Mimer X-Link

Connecting radios all over the world

Mimer X-Link MK2

Configuration

Version 1.0

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This guide will help with the setup of your Mimer X-Link MK2.

Please also refer to the separate sheets with instructions for connection of different radio types and to the web page www.lse.se/x-link.

All documentations and software are found on:
www.lse.se/x-link/x2-download/

1 Contents

2   General

Mimer X-Link consists of a small interface box and two cable kits.
The interface and the cable kits will connect two radios together in a cross patch. Almost any two types of radios can be patched. Alternatively other types of audio equipment, for example PA-systems, can be connected.

2.1   Basic functionality

All audio that comes in on one radio is retransmitted on the other radio and vice versa.

In this way cross patches can be created between different types of radio systems, for example Tetra-Analogue, DMR-Airband or Marine-Tetra.

A note about Tetra systems

Please note that when using Tetra radios in any type of crosslink, the switching of talk direction takes longer time than it does with analogue radios. In a conversation across the X-Link you will need to make a short pause before beginning to talk, in order for the system to set up the connection. If not doing so, you may lose the first phrase of what you say.

Please also see the note about "Roger beeps" below.

A note about PoC systems

Please note that when using PoC radios over 4G, the first PTT takes longer than the following. This is due to the call setup time in the system. When the call is ongoing, the PTT and audio is instantly transferred. This also affects the use through a X-Link where you might lose the first audio.

Please also see the note about "Roger beeps" below.

2.2   Connections

Cable kits can be ordered for most types of radios, ready for "plug and play".

Also cables with "open end" are provided for connection to uncommon radio types or other audio sources.

Take care to connect the radio cables in the correct ports, depending on interface programming.

Power to the interface needs to be connected to the red/black 12VDC leads. This can in most cases be the same power source as is used for the radios. Since only one radio transmits at a time, the PSU needs only to have power for the most demanding radio at transmission, plus at the same time the other radio in receive mode, and the interface.

3   Settings in the radios

3.1   Radio programming

All radios that you connect needs to be setup so that they match the X-Link interface and the cable kit. Please see separately supplied sheets with instructions for each radio type.

Download for each radio type here: www.lse.se/x-link/x2-download/

3.1.1   Audio

The radios need to be configured so that the audio is available at the correct ports and so that the audio levels in/out are optimal.

3.1.2   I/O-Ports

Most radios need to be setup so that they have an active external PTT on the correct port. The X-Link output for PTT is "active low".

In some cases, a squelch or PL-detect output on the radio is used, this also needs to be on the correct port of the radio. The X-Link interface input can be set to either "active low" or "active high".

3.1.3   PEI-Ports

On Tetra radios the PEI-port needs to be configured correctly and available on the ports that the interface and cable kit expects.

3.2   Note about Roger beeps etc

Many radios, especially the digital radios and PoC-radios, have a lot of sounds that alerts the user of different things, like "the talk group is set up" or "you have released the PTT".

All of these beeps will be detected as reception audio and trigger a transmission on the other radio. **We strongly recommend that you turn all such beeps off.** Otherwise, you will get unwanted transmissions that are both confusing and annoying. In worst case it will cause an eternal loop where the two radios trigger each other.

4   Settings in the interface

4.1   Audio gain

The audio gain can be separately adjusted for each direction, radio A to radio B and B to A. Both need to be carefully adjusted for the system to work well. The radio users shall not hear any difference between a normal call and a call that goes through the X-Link.

In most cases we will configure the interface with the default levels for the radio type it is ordered for. But this may need fine-tuning on site at installation.

If the type of radio or audio source is unknown to us, you will need to adjust the audio levels yourself. This is done using the X-Link configuration software.

Before adjusting the gain, check that the audio output from the radio is set according to the instruction sheet for each radio type.

4.2   Audio detection and PTT

The way the interface detects incoming traffic on a radio, and the way it triggers PTT on the other radio is different for each radio type. This must be correctly configured for the system to work.

Many radios provide information that they are receiving voice traffic. This can be a squelch output signal on an analogue radio, or a data message like a PEI message from a Tetra radio. Other radios don´t have this and the interface will then use the level of the incoming audio to detect reception.

Once again, we will pre-configure the interface with the correct settings for the radio type it is ordered for.

If the type of radio or audio source is unknown to us, you will need configure all settings yourself. This is done using the X-Link configuration software.

5   X-Link configuration software

The configuration software is a standard Windows program.

You connect your PC to the interface box using a standard Micro-USB cable (normally not included).

5.1   Installation

You will need the X-Link configuration software and in some cases also the USB driver.

Both available for download from www.lse.se/x-link/x2-download/

5.1.1   X-Link Configuration

To start with, you need to place the supplied "XLinkConf" exe-file in any convenient place on your computer. You may also copy it directly to the desktop.

Double click to start the program.

