3. Enter all necessary commands according to the tasks listed below.

<table>
<thead>
<tr>
<th>Task</th>
<th>Command</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enabling broadcast mode</td>
<td>broadcast</td>
<td>If enabled, ETX-204A listens to NTP broadcast messages and obtains accurate timestamps from them. Type <code>no broadcast</code> to disable broadcast mode.</td>
</tr>
<tr>
<td>Setting polling interval (in minutes)</td>
<td>poll-interval interval &lt;1–1440&gt;</td>
<td></td>
</tr>
<tr>
<td>Setting the IP address of the server</td>
<td>address &lt;IP-address&gt;</td>
<td></td>
</tr>
</tbody>
</table>
Set SNTP server as preferred server.

**Note:** Only one server can be preferred.

Setting UDP port for NTP requests, to a specific UDP port or to default UDP port (123)

Setting administratively enabling server

Sending query to server and displaying result

For example:

To define SNTP server:
- Server ID = 1
- IP address = 192.1.1.1
- Preferred
- Administratively enabled

---

**ETX-204A# configure system date-and-time sntp**
**ETX-204A>config>system>date-time>sntp# server 1**
**ETX-204A>config>system>date-time>sntp>server(1)# address 192.1.1.1**
**ETX-204A>config>system>date-time>sntp>server(1)# prefer**
**ETX-204A>config>system>date-time>sntp>server(1)# no shutdown**
**ETX-204A>config>system>date-time>sntp>server(1)# query-server**

---

**Query Server Replay**

---

**Current Source : 1 127.0.0.1**

**NTP Server** **Type** **UDP Port** **Tstamp** **Date** **Time** **Strat** **Received**

---

**192.1.1.1** **Prefer** **123** **00-00-0000** **00:00:00** **0** **--**

---
4.10 Syslog

ETX-204A uses the Syslog protocol to generate and transport event notification messages over IP networks to a Syslog server. The Syslog operation is compliant with the RFC 3164 requirements.

Configuring Syslog Parameters

> To configure syslog parameters:

1. Navigate to the system context (`config>system`).
2. Define syslog server parameters:
   a. Specify the syslog server to receive syslog messages, from 1 to 5:
      ```
      syslog server <server-ID>
      ```
      The system switches to the context of the specified syslog server (`config>system>syslog(server <server-ID>)`).
   b. Specify the IP address of the server:
      ```
      address <0.0.0.0–255.255.255.255>
      ```
   c. Specify the UDP port on the server that receives syslog messages:
      ```
      port <1–65535>
      ```
   d. Enter `exit` to exit the server context.
      The system switches to the system context (`config>system`).
3. Define syslog device parameters:
   a. Enter: `syslog device`
      The system switches to the syslog device context (`config>system>syslog(device)`)
   b. Specify the module, task, or function from which syslog messages are sent:
      ```
      facility <local1–local7>
      ```
      Default: local1
   c. Specify the UDP port that transmits syslog messages:
      ```
      port <1–65535>
      ```
      Default: 514
   d. Specify the severity level. The log messages that contain severity level up to the specified level are transmitted:
      ```
      severity-level
      ```
      {critical|major|minor|warning|event|info|debug}
   e. Enable the transmitting of syslog messages:
      ```
      no shutdown```
Displaying Syslog Statistics

➢ To display syslog statistics:

1. At the system context (config>system), enter: syslog device

   The system switches to the syslog device context
   (config>system>syslog(device))

2. Enter: show statistics.

3. Syslog statistics appear as shown in Figure 4-9. The counters are described in Table 4-15.

```
ETX-204A>config>system>syslog(device)# show statistics
Total Tx Messages : 356
Non-queued Dropped Messages: 265
```

Figure 4-9. Syslog Statistics

Table 4-15. Syslog Statistic Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Tx Messages</td>
<td>The total number of syslog messages transmitted</td>
</tr>
<tr>
<td>Non-queued Dropped Messages</td>
<td>The total number of syslog messages that were dropped before being queued</td>
</tr>
</tbody>
</table>

4.11 Configuring Temperature Threshold

You can define minimum and maximum temperature thresholds in order to receive trap notification that the device temperature has left the allowed range or returned to the allowed range. You can use a hysteresis mechanism to avoid sending an excessive amount of traps when a threshold is repeatedly crossed.

You can configure the minimum temperature, maximum temperature, hysteresis value (optional), and temperature unit (Celsius or Fahrenheit).

The hysteresis defines the margin around the temperature thresholds for sending trap notification of temperature threshold crossed:

- Trap notification of temperature too high is sent when the temperature rises above \( \text{maximum temperature} + \text{hysteresis value} \)
- After trap notification of temperature too high has been sent, the trap notification of temperature OK is sent when the temperature falls below \( \text{maximum temperature} - \text{hysteresis value} \)
- Trap notification of temperature too low is sent when the temperature falls below \( \text{minimum temperature} - \text{hysteresis value} \)
- After trap notification of temperature too low has been sent, the trap notification of temperature OK is sent when the temperature rises above \( \text{minimum temperature} + \text{hysteresis value} \).
To configure the temperature threshold:

1. Navigate to `configure chassis`.

   The `config>chassis#` prompt is displayed.

2. Type:

   ```plaintext
   temperature-threshold { celsius | fahrenheit }
   min min-value max max-value [ hysteresis hysteresis-value ]
   ```

   The temperature thresholds are set as specified.

For example:

1. To define temperature thresholds:
   - Minimum temperature = -20 degrees Celsius
   - Maximum temperature = 50 degrees Celsius
   - Hysteresis = 4.

   ```plaintext
   ETX-204A# configure chassis
   ETX-204A#config>chassis# temperature-threshold celsius min -20 max 50 hysteresis 4
   ETX-204A# config>chassis#
   ```

---

### 4.12 Clearing Device Statistics

You can clear the statistics for Ethernet ports, flows, and OAM services.

1. To clear the statistics:
   - At the device prompt, enter `clear-statistics`.

   The statistics for Ethernet ports, flows, and OAM services are cleared.

For example:

```plaintext
ETX-204A# clear-statistics
ETX-204A#
```

---

### 4.13 Administration

#### Working with the Inventory

The ETX-204A inventory table displays the unit's components, hardware and software revisions, and power supply types. You can display an inventory table that shows all installed components, and you can display more detailed information for each component. You can configure an alias name, asset ID, and serial number for inventory components.

#### Standards and MIBs

The inventory feature is implemented according to RFC 4133 – Entity MIB (RFC 2737 was made obsolete by RFC 4133 version 3).
Benefits
You can monitor the installed components and hardware/software revisions.

Displaying Inventory Information

➢ To display the inventory table:
  • At the config>system# prompt, enter `show inventory-table`.
    The inventory table is displayed (refer to Example to see a typical inventory table output).

You can display more information for each installed inventory component. To do so, you need to enter the `inventory` level with the corresponding inventory component index. Table 4-16 shows the inventory component indices. As shown in the table, the component indices are fixed for the chassis, CPU, and power supply (if unit is 17.4”). For other components, the index is determined by the position of the corresponding row in the output of `show inventory-table`, therefore it changes according to what is installed in the unit.

<table>
<thead>
<tr>
<th>Inventory Component</th>
<th>Index in 8.4” Unit</th>
<th>Index in 17.4” Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chassis</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>CPU</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Power Supply 1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Power Supply 2</td>
<td>Determined by position of corresponding row in <code>show inventory-table</code> output</td>
<td>4</td>
</tr>
<tr>
<td>Fan 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fan 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature Sensor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Network Port 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Network Port 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>User Port 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>User Port 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>User Port 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>User Port 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management Ethernet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>External Clock</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

➢ To display the inventory component information:
  1. Navigate to `configure system inventory <index>`.  
  2. Enter `show status`.

  Information for the corresponding inventory component is displayed (refer to Table 4-17 for information on the parameters).
**Note** If you enter the `inventory` command with an index corresponding to a power supply that is not installed in the unit, a message is displayed stating that the entry instance doesn’t exist.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Name of component&lt;br&gt;Possible values (according to component type):&lt;br&gt;<code>&lt;device-name&gt;</code> – Chassis&lt;br&gt;CPU&lt;br&gt;Power Supply <code>&lt;n&gt;</code>&lt;br&gt;Fan <code>&lt;n&gt;</code>&lt;br&gt;Temperature Sensor&lt;br&gt;Network Port <code>&lt;n&gt;</code>&lt;br&gt;User Port <code>&lt;n&gt;</code>&lt;br&gt;Management Ethernet&lt;br&gt;External Clock</td>
</tr>
<tr>
<td>HW Rev</td>
<td>Hardware revision (relevant only for chassis)</td>
</tr>
<tr>
<td>SW Rev</td>
<td>Software revision (relevant only for chassis)</td>
</tr>
<tr>
<td>FW Rev</td>
<td>Firmware revision (relevant only for chassis)</td>
</tr>
<tr>
<td>Serial No.</td>
<td>Serial number (blank if unknown for component)</td>
</tr>
<tr>
<td>MFG Name</td>
<td>Manufacturer name (blank if unknown for component)</td>
</tr>
<tr>
<td>Model Name</td>
<td>Model name (blank if unknown for component)</td>
</tr>
<tr>
<td>Alias</td>
<td>Alias name for component</td>
</tr>
<tr>
<td>Asset ID</td>
<td>Identification information for component</td>
</tr>
</tbody>
</table>

Table 4-17. Inventory Parameters

- **Parameter**: Description of component type, in the form: `RAD.<device-name>.<Physical Class>`, e.g. `RAD.ETX-204A.Port`
- **Contained In**: Index (from Table 4-16) of the component that contains the component for which information is being displayed. This is 0 for the chassis, as it is not contained in any component, and 1 for all other components, as they are all contained in the chassis.
- **Physical Class**: Class of component<br>Possible values: Chassis, CPU, Power Supply, Fan, Sensor, Port
- **Relative Position**: Contains the relative position of this component among other similar components (with the exception of the relative positions for the chassis, management Ethernet port, and clock port).<br>Possible values for the various component types:<br>Chassis – 4294967295<br>CPU – 1<br>Power Supply – 1 or 2<br>Fan – 1 or 2<br>Temperature Sensor – 1<br>Network Port – 1 or 2<br>User Port – 3, 4, 5, or 6<br>Management Ethernet – 101<br>External Clock – 301

Table 4-16 (not shown)
**Parameter** | **Description**
---|---
FRU | Indicates whether this component is a field replaceable unit that can be replaced on site. For ETX-204A this is normally true only for the chassis, and for the power supplies in the 17.4-inch unit.

### Setting Administrative Inventory Information

If necessary, you can configure the alias, asset ID and serial number for inventory components. To configure the information, you need to enter the inventory level with the corresponding inventory component index as specified in Table 4-16.

