USER MANUAL

EtherMPX

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DOCUMENT REVIEWS

Date	Version	Notes
01 Mar 2014	1.0	Initial release
20 Feb 2015	1.1	Rephrase of some sections
10 Mar 2015	1.2	Merged with SFN option User Manual
17 July 2015	1.3	Introducing v3.4.4 new SFN features
17 Aug 2015	1.4	Merged with Low Latency option User Manual
07 Nov 2015	1.5	Updated list of Optional components
15 Nov 2015	1.6	Merged with SNMP User Manual (v4)

Dear customer,

After introducing our DDS-30 FM Exciter in 2010, the first in the world capable to accept Digital MPX (MPX over AES), it was time to solve another problem: there was no Digital MPX STL in the market! Also, the existing Analog MPX STLs could not meet our high standards in order to exploit the full capabilities of DDS-30.

That's why we decided to design a Digital MPX STL, which could transport Digital MPX, beside the classic analog MPX, analog L/R, and digital L/R (over AES) modes. Since we are big fans of the "everything IP" concept, we couldn't select something else than IP transmission!

In your hands, you have the EtherMPX IP STL, which is the result of our research and development. Since version 3, an LCD user interface and SFN over IP capabilities added, so you don't need GPS receivers anymore! At version 4, we introduced a separate Ethernet port for management over SNMP and/or other protocols.

Always with 24bit professional high-end audio performance and minimal latency, we could compare the performance of EtherMPX to a cable! Even if EtherMPX is designed to be a perfect match with our DDS-30 FM Exciter, you can use it to deliver analog MPX to any other exciter, and you will notice immediately the difference compared to any analog FM STL.

So, enjoy using your EtherMPX and thank you for selecting us for your business!

Sigmacom Broadcast
March 2014

Contents

1. Hardware description

The front panel (Encoder / Decoder):

1. LCD Display [20x4 characters]
2. Navigation buttons [UP, DOWN, OK]
3. Monitor output [1/4" TRS Female jack]
4. Status LEDs [ACT, LINK, PWR]

The rear panel (Encoder):
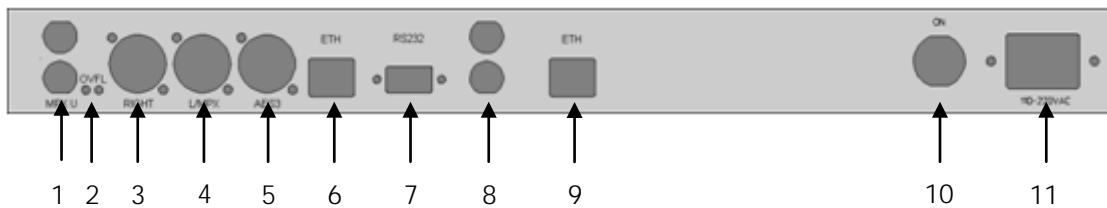
1. Unbalanced MPX input (BNC female)
2. Excessive input level alarm LEDs (L/R)
3. Right channel balanced input (XLR3 female)
4. Left channel / MPX balanced input (XLR3 female)
5. AES/EBU balanced input (XLR3 female)
6. 10/100 Ethernet port (RJ45 female) for audio payload
7. RS232 port (DB9 female)
8. 10MHz input& output (BNC female – SFN option)
9. 10/100 Ethernet port (RJ45 female) for management (v4 only)
10. On/Off power switch
11. 100-240VAC power input connector (IEC)

The rear panel (Decoder):
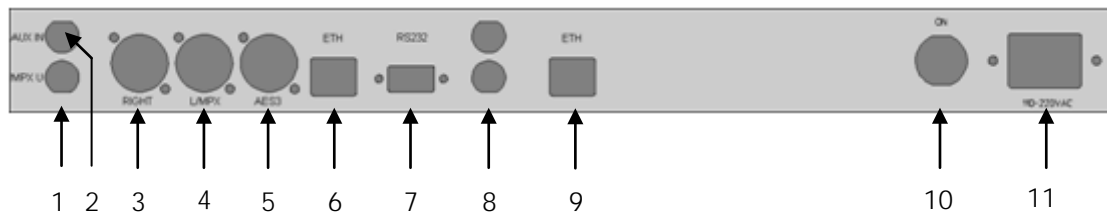
1. Unbalanced MPX output (BNC female)
2. Unbalanced AUX MPX input (BNC female)
3. Right channel balanced output (XLR3 male)
4. Left channel / MPX balanced output (XLR3 male)
5. AES/EBU balanced output (XLR3 male)
6. 10/100 Ethernet port (RJ45 female) for audio payload
7. RS232 port (BD9 female)
8. 10MHz output (BNC female – SFN option)
9. 10/100 Ethernet port (RJ45 female) for management (v4 only)
10. On/Off power switch
11. 100-240 VAC power input connector (IEC)

2. Basic installation instructions (Encoder & Decoder):

1. Install both Encoder & Decoder in a 19″ rack.
2. Connect power and Ethernet cables as shown below:

Encoder connections

[1]   [2]   [4]   [3]

- Connect the MPX output of your audio processor / stereo encoder
- Connect the RJ45 LAN cable of your local network
- Connect the IEC power cable (100-240VAC, 50-60Hz)
- Turn the power switch on

Decoder connections

[1] [2]   [3]   [5]   [4]

- Connect the MPX output of the EtherMPX Decoder to your FM Exciter
- Connect your backup audio source to AUX IN
- Connect the RJ45 LAN cable of your local network
- Connect the IEC power cable (100-240VAC, 50-60Hz)
- Turn the power switch on

Audio levels adjustment at Encoder:

Analog audio input at Encoder should not exceed +6dBu (4.37Vpp). Suggested nominal range is 0dBu (2.19Vpp) to +4dBu (3.47Vpp).
The audio outputs at the Decoder will provide the same audio level (1:1) as fed into the Encoder. Analog and digital outputs of Decoder are operating simultaneously.

Rear panel LED indications at Encoder:

- OVFL LEDs (two, one for each analog input): Indicates extremely audio level that needs immediate attention, otherwise damage may occur at analog input stages of the Encoder.

Front panel LED indications (Encoder & Decoder):

- PWR LED: Indicates that power is turned on
- LINK LED: Indicates that an Ethernet connection is present.
- ACT LED: Indicates that audio transmission is active.

Note: When Encoder is configured in "Unicast" mode and powered on, it searches for the Decoder (ACT LED is blinking every second). When a connection is established, ACT LED at Encoder & Decoder stay always on. If connection is lost, Encoder will cease transmission after 10 minutes and will start the search sequence each 17 seconds.

Default settings:

- Encoder default IP: 192.168.1.90 / 24
- Decoder default IP: 192.168.1.91 / 24
- Factory setup: Analog MPX, Unicast

Network considerations:

If you have multiple EtherMPX devices in the same network (like 1 Encoder and 2 or more Decoders), you MUST change the IP addresses of the devices accordingly to avoid IP conflicts (two devices with the same IP in the same network is **never allowed**).

If you have multiple networks or other traffic reaching the EtherMPX Encoder or Decoder, you **must filter it**. A recommended practice is to make network segmentation by using VLANs.

It is strongly recommended to use transparent bridge Ethernet links with sufficient bandwidth and low jitter in order for the EtherMPX system to operate normally. The latency, delay variance and fragmentation caused by routing, **is forbidden** for real-time traffic such as EtherMPX produces.

The required bandwidth for L/R mode is roughly 2.4Mbit/s, and for MPX mode is roughly 4.75Mbit/s.

The audio buffer size at the decoder side depends on the network jitter you have in your transmission network. Select an appropriate buffer size to compensate the instability of your transmission network - otherwise you will experience audible audio artifacts ("clicks" and "pops") due to packet loss or drops.

Always consider that an increased buffer size results into additional latency to the audio delivered.

3. LCD menus:

From the LCD menus the user can view or modify some basic parameters (described below). To control all system parameters, you have to use the EtherMPX NMS (Network Management System) software.

To navigate through the menus:
You can use the "UP" and "DOWN" buttons in the front panel, to navigate through the User Interface menus displayed in the LCD.
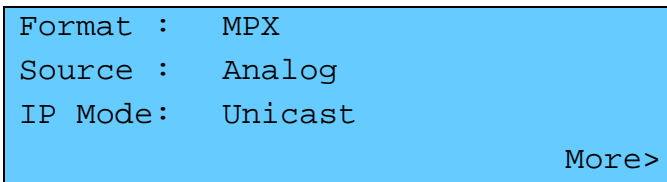
To modify a parameter:
Press once the "OK" button and a blinking cursor should appear in the screen. Use the "UP" and "DOWN" arrow buttons to move the cursor over the parameter you want to modify. When you set the cursor over the desired parameter, click once again the "OK" button. Now you can use the "UP" and "DOWN" buttons to modify the parameter.

