**UBEX-MMU-X200**

**Introduction**
UBEX-MMU-X200 is a Matrix Management Unit (MMU) for the UBEX AV Over IP optical extender product line. With a standard Ethernet switch installed as a corepoint, a virtual matrix can be created with UBEX devices connected to the IP network as input and output endpoints. The established virtual matrix is necessary to be controlled by the MMU also connected to the Ethernet switch.

The MMU builds and constantly updates a database of the connected UBEX endpoints, connected to the Ethernet switch. The established virtual matrix is necessary to be controlled by the MMU also connected to the Ethernet switch. The virtual matrix can be created with UBEX devices connected to the IP network as input and output endpoints. The established virtual matrix is necessary to be controlled by the MMU also connected to the Ethernet switch.

**Box Contents**
- UBEX-MMU-X200 device
- IEC power cable
- Phoenix Combicon 3-pole connector (2x)
- Safety and warranty info, Quick Start Guide

**Quick Start Guide**

**UBEX-MMU-X200**

**Control Ethernet port 1**
Front panel RJ45 connector for control and firmware upgrade purposes. The port supports 100 Mbps Ethernet connection, auto-negotiation and auto-MDIX/MDIEX.

**Status LEDs**
The LEDs give immediate feedback about the recent status of the device.

**LCD screen**
LCD screen showing the most important settings and parameters in the front panel menu.

**Jog dial control knob**
Gantry setting and menu navigation by the jog dial control. Keep dial and click while getting feedback on the LCD.

**Reset button**
Reboots the device (the same as disconnecting from the power source and reconneting again).

**RS-232 connectors**
2x3-pole Phoenix connector for serial communication. The connectors are for controlling the device and connection with third-party system controllers.

**Control Ethernet port 2**
Rear panel RJ45 connector for control and firmware upgrade purposes. The port supports 1 Gbps Ethernet connection, auto-negotiation and auto-MDIX/MDIEX.

**Ethernet port for UBEX network**
RJ45 connector with 1 GBE support for connection to the UBEX network. Connect the MMU and the L3 switch by a CAT5e cable via the connector.

**SFP slot for 1Gbe SFP module for UBEX network**
Optical port slots for a 1 GBE SFP module or DAC cable for connection to the UBEX network. Connect the MMU and the L3 switch by a CAT5e fiber optical cable or DAC cable.

**AC connector**
Standard IEC connector accepting 100-240 V, 50 or 60 Hz.

**Use only one of the UBEX network connectors (RAJ5 or SFP) in the same time to avoid the network loop.**

**Pay attention about network switch configuration due to the bandwidth differences of the front and rear side Control Ethernet ports. Front port supports 100 Mbps, rear side supports 1 Gbps Ethernet connection.**

**Status LEDs**
- **LIVE**
  - Blinking: The device operates normally, the core software is running.
  - On: Device initialization is in progress.
  - Off: The device is not powered or out of operation.

- **POWER**
  - On: The device is powered and ready to use.
  - Off: The device is not powered or out of operation.

**Hardware requirements:**
- Layer 3 (L3) switch
- UBEX endpoints
- UBEX-MMU-X200 Matrix Management Unit

The managed switch in the network shall offer the following capabilities:
- 10 GbE support
- GMPV3 snooping
- Non-blocking
- VLAN support
- Link Aggregation Control Protocol (LACP)

**Functions of the Matrix Management Unit:**
- Dynamic crosspoint handling
- Network bandwidth utilization management
- EDID management
- Monitoring of the network and the endpoints
- Backup and restore
- Firmware upgrade for more endpoint devices in batch and parallel
- Interface for third-party system controllers

**Further Information**

The User's manual of this appliance is available on www.lightware.com. See the Downloads section on the dedicated product page.

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Front Panel Operation

Navigation in the LCD Menu
The front panel has a color LCD showing the most important settings and parameters. The jog dial control knob can be used to navigate between the menu items or change the value of a parameter. The knob can be pressed to enter a menu or edit a parameter.

Set Static IP Address

The IP address of the endpoint can be set from the front panel:

1. Navigate to the System Settings / Network (DHCP) menu and check the current state of the DHCP. If the setting is Enabled change it to Disabled. After it navigate to Save and press Enter.
2. Navigate to the System Settings / Network menu, and select the Static IP Static Subnet, and Static Gateway options. Set the parameters by the front panel buttons according to your network requirements.
3. Navigate to Save (the last one of the Network menu) and press Enter.

Set Dynamic IP Address (DHCP)

1. Navigate to the System Settings / Network / DHCP menu and check the current state of the DHCP. If the setting is Enabled change it to Disabled.
2. Navigate to the Save submenu (the last one of the Network menu) and press Enter.