**To set inventory component information:**

1. Navigate to `configure system inventory <index>`. The `config>system>inventor(<index>)#` prompt is displayed.
2. Enter all necessary commands according to the tasks listed below.

<table>
<thead>
<tr>
<th>Task</th>
<th>Command</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assigning user-defined alias to component</td>
<td>alias &lt;string&gt;</td>
<td>Using <code>no</code> before <code>alias</code> removes the alias. <strong>Note:</strong> Configuring the alias is meaningful only for the chassis component. It can be used by a network manager as a non-volatile identifier for the device.</td>
</tr>
<tr>
<td>Assigning user-specific asset identifier to the component (usually for removable physical components)</td>
<td>asset-id &lt;id&gt;</td>
<td>Using <code>no</code> before <code>asset-id</code> removes the asset ID.</td>
</tr>
<tr>
<td>Assigning vendor-specific serial number to the component</td>
<td>serial-number &lt;string&gt;</td>
<td>Using <code>no</code> before <code>serial-number</code> removes the serial number.</td>
</tr>
</tbody>
</table>

### Example

**To display the following inventory information:**

- Inventory table
- Inventory information for the following components:
  - Chassis (index 1)
  - Power Supply 1 (index 3)
  - Temperature Sensor (index 7)
  - User Port 1 (index 10).
ETX-204A# configure system
ETX-204A# config>system# show inventory-table

<table>
<thead>
<tr>
<th>Physical Class</th>
<th>Name</th>
<th>HW Rev</th>
<th>SW Rev</th>
<th>FW Rev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chassis</td>
<td>ETX-204A-HAC – Chass</td>
<td>2.00</td>
<td>2.20</td>
<td>1.3.0.0.0.0.1.1</td>
</tr>
<tr>
<td>Power Supply</td>
<td>Power Supply 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fan</td>
<td>Fan 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fan</td>
<td>Fan 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Port</td>
<td>Network Port 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Port</td>
<td>Network Port 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Port</td>
<td>User Port 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Port</td>
<td>User Port 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Port</td>
<td>User Port 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Port</td>
<td>User Port 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Port</td>
<td>Management Ethernet</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Port</td>
<td>External Clock</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ETX-204A>config>system# inventory 1
ETX-204A>config>system>inventor(1)# show status
Description       : RAD.ETX-204A.Chassis
Contained In      : 0
Physical Class    : Chassis
Relative Position : 4294967295
Name              : ETX-204A - Chassis
HW Rev            : 2.00
SW Rev            : 2.20b05
FW Rev            : 1.3.0.0.0.0.1.24
Serial Number     : 00-20-D2-30-CC-9D
MFG Name          : RAD
Model Name        :
Alias             :
Asset ID          :
FRU               : True

ETX-204A>config>system>inventor(1)# exit
ETX-204A>config>system# inventory 3
ETX-204A>config>system>inventor(3)# show status
Description       : RAD.ETX-204A.Power Supply
Contained In      : 1
Physical Class    : Power Supply
Relative Position : 1
Name              : Power Supply 1
HW Rev            :
SW Rev            :
FW Rev            :
Serial Number     :
MFG Name          : RAD
Model Name        :
Alias             :
Asset ID          :
FRU               : True

ETX-204A>config>system>inventor(3)# exit
<table>
<thead>
<tr>
<th>Description</th>
<th>RAD.ETX-204A.Temperature Sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contained In</td>
<td>1</td>
</tr>
<tr>
<td>Physical Class</td>
<td>Sensor</td>
</tr>
<tr>
<td>Relative Position</td>
<td>1</td>
</tr>
<tr>
<td>Name</td>
<td>Temperature Sensor</td>
</tr>
<tr>
<td>HW Rev</td>
<td></td>
</tr>
<tr>
<td>SW Rev</td>
<td></td>
</tr>
<tr>
<td>FW Rev</td>
<td></td>
</tr>
<tr>
<td>Serial Number</td>
<td></td>
</tr>
<tr>
<td>MFG Name</td>
<td>RAD</td>
</tr>
<tr>
<td>Model Name</td>
<td></td>
</tr>
<tr>
<td>Alias</td>
<td></td>
</tr>
<tr>
<td>Asset ID</td>
<td></td>
</tr>
<tr>
<td>FRU</td>
<td>False</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Description</th>
<th>RAD.ETX-204A.Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contained In</td>
<td>1</td>
</tr>
<tr>
<td>Physical Class</td>
<td>Port</td>
</tr>
<tr>
<td>Relative Position</td>
<td>3</td>
</tr>
<tr>
<td>Name</td>
<td>User Port 1</td>
</tr>
<tr>
<td>HW Rev</td>
<td></td>
</tr>
<tr>
<td>SW Rev</td>
<td></td>
</tr>
<tr>
<td>FW Rev</td>
<td></td>
</tr>
<tr>
<td>Serial Number</td>
<td></td>
</tr>
<tr>
<td>MFG Name</td>
<td></td>
</tr>
<tr>
<td>Model Name</td>
<td></td>
</tr>
<tr>
<td>Alias</td>
<td></td>
</tr>
<tr>
<td>Asset ID</td>
<td></td>
</tr>
<tr>
<td>FRU</td>
<td>False</td>
</tr>
</tbody>
</table>

ETX-204A>config>system# inventory 7
ETX-204A>config>system>inventor(7)# show status
ETX-204A>config>system>inventor(7)# exit
ETX-204A>config>system# inventory 10
ETX-204A>config>system>inventor(10)# show status
ETX-204A>config>system>inventor(10)# exit
ETX-204A>config>system#
To set the chassis alias to “ETX-test-unit”:

<table>
<thead>
<tr>
<th>Command</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>ETX-204A# configure system</td>
<td></td>
</tr>
<tr>
<td>ETX-204A&gt;config&gt;system# inventory 1</td>
<td></td>
</tr>
<tr>
<td>ETX-204A&gt;config&gt;system&gt;inventor(1)# alias ETX-test-unit</td>
<td></td>
</tr>
<tr>
<td>ETX-204A&gt;config&gt;system&gt;inventor(1) show status</td>
<td>Description : RAD.ETX-204A.Chassis</td>
</tr>
<tr>
<td></td>
<td>Contained In : 0</td>
</tr>
<tr>
<td></td>
<td>Physical Class : Chassis</td>
</tr>
<tr>
<td></td>
<td>Relative Position : 4294967295</td>
</tr>
<tr>
<td></td>
<td>Name : ETX-204A - Chassis</td>
</tr>
<tr>
<td></td>
<td>HW Rev : 2.00</td>
</tr>
<tr>
<td></td>
<td>SW Rev : 2.20b05</td>
</tr>
<tr>
<td></td>
<td>FW Rev : 1.3.0.0.0.0.1.24</td>
</tr>
<tr>
<td></td>
<td>Serial Number : 00-20-D2-30-CC-9D</td>
</tr>
<tr>
<td></td>
<td>MFG Name : RAD</td>
</tr>
<tr>
<td></td>
<td>Model Name :</td>
</tr>
<tr>
<td></td>
<td>Alias : ETX-test-unit</td>
</tr>
<tr>
<td></td>
<td>Asset ID :</td>
</tr>
<tr>
<td></td>
<td>FRU : True</td>
</tr>
</tbody>
</table>

Displaying Environment

You can display information about the type and status of the power supplies, the status of the fans, and the temperature sensor.

To display the information:

1. Navigate to **configure chassis**.
   The **config>chassis#** prompt is displayed.

2. Enter:
   **show environment**.
   The information is displayed as shown in the example below.

   The power supply type is indicated as **AC**, **DC**, or **--** (if it is absent or has failed).

   The status for the power supplies and fans indicates whether the unit is present and functioning properly, or is absent (does not exist), or has failed.

   The temperature sensor status indicates the temperature, and whether the sensor is functioning correctly.
For example:

```
ETX-204A# configure chassis
ETX-204A>config>chassis# show environment
Power Supply  Type  Status
------------------
1              AC      OK
2              --      Not exist
FAN
------------------
1                   OK
2                   OK
Sensor  Value                         Status
------------------
1.        32             Celsius        OK
```

```
ETX-204A>config>chassis#
```

**Displaying Software Versions**

You can display the active, main, and backup software file versions, dates, and times.

➢ To display the versions:
  - At the file# prompt enter:
    ```
    show version.
    ```

For example:

```
ETX-204A# file
ETX-204A>file# show version
Active : 2.20  21/07/2009 15:41:46
Main   : 2.20  21/07/2009 15:41:46
Backup : 2.20d01 31/03/2009 22:19:34
ETX-204A>file#
```

**Displaying CPU and Memory Utilization**

You can view the CPU and memory buffer usage. Refer to *Table 4-18* for a description of the memory buffers.

➢ To display CPU usage:
  - From the system context (config>system), enter `show cpu-utilization`.
    The CPU usage is displayed.
To display memory buffer usage:

- From the system context (`config>system`), enter `show buffers`. The memory buffer usage is displayed.

```plaintext
ETX-204A>config>system# show buffers

<table>
<thead>
<tr>
<th>Name</th>
<th>Size</th>
<th>Total Buffers</th>
<th>Free Buffers</th>
<th>Alloc. Failures</th>
<th>Free Failures</th>
</tr>
</thead>
<tbody>
<tr>
<td>VLAN</td>
<td>64</td>
<td>100</td>
<td>99</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Huge</td>
<td>8192</td>
<td>100</td>
<td>100</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Large</td>
<td>2048</td>
<td>1000</td>
<td>796</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Medium</td>
<td>512</td>
<td>4000</td>
<td>3975</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Small</td>
<td>64</td>
<td>4000</td>
<td>3979</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Queue</td>
<td>16</td>
<td>8000</td>
<td>8000</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
```

**Figure 4-11. Memory Buffer Usage**

**Table 4-18. Memory Buffers**

<table>
<thead>
<tr>
<th>Buffer</th>
<th>Size</th>
<th>Total Buffers Available</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>VLAN</td>
<td>64</td>
<td>100</td>
<td>Unused, except three of the buffers are used for internal functions</td>
</tr>
<tr>
<td>Huge</td>
<td>8192</td>
<td>100</td>
<td>Unused</td>
</tr>
<tr>
<td>Large</td>
<td>2048</td>
<td>1000</td>
<td>OAM CFM and OAM EFM</td>
</tr>
<tr>
<td>Medium</td>
<td>512</td>
<td>4000</td>
<td>Event log and traps</td>
</tr>
<tr>
<td>Small</td>
<td>64</td>
<td>4000</td>
<td>Management traffic</td>
</tr>
<tr>
<td>Queue</td>
<td>16</td>
<td>8000</td>
<td>Application task messages</td>
</tr>
</tbody>
</table>

**File Operations**

You can perform the following operations:

- Transfer files via SFTP
- Copy files within the ETX-204A unit
- Display files
- Swap files
- Delete files.
You can copy files via the `copy` command, or via the commands shown in Table 4-19. As shown in the table, some commands that reset the device also erase the saved user configuration by copying another file to it before the reset.