When done, click "OK" button again. A confirmation menu appears "SAVE? Y/N" where you can select "Y" if you want to apply and save the new settings, or "N" to discard any changes you made.
If you don't push any button within 30 seconds, the system discards any changes and returns to the main menu.

1. **Menu: Operational mode**

```
Format :   MPX
Source :   Analog
IP Mode:   Unicast
                     More>
```

Format:
<u>Enc & Dec</u>: Select the audio format you need to transport through EtherMPX. You can select between "MPX" or "L/R".

Source:
<u>Enc only</u>: Select the source port of the Encoder. You can select between "Analog" or "Digital" (AES/EBU) input.

IP Mode:
<u>Enc only</u>: Select the transmission mode. If you want to feed only one EtherMPX Decoder in your network, select "Unicast". If you need to feed more than one EtherMPX Decoders simultaneously, select "Multicast" (Destination IP: 239.255.255.239).

2. Menu: Audio level

```
Input                   dBFS
A ████  ████  ████  ████  -10.3
B -
<Back                  More>
```

A: Displays the audio level of L/MPX channel
B: Displays the audio level of Right channel (only in L/R mode)

Audio levels are displayed as a bar graph (VU meter) and as numerical value in dBFS. Please note that this is a display only menu. You cannot modify any parameter.

3. Menu: Network settings(Encoder)

```
ID :       SIGMACOM ENCODER
IP :       192.168.001.090
Clk:   Int              SFN:Off
<Back                  More>
```

ID:
Displays the device name. You cannot modify this parameter from the LCD menu, you have to use the EtherMPX NMS software.

IP:
Displays the device IP address. You can modify this parameter within the range of 1.0.0.1 to 254.255.255.254.

Clk:
Selects the reference clock source "Int" or "Ext". You cannot modify this parameter from NMS to avoid loss of communication. Only local modification is allowed. When selecting "Int", the Encoder uses the internal 10MHz TCXO reference. When selecting external, uses an external 10MHz reference connected at the rear "10MHz INPUT" female BNC connector. If the external 10MHz reference is lost, system halts.

SFN:
Displays the operational status of the SFN option (if installed). The "Off" status disables the Master Clock. When "On" the Master Clock is enabled.

Menu: Network settings (Decoder)

```
ID :        SIGMACOM DECODER
IP :        192.168.001.091
Att:  0.0                SFN:Off
<Back                    More>
```

ID:
Displays the device name. You cannot modify this parameter from the LCD menu, you have to use the EtherMPX NMS software.

IP:
Displays the device IP address. You can modify this parameter within the range of 1.0.0.1 to 254.255.255.254.

Att:
Displays the analog output attenuation setting. A value of 0dB means no attenuation. You can modify this parameter in steps of 0.5dB within the range 0.0dB to Mute.

SFN:
Displays the operational status of the SFN option (if installed). The "Off" status means that the device is running on the internal clock. When "On" the device is synchronized to the Encoder Master Clock.

4. Menu: System information

```
        Sigmacom EtherMPX v4
DSP=        V4.00
CPU =       V4.00
<Back
```

DSP:
<u>Enc & Dec</u>: Displays the firmware version running in the main processor. You cannot modify this parameter.

CPU:
<u>Enc & Dec</u>: Displays the firmware version running in the O&M (Operation & Maintenance) processor. You cannot modify this parameter.

4. NMS Software description (for v3 devices)
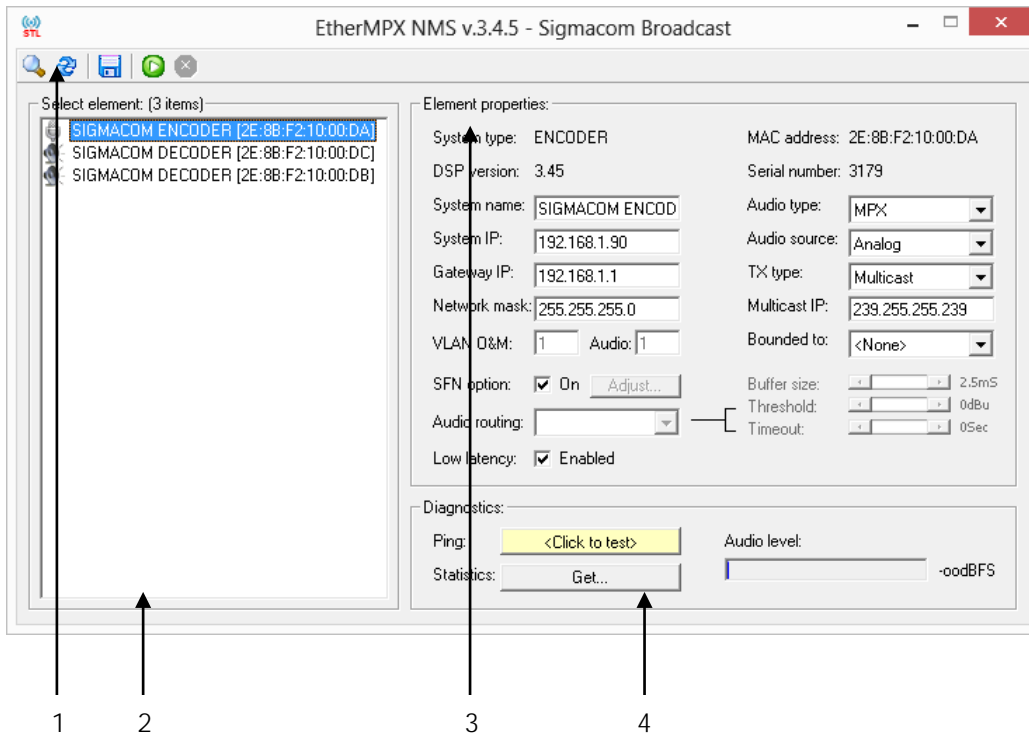
1. Command buttons

🔍 **Discovery**
Use this command to auto detect all EtherMPX devices in your network. Your computer must be in the same subnet as your devices are.

🔄 **Refresh**
Use this command to discard any changes made, and reload the last saved configuration stored in your computer.

💾 **Save**
Use this command to save locally in your computer any changes made, and simultaneously send them to the selected device (Encoder or Decoder).

▶ **Play**
This command is available only when the selected device is an Encoder device. Use this command to start audio level capture and display it in real time at the VU meter located at the down right corner of the "Diagnostics" area.

⊗ **Stop**
This command is available only when the VU meter is running. Use it to stop audio level capture from Encoder.

2. Devices list

In this area will be displayed all the devices discovered in your network after you used the "Discovery" command button.

- icon: Indicates an Encoder device
- icon: Indicates a Decoder device

Next to each icon, the device name and MAC address is displayed.

3. Device properties

When you click on a device in the "Devices list" area, its properties and parameters are displayed here.

- **System type:** ENCODER or DECODER (non modifiable)
- **DSP version:** The firmware version running in the main processor of the selected device (non modifiable)
- **MAC address:** The MAC address of the network interface of the selected device (non modifiable)
- **Serial number:** The production serial number of the selected device (non modifiable)
- **System name:** View or modify the human friendly name of the selected device. Highly recommended if you have more than one Encoder or more than one Decoder in your network. This helps you to identify the proper device to manage.
- **System IP:** View or modify the IP address of the selected device.
- **Gateway IP:** View or modify the network gateway IP address of the selected device.
- **Network mask:** View or modify the network mask of the selected device.
- **VLAN:** Reserved for future releases. User cannot modify this.
- **SFN option:** Enable or Disable SFN operation. Available only when SFN option is installed in the selected device.
- **SFN Adjust:** View or modify the SFN tuning parameters.
- **Audio routing:** This is a Decoder only functionality. View or modify the audio route of the selected Decoder. Use the drop down menu to select between the available options:
    - o Force external: Route the audio from AUX IN to the MPX OUT
    - o Force internal: Route the audio from Ethernet to the MPX OUT
    - o Auto detect: Enables the Silence Detector (see below).
- **Low Latency:** Enable or disable the Low Latency Option. Available only when Low Latency option is installed in the selected device.
- **Audio type:** View or modify the audio format of the selected device. Use the drop down menu to select between "MPX" or "L/R".
- **Audio source:** This is an Encoder only functionality. View or modify the input source of the Encoder. Use the drop down menu to select between "Analog" or "Digital" (AES/EBU) inputs.