Restore Factory Default Settings

1. Navigate to the Restore Factory Defaults menu and press Enter. After the confirmation the device reboots and the following factory default values are reloaded in the device:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Static IP</td>
<td>192.168.0.100</td>
</tr>
<tr>
<td>Static Subnet</td>
<td>255.255.255.0</td>
</tr>
<tr>
<td>Default gateway</td>
<td>192.168.0.1</td>
</tr>
<tr>
<td>DHCP</td>
<td>Disabled</td>
</tr>
</tbody>
</table>

2. Pull down on the handle bar.
3. Disconnect the LC connectors from the SFP module.
4. Connect the LC connectors to the SFP module.
5. Connect the module to the SFP port slot.
6. The SFP module has a side that clips to the connector on the port of the switch, and is designed to prevent the module from being inserted the wrong way into the port. Do NOT force it. The optical port slot can handle SFP module for the fiber optical connection designed to prevent the module from being inserted the wrong way into the port. Do NOT force it.

Software Control – Using Lightware Device Controller (LDC)

The device can be controlled from a computer through the Ethernet and RS-232 ports using Lightware Device Controller. Please download the application from www.lightware.com, install on a Windows PC or macOS and establish the connection to the device.

Remote IP Editor - How to Change the IP Address Remotely

For details about requirements of the network switch, real-life examples and useful practices please visit our website (www.lightware.com) and download the Installation and Network Setup Guide for UBEX and the System Design Guide for UBEX documents.

Typical Application

Installation of the SFP Module

The UBEX-MMU-X200 matrix management unit has one SFP module slot for the fiber optical connection via the network switch.

1. Put-up on the handle bar.
2. Connect the module to the SFP port slot.
3. Connect the LC connectors to the SFP module.
4. The optical port slot can handle SFP module up to 1 Gbit support.

Inserting and Cabling of SFP Module

1. Disconnect the LC connectors from the SFP module.
2. Pull down on the handle bar.
3. Gently slide out the SFP module from the slot.

Ethernet Switch - Detailed Requirements

In the virtual matrix architecture a third-party switch is used to transfer IP packets. In connection with this switch, the following criteria must be fulfilled:

- 10 Gbps non-blocking switch (capable of full bandwidth transmission between all ports).
- Supports IEEE Std. 802.3ad-2005 Link Aggregation Control Protocol, with Link Aggregation Groups for each endpoint.
- Supports Internet Group Management Protocol version 2 (ICMP/2398 snooping).
- IPv4 (or Layer 3) Multicast Forwarding based on IGMP snooping, with at least 16 addresses available for each endpoint, e.g. 4096 IPv4 multicast addresses for 256 endpoints.
- Supports IEEE Std. 802.1Q VLAN tagging: 1 VLAN (286) reserved for UBEX control and media transmission, other(s) available for user traffic.

Optional Requirements:

- Supports IEEE Std. 802.1Q (formerly 802.1p) priority code point (PCP), and implements priority based queuing for at least 1 prioritized traffic class. This is required to guarantee uninterrupted media transmission regardless of the user traffic.
- Supports Link Layer Discovery Protocol (LLDP), in order to discover network topology.
- Supports IEEE Std. 802.1Q (formerly 802.1p) Multiple Spanning Tree Protocol (MSTP), in order to detect switching loops in VLAN's.

Ethernet Switch Configuration

Link Aggregation

Create Link Aggregation Groups (LAG's) / EtherChannels etc. for each port pair that is used. The bonding mode is dynamic: 802.3ad-LACP has to be enabled for each group.

VLAN

The UBEX network uses 802.1Q tagged frames with the VLAN ID of 286. This VLAN has to be available from each LAG, with tagged frames. The LAG's have to be in trunk mode (multiple VLAN's are available on UBEX devices, other VLAN's may be used with tagged or untagged frames). The port where the MMU is connected is also a trunk port.

VXMP

VXMPv2 snooping has to be enabled for each LAG in this VLAN.

Optional Configuration

Enable Link Layer Discovery Protocol (LLDP) on all ports to access topology information in order to speed up your installation process.

Network Setup Guide for UBEX

For more details about requirements of the network switch, real-life examples and useful practices please visit our website (www.lightware.com) and download the Installation and Network Setup Guide for UBEX and the System Design Guide for UBEX documents.

Wiring Guide for RS-232 Data Transmission

UBEX-MMU-X200 supplied with 3-pole Phoenix connector. See the examples of connecting to a DCE (Data Circuit-terminating Equipment) or an UTE (Data Terminal Equipment) type device.

Cable Wiring Guide on our website www.lightware.com/support/guides-and-white-papers.