**Table 4-19. Commands That Copy Files**

<table>
<thead>
<tr>
<th>Command</th>
<th>Level</th>
<th>Copies...</th>
<th>Additional Actions</th>
<th>Manual Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>factory-default</td>
<td>admin</td>
<td>factory-default to startup-config</td>
<td>Unit resets after copying</td>
<td><strong>Resetting to Factory Defaults</strong></td>
</tr>
<tr>
<td>user-default</td>
<td>admin</td>
<td>user-default-config to startup-config</td>
<td>Unit resets after copying</td>
<td><strong>Resetting to User Defaults</strong></td>
</tr>
<tr>
<td>save</td>
<td>global</td>
<td>running-config to startup-config</td>
<td>None</td>
<td><strong>Saving Configuration</strong></td>
</tr>
</tbody>
</table>

**Downloading/Uploading Files**

You can download or upload files to the ETX-204A unit via SFTP. Normally the types of files copied are configuration files and software files.

The software files can also be downloaded to ETX-204A via the Boot Manager, using XMODEM or TFTP. For details on upgrading the device software, refer to Chapter 6.

*Note*

TFTP is available only when downloading a software image via the Boot Manager. When you copy files with the `copy` command, you have to use SFTP.

**SFTP Application**

The SFTP protocol is used to provide secure file transfers via the product's Ethernet interface. SFTP is a version of FTP that encrypts commands and data transfers, keeping your data secure and your session private. For SFTP file transfers, an SFTP server application must be installed on the local or remote computer.

A variety of third-party applications offer SFTP server software. For more information, refer to the documentation of these applications.

![Figure 4-12. Downloading a Software Application File via SFTP](image)

**Setting up SFTP Server**

If you use a local laptop and SFTP is the preferred transfer method, a SFTP server application must be installed on it.

As mentioned above, third-party applications are available and you should refer to their setup documentation.
Checking the Firewall Settings

SFTP file transfers are carried out through TCP port 22. You should check that the firewall you are using on the server computer allows communication through this port.

➢ To allow communication through port 22 in Windows XP:

1. Double-click the My Network Places icon, located on the desktop.
   The My Network Places window appears.

2. On the Network Tasks sidebar, click View network connections.
   The available network connections are displayed.

3. On the Network Tasks sidebar, click Change Windows Firewall settings.
   The Windows Firewall dialog box appears.

4. Click the Exceptions tab.
5. Check whether port 22 appears on the exceptions list. If it does not, click **Add Port** and add it to the list of exceptions.

**Note**  Different firewall types require different configuration. Refer to your firewall’s documentation to check how SFTP file transfers can be allowed to pass through it using TCP port 22.

**Using CLI to Download/Upload Files**

You use the **copy** command in the **file** context to download/upload files.

▶ **To download a file via SFTP:**

- At the **file#** prompt, enter:

```
copy sftp://<user>:<password>@<sftp-server-ip-addr>/<source-file>
<destination-file>.
```

For example:

- SFTP server address – 192.20.20.20
- SFTP user name – admin
To upload a file via SFTP:

- At the file# prompt, enter:
  ```
  copy <source-file> sftp://<user>:<password>@<sftp-server-ip-addr>/<dest-file>.
  ```

For example:

- SFTP server address – 192.20.20.20
- SFTP user name – admin
- SFTP password – 1234
- Source file name – db1conf.log
- Destination file name – db1conf.cfg.

To copy files within the device:

- At the file# prompt, enter:
  ```
  copy <source-file> <dest-file>.
  ```

For example:

- Source file name – running-config
- Destination file name – startup-config.

To display the files:

- At the file# prompt, enter: `dir`.

  A list of the file names and types is displayed.
For example:

```plaintext
ETX-204A# file
ETX-204A>file# dir
Type    Name
------------------------------------------------------------
Software backup-sw
Software main-sw
Configuration factory-default
Configuration startup-config
Configuration user-default-config
Event Log logfile
```

### Swapping Files

You can swap files, via SFTP or locally.

➢ To swap the files:

- At the `file#` prompt, enter the swap command in one of the following forms, according to where the files are located.

<table>
<thead>
<tr>
<th>Task</th>
<th>Command</th>
<th>Comments</th>
</tr>
</thead>
</table>
| Swap <file1> from SFTP server with <file2> located on device | swap  
`sftp://<user>:<password>@<sftp-server-ip-address>/<file1> <file2>` |  |
| Swap <file1> located on device with <file2> from SFTP server | swap <file1>  
`sftp://<user>:<password>@<sftp-server-ip-address>/<file2>` |  |
| Swap <file1> located on device with <file2> located on device | swap <file1> <file2> |  |

### Deleting Files

You can delete files. Before deleting the file, make sure the file is not in use.

➢ To delete a file:

1. At the `file#` prompt, enter: `delete <file-name>`.

   You are prompted to confirm the deletion.

2. Confirm the deletion.

For example:

```plaintext
ETX-204A# file
ETX-204A>file# delete db2conf.cfg
File will be erased. Are you sure?? [yes/no] yes
```
Saving Configuration

You must save your configuration if you wish to have it available, as it is not saved automatically. You can save your configuration as follows:

- To save the user configuration in `startup-config`:
  - In any level enter: `save`
  - At the `file#` prompt enter:
    `copy running-config startup-config`.
- To save the user default configuration in `user-default-config`, at the `file#` prompt enter:
  `copy running-config user-default-config`.

Reset

ETX-204A supports the following types of reset:

- Reset to factory defaults
- Reset to user defaults
- Overall reset (restart) of the device.

Resetting to Factory Defaults

To reset ETX-204A to factory defaults:

1. Navigate to the admin context (`admin`) and enter `factory-default`.

   A confirmation message is displayed:
   `Current configuration will be erased and device will reboot with factory default configuration. Are you sure?? [yes/no]`

2. Enter `yes` to confirm the reset to factory defaults.

   The `factory-default` file is copied to the `startup-config` file. The unit resets, and after it completes its startup the factory defaults are loaded.

Resetting to User Defaults

To reset ETX-204A to user defaults:

1. Navigate to the admin context (`admin`) and enter `user-default`.

   A confirmation message is displayed:
   `Current configuration will be erased and device will reboot with user default configuration. Are you sure?? [yes/no]`

2. Enter `yes` to confirm the reset to user defaults.

   The `user-default-config` file is copied to the `startup-config` file. The unit resets, and after it completes its startup the user defaults are loaded.
Restarting the Unit

If necessary, you can restart ETX-204A without interrupting the power supply.

To restart ETX-204A:

1. Navigate to the admin context (admin) and enter `reboot`.

   A confirmation message is displayed:
   
   Device will reboot. Are you sure?? [yes/no]

2. Enter `yes` to confirm the reset.

   The unit restarts.
Chapter 5
Monitoring and Diagnostics

The following are described in this chapter:
• Detecting problems
• Alarms and traps
• Performing diagnostic tests.

5.1 Detecting Problems

The LED indicators indicate errors on the hardware level.

LEDs

If an LED is red, that usually indicates there is a problem. Check the port that is associated with the LED to further investigate the problem. Refer to Chapter 3 for a description of the unit LEDs.

Alarms and Traps

Errors can be indicated by events and traps. An event is an error report that is written in the event log. A trap is an error report that is sent to a management station. Refer to Handling Events for further details on events and traps.

5.2 Handling Events

ETX-204A maintains a log file that can hold up to 2084 events (system messages). All events are time-stamped.

Working with the Event Log

This section explains how to display and clear the event log.

➢ To display the event log:
  1. Navigate to the system context.
2. Display the event log:

   `show event-log`

   To scroll up and down in the list, use the arrow keys. The events are listed in Table 5-1.

   ➤ To clear the event log:
   - At the `system` context, enter:

     `clear-event-log`.

### Table 5-1. Event List

<table>
<thead>
<tr>
<th><strong>System Events</strong></th>
<th><strong>Description</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>CLI TEXT FILE ERROR:</td>
<td>An error occurred while attempting to load the specified configuration file. When this error occurs, the file is deleted and the unit reboots.</td>
</tr>
<tr>
<td>{STARTUP-CONFIG FILE/USER-DEFAULT-CONFIG FILE}</td>
<td></td>
</tr>
<tr>
<td>COLD START</td>
<td>The unit has rebooted</td>
</tr>
<tr>
<td>DYING GASP</td>
<td>The unit lost power and sent indication of dying gasp</td>
</tr>
<tr>
<td>FAN {1,2} ON</td>
<td>The specified fan is on</td>
</tr>
<tr>
<td>FAN {1,2} OFF</td>
<td>The specified fan is off</td>
</tr>
<tr>
<td>FATAL ERROR AT MODULE X, LINE X</td>
<td>Fatal error has been detected at the specified location</td>
</tr>
<tr>
<td>INVALID LOGIN VIA (TELNET/TERMINAL/SSH)</td>
<td>Invalid user name and/or password has been detected while initializing the Telnet/terminal/SSH management session</td>
</tr>
<tr>
<td>LOGIN VIA (TELNET/TERMINAL/SSH)</td>
<td>Login has been performed via Telnet/terminal/SSH application</td>
</tr>
<tr>
<td>POWER SUPPLY {1,2} ON</td>
<td>The specified power supply is on</td>
</tr>
<tr>
<td>POWER SUPPLY {1,2} OFF</td>
<td>The specified power supply is off because it has failed or is absent</td>
</tr>
<tr>
<td>SYSTEM USER RESET</td>
<td>System reset occurred due to user request or as a result of configuration download</td>
</tr>
<tr>
<td>TEMPERATURE XX{C} IS OK</td>
<td>The internal temperature has returned to the allowed range after being too low or too high</td>
</tr>
<tr>
<td>TEMPERATURE XX{C} IS TOO HIGH</td>
<td>The internal temperature has risen above the upper allowed threshold</td>
</tr>
<tr>
<td>TEMPERATURE -XX{C} IS TOO LOW</td>
<td>The internal temperature has fallen below the lower allowed threshold</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Clock Selection Events</strong></th>
<th><strong>Description</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>SOURCE CLOCK [sourceId] STATUS SET TO [OK/MONITORING FAILED/PHY FAILED/ESMC FAILED]</td>
<td>The source clock status has changed as specified</td>
</tr>
<tr>
<td>STATION OUT SOURCE SET TO [LOCKED/UNLOCKED] STATE</td>
<td>The station clock output has changed as specified</td>
</tr>
</tbody>
</table>
### System Clock Status

The system clock status has changed as specified, due to change in system clock selection or system clock state.