- **TX type:** This is an Encoder only functionality. View or modify the audio over IP transmission mode at the Encoder. Use the drop down menu to select between "Unicast" (one Encoder to one Decoder) or "Multicast" (one Encoder to many Decoders). When in "Multicast" packets sent from Encoder, will have destination IP as defined in the "Multicast IP" field box (see below).
- **Remote / Multicast IP:** This field has a double purpose. In Encoder with TX Type = Unicast, you type the IP address of the target Decoder to transmit to. In Encoder with TX Type = Multicast you type the destination Multicast IP address in the range of 239.0.0.1 to 239.255.255.254. The Decoders participating in this group, must be also configured to "listen" to the same multicast IP address.
- **Bounded to:** Reserved for future releases, has no effect.
- **Buffer size:** This is a Decoder only functionality. View or modify the audio buffer size of the selected Decoder. Please refer to "Network considerations" section above.
- **Threshold:** This is a Decoder only functionality and it is enabled only when "Auto detect" audio routing is selected. This is a parameter of the integrated Silence Detector in the Decoder, and defines the audio level threshold to start a countdown timer before it bridges the AUX IN to the MPX OUT connector (assuming that the audio over IP is lost).
- **Timeout:** This is a Decoder only functionality and it is enabled only when "Auto detect" audio routing is selected. This is a parameter of the integrated Silence Detector in the Decoder, and defines the initial value of the countdown timer.

Silence Detector example: Threshold = -18dBu, Timeout = 20 sec.
If the audio level coming from the EtherMPX encoder is below -18dBu for 20 consecutive seconds, the Silence Detector will assume that the audio over IP is lost, and will route the audio from the AUX IN connector to the MPX OUT connector.

When the audio level is restored above -18dBu for 5 consecutive seconds, the Silence Detector assumes that the audio over IP is OK and routes the audio from Ethernet to the MPX OUT connector.

If your program has long periods of silence, or long pauses between songs and talent, it is recommended to set the audio routing of the Decoder to "Force internal".

Note: The 5 seconds restoration timer is hardcoded and cannot be modified by the user.

4. Diagnostics

When you have selected a device in the "Devices list" area, you can use the following tools:

- **Ping response:** Click with your mouse this button, to perform an ICMP ping towards to the IP address of the selected device. The ping is originating from your computer IP address, so it must be in the same subnet as the device is.

  o If there is a ping response, the button turns in green color and the response time is displayed.
  o If there is no response within a second, the button turns into red color with a "Failure" caption.

- **Statistics:** Every EtherMPX device keeps statistical counters about Ethernet packets being transmitted or received. If the SFN option is installed, statistical counters about the synchronization performance are displayed. Click on the "Get" button, and a new window will appear (see below):
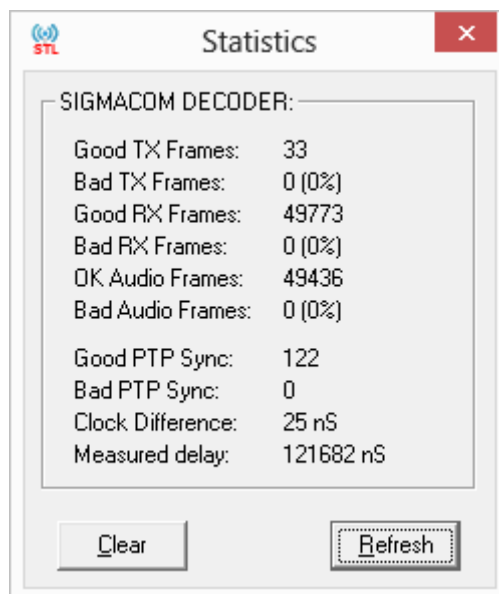
- **Good TX Frames**: Ethernet frames transmitted OK from the device (no internal underruns / overruns, network collisions).
- **Bad TX Frames:** Ethernet frames that failed to be transmitted from the device (possible causes: internal underrun /overrun, or network collisions). The error percentage is shown inside the parenthesis.
- **Good RX Frames**: Ethernet frames received OK from the device (no CRC errors, no underruns / overruns, no network collisions).
- **Bad RX Frames**: Ethernet frames received, but dropped by the device (possible causes: CRC errors, internal underrun / overrun, network collisions). The error percentage is shown in the parenthesis.
- **OK Audio Frames:** Ethernet frames with audio payload that transmitted or received OK.

- **Bad Audio Frames:** Ethernet frames with audio payload, but dropped by the device (possible causes: CRC errors, internal underrun / overrun, network collisions). The error percentage is shown in the parenthesis.
- **Good PTP Sync**: (Only available if SFN option is installed and enabled). Number of SYNC messages received OK and took into account by the EtherMPX algorithms to calculate and calibrate on-the-fly the sync parameters.
- **Bad PTP Sync**: (Only available if SFN option is installed and enabled). Number of PTP SYNC messages received, but rejected by the EtherMPX algorithms. Possible causes: glitching Master Clock, heavy loaded network, many irrelevant Ethernet packets that must be filtered out.
- **Clock difference**: (Only available if SFN option is installed and enabled). The measured mismatch between the Master Clock and the local clock, expressed in nanoseconds (nS). This value must be as low as possible to indicate that there is a good sync with the Master Clock. Cases of >100nS difference, indicate a network problem. Possible causes: excessive latency fluctuations caused by Ethernet switches or wireless transmission.
- **Measured delay**: (Only available if SFN option is installed and enabled). The network latency as measured between local device and Master Clock device.
- **Clear Button**: Click this button to reset all displayed counters to zero. A confirmation dialog appears to verify this operation.
- **Refresh Button**: Click this button to update the counters (fetch the latest values from the EtherMPX device).

- **Audio level:** This is an Encoder only functionality. This is a real time VU meter, which displays the audio level of the selected Encoder. To start monitoring the audio level, select the Encoder device you want, and click the "Play" button on the top strip. To stop the audio monitoring, just click the "Stop" button next, or select some other device from the "Devices list". Keep in mind that audio monitoring causes reverse direction IP traffic of about 100-200kbit/s.

  ⚠ If you are working with analog audio, a good practice is to keep the Encoder input level in the range between -6.0 to -8.0dBFS.
  When utilizing the digital input, a good practice is to keep the audio input level up to -2.0dBFS.

IMPORTANT NOTE:

Everything described in this chapter (NMS Software description), is valid *only* for version 3 EtherMPX devices.

For version 4 EtherMPX devices, you must use the secondary Ethernet port "MGMT" to manage the device over SNMPv1 protocol (see chapter 8 – SNMP Management).

5. SFN Option

This section refers to the SFN Option, wherever available and enabled.

- **Operation principals:**
  The purpose of EtherMPX SFN option is to deliver synced audio and a synced 10MHz reference signal at each Decoder. To accomplish this, we have implemented an End-to-End (E2E) PTPv2-based mechanism (IEEE1588v2) which synchronizes each Slave Clock (Decoder) to the Master Clock (Encoder).

  Inside an overlapping area with ≤10dB wanted/unwanted signal, the required accuracy is <5uS. The EtherMPX SFN option can control down to nS, but the accuracy and stability heavily depends on the intermediate network elements, such as Ethernet switches, wireless IP links etc.

  In practice, a wander of ±200nS per Ethernet switch should be expected, which can be improved by using PTP-aware Ethernet switches.

  ⚠ In cases where excessive latency fluctuations occur (like WiFi links), the EtherMPX algorithms cannot handle it, and synchronization becomes extremely poor. We are constantly trying to improve these algorithms, so please consult our support team for latest information.

  The overall performance & accuracy is also affected by the quality of the Master Clock. The Encoder Master Clock is based on a TCXO with an accuracy of 50ppb, so in cases where more accuracy is required, it is suggested to use an external 10MHz clock (Rubidium atomic clock, or GPS 10MHz reference).

- **Encoder:**
  To turn on the SFN operation, switch the "SFN" parameter to "On" (this can be modified from the front panel menu or the NMS, see previous sections). When enabled, the Encoder sends a SYNC message every 1 second with destination IP 224.0.1.129.