### File Transfer Events

<table>
<thead>
<tr>
<th>Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMAGE/CONFIGURATION DOWNLOAD/UPLOAD</td>
<td>SFTP/TFTP session has been initiated for download/upload action with image/configuration file</td>
</tr>
<tr>
<td>DOWNLOAD/UPLOAD OK</td>
<td>SFTP/TFTP download/upload session has successfully completed</td>
</tr>
<tr>
<td>DOWNLOAD/UPLOAD FAILED/FILE REJECTED</td>
<td>SFTP/TFTP session has failed because the download/upload failed or the file was rejected</td>
</tr>
</tbody>
</table>

### Physical Port Events

<table>
<thead>
<tr>
<th>Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LINK DOWN [PORT X/ STATION PORT]</td>
<td>Network/user Ethernet port or station clock has been disconnected</td>
</tr>
<tr>
<td>LINK UP [PORT X/ STATION PORT]</td>
<td>Network/user Ethernet port or station clock has been connected</td>
</tr>
<tr>
<td>LINK ADMIN DOWN [PORT X/ STATION PORT]</td>
<td>Network/user Ethernet port or station clock has been disabled by the user</td>
</tr>
<tr>
<td>SFP INSTALLED PORT X</td>
<td>SFP has been inserted in specified Ethernet port</td>
</tr>
<tr>
<td>SFP REMOVED PORT X</td>
<td>SFP has been removed from specified Ethernet port</td>
</tr>
</tbody>
</table>

### DHCP Events

<table>
<thead>
<tr>
<th>Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP X.X.X.X ASSIGNED BY SERVER Y.Y.Y.Y</td>
<td>IP address X.X.X.X has been assigned by DHCP server Y.Y.Y.Y</td>
</tr>
<tr>
<td>IP X.X.X.X IS RELEASED</td>
<td>IP address X.X.X.X has been released by ETX-204A</td>
</tr>
</tbody>
</table>

### OAM CFM Events

<table>
<thead>
<tr>
<th>Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OAM CC OK ON</td>
<td>OAM.ag connectivity check (CC) with remote MEP has been confirmed</td>
</tr>
<tr>
<td>OAM CC MISMERGE ON</td>
<td>OAM.ag CC mismerge for remote MEP has been detected</td>
</tr>
<tr>
<td>OAM CC UNEXPECTED MEP ON</td>
<td>OAM.ag CC unexpected MEP for remote MEP has been detected</td>
</tr>
<tr>
<td>OAM CC UNEXPECTED MEP OFF</td>
<td>OAM.ag CC unexpected MEP for remote MEP event has been canceled</td>
</tr>
<tr>
<td>OAM CC UNEXPECTED PERIOD ON</td>
<td>OAM.ag CC unexpected period for remote MEP has been detected</td>
</tr>
<tr>
<td>OAM CC LOSS OF CONTINUITY</td>
<td>OAM.ag CC continuity loss has been detected for remote MEP</td>
</tr>
<tr>
<td>OAM CC RDI DETECTED ON</td>
<td>OAM.ag CC RDI for remote MEP has been detected</td>
</tr>
<tr>
<td>OAM UNEXPECTED MD LEVEL ON</td>
<td>OAM.ag CC unexpected MD level has been detected</td>
</tr>
<tr>
<td>OAM UNEXPECTED MD LEVEL OFF</td>
<td>OAM.ag CC unexpected MD level event has been canceled</td>
</tr>
</tbody>
</table>

### OAM CFM Service Events

<table>
<thead>
<tr>
<th>Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRAMES ABOVE DELAY DROPPED BELOW</td>
<td>Y.1731 Frame Delay Threshold has been reached (dropped below)</td>
</tr>
<tr>
<td>FRAMES ABOVE DELAY EXCEEDED</td>
<td>Y.1731 Frame Delay Threshold has been reached (exceeded)</td>
</tr>
</tbody>
</table>
FRAMES ABOVE DELAY VARIATION DROPPED BELOW
Y.1731 Frame Delay Variation Threshold has been reached (dropped below)

FRAMES ABOVE DELAY VARIATION EXCEEDED
Y.1731 Frame Delay Variation Threshold has been reached (exceeded)

FRAMES LOSS RATIO DROPPED BELOW
Y.1731 Frame Loss Ratio Threshold has been reached (dropped below)

FRAMES LOSS RATIO EXCEEDED
Y.1731 Frame Loss Ratio Threshold has been reached (exceeded)

UNAVAILABILITY RATIO DROPPED BELOW
Y.1731 Unavailability Ratio Threshold has been reached (dropped below)

UNAVAILABILITY RATIO EXCEEDED
Y.1731 Unavailability Ratio Threshold has been reached (exceeded)

OAM EFM Events Description

<table>
<thead>
<tr>
<th>Event Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OAM (802.3ah) REMOTE DYING GASP PORT X</td>
<td>Dying gasp indication has been received from the remote partner on OAM link on port X</td>
</tr>
<tr>
<td>OAM (802.3ah) CONNECTIVITY FAIL PORT X ON</td>
<td>OAM connectivity has been lost on port X</td>
</tr>
<tr>
<td>OAM (802.3ah) CONNECTIVITY FAIL PORT X OFF</td>
<td>OAM connectivity has been restored on port X</td>
</tr>
<tr>
<td>OAM (802.3ah) REMOTE LINK FAIL PORT X ON</td>
<td>Indication of OAM connectivity failure has been received from the remote partner on OAM link on port X</td>
</tr>
<tr>
<td>OAM (802.3ah) REMOTE LINK FAIL PORT X OFF</td>
<td>Indication of OAM connectivity recovery has been received from the remote partner on OAM link on port X</td>
</tr>
<tr>
<td>OAM (802.3ah) REMOTE CRITICAL ERRORS PORT X ON</td>
<td>Indication of critical errors has been received from the remote partner on OAM link on port X</td>
</tr>
<tr>
<td>OAM (802.3ah) REMOTE CRITICAL ERRORS PORT X OFF</td>
<td>Indication of critical error termination has been received from the remote partner on OAM link on port X</td>
</tr>
<tr>
<td>OAM (802.3ah) REMOTE LOOPBACK PORT X ON</td>
<td>Indication of remote loopback activation has been received from the remote partner on OAM link on port X</td>
</tr>
<tr>
<td>OAM (802.3ah) REMOTE LOOPBACK PORT X OFF</td>
<td>Indication of remote loopback deactivation has been received from the remote partner on OAM link on port X</td>
</tr>
</tbody>
</table>

Working with Traps

The traps are listed in the following table.

Table 5-2. Trap List

<table>
<thead>
<tr>
<th>Trap</th>
<th>Description</th>
<th>OID</th>
<th>Maskable</th>
</tr>
</thead>
<tbody>
<tr>
<td>agnDyingGaspTrap</td>
<td>A power failure (dying gasp) has occurred</td>
<td>1.3.6.1.4.1.164.6.1.0.36</td>
<td>Yes</td>
</tr>
<tr>
<td>agnFanFailureTrap</td>
<td>A fan is on or off</td>
<td>1.3.6.1.4.1.164.6.1.0.14</td>
<td>Yes</td>
</tr>
<tr>
<td>Trap</td>
<td>Description</td>
<td>OID</td>
<td>Maskable</td>
</tr>
<tr>
<td>-------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>-------------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>agnPowerFailureTrap</td>
<td>A power failure has occurred or a power supply status has changed</td>
<td>1.3.6.1.4.1.164.6.1.0.13</td>
<td>Yes</td>
</tr>
<tr>
<td>agnStatusChangeTrap</td>
<td>SNMP agent status has changed</td>
<td>1.3.6.1.4.1.164.6.1.0.2</td>
<td>Yes</td>
</tr>
<tr>
<td>agnTempThresholdTrap</td>
<td>The device temperature has left the allowed range, or has returned to the allowed range</td>
<td>1.3.6.1.4.1.164.6.1.0.37</td>
<td>Yes</td>
</tr>
<tr>
<td>agnUploadDataTrap</td>
<td>Data sent to generic Intervals Statistics Collection application</td>
<td>1.3.6.1.4.1.164.6.1.0.11</td>
<td>Yes</td>
</tr>
<tr>
<td>authenticationFailure</td>
<td>There was an attempt to access the device with the wrong SNMP community</td>
<td>1.3.6.1.6.3.1.1.5.5</td>
<td>Yes</td>
</tr>
<tr>
<td>coldStart</td>
<td>The unit has been restarted</td>
<td>1.3.6.1.6.3.1.1.5.1</td>
<td>Yes</td>
</tr>
<tr>
<td>csmDomainStateChange</td>
<td>The system clock selection has changed to Internal Source/ Source 1/ Source 2, or system clock status has changed to Automatic/ Freerun/ Holdover/ Locked/ Prelocked2/ Prelocked/ Loss Of Lock</td>
<td>1.3.6.1.4.1.164.6.1.0.33</td>
<td>Yes</td>
</tr>
<tr>
<td>csmDomainStationStateChange</td>
<td>The station clock output state has been set to Locked/ Unlocked</td>
<td>1.3.6.1.4.1.164.6.1.0.34</td>
<td>Yes</td>
</tr>
<tr>
<td>csmSourceStatusChange</td>
<td>The source clock status has been set to OK/ Monitoring Failed/ PHY Failed/ ESMC Failed</td>
<td>1.3.6.1.4.1.164.6.1.0.35</td>
<td>Yes</td>
</tr>
<tr>
<td>dot3OamOperStatusChange</td>
<td>OAM (802.3ah) connectivity has been lost or restored</td>
<td>1.3.6.1.4.1.164.3.1.6.1.6.0.1</td>
<td>Yes</td>
</tr>
<tr>
<td>dot3OamPeerEvent</td>
<td>One of the following OAM (802.3ah) indications has been received from remote partner: Connectivity failure Connectivity recovered Critical error started Critical error ended Dying gasp</td>
<td>1.3.6.1.4.1.164.3.1.6.1.6.0.2</td>
<td>Yes</td>
</tr>
<tr>
<td>ethOamCfmDefectCondition</td>
<td>One of the following OAM CFM conditions has occurred: Failure Mismerge Unexpected MEP Unexpected MD level Unexpected period RDI OK Not applicable</td>
<td>1.3.6.1.4.1.164.3.1.6.1.3.0.1</td>
<td>Yes</td>
</tr>
</tbody>
</table>
### Trap Description

<table>
<thead>
<tr>
<th>Trap</th>
<th>Description</th>
<th>OID</th>
<th>Maskable</th>
</tr>
</thead>
<tbody>
<tr>
<td>failedLogin</td>
<td>Failed login to ETX-204A has occurred</td>
<td>1.3.6.1.4.1.164.6.1.0.25</td>
<td>Yes</td>
</tr>
<tr>
<td>fallingAlarm</td>
<td>An RMON falling event has been triggered, by dropping below one of the following Y.1731 thresholds: Frame Delay Frame Delay Variation Frame Loss Ratio Unavailability Ratio</td>
<td>1.3.6.1.2.1.16.0.2</td>
<td>Yes</td>
</tr>
<tr>
<td>linkDown</td>
<td>Network or user Ethernet port has been disconnected</td>
<td>1.3.6.1.6.3.1.1.5.3</td>
<td>Yes</td>
</tr>
<tr>
<td>linkUp</td>
<td>Network or user Ethernet port has been connected</td>
<td>1.3.6.1.6.3.1.1.5.4</td>
<td>Yes</td>
</tr>
<tr>
<td>prtStatusChangeTrap</td>
<td>An SFP has been inserted into or removed from one of the ports</td>
<td>1.3.6.1.4.1.164.6.1.0.3</td>
<td>Yes</td>
</tr>
<tr>
<td>risingAlarm</td>
<td>An RMON rising event has been triggered, by exceeding one of the following Y.1731 thresholds: Frame Delay Frame Delay Variation Frame Loss Ratio Unavailability Ratio</td>
<td>1.3.6.1.2.1.16.0.1</td>
<td>Yes</td>
</tr>
<tr>
<td>successfulLogin</td>
<td>Successful login to ETX-204A has occurred</td>
<td>1.3.6.1.4.1.164.6.1.0.24</td>
<td>Yes</td>
</tr>
<tr>
<td>tftpStatusChangeTrap</td>
<td>TFTP session status has changed, one of the following has occurred: Connecting Transferring data Ended with timeout Ended OK error</td>
<td>1.3.6.1.4.1.164.6.1.0.1</td>
<td>Yes</td>
</tr>
</tbody>
</table>

### Setting the Trap Delay

You can configure a delay before the ETX-204A device sends traps.

**To set trap delay:**

1. Navigate to `configure management snmp`.
2. Enter the delay in seconds: `trap-delay <0-150>`. Traps are sent with the specified delay.

### Masking Traps

You can mask traps to prevent them from being sent to all management stations.
To mask traps to all network managers:

1. Navigate to `configure management snmp`.

   The `config>mngmnt>snmp`# prompt is displayed.

2. Enter:

   ```
   trap-mask {all | cold-start | authentication-failure |
   link-up-down | tftp-sftp-status | agent-status | port-status |
   upload-data | power-failure | login-successful |
   login-failure | cfm-defect-condition | dying-gasp |
   configuration-changed | temperature-threshold | fan-failure |
   link-oam-connectivity-fail | link-oam-remote-loopback |
   link-oam-remote-critical | link-oam-remote-link |
   link-oam-remote-dying-gasp | system-clock-state |
   clock-station-state | clock-source-status}
   ```

   The specified trap is not sent to any network managers.

   • To mask all the traps, enter `trap-mask all`
   • To unmask all the traps, enter `no trap-mask all`
   • To unmask a specific trap, enter `no trap-mask {trap-name}` where `trap-name` is one of the traps specified above.

### Working with Trap Synchronization

You can add network managers (SNMPv1) or target manager stations (SNMPv3) to groups for trap synchronization. Traps are sent to the groups with sequence IDs to allow the managers to detect when traps have been lost, and request that traps be sent again.

- A trap synchronization group can contain managers of only one type, e.g. you cannot mix SNMPv1 and SNMPv3 managers in a group
- A manager cannot belong to more than one group
- The trap masking must be the same for all managers in a group.

### Adding Network Managers to Trap Synchronization Group

To add a network manager to a trap synchronization group:

1. Navigate to `configure management manager <manager-ip-address>/32`.

   The `config>mngmnt>manager <manager-ip-address>/32`# prompt is displayed.

2. Enter `trap-sync-group <group-id> [import-trap-masking]`.

   The manager is added to the specified group. If the group does not exist, it is created. If you specify the `import-trap-masking` parameter, the manager’s trap masking is imported from the first manager in the group.
Adding Target Manager Stations to Trap Synchronization Group

To add a target manager station to a trap synchronization group:

1. Navigate to `configure management snmp target <target-name>`.  
   The `config>mngmnt>snmp>target <target-name>` # prompt is displayed.

2. Enter `trap-sync-group <group-id> [import-trap-masking]`.  
   The manager is added to the specified group. If the group does not exist,  
   it is created. If you specify the `import-trap-masking` parameter, the  
   manager's trap masking is imported from the first manager in the group.

To remove the manager from the group, enter `no trap-sync-group <group-id>`. If the manager was the last in the group, the group is deleted.

Configuring Trap Synchronization Masking (SNMPv1)

If a group contains SNMPv1 managers, you can configure the trap masking of the group.

To configure trap masking:

1. Navigate to `configure management trap-sync-group <group-id>`.  
   The `config>mngmnt>trap-sync-group <group-id>` # prompt is displayed.

2. To mask or unmask traps:
   - To mask all traps, enter `trap-mask all`.  
     All traps are masked for the group.
   - To unmask all traps, enter `no trap-mask`.  
     All traps are unmasked for the group.

Configuring Trap Synchronization Target Parameters and Tags (SNMPv3)

If a group contains SNMPv3 managers, you can configure the target parameters and tag list for the group. Refer to Chapter 4 for information on target parameters and tags.

To specify a set of target parameters:

1. Navigate to `configure management trap-sync-group <group-id>`.  
   The `config>mngmnt>trap-sync-group <group-id>` # prompt is displayed.

2. Enter `target-params <target-param-name>`.  
   The specified set of target parameters is assigned to the group.
To specify tags:
1. Navigate to `configure management trap-sync-group <group-id>`.
   The `config>mngmnt>trap-sync-group(<group-id>)#` prompt is displayed.
2. Enter `tag-list <tag-list>`.
   The specified list of tags is assigned to the group.

**Note**
To remove the tag list, enter `no tag-list`.

**Displaying Trap Synchronization Information**
You can display the trap synchronization information.

To display trap synchronization information:
1. If SNMPv3 is enabled, navigate to `configure management snmp` otherwise navigate to `configure management`.
   The `config>mngmnt#` or `config>mngmnt>snmp#` prompt is displayed respectively.
2. Enter `show trap-sync`.
   The trap synchronization information is displayed.

---

### 5.3  Running a Ping Test

You can ping a remote IP host to check the ETX-204A IP connectivity with that host.

To ping an IP host:
1. In any level, start pinging the desired host specifying its IP address and optionally the number of packets to send:
   `ping <1.1.1.1–255.255.255.255> [number-of-packets <0–50>]`
2. To stop the ping test, enter `no ping`.

---

### 5.4  Tracing the Route

This diagnostic utility traces the route through the network from ETX-204A to the destination host. The trace route utility supports up to 30 hops.

To trace a route:
- In any level, start the trace route and specify the IP address of the host to which you intend to trace route:
  `trace-route <1.1.1.1–255.255.255.255>`
5.5 Technical Support

Technical support for this product can be obtained from the local distributor from whom it was purchased.

For further information, please contact the RAD distributor nearest you or one of RAD's offices worldwide. This information can be found at www.rad.com (offices – About RAD > Worldwide Offices; distributors – Where to Buy > End Users).
Chapter 6

Software Upgrade

This chapter explains how to upgrade ETX-204A to software version 2.2.

Software upgrade is required to fix product limitations, enable new features, or to make the unit compatible with other devices that are already running the new software version.

ETX-204A stores two software versions, each of them in one of the two 2.56 MB partitions of its flash memory, which also contains a boot program. The software is stored in compressed format. The main version is decompressed and loaded into the ETX-204A RAM upon power-up. The backup software is kept for backup purposes. If the main software becomes corrupted, you can swap it with the backup. By default, ETX-204A is delivered with active software only.

New software releases are distributed as *.img files, to be downloaded to ETX-204A. When starting a download, ETX-204A erases the current backup and places the new software in the backup partition. When downloading is complete, the unit checks the integrity of the new software file. If it is correct, the backup and active files are swapped. The new software release becomes active and the former active software becomes the backup. If a failure occurs during downloading, the new version is erased. In this case, only one version is left stored in the flash memory. The backup software can be downloaded to the unit and swapped with the main software later.

The information in this chapter includes the following:

- Detailed conditions required for the upgrade
- Any impact the upgrade may have on the system
- Overview of downloading options
- Upgrade via the File Copy command
- Upgrade via the Boot menu.

Note

Sometimes you may find it necessary to downgrade by downloading an older software version to the ETX-204A. In this case the procedures described in this section can be used to download the software image.

When you downgrade the software, the device configuration cannot be preserved. You must format the flash via the boot menu (Figure 6-3) before downloading the earlier software version.

6.1 Compatibility Requirements

Following are the software releases that can be upgraded to version 2.2, as well as the hardware revisions that can accept the software version 2.2.
Chapter 6  Software Upgrade

6.2 Impact
ETX-204A continues operating with the previous software version until you manually reset the unit.

6.3 Software Upgrade Options
Application software can be downloaded to ETX-204A via SFTP, using the File Transfer command (File Copy), or via XMODEM or TFTP, using the boot menu.

6.4 Prerequisites
This section lists the software file names and outlines system requirements needed for the upgrade procedure.

Software Files

The version 2.2 release file is distributed as a software file with a name similar to `etx204A_2_20.IMG`. The image file (and exact name) can be obtained from the local RAD business partner from whom the device was purchased.

System Requirements

Before starting the upgrade, verify that you have the following:

- For upgrade via SFTP/TFTP:
  - Operational ETX-204A unit with valid IP parameters configured for the host
  - Connection to a PC with a SFTP/TFTP server application and a valid IP address
  - Software image file stored on the PC
- For upgrade via XMODEM:
  - Operational ETX-204A unit
  - Connection to a PC via HyperTerminal
  - Software image file stored on the PC.

- Software – Ver. 2.0
- Hardware – 1.0 and above.
6.5 Upgrading the Device Software via CLI

The recommended software downloading method is to use the file copy command.

Network administrators can use this procedure to distribute new software releases to all the managed ETX-204A units in the network from a central location.

Use the following procedure to download software release 2.2 to ETX-204A via CLI.

1. Verify that the image file is stored on the PC with the SFTP server application.
2. Verify that the ETX-204A host has valid IP parameters.
3. Ping the PC to verify the connection.
4. Activate the SFTP server application.
5. Download the image file from the PC to ETX-204A.

*Note* Configuration values shown in this chapter are examples only.

Verifying the Host Parameters

In order to be able to establish communication with the SFTPTFTP server, the ETX-204A host must have host IP parameters configured according to your network requirements. In addition, flows must be defined to and from the ETX-204A host. Refer to the following manual sections for additional information:

- *Connecting to ASCII Terminal* in Chapter 2
- *Working with Terminal* in Chapter 3
- *Configuring the Host IP Settings* in Chapter 4.

Pinging the PC

Check the integrity of the communication link between ETX-204A and the PC by pinging the PC from ETX-204A.

*To ping the PC:*

1. In any level, start pinging the PC specifying its IP address and optionally the number of packets to send:
ping <ip-address> [number-of-packets <num-packets>]

A reply from the PC indicates a proper communication link.