  To use the internal 10MHz reference (default), set the "CLK" parameter to "Int" from the front panel menu (LCD display and buttons). If you want to use an external 10MHz reference, please first connect your external source to the rear female BNC connector marked as "10MHz INPUT" and then set the "CLK" parameter to "Ext" from the front panel menu.

  When switching from "Int" to "Ext" and vice versa, user must perform a full power reset of the Encoder, in order to trigger a re-sync command to all Decoders participating in the network.

⚠ **Important:**

- The same re-sync command is also sent by the Encoder every time you save any parameter modification.
- When a Decoder receives the re-sync command, the output audio is muted for a few mS.

The rear female BNC connector marked as "10MHz output" provides 10MHz 3.3Vpp CMOS signal output (AC coupled), to drive any other device needed a synced 10MHz signal – e.g. an FM Exciter.

In case you are using an external 10MHz reference and it is lost, the system switches into a st-by mode (no audio or SYNC packets are transmitted). As a protection measure, you cannot modify "Int" / "Ext" clock selection from the NMS software – only local modifications are allowed.

- **Decoder:** To turn on the PTP operation, switch the "SFN" selection to "On" (this can be modified from the front panel menu or the NMS - see previous sections).

When enabled, the device captures SYNC messages and the PTP algorithms process them and apply corrections to the local clock.
Every 30 seconds, the Decoder initiates an E2E Path Delay measurement procedure, to determine the network latency towards the Encoder.

After a short (15-30 minutes) to a medium (30-60 minutes) period of time, the averaging errors should be minimized and the 10MHz output of the Decoder will be in close sync to the Master Clock (Encoder).

The accuracy and stability of the synchronization, heavily depends on the intermediate network elements, such as Ethernet switches, wireless IP links etc. The environment temperature can also affect the accuracy and stability of synchronization.

If after 1 hour of operation, the "Clock Difference" counter (see "Statistics" section above) is over 100nS, then you need to investigate what causes this instability in your network.

Also, an excess of 10:1 ratio between "Good PTP Sync" and "Bad PTP Sync", also indicates a network issue that disturbs the operation of the PTP mechanism.

In cases where excessive latency fluctuations occur (like WiFi links), the PTP algorithms cannot handle it, and synchronization is extremely poor. We are constantly trying to improve our PTP algorithms, so please consult our support team for further information.

- ## **SFN Adjustments**

As of version 3.4.4, an additional menu "SFN Adjustments" is introduced to allow manual control on some SFN parameters. When the SFN Option is enabled, you can access the "SFN Adjustments" menu by clicking the "Adjust…" button, next to SFN "On/Off" checkbox.

⚠ Everything in this chapter is valid only for version 3 EtherMPX devices. For version 4 EtherMPX devices, you must use the secondary Ethernet port "MGMT" to manage the device over SNMPv1 protocol (see chapter 8 – SNMP Management).
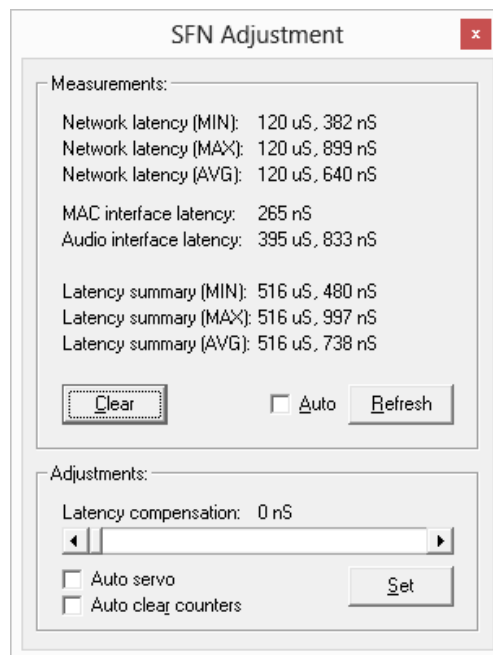
From this menu, the user can get information about the latency measurements performed by each Decoder (measurement period: 30 seconds), and adjust manually the compensation.

"Measurements" section

- o **Network latency (MIN):** The minimum latency measured ("lucky packet") since last counter reset.
- o **Network latency (MAX):** The highest latency measured since last counter reset.
- o **Network latency (AVG):** A 2-samples rolling average value, since last counter reset.
- o **MAC interface latency:** A constant value displaying the latency by the MAC interface.
- o **Audio interface latency:** A constant value displaying the latency caused by the ADC and DAC circuitry.
- o **Latency summary (MIN):** The minimum sum of all above values.
- o **Latency summary (MAX):** The maximum sum of all above values,
- o **Latency summary (AVG):** The average sum of all above values,
- o **Clear button:** Perform a reset to zero for all statistical & SFN counters. A confirmation dialog box appears to verify this action.
- o **Auto:** Check this box to begin auto refresh displayed values. The auto refresh function stops if the user clicks on any other control (scroll bar, checkboxes).
- o **Refresh button:** Click this button to manually refresh the displayed values.

"Adjustments" section

- **Latency compensation:** Use the scroll bar to set the desired latency compensation and then click the "Set" button to send this value to the selected Decoder device. Range: 0 – 2.5mS in 100nS steps.
- **Set button:** Click this button to send the displayed values to the selected Decoder device. There is no prior confirmation dialog box.
- **Auto servo:** Check this box to enable automatic latency compensation. Do not use it without PTP-aware network devices. Update rate: every second.
- **Auto clear counters:** Check this box to perform counters reset after every time you send a new parameter.

Any changes made at "SFN Adjustments" menu, are not automatically saved at the remote Decoder device and will be lost at next reboot.

After exiting the "SFN Adjustments" menu, a notification will be displayed to remind the user for unsaved parameters:
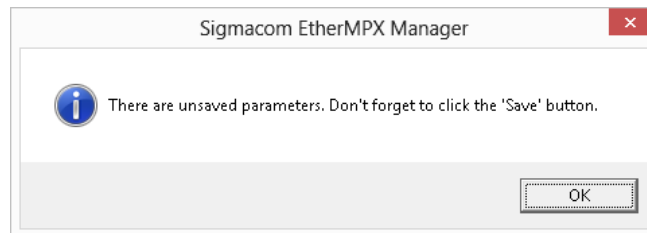
After sending a new parameter or saving previous changes, the user must wait until the system is stabilized for a short (15-30 minutes) to a medium (30-60 minutes) period of time (averaging errors are minimized) before evaluating the effect of the changes.

The following screenshot demonstrates the synced MPX output of 2 Decoders (Decoder 1: Yellow, Decoder 2: Blue) without "Auto" or "Manual" delay compensation. The test signal is a frequency sweep of 1-50kHz:
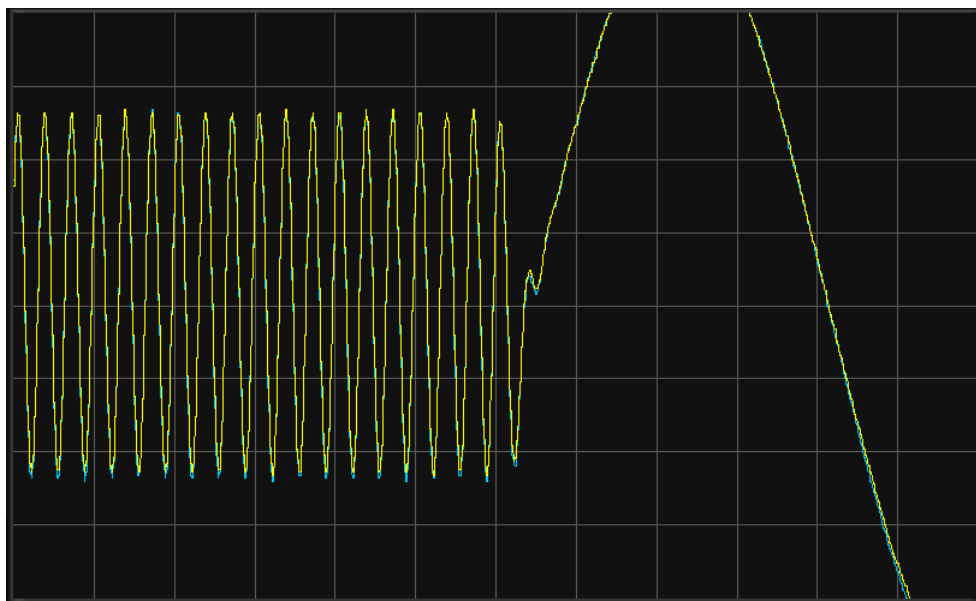
6. Low Latency Option

This section refers to the Low Latency Option, wherever available and enabled.