2. If the ping request times out, check the link between ETX-204A and the PC (physical path, configuration parameters, etc.)

Activating the SFTP Server

Once the SFTP server is activated on the PC, it waits for any SFTP file transfer request originating from the product, and carries out the received request automatically.

SFTP file transfers are carried out through TCP port 22. Make sure that the firewall you are using on the server allows communication through this port (refer to Chapter 4 for details).

Activating the TFTP Server

Once the TFTP server is activated on the PC, it waits for any TFTP file transfer request originating from the product, and carries out the received request automatically.

TFTP file transfers are carried out through port 69. Make sure that the firewall you are using on the server allows communication through this port (refer to Chapter 4 for details).

**Note**  Configure the connection timeout of the TFTP server to be more than 30 seconds to prevent an automatic disconnection during the backup partition deletion (about 25 seconds).

Downloading the New Software Release File

This procedure is used to replace the current software version with the new software release.

▸ To copy the image file to the ETX-204A unit:

1. Navigate to the file context.
2. Enter:
   
   ```
   copy sftp://<username>:<password>@<ip-address>/<image-file-name> main-sw
   ```
   
   Where ip-address is the IP address of the PC where the SFTP server is installed.

   The software download begins. When the process is completed, use the reboot command in the admin context to restart ETX-204A, for the new software version to become active.
6.6 Upgrading the Device Software via the Boot Menu

Software downloading can also be performed using the Boot menu. The Boot menu can be reached while ETX-204A performs initialization, for example, after power-up.

You may need to start the loading from the Boot menu if you are unable to use the copy command (for example, because the ETX-204A software has not yet been downloaded or is corrupted).

**Caution**
The Boot menu procedures are recommended only for use by authorized personnel, because this menu provides many additional options that are intended for use only by technical support personnel.

Two software downloading options are available from the Boot menu:

- **Downloading using the XMODEM protocol.** This is usually performed by downloading from a PC directly connected to the CONTROL DCE port of the unit.

  ![Figure 6-2. Downloading a Software Application File via XMODEM](image)

- **Downloading using TFTP.** This is usually performed by downloading from a remote location that provides an IP communication path to an Ethernet port of ETX-204A.

**Accessing the Boot Menu**

The boot menu can be accessed when the device is powered up, before logging in.

➢ **To access the Boot menu:**

1. Configure the communication parameters of the selected PC serial port for asynchronous communication with 9,600 bps, no parity, one start bit, eight data bits and one stop bit. Turn all types of flow control off.

2. Turn off ETX-204A.

3. Activate the terminal application.

4. Turn on ETX-204A and immediately start pressing the **Enter** key several times in sequence until you see the Boot screen. A typical screen is shown below (the exact version and date displayed by your ETX-204A unit may be different).
Note: If you miss the timing, ETX-204A performs a regular reboot process (this process starts with Loading and ends with a message to press <Enter> a few times to display the login screen).

<table>
<thead>
<tr>
<th>Boot Version 3.00 (Mar 8 2009)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boot Manager Version 10.06 (Mar 8 2009)</td>
</tr>
<tr>
<td>0 - Exit boot-manager</td>
</tr>
<tr>
<td>1 - Dir</td>
</tr>
<tr>
<td>2 - Set active software copy</td>
</tr>
<tr>
<td>3 - Delete software copy</td>
</tr>
<tr>
<td>4 - Download boot manager or an application by XMODEM</td>
</tr>
<tr>
<td>5 - Format Flash</td>
</tr>
<tr>
<td>6 - Show basic hardware information</td>
</tr>
<tr>
<td>7 - Reset board</td>
</tr>
<tr>
<td>8 - System configuration</td>
</tr>
<tr>
<td>9 - Download boot manager or an application by TFTP</td>
</tr>
<tr>
<td>Press the ESC key to return to the main menu</td>
</tr>
</tbody>
</table>

Select:

![Figure 6-3. Boot Menu](image)

Using the XMODEM Protocol

Use the following procedure to download software release 2.2 to ETX-204A via XMODEM.

To download software release via XMODEM:

1. Verify that the image file is stored on the PC with the terminal application.
2. From the Boot menu (Figure 6-3), select Download Files or an Application by XMODEM.
   A message is displayed that requests the partition number to which the new software is to be downloaded, and offers a recommended value.
3. If there is no special reason to select a different value, type the recommended number and then press <Enter>. A typical display is shown below:

```
Select Copy number for download ( 1 )
Select: 1
```
4. The process starts, and the following is displayed:

```
Erasing Partition please wait ....
Please start the XMODEM download.
```
5. Start the transfer in accordance with the program you are using. For example, if you are using the Windows HyperTerminal utility:
   - Select Transfer in the HyperTerminal menu bar, and then select Send File on the Transfer menu.
   - The Send File window is displayed:
Select the prescribed ETX-204A software file name (you may use the 
Browse function to find it).

In the Protocol field, select Xmodem.

- When ready, press Send in the Send File window.

You can now monitor the progress of the downloading in the Send File 
window.

**Note** If downloading fails, repeat the whole procedure.

When the downloading process is successfully completed, a sequence of 
messages similar to the following is displayed:

```
Loading ...
Decompressing to RAM.

Processing archive: FLASH
Extracting ETX-204A.BIN............................ CRC OK

Running ...

* In order to start working - press the ENTER button for few times*

*******************************************************************
```

6. At this stage, press the **Enter** key several times to go to the login screen.

**Using TFTP**

Use the following procedure to download software release 2.2 to ETX-204A via 
TFTP.

➢ To download software release via TFTP:

1. From the Boot menu (*Figure 6-3*), select **Download Files or an Application by**

   **TFTP**.

   The following message is displayed:

   ```
Enter TFTP timeout in case of failure [20 sec]:
```

2. Enter the amount of time to wait for the TFTP server.

   The following message is displayed:

   ```
Enter the target file name []:
```

3. Enter the name of the software image file.

   The following message is displayed:

   ```
Enter the server IP address []:
```

4. Enter the IP address of the PC where the TFTP server is installed.
If no errors are detected, the downloading process starts, and the screen displays its progress. After the image has been downloaded, use the `reboot` command in the `admin` context to reset ETX-204A in order to load the new release.

6.7 Verifying Upgrade Results

To verify that the upgrade was successful, log on to ETX-204A via HyperTerminal to view the Inventory table (`show inventory-table`) in the system context (`config>system`), and verify the active software version in the SW Rev column.
Chapter 7
Configuring Typical Applications

This chapter provides detailed instructions for setting up a typical application using ETX-204A units. Refer to Chapter 4 for a detailed description of all configuration options available for ETX-204A.

7.1 Ethernet Private Line Application

Figure 7-1 illustrates a point-to-point application of an Ethernet private line over a WAN.

![Figure 7-1. Point-to-Point Ethernet Private Line over Wide Area Network]

In this application, ETX-204A (A) receives Ethernet user traffic separated by VLAN at both Gigabit Ethernet user ports, and transmits it over separate VLANs through the Wide Area network. ETX-204A (B) receives the user traffic separated by VLAN from the Wide Area network user traffic separated by VLAN, and transmits it via both Gigabit Ethernet user ports, separated by VLAN.

You must configure the following to deploy ETX-204A units in this application:

1. System parameters (host IP, default gateway)
2. Classifier profiles

The default policer and queue map profiles are used when creating the flows. Refer to the descriptions of creating profiles in Chapter 4 for information on the default profiles.

Table 7-1. System Configuration Summary, Point-to-Point Application

<table>
<thead>
<tr>
<th>Device</th>
<th>Host IP</th>
<th>IP mask</th>
<th>Default Gateway</th>
</tr>
</thead>
<tbody>
<tr>
<td>ETX-204A (A)</td>
<td>192.168.10.10</td>
<td>255.255.255.0</td>
<td>192.168.10.1</td>
</tr>
<tr>
<td>ETX-204A (B)</td>
<td>192.168.10.20</td>
<td>255.255.255.0</td>
<td>192.168.10.1</td>
</tr>
</tbody>
</table>
### Configuring Management Connectivity

The configuration procedure for system parameters is similar for both ETX-204A units, except for defining different host IP addresses.

- **To configure the host parameters at ETX-204A (A):**
  - Execute the following script to disable DHCP and configure the host parameters as listed in Table 7-1.

```
configure management
  host 1
    no dhcp
    ip-address 192.168.10.10/24
    default-gateway 192.168.10.1
exit all
```

- **To configure the host parameters at ETX-204A (B):**
  - Execute the following script at ETX-204A (B) to disable DHCP and configure the host parameters as listed in Table 7-1.

```
configure management
  host 1
    no dhcp
    ip-address 192.168.10.20/24
    default-gateway 192.168.10.1
exit all
```

### Configuring Classifier Profiles

In both units, you have to create classifier profiles for VLANs 20, 30, 220, and 230. The same scripts can be used in both units, therefore they are presented here only once.

- **To create the classifier profile for VLAN 20:**
  - Execute the following script to create the classifier profile for VLAN 20.

```
configure flows
  classifier-profile vlan20 match-any
    match vlan 20
exit all
```
To create the classifier profile for VLAN 30:

- Execute the following script to create the classifier profile for VLAN 30.

```
configure flows
  classifier-profile vlan30 match-any
  match vlan 30
exit all
```

To create the classifier profile for VLAN 220:

- Execute the following script to create the classifier profile for VLAN 220.

```
configure flows
  classifier-profile vlan220 match-any
  match vlan 220
exit all
```

To create the classifier profile for VLAN 230:

- Execute the following script to create the classifier profile for VLAN 230.

```
configure flows
  classifier-profile vlan230 match-any
  match vlan 230
exit all
```

Configuring Flows

In both units, you have to create four flows, as flows are unidirectional (see Table 7-2)

- Flow 11 from user port 1 (ethernet 3) to network port 1 (ethernet 1), changing VLAN 20 to VLAN 220
- Flow 12 from network port 1 (ethernet 1) to user port 1 (ethernet 3), changing VLAN 220 to VLAN 20
- Flow 13 from user port 2 (ethernet 4) to network port 1 (ethernet 1), changing VLAN 30 to VLAN 230
- Flow 14 from network port 1 (ethernet 1) to user port 2 (ethernet 4), changing VLAN 230 to VLAN 30

The same scripts can be used in both units, therefore they are presented here only once.

To create flow 11:

- Execute the following script to create flow 11 as shown in Table 7-2.

```
configure flows flow flow11
  classifier vlan20
  policer profile Policer1
  ingress-port ethernet 3
  egress-port ethernet 1 queue-map CosProfile1 block 0/1
  mark all
  vlan 220
  no shutdown
exit all
```
To create flow 12:

- Execute the following script to create flow 12 as shown in Table 7-2.

```plaintext
configure flows flow flow12
  classifier vlan220
  policer profile Policer1
  ingress-port ethernet 1
  egress-port ethernet 3 queue-map CosProfile1 block 0/1
  mark all
  vlan 20
  no shutdown
exit all
```

To create flow 13:

- Execute the following script to create flow 13 as shown in Table 7-2.

```plaintext
configure flows flow flow13
  classifier vlan30
  policer profile Policer1
  ingress-port ethernet 4
  egress-port ethernet 1 queue-map CosProfile1 block 0/1
  mark all
  vlan 230
  no shutdown
exit all
```

To create flow 14:

- Execute the following script to create flow 14 as shown in Table 7-2.

```plaintext
configure flows flow flow14
  classifier vlan230
  policer profile Policer1
  ingress-port ethernet 1
  egress-port ethernet 4 queue-map CosProfile1 block 0/1
  mark all
  vlan 30
  no shutdown
exit all
```
Appendix A

Connection Data

A.1 10/100/1000BaseT Connector

The Ethernet electrical interface (10/100/1000BaseT) portion of the SFP/UTP combo ports terminates in 8-pin RJ-45 connectors, wired in accordance with Table A-1. The 10/100/1000BaseT connector supports both MDI and MDIX modes.

Table A-1. 10/100/1000BaseT Connector Pinout

<table>
<thead>
<tr>
<th>Pin</th>
<th>MDI</th>
<th>MDIX</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A+</td>
<td>B+</td>
</tr>
<tr>
<td>2</td>
<td>A-</td>
<td>B-</td>
</tr>
<tr>
<td>3</td>
<td>B+</td>
<td>A+</td>
</tr>
<tr>
<td>4</td>
<td>C+</td>
<td>D+</td>
</tr>
<tr>
<td>5</td>
<td>C-</td>
<td>D-</td>
</tr>
<tr>
<td>6</td>
<td>B-</td>
<td>A-</td>
</tr>
<tr>
<td>7</td>
<td>D+</td>
<td>C+</td>
</tr>
<tr>
<td>8</td>
<td>D-</td>
<td>C-</td>
</tr>
</tbody>
</table>

A.1 MNG Connector

The ETX-204A Ethernet management port uses an electrical interface that terminates in an RJ-45, 8-pin connector. The port supports MDI and MDIX modes. Table A-2 lists the pin assignments.

Table A-2. MNG Pinout

<table>
<thead>
<tr>
<th>Pin</th>
<th>Designation</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RxD+</td>
<td>Receive Data output, + wire</td>
</tr>
<tr>
<td>2</td>
<td>RxD–</td>
<td>Receive Data output, – wire</td>
</tr>
<tr>
<td>3</td>
<td>TxD+</td>
<td>Transmit Data input, + wire</td>
</tr>
<tr>
<td>4, 5</td>
<td>–</td>
<td>Not connected</td>
</tr>
</tbody>
</table>
### A.2 CONTROL Connector

The control terminal interface terminates in a V.24/RS-232 9-pin D-type female DCE connector. *Table A-3* lists the CONTROL connector pin assignments.

*Table A-3. CONTROL Connector Pinout*

<table>
<thead>
<tr>
<th>Pin</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>Transmit Data (output)</td>
</tr>
<tr>
<td>3</td>
<td>Receive Data (input)</td>
</tr>
<tr>
<td>4, 5, 6, 7, 8, 9</td>
<td>-</td>
</tr>
</tbody>
</table>

### A.1 EXT CLK Connector

The station clock port terminates in an 8-pin RJ-45 connector, wired in accordance with *Table A-4.*

*Table A-4. EXT CLK Connector Pinout*

<table>
<thead>
<tr>
<th>Pin</th>
<th>Direction</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 2</td>
<td>Input</td>
<td>T3 (Input)</td>
</tr>
<tr>
<td>3</td>
<td>-</td>
<td>Not connected</td>
</tr>
<tr>
<td>4, 5</td>
<td>Output</td>
<td>T4 (Output)</td>
</tr>
<tr>
<td>6, 7, 8</td>
<td>-</td>
<td>Not connected</td>
</tr>
</tbody>
</table>
Appendix B

Operation, Administration, and Maintenance (OAM)

B.1 Introduction

ETX-204A supports standard implementation of Ethernet OAM based on ITU-T Y.1731 and IEEE 802.1ag-D8. Pre-standard implementation based on Y.1731 is supported for backward compatibility, for instance when working opposite a device with an older version of Ethernet OAM software. This appendix describes the pre-standard implementation. The standard implementation can be found in the ITU-T Y.1731 and IEEE 802.1ag-D8 documentation.

The pre-standard OAM implementation provides the following:

- Continuity check
- Non-intrusive loopback which used to detect loss of bidirectional continuity
- Performance measurements (per service).

*Table B-1* lists the Ethernet OAM-related terms used in the appendix.

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNI</td>
<td>User Network Interface. The physical demarcation point between the responsibility of the Service Provider and the responsibility of the Subscriber</td>
</tr>
<tr>
<td>UNI_C</td>
<td>Customer side of a UNI link</td>
</tr>
<tr>
<td>UNI_N</td>
<td>Network side of a UNI link</td>
</tr>
<tr>
<td>Service frame</td>
<td>An Ethernet frame transmitted across the UNI toward the Service Provider or an Ethernet frame transmitted across the UNI toward the Subscriber.</td>
</tr>
<tr>
<td>Flow</td>
<td>Ethernet Virtual Connection : An association of two or more UNIs that limits the exchange of Service Frames to UNIs in the Ethernet Virtual Connection</td>
</tr>
<tr>
<td>Point-to-point Flow</td>
<td>Flow connecting exactly two UNIs</td>
</tr>
</tbody>
</table>
## Term Description

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multipoint-to-Multipoint Flow</td>
<td>Flow connecting two or more UNIs</td>
</tr>
<tr>
<td>Service Instance / Class of service (CoS)</td>
<td>A set of Service Frames that have a commitment from the Service Provider to receive a particular level of performance</td>
</tr>
<tr>
<td>Service Instance Identifier (CoS ID)</td>
<td>Service Frame delivery performance is specified for all Service Frames transported within a flow with a particular Class of Service instance. The Class of Service instance is identified by a Class of Service Identifier associated with each Service Frame (Class of service can be identified by more than one parameter/frame attribute)</td>
</tr>
<tr>
<td>MEP</td>
<td>Proactive OAM reference point which is capable to initiate and terminate proactive OAM frames. MEP is also capable to initiate and react to diagnostics OAM frames.</td>
</tr>
<tr>
<td>MIP</td>
<td>A provisioned OAM reference point which is capable to respond to diagnostics OAM frames initiated by the MEP.</td>
</tr>
<tr>
<td>MEP Service Instance Source</td>
<td>The receiver of OAM frames in each Service Instance</td>
</tr>
<tr>
<td>MEP Service Instance Destination</td>
<td>The transmitter of OAM frames in each Service Instance</td>
</tr>
</tbody>
</table>

### B.2 Reference Architecture

*Figure B-1* illustrates two OAM flows:

- **OAM flow originating from the CPE**
  
  The CPE-to-CPE OAM flow is transferred transparently by ETX-204A and treated as data.

- **OAM flow originating from the ETX-204A devices.**
  
  The ETX-204A OAM flow runs on a data flow on the same VLAN. The ETX-204A units terminate the OAM flow and can be referred as a Maintenance Entity (ME). Each device supports up to 8 such MEs. In this case, the ETX-204A units act as MEPs (Maintenance End-Points) and not as a MIP (Maintenance Intermediate Points) and all measurements are performed on the UNI_N to UNI_N segment.
Handling of OAM Levels

**UNI_C to UNI_N Direction**

In the UNI_C to UNI_N direction ETX-204A blocks all OAM messages with OAM level greater than 2. Messages with other OAM levels are passed transparently.

**Network Ingress to UNI_N Direction**

All OAM messages coming from the network ingress with the device MAC address or with the special OAM multicast address are sent to the CPU. All other OAM messages are passed transparently to the user ports as per the respective flow definition.

---

**B.3 OAM Entities**

This section describes the OAM entities hierarchy. Figure B-2 illustrates the relationship between UNI, flow and Service Instance (COS ID), when one or more service instances belong to one flow and one or more flow belong to a UNI. From the OAM perspective, the continuity messages and defects are activated per flow, and the PM is activated per service instance.

*Note*  
A flow can belong only to one UNI in the same ETX-204A.

---

*Figure B-1. OAM Architecture*
Figure B-3, Figure B-4 and Figure B-5 illustrate different combinations of UNIs, flows and service instances. Each UNI contains at least one flow, which contain at least one service instance.

- In the one flow per UNI case (Figure B-3), the PM and CC are transmitted once.

![Figure B-3. One Flow per UNI](image)

- In case of multiple flows per UNI (Figure B-4), PM and CC are transmitted three times.

![Figure B-4. Multiple Flows per UNI](image)

- In case of one flow and multiple CoS (Service Instances) per UNI (Figure B-5), the PM is transmitted three times and the CC – once.

![Figure B-5. One Flow and Multiple CoS (Service Instances) per UNI](image)

### B.4 OAM Flows

Figure B-6 illustrates a typical OAM traffic flow. The OAM message is transmitted from the source MEP 1 to the destination MEP 2 and the reply is transmitted back. The source is also a destination for messages from the other direction.

The OAM interval is one second, so each NTU transmits one request and one reply and receive one request and one reply. Total of four messages are transmitted per second per service instance.

![Figure B-6. OAM Flow](image)
OAM Message Addressing

The OAM defines two modes of addressing, unicast and multicast. Unicast addressing is used for point-to-point connections, while multicast addressing is used in cases where the MAC address of the destination MEP is not known. Currently ETX-204A supports point-to-point flows in proprietary mode.

OAM Message Association

On the receiver side the OAM frame is associated with a flow and a service.

Flow Association

When an OAM frame is associated with a flow, the following steps are performed:

- Request message reception
  When a request message is received, the VLAN is extracted to find the Flow ID. The Flow ID found at the receiver is compared against the Flow ID in the frame. If the IDs are equal, further service association is made. If it is not found, the “Flow ID no match” notification is returned in the reply message.

- Reply message reception
  When a reply message is received, the VLAN is extracted to find the Flow ID. The Flow ID found at the receiver is compared against the Flow ID in the frame. If the IDs are equal, further service association is made. If it is not found, the frame is discarded and connectivity alarm is issued.

Service Association

When an OAM frame is associated with a service, the following steps are performed:

- Request message reception
  The class of service characteristics are extracted from the frame and must be matched to an entry in the flows <-> services table at the receiver. If they are matched, the frame is processed. If not, the service ID is returned with the “Not Found” notification.

- Reply message reception
  The class of service characteristics are extracted from the frame and must be matched to an entry in the flow <-> services table at the receiver. If they are matched, the frame is processed. If not, the frame is discarded.