- **Operation principals:**
  The purpose of EtherMPX Low Latency option is to deliver audio with much lower latency than Basic version (50% latency reduction).

  ⚠️ **Important:**

  The Low Latency option must be enabled in both Encoder and Decoder(s), otherwise it will result in cropped audio.

  In Basic version, the Encoder collects audio samples until a total buffer of 2.5mS (for MPX mode) or 5mS (for L/R mode) before sending this audio frame to the network. Additionally, each Decoder is keeping a buffer of incoming audio frames (see previous section "Network considerations").

  When Low Latency option is installed and enabled, the Encoder collects audio samples up to 1.25mS (for MPX mode) or 2.5mS (for L/R mode) before sending the audio frame to the network. The Decoder minimum buffer size is also 1 frame, resulting into 1.25mS (for MPX mode) or 2.5mS (for L/R mode) additional latency.

  - Therefore, in Basic version, the end-to-end latency is:
    2.5mS latency introduced by the Encoder, plus 2.5mS latency introduced by the Decoder (when in minimum buffer size) = 5.0mS in total for MPX mode.
  - With Low Latency option, these values become:
    1.25mS latency introduced by the Encoder, plus 1.25mS latency introduced by the Decoder (when in minimum buffer size) = 2.5mS in total for MPX mode.

  Without Low Latency option, the Decoder buffer size is adjustable between 2.5 to 60.0mS in 2.5mS steps, while with Low Latency option is adjustable between 1.25 to 60.0mS in 1.25mS steps.

  ⚠️ **Important:**

  The Low Latency Option is very sensitive to network packet loss or jitter, therefore avoid using over unreliable transmission networks.

7. Implementation examples
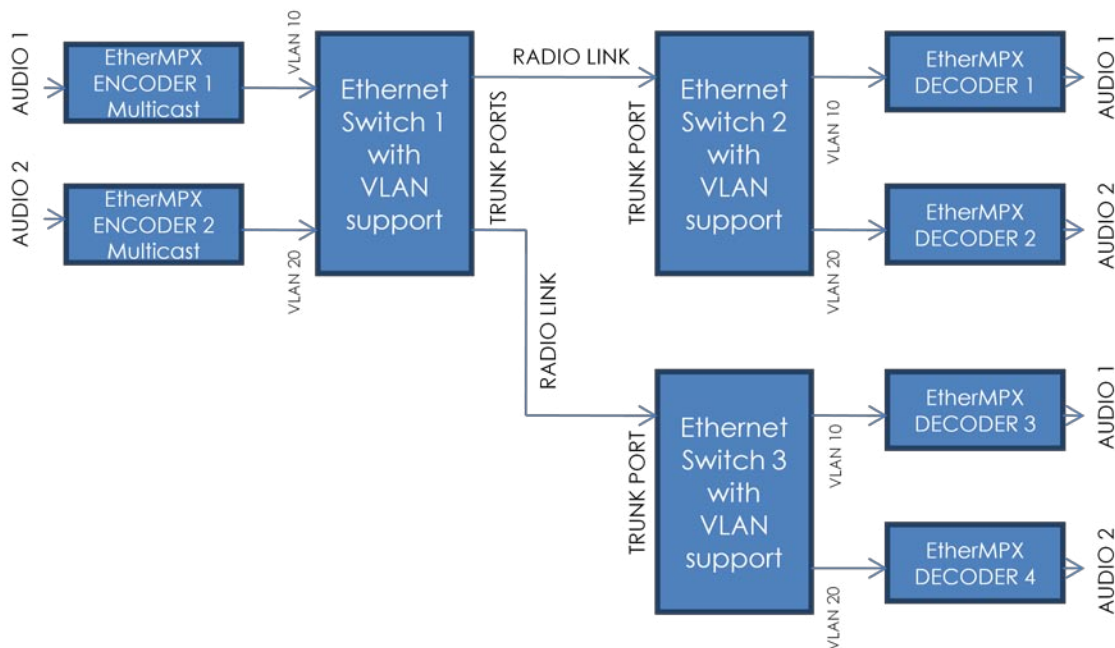
Example 1: Multicast with VLANs

Two different radio programs must be transported to two different TX sites over single IP radio links. We need both programs at each TX site.

Because two Encoders are operating in "Multicast" mode (this is needed in order to feed more than one Decoder), these two streams must be logically separated inside the network.

To achieve this, you need Ethernet switches that support VLANs.

You will need to define separate VLANs - one for each radio program (VLAN 10 for radio program 1, and VLAN 20 for radio program 2 in our example). Even if you have isolated network segments, you should define unique IP addresses to each device.

Note that the ports connected to IP radio links, must be configured as trunk ports to allow all VLANs to pass through. The ports connected to Encoders & Decoders, must add the appropriate VLAN tags to ingress traffic, and discard VLAN tags on egress traffic.
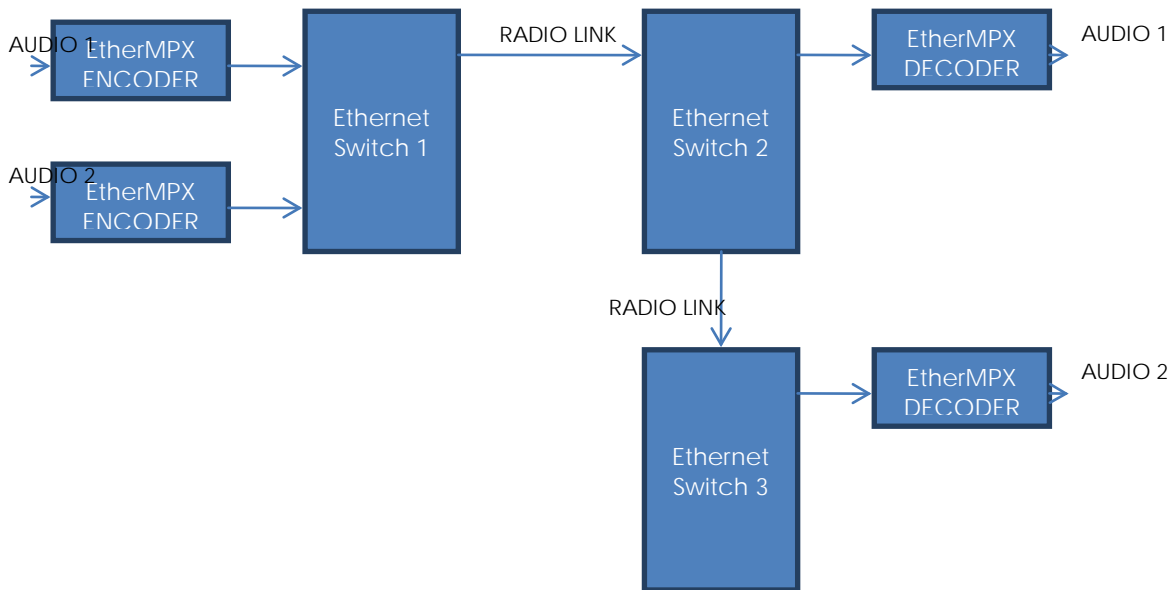
Example 2: Unicast

Two different radio programs must be transported to two different TX sites over single IP radio links. We need only one program at each TX site.

To achieve this, you can use simple, ordinary Ethernet switches (no need for VLAN support in this setup).

Because two Encoders are operating in "Unicast" mode (each one is paired to only one Decoder), they can co-exist in the same network without the need of VLANs. Of course each device must also have a unique IP address.

Note:

These are only two mere examples. The flexibility and the possibilities of using EtherMPX over an IP network are endless.
If you need any assistance on designing your own transmission network, please do not hesitate to consult us!

8. SNMP description

All version 4 EtherMPX devices provide a separate RJ45 connector at the rear side, marked as "MGMT". This is an Ethernet interface dedicated for management purposes over SNMP protocol. At the moment it utilizes only SNMP v1, but this will be enriched in future versions / upgrades.

The supported SNMP PDUs are shown below:

- GetRequest
- SetRequest
- GetNextRequest
- Response
- Trap

The EtherMPX MIB file is the same for Encoder and Decoder. The file contains 50 variables, which some are specific for Encoder devices, some are specific for Decoder devices, and some are valid for both device types.

If you try to issue an SNMP command that is not supported from the specific device type, you will get an error response.

Further down on the document, the whole structure of the MIB file is explained. Since there are no tables in the MIB file, multi-variable commands are not supported; i.e. you cannot issue a GetRequest with 2 (or more) variables in the same request. Instead, a series of GetRequest or GetNextRequest commands can be issued.

SNMP TRAP

EtherMPX issues a TRAP PDU every time the Silence Detector is activated.

- **Defaults & Limitations:**

  - The default read-only community string is **sigmacom**
    The default read-write community string is **ethermpx**

    ⚠️ **CAUTION!** You can change the community strings to your choice but they must be of fixed length 8 characters (no more & no less).

  - Default IP address of the MGMT port is 192.168.1.16/24
  - Variable "sysDeviceName" is used for the unique name you give to the device and it must be of fixed length 16 characters (no more & no less). This name is displayed in the LCD screen of the device.

- **SNMP integration:**

There are 2 ways of integrating an EtherMPX device in your third party SNMP management software. Either load the MIB file that came along with this documentation, or configure the OIDs manually like the example below. If you are configuring the OIDs manually, you can copy-paste them from MIB file but **don't forget to add .0** at the end of each one.

⚠️ **Example:**
MIB file: **1.3.6.1.4.1.44467.1.4**
Custom OID: **1.3.6.1.4.1.44467.1.4.0**

To prevent misconfiguration of MGMT network settings, and hence loosing contact with the device, a 2 step process has been implemented.

Variables **snmpAgentMask, snmpAgentGW, snmpAgentIP, snmpAgentDNS** are read-only.
If you need to change them, you must first change variables **snmpNewAgentMask**, **snmpNewAgentGW**, **snmpNewAgentIP**, and **snmpNewAgentDNS**. After you verify that everything is correct, then you must set the **snmpSetSettings** variable to **1.**

This will cause active variables to be overwritten with the **"new"** values and the MGMT engine of EtherMPX will reset for 25 seconds. This will not affect the audio part. After 25 sec you can connect to the new MGMT IP.