Ethernet Loopback (ETH-LB)

The ETH-LB can be used to verify connectivity. The ETH-LB is performed by sending a request ETH-LB message to the remote unit and expecting an ETH-LB reply message back to verify connectivity. When the insertion rate of ETH-LB messages is much slower compared to data rate between the flow points.

Unicast ETH-LB request message is sent from a MEP to a specific MEP (remote device). The DA of the request message is a unicast MAC address of destination device. Upon receipt of the request message, the MEP responds with unicast ETH-
LB reply message. The DA of the reply message is a unicast MAC address of requesting device, learned from request message.

**Continuity Check (ETH-CC)**

Ethernet Continuity Check (ETH-CC) can be used to detect continuity failures across flows between a given pair of edge service point on a flow. Continuity failures are caused by:

- Major failures (link failure, device failure, network path failure etc)
- Minor failures (software failure, memory corruption, incorrect configuration etc).

The ETH-CC signal is generated by one MEP. Upon receipt of the first ETH-CC signal from a sending MEP, the receiving MEP detects continuity with sending MEP and expects to receive further periodic ETH-CC signals. Once the receiving MEP stops receiving periodic ETH-CC signals from sending MEP, it declares continuity failure.

**OAM Procedures**

This section discusses the continuity check (CC) and the performance measurement (PM) procedures.

**Continuity Check Procedure**

The loopback message and the ETH-CC messages are used for continuity check. In case the services are defined and PM collection is enabled, they are also used to carry PM messages. If PM collection is disabled, the messages are used for continuity check only.

If the RX CC mode of the receiver is configured to CC-based, the continuity detection is based on ETH-CC. If the mode is set to LB-based, the continuity detection is based on ETH-LB. If the mode is disabled, the continuity detection is not performed.

**ETH-LB Method**

The ETH-LB method includes the following elements:

- **Unicast ETH-LB transmission**
  
  Unicast ETH-LB request message is transmitted by a MEP (ETX-204A) every 1 second. The transmitted Transaction Identifier is retained for at least 5 seconds after the unicast ETH-LB signal is transmitted. The Transaction Identifier must be changed for every unicast ETH-LB message, and no Transaction Identifier from the same MEP is allowed to be repeated within 1 minute.

- **Unicast ETH-LB reception and reply transmission**
  
  Whenever a valid unicast ETH-LB request message is received by MEP (ETX-204A), a unicast ETH-LB reply message is generated and transmitted to the requesting MEP. Every field in the unicast ETH-LB request message is copied to the unicast ETH-LB reply message with the following exceptions:
• The source and destination MAC addresses are swapped.
• The OpCode field is vendor-specific 0xFE.
• The Flow and MEP ID are processed as follows: if the Flow/MEP ID do not exist in the device, it changes them to “No Match” otherwise they are left intact.

• Unicast ETH-LB reply receipt
  When a unicast ETH-LB reply message is received by a MEP (ETX-204A) diagnostic flow termination function, it examines the TLVs returned in the unicast ETH-LB reply message. The signal is declared invalid if the TLVs do not match those sent in the corresponding unicast ETH-LB request signal, including MEP ID and Flow ID.

• Continuity declarations
  Loss of Continuity and Connectivity Mismatch states are declared by the ETH-LB mechanism.
  • Loss of continuity declaration
    After the source device sends an ETH-LB message a timer is set with a 3.52 second timeout. If the destination device does send reply within the timeout, the source enters the loss of continuity state. Upon reply from the destination, the source resets the timer to 3.52 seconds. Regarding the continuity check message, the source checks only the Flow ID with the MEP ID. When the source enters the loss of continuity state, it adds 24 to Unavailable Seconds counter. The 3.52 second period is calculated as a sliding window.
    Loss of continuity state is cleared after 3.52 seconds with at least 21 reply messages from the destination. In this case the Unavailable Seconds counter decreased by 24.
  • Connectivity mismatch declaration
    If the source Flow ID is not equal to the destination Flow ID as recorded in the reply message for 10 consecutive times, the source enters in to misconnection state.
    Misconnection state is cleared after 10 consecutive reply messages with the correct flow name from the destination.
    The Unavailable counter is maintained by the service according to the number of PM messages that did not receive replies. If a mismatch notification is received to the LB request, the frame is dropped and reply message is not sent. This is why the service becomes unavailable (no reply) in case of mismatch and the unavailable counter is raised.

**ETH-CC Method**

The ETH-CC method includes the following elements:

• ETH-CC transmission
  Unicast ETH-CC request message is transmitted by a MEP (ETX-204A) every 1 second. The transmitted Transaction Identifier is retained for at least 5 seconds after the unicast ETH-CC signal is transmitted. The Transaction Identifier must be changed for every Unicast ETH-CC message, and no
Transaction Identifier from the same MEP is allowed to be repeated within 1 minute.

• Unicast ETH-CC reply receipt

When a unicast ETH-CC message is received by a MEP (ETX-204A) diagnostic flow termination function, it examines the TLVs returned in the unicast ETH-CC message, and declares the signal invalid if the TLVs do not match those sent in the corresponding exiting MEP ID and Flow ID.

• Continuity declarations

Loss of Continuity and Connectivity Mismatch states are declared by the ETH-CC mechanism.

  • Loss of continuity declaration

  When the MEP receives the ETH-CC message a timer is set with a 3.5 seconds timeout. If the source does send another message during this period, the destination enters the loss of continuity state. Upon receipt of the ETH-CC message, the destination resets the timer to 3.5 seconds. Regarding the continuity check message, the destination check the Flow ID and the MEP ID. When the destination enters the loss of continuity state, it adds 4 to the Unavailable Seconds counter. The 3.5 second period is calculated as a sliding window.

  Loss of continuity state is cleared after 3.5 seconds with at least 2 messages from the source. In this case the Unavailable Seconds counter is decreased by 4.

  • Connectivity mismatch declaration

  If the source Flow ID is not equal to the destination Flow ID for 10 consecutive times, the destination enters in to misconnection state.

  Misconnection state is cleared after 10 consecutive reply messages with the correct flow name from the source.

The Unavailable counter is maintained by the service according to the number of PM messages that did not receive replies. If a mismatch notification is received to the LB request, the frame is dropped and reply message is not sent. This is why the service becomes unavailable (no reply) in case of mismatch and the unavailable counter is raised.

Performance Measurement

For details on OAM statistic counters, refer to Chapter 5.
AC/DC Adapter (AD) Plug
for DC Power Supply Connection

**Note**

*Ignore this supplement if the unit is AC-powered.*

Certain units are equipped with a wide-range AC/DC power supply. These units are equipped with a standard AC-type 3-prong power input connector located on the unit rear panel. This power input connector can be used for both AC and DC voltage inputs.

For DC operation, a compatible straight or 90-degree AC/DC Adapter (AD) plug for attaching to your DC power supply cable is supplied with your RAD product (see Figure 1 and Figure 2).

Connect the wires of your DC power supply cable to the AD plug, according to the voltage polarity and assembly instructions provided on page 2.

**Caution**

Prepare all connections to the AD plug **before** inserting it into the unit’s power connector.

---

*Figure 1. Straight AD Plug*

*Figure 2. 90-Degree AD Plug*
To prepare the AD plug and connect it to the DC power supply cable:

1. Loosen the cover screw on the bottom of the AD plug to open it (see Figure 3).

2. Run your DC power supply cable through the removable cable guard and through the open cable clamp.

3. Place each DC wire lead into the appropriate AD plug wire terminal according to the voltage polarity mapping shown. Afterwards, tighten the terminal screws closely.

4. Fit the cable guard in its slot and then close the clamp over the cable. Tighten the clamp screws to secure the cable.

5. Reassemble the two halves of the AD plug and tighten the cover screw.

6. Connect the assembled power supply cable to the unit.

Note: You have to flip over the non-90-degree AD plug type by 180 degrees to insert it into the unit. After inserting it, verify that the blue (negative) wire is connected to the POWER and the brown (positive) wire is connected to the RETURN.

Warning

- Reversing the wire voltage polarity will not cause damage to the unit, but the internal protection fuse will not function.
- Always connect a ground wire to the AD plug's chassis (frame) ground terminal. Connecting the unit without a protective ground, or interrupting the grounding (for example, by using an extension power cord without a grounding conductor) can damage the unit or the equipment connected to it!
- The AD adapter is not intended for field wiring.
**Note**  
*Ignore this supplement if the unit is AC-powered.*

Certain DC-powered units are equipped with a plastic 3-pin VDC-IN power input connector, located on the unit rear panel. Different variations of the connector are shown in [Figure 1](#). All are functionally identical.

Supplied with such units is a kit including a mating Terminal Block (TB) type connector plug for attaching to your power supply cable.

Connect the wires of your power supply cable to the TB plug, according to the voltage polarity and assembly instructions provided on the following pages.

---

**Caution**

Prepare all connections to the TB plug **before** inserting it into the unit’s VDC-IN connector.
To prepare and connect the power supply cable with the TB Plug:

**Note:** Refer to *Figure 2* for assistance.

1. Strip the insulation of your power supply wires according to the dimensions shown.
2. Place each wire lead into the appropriate TB plug terminal according to the voltage polarity mapping shown in *Figure 3*. (If a terminal is not already open, loosen its screw.) Afterwards, tighten the three terminal screws to close them.
3. Pull a nylon cable tie (supplied) around the power supply cable to secure it firmly to the TB plug grip, passing the tie through the holes on the grip.
4. Isolate the exposed terminal screws/wire leads using a plastic sleeve or insulating tape to avoid a short-circuit.
5. Connect the assembled power supply cable to the unit by inserting the TB plug into the unit’s VDC-IN connector until it snaps into place.

---

**Warning**

- Reversing the wire voltage polarity can cause damage to the unit!
- Always connect a ground wire to the TB plug’s chassis (frame) ground terminal. Connecting the unit without a protective ground, or interruption of the grounding (for example, by using an extension power cord without a grounding conductor) can cause harm to the unit or to the equipment connected to it!
Note: Certain TB plugs are equipped with captive screws for securing the assembled cable’s TB plug to the unit’s VDC-IN connector (C and E types only). To secure the plug, tighten the two screws on the plug into the corresponding holes on the sides of the input connector as shown in Figure 4.

Figure 4. TB Plug with Captive Screws (optional)

➢ To disconnect the TB plug:
1. If the TB plug is equipped with captive screws, loosen the captive screws (see Figure 4).
2. If the unit’s VDC-IN connector is type B, lift the locking latch (see Figure 1).
3. Pull out the TB plug carefully.

Caution Always lift the locking latch of type B connectors before disconnecting the TB plug, to avoid damaging the TB plug.
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RAD Data Communications would like your help in improving its product documentation. Please complete and return this form by mail or by fax or send us an e-mail with your comments.

Thank you for your assistance!

**Manual Name:** ETX-204A Ver. 2.2  
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<th>Good</th>
<th>Fair</th>
<th>Poor</th>
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