SIGMACOM-ETHERMPX-MIB file

--- © 2015 Sigmacom Broadcast - www.sigmacom.gr - info@sigmacom.gr
--- SNMP V1

```
        SIGMACOM-ETHERMPX-MIB DEFINITIONS ::= BEGIN

                IMPORTS
                        OBJECT-TYPE
                                FROM RFC-1212
                        TRAP-TYPE
                                FROM RFC-1215
                        enterprises, IpAddress, Gauge
                                FROM RFC1155-SMI;


--
-- Node definitions
--

                -- 1.3.6.1.4.1.44467
                sigmacom OBJECT IDENTIFIER ::= { enterprises 44467 }


                -- 1.3.6.1.4.1.44467.1
                etherMPX OBJECT IDENTIFIER ::= { sigmacom 1 }


                -- 1.3.6.1.4.1.44467.1.1
                sysAudioAttenuation OBJECT-TYPE
                        SYNTAX Gauge
                        ACCESS read-write
                        STATUS mandatory
                        DESCRIPTION
                "Decoder analog output attenuation. Range=255-14, step=1, attenuation(dB)=255-
(value*0,5)."
                        ::= { etherMPX 1 }


                -- 1.3.6.1.4.1.44467.1.2
                sysAudioBufferSize OBJECT-TYPE
                        SYNTAX Gauge
                        ACCESS read-write
                        STATUS mandatory
                        DESCRIPTION
                "Decoder audio buffer. Range=1-24, step=1, latency(mS)=value*2,5. If
LowLatencyOption, Range=1-58, step=1, latency(mS)=value*1,25"
                        ::= { etherMPX 2 }


                -- 1.3.6.1.4.1.44467.1.3
                sysAudioFramesRxErr OBJECT-TYPE
                        SYNTAX Gauge
                        ACCESS read-only
                        STATUS mandatory
                        DESCRIPTION
                "Ethernet frames with audio payload, but dropped by the device (possible causes: CRC
errors, internal underrun / overrun, network collisions). Auto reset to zero when reaches
value=268.435.456."
                        ::= { etherMPX 3 }


                -- 1.3.6.1.4.1.44467.1.4
                sysAudioFramesRxOk OBJECT-TYPE
                        SYNTAX Gauge
                        ACCESS read-only
                        STATUS mandatory
                        DESCRIPTION
                "Ethernet frames with audio payload that received OK. Auto reset to zero when reaches
value=268.435.456."
                        ::= { etherMPX 4 }


                -- 1.3.6.1.4.1.44467.1.5
```

```
sysAudioFramesTxErr OBJECT-TYPE
        SYNTAX Gauge
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
"Ethernet frames with audio payload, but dropped by the device (possible causes: CRC
errors, internal underrun / overrun, network collisions). Auto reset to zero when reaches
value=268.435.456."
        ::= { etherMPX 5 }


-- 1.3.6.1.4.1.44467.1.6
sysAudioFramesTxOk OBJECT-TYPE
        SYNTAX Gauge
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
"Ethernet frames with audio payload that transmitted OK. Auto reset to zero when
reaches value=268.435.456."
        ::= { etherMPX 6 }


-- 1.3.6.1.4.1.44467.1.7
sysAudioInputPort OBJECT-TYPE
        SYNTAX Gauge
        ACCESS read-write
        STATUS mandatory
        DESCRIPTION
"Audio input interface of Encoder. Value=0(Digital), Value=1(Analog)."
        ::= { etherMPX 7 }


-- 1.3.6.1.4.1.44467.1.8
sysAudioInputType OBJECT-TYPE
        SYNTAX Gauge
        ACCESS read-write
        STATUS mandatory
        DESCRIPTION
"Audio type to be transmitted. Must be the same in both Encoder and Decoder.
Value=0(L/R), Value=1(MPX)."
        ::= { etherMPX 8 }


-- 1.3.6.1.4.1.44467.1.9
sysLowLatencyOptionEnabled OBJECT-TYPE
        SYNTAX Gauge
        ACCESS read-write
        STATUS mandatory
        DESCRIPTION
"Enable or disable Low Latency Option. Must be the same in both Encoder and Decoder.
Value=0(Disable), Value=1(Enable)."
        ::= { etherMPX 9 }

-- 1.3.6.1.4.1.44467.1.10
sysMulticastIp OBJECT-TYPE
        SYNTAX IpAddress
        ACCESS read-write
        STATUS mandatory
        DESCRIPTION
"Definition of multicast IP for audio packets. Must be the same in both Encoder and
Decoder."
        ::= { etherMPX 10 }

-- 1.3.6.1.4.1.44467.1.11
sysRemoteIp OBJECT-TYPE
        SYNTAX IpAddress
        ACCESS read-write
        STATUS mandatory
        DESCRIPTION
"Define in Encoder the IP address of target Decoder (used only for multicast
transmission)."
        ::= { etherMPX 11 }


-- 1.3.6.1.4.1.44467.1.12
sysStreamingType OBJECT-TYPE
        SYNTAX Gauge
```

```
                    ACCESS read-write
                    STATUS mandatory
                    DESCRIPTION
            "Define in Encoder the transmission type. Value=0(Unicast), value=1(Multicast)."
                    ::= { etherMPX 12 }


            -- 1.3.6.1.4.1.44467.1.13
            sysGateway OBJECT-TYPE
                    SYNTAX IpAddress
                    ACCESS read-write
                    STATUS mandatory
                    DESCRIPTION
            "Define the IP gateway of the Audio_ETH interface."
                    ::= { etherMPX 13 }


            -- 1.3.6.1.4.1.44467.1.14
            sysIpAddress OBJECT-TYPE
                    SYNTAX IpAddress
                    ACCESS read-write
                    STATUS mandatory
                    DESCRIPTION
            "Define the IP address of the Audio_ETH interface."
                    ::= { etherMPX 14 }



            -- 1.3.6.1.4.1.44467.1.15
            sysMacAddress OBJECT-TYPE
                    SYNTAX OCTET STRING
                    ACCESS read-only
                    STATUS mandatory
                    DESCRIPTION
            "Display the MAC address of the Audio_ETH interface."
                    ::= { etherMPX 15 }


            -- 1.3.6.1.4.1.44467.1.16
            sysRxFramesErr OBJECT-TYPE
                    SYNTAX Gauge
                    ACCESS read-only
                    STATUS mandatory
                    DESCRIPTION
            "Ethernet frames received, but dropped by the device (possible causes: CRC errors,
internal underrun / overrun, network collisions). Auto reset to zero when reaches
value=268.435.456."
                    ::= { etherMPX 16 }


            -- 1.3.6.1.4.1.44467.1.17
            sysRxFramesOk OBJECT-TYPE
                    SYNTAX Gauge
                    ACCESS read-only
                    STATUS mandatory
                    DESCRIPTION
            "Ethernet frames received OK from the device (no CRC errors, no underruns / overruns,
no network collisions). Auto reset to zero when reaches value=268.435.456."
                    ::= { etherMPX 17 }


            -- 1.3.6.1.4.1.44467.1.18
            sysSubnetMask OBJECT-TYPE
                    SYNTAX IpAddress
                    ACCESS read-write
                    STATUS mandatory
                    DESCRIPTION
            "Define the IP subnet mask of the Audio_ETH interface."
                    ::= { etherMPX 18 }



            -- 1.3.6.1.4.1.44467.1.19
            sysTxFramesErr OBJECT-TYPE
                    SYNTAX Gauge
                    ACCESS read-only
                    STATUS mandatory
                    DESCRIPTION
            "Ethernet frames that failed to be transmitted from the device (possible causes:
internal underrun / overrun, or network collisions). Auto reset to zero when reaches
value=268.435.456."
                    ::= { etherMPX 19 }
```

```
                    -- 1.3.6.1.4.1.44467.1.20
              sysTxFramesOk OBJECT-TYPE
                        SYNTAX Gauge
                        ACCESS read-only
                        STATUS mandatory
                        DESCRIPTION
              "Ethernet frames transmitted OK from the device (no internal underruns / overruns,
network collisions). Auto reset to zero when reaches value=268.435.456."
                        ::= { etherMPX 20 }


                    -- 1.3.6.1.4.1.44467.1.21
              sfnFramesErr OBJECT-TYPE
                        SYNTAX Gauge
                        ACCESS read-only
                        STATUS mandatory
                        DESCRIPTION
              "Decoder only: number of PTP SYNC messages received, but rejected by the EtherMPX
algorithms. Possible causes: glitching Master Clock, heavy loaded network, many irrelevant Ethernet
packets that must be filtered out. Auto reset to zero when reaches value=268.435.456."
                        ::= { etherMPX 21 }


                    -- 1.3.6.1.4.1.44467.1.22
              sfnFramesMismatch OBJECT-TYPE
                        SYNTAX Gauge
                        ACCESS read-only
                        STATUS mandatory
                        DESCRIPTION
              "Decoder only: the measured mismatch between the Master Clock and the local clock,
expressed in nanoseconds (nS). This value must be as low as possible to indicate that there is a
good sync with the Master Clock."
                        ::= { etherMPX 22 }


                    -- 1.3.6.1.4.1.44467.1.23
              sfnFramesOk OBJECT-TYPE
                        SYNTAX Gauge
                        ACCESS read-only
                        STATUS mandatory
                        DESCRIPTION
              "Decoder only: number of SYNC messages received OK and took into account by the
EtherMPX algorithms to calculate and calibrate on-the-fly the sync parameters. Auto reset to zero
when reaches value=268.435.456."
                        ::= { etherMPX 23 }


                    -- 1.3.6.1.4.1.44467.1.24
              sfnLatencyAvg OBJECT-TYPE
                        SYNTAX Gauge
                        ACCESS read-only
                        STATUS mandatory
                        DESCRIPTION
              "Decoder only: a 2-samples rolling average value of the measured latency towards the
Encoder, since last counter reset."
                        ::= { etherMPX 24 }

                    -- 1.3.6.1.4.1.44467.1.25
              sfnLatencyMax OBJECT-TYPE
                        SYNTAX Gauge
                        ACCESS read-only
                        STATUS mandatory
                        DESCRIPTION
              "Decoder only: The highest measured latency towards the Encoder, since last counter
reset."
                        ::= { etherMPX 25 }

                    -- 1.3.6.1.4.1.44467.1.26
              sfnLatencyMin OBJECT-TYPE
                        SYNTAX Gauge
                        ACCESS read-only
                        STATUS mandatory
                        DESCRIPTION
              "Decoder only: The lowest measured latency towards the Encoder, since last counter
reset."
```

```
                    ::= { etherMPX 26 }


        -- 1.3.6.1.4.1.44467.1.27
        sfnLatencyNow OBJECT-TYPE
                SYNTAX Gauge
                ACCESS read-only
                STATUS mandatory
                DESCRIPTION
        "Decoder only: The network latency as measured between local device and Master Clock
device. Updated every 30 sec."
                    ::= { etherMPX 27 }


        -- 1.3.6.1.4.1.44467.1.28
        sfnAutoLatency OBJECT-TYPE
                SYNTAX Gauge
                ACCESS read-write
                STATUS mandatory
                DESCRIPTION
        "Decoder only: Auto compensate measured latency. Not recommended without PTP-aware
network elements. Value=0(Disable), value=1(Enable)."
                    ::= { etherMPX 28 }


        -- 1.3.6.1.4.1.44467.1.29
        sfnClockSelection OBJECT-TYPE
                SYNTAX Gauge
                ACCESS read-write
                STATUS mandatory
                DESCRIPTION
        "Encoder only: Select internal TCXO or external 10MHz clock source. Use with extreme
caution, see User Manual. Value=0(Internal), value=1(External)."
                    ::= { etherMPX 29 }



        -- 1.3.6.1.4.1.44467.1.30
        sfnOptionEnabled OBJECT-TYPE
                SYNTAX Gauge
                ACCESS read-write
                STATUS mandatory
                DESCRIPTION
        "Enable or disable SFN Option. Must be the same in both Encoder and Decoder.
Value=0(Disable), Value=1(Enable)."
                    ::= { etherMPX 30 }



        -- 1.3.6.1.4.1.44467.1.31
        sfnUserLatency OBJECT-TYPE
                SYNTAX Gauge
                ACCESS read-write
                STATUS mandatory
                DESCRIPTION
        "Decoder only: user defined latency compensation with 100nS steps. Range 0-25000,
step=1, latency(nS)=value*100."
                    ::= { etherMPX 31 }



        -- 1.3.6.1.4.1.44467.1.32
        sysSilenceDetectorMode OBJECT-TYPE
                SYNTAX Gauge
                ACCESS read-write
                STATUS mandatory
                DESCRIPTION
        "Operational mode of Silence Detector engine in Decoder. Value=0(Auto detect),
value=1(Force internal), value=2(Force external)."
                    ::= { etherMPX 32 }



        -- 1.3.6.1.4.1.44467.1.33
        sysSilenceDetectorThreshold OBJECT-TYPE
                SYNTAX Gauge
                ACCESS read-write
                STATUS mandatory
                DESCRIPTION
        "Lowest audio level threshold that triggers countdown timer. Range=1-154, step=1,
level(dBu)=56-(Log10(value*2.0487)*20))."
                    ::= { etherMPX 33 }
```

```
-- 1.3.6.1.4.1.44467.1.34
sysSilenceDetectorTimeout OBJECT-TYPE
        SYNTAX Gauge
        ACCESS read-write
        STATUS mandatory
        DESCRIPTION
"Initial value of countdown timer in Decoder, before switching to AUX input. Range=1-
220, step=1, time(Sec)=value*0,455."
        ::= { etherMPX 34 }


-- 1.3.6.1.4.1.44467.1.35
sysDeviceName OBJECT-TYPE
        SYNTAX OCTET STRING (SIZE(16))
        ACCESS read-write
        STATUS mandatory
        DESCRIPTION
"Device name (Fixed size is 16 characters)."
        ::= { etherMPX 35 }


-- 1.3.6.1.4.1.44467.1.36
sysDspVersionMajor OBJECT-TYPE
        SYNTAX Gauge
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
"Display major version of DSP software."
        ::= { etherMPX 36 }


-- 1.3.6.1.4.1.44467.1.37
sysDspVersionRevision OBJECT-TYPE
        SYNTAX Gauge
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
"Display revision of DSP software."
        ::= { etherMPX 37 }


-- 1.3.6.1.4.1.44467.1.38
sysSerialNumber OBJECT-TYPE
        SYNTAX Gauge
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
"Device serial number."
        ::= { etherMPX 38 }

-- 1.3.6.1.4.1.44467.1.39
snmpManagerIP OBJECT-TYPE
        SYNTAX IpAddress
        ACCESS read-write
        STATUS mandatory
        DESCRIPTION
"IP address of the SNMP manager that receives SNMP traps."
        ::= { etherMPX 39 }


-- 1.3.6.1.4.1.44467.1.40
snmpReadOnlyComString OBJECT-TYPE
        SYNTAX OCTET STRING (SIZE(8))
        ACCESS read-write
        STATUS mandatory
        DESCRIPTION
"Read-Only Community String. Default is 'sigmacom'. Fixed size is 8 characters"
        ::= { etherMPX 40 }

-- 1.3.6.1.4.1.44467.1.41
snmpReadWriteComString OBJECT-TYPE
        SYNTAX OCTET STRING (SIZE(8))
        ACCESS read-write
        STATUS mandatory
        DESCRIPTION
"Read-Write Community String. Default is 'ethermpx'. Fixed size is 8 characters"
```

```
                  ::= { etherMPX 41 }


         -- 1.3.6.1.4.1.44467.1.42
         snmpAgentMask OBJECT-TYPE
                  SYNTAX IpAddress
                  ACCESS read-only
                  STATUS mandatory
                  DESCRIPTION
         "IP subnet mask of the Management_ETH interface."
                  ::= { etherMPX 42 }

         -- 1.3.6.1.4.1.44467.1.43
         snmpAgentGW OBJECT-TYPE
                  SYNTAX IpAddress
                  ACCESS read-only
                  STATUS mandatory
                  DESCRIPTION
         "IP gateway of the Management_ETH interface."
                  ::= { etherMPX 43 }

         -- 1.3.6.1.4.1.44467.1.44
         snmpAgentIP OBJECT-TYPE
                  SYNTAX IpAddress
                  ACCESS read-only
                  STATUS mandatory
                  DESCRIPTION
         "IP address of the Management_ETH interface."
                  ::= { etherMPX 44 }

         -- 1.3.6.1.4.1.44467.1.45
         snmpAgentDNS OBJECT-TYPE
                  SYNTAX IpAddress
                  ACCESS read-only
                  STATUS mandatory
                  DESCRIPTION
         "DNS server for the Management_ETH interface."
                  ::= { etherMPX 45 }


         -- 1.3.6.1.4.1.44467.1.46
         snmpNewAgentMask OBJECT-TYPE
                  SYNTAX IpAddress
                  ACCESS read-write
                  STATUS mandatory
                  DESCRIPTION
         "New IP subnet mask of the Management_ETH interface."
                  ::= { etherMPX 46 }

         -- 1.3.6.1.4.1.44467.1.47
         snmpNewAgentGW OBJECT-TYPE
                  SYNTAX IpAddress
                  ACCESS read-write
                  STATUS mandatory
                  DESCRIPTION
         "New IP gateway of the Management_ETH interface."
                  ::= { etherMPX 47 }

         -- 1.3.6.1.4.1.44467.1.48
         snmpNewAgentIP OBJECT-TYPE
                  SYNTAX IpAddress
                  ACCESS read-write
                  STATUS mandatory
                  DESCRIPTION
         "New IP address of the Management_ETH interface."
                  ::= { etherMPX 48 }

         -- 1.3.6.1.4.1.44467.1.49
         snmpNewAgentDNS OBJECT-TYPE
                  SYNTAX IpAddress
                  ACCESS read-write
                  STATUS mandatory
                  DESCRIPTION
         "New DNS server for the Management_ETH interface."
                  ::= { etherMPX 49 }
```

```
            -- 1.3.6.1.4.1.44467.1.50
          snmpSetSettings OBJECT-TYPE
                  SYNTAX Gauge
                  ACCESS read-write
                  STATUS mandatory
                  DESCRIPTION
          "IP assignment method.  0=DHCP, 1=STATIC. If STATIC is applied then snmp 'New'
variables will be activated"
                  ::= { etherMPX 50 }


--
-- Trap definitions
--

          silenceDetectorActivated TRAP-TYPE
                  ENTERPRISE etherMPX
                  ::=  1


      END
```

9. Technical specifications

GENERAL	
Model name	EtherMPX v3 / v4
Dimensions	19" 1U chassis
Power supply	230VAC 50Hz, 12W per device (17W for v4)
Operating temp	-20 to +60 Celsius
Transport protocol	Proprietary UDP Unicast or Multicast
Sync protocol	PTPv2 (IEEE1588-2008 based)
QoS management	IETF RFC2474 compliant
SNMP management	SNMPv1 (for v4 EtherMPX devices)
Audio compression	None (Linear PCM)
Audio resolution	8 – 24bit for Digital L/R & MPX input 24bit for Analog L/R & MPX output 24bit for Digital L/R & MPX output
Audio sample rate	8 – 192kHz input for Digital L/R input 48kHz internal for Analog L/R input 174–192kHz input for Digital MPX input 192kHz internal for Analog MPX input
Audio latency	L/R mode: 10.0–125.0mS, user adjustable MPX mode: 5.0–62.5mS, user adjustable Low Latency Option: Down to 5.0mS (for L/R), 2.5mS (for MPX)
Network usage	L/R mode: 2.37 Mbit/s typical MPX mode: 4.74 Mbit/s typical
Audio monitor	Stereo ¼" Female jack in front panel
User interface / control	Locally: Front panel UI (LCD + buttons) Remotely: EtherMPX NMS Software

DECODER	
Input name	Port A
Input type	Digital electrical interface
Connector	XLR-3 female
Impedance	110 Ohm balanced - transformer isolated
Supported formats	AES3, IEC60958, S/PDIF
Maximum data rate	12.3 Mbit/s typical
Audio sample rate	32 – 192 kHz (174 –192kHz for D-MPX)
Audio sample resolution	24 bit

Input name	Port B
Input type	Analog electrical interface - 2 outputs, 1 input
Connectors	2 x XLR-3 female (balanced R, L/MPX) output 1 x BNC female (unbalanced MPX only) output 1 x BNC female (unbalanced MPX only) AUX in **XLR is DC coupled, BNCs are AC coupled
Impedance	1 kOhm
ADC resolution	24 bit
ADC sample rate	48kHz for L/R input, 192kHz for A-MPX
ADC THD+N	-106dB (0.0005%)
ADC Dynamic range	121 dB (no weighting)
Channel separation	135 dB typical
Reference input	3.47Vpp (+4dBu) for 0 dBFS
Input BW @ 48kHz SR	-0.1dB @ 20 kHz
Input BW @ 192kHz SR	-0.1dB @ 80 kHz

Output SYNC (optional)	10MHz TTL 3.3V
Output type	Analog electrical interface
Connector	BNC female (unbalanced)
Impedance	50 Ohm

ENCODER	
Input name	Port A
Input type	Digital electrical interface
Connector	XLR-3 female
Impedance	110 Ohm balanced - transformer isolated
Supported formats	AES3, IEC60958, S/PDIF
Maximum data rate	12.3 Mbit/s typical
Audio sample rate	32 – 192 kHz (174–192kHz for D-MPX)
Audio resolution	24 bit

Input name	Port B
Input type	Analog electrical interface - 3 inputs
Connectors	2 x XLR-3 female (balanced R, L/MPX) input 1 x BNC female (unbalanced MPX only) input **XLR is DC coupled, BNC is AC coupled
Impedance	1 kOhm
ADC resolution	24 bit
ADC sample rate	48kHz for L/R input, 192kHz for A-MPX
ADC THD+N	-106dB (0.0005%)
ADC Dynamic range	121 dB (no weighting)
Channel separation	135 dB typical
Reference input	3.47Vpp (+4dBu) for 0 dBFS
Input BW @ 48kHz SR	-0.1dB @ 20 kHz
Input BW @ 192kHz SR	-0.1dB @ 80 kHz

Input SYNC (optional)	10MHz sine, 0dBm typical
Input type	Analog electrical interface
Connector	BNC female (unbalanced)
Impedance	50 Ohm

Output SYNC (optional)	10MHz TTL 3.3V
Output type	Analog electrical interface
Connector	BNC female (unbalanced)
Impedance	50 Ohm

Ethernet port audio	RJ45 female, IEEE802.3, 100Mbps MDIX
Ethernet port manage	RJ45 female, IEEE802.3, 10/100Mbps MDIX

CE FC RoHS

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTE: Technical specifications are subject to change without notice. Please contact us if you have questions, or to get latest information and updates.