5.1.2   USB Driver

You might also need to install the USB driver for the X-Link interface. Click on the folder "X-Link USB Drivers" and then "Driver Installation Tool". Then click on one of the x64 or x86 folders depending on the type of CPU in your computer. Almost all computers today are x64.
Now finally double-click on the file "McphCdcDriverInstallationTool.exe"

This will install the USB driver

5.2 Usage

The software has one single screen showing a real-time illustration of the two radios connected via the interface box.
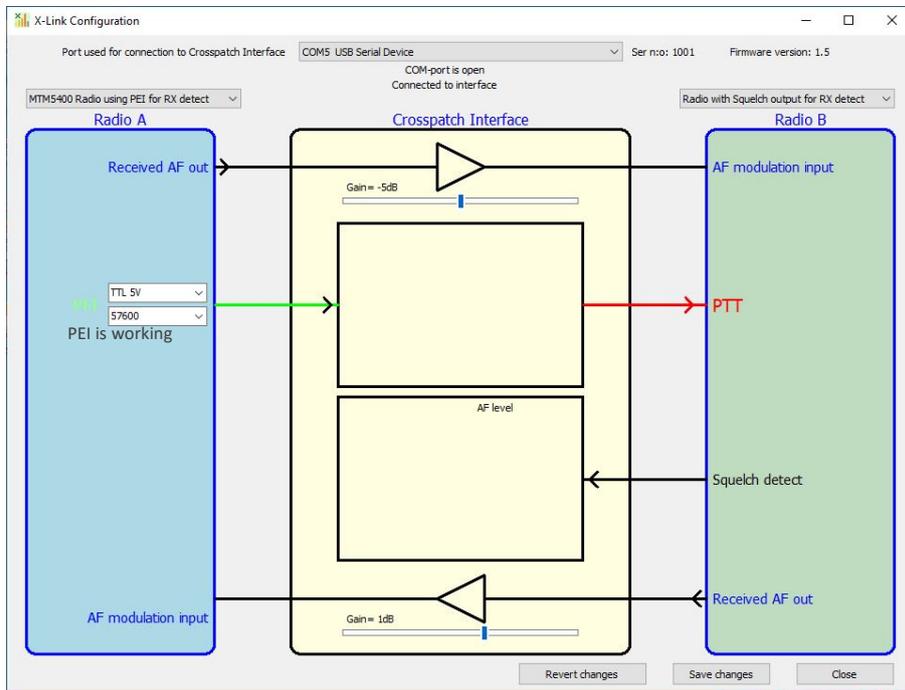
In the picture above, Radio A is receiving (green arrow) and the interface is giving Radio B a PTT signal (red arrow).

Radio A in the example is a Motorola Tetra radio and uses the PEI serial port to give the interface information that it is receiving. Radio B is an analogue radio with a physical output pin (squelch) that triggers when the radio is receiving.

5.2.1 Getting started with the Configuration program

Connect the USB cable to your X-Link interface and power up the interface.

Then start the "XLinkConf" program.

To begin with, you need to select the COM-Port created by the USB driver for the X-Link interface. It will have a name like "COM5 USB Serial Device", or "COM5 USB Serial port". The number will be randomly assigned by your computer.

You may have more than one such device listed in the drop-down list at the top of the program. If unsure, you can try each of them until you find the right one.

When the right port is selected, the program will show "Com-port is open" and "Connected to interface"

The software will then read the current settings, the firmware version and the serial number from the interface. When you see this information, you have a working connection to the X-Link interface.

The screen will show a block diagram with the two radios and the X-Link interface between them. Please refer to example picture above. The look of the diagram will be different depending on the settings in the interface.
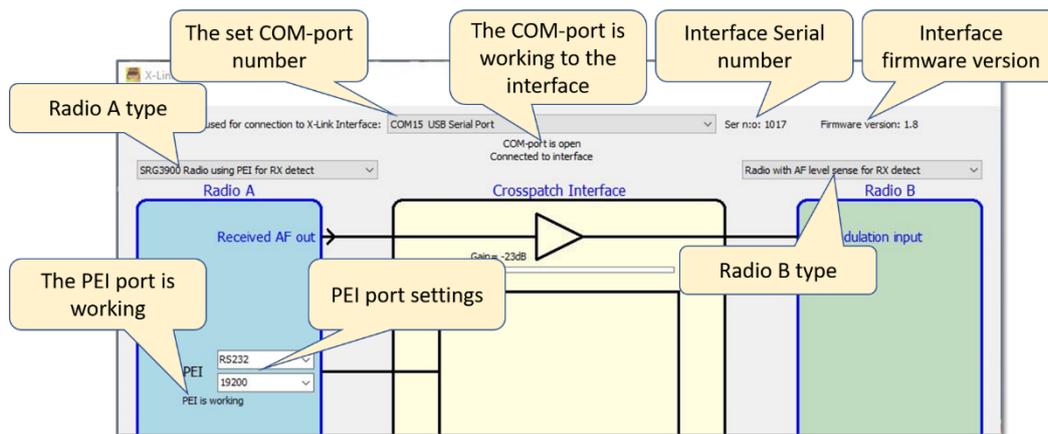
Useful information in the setup software.

5.2.2   Radio types

If needed, you can change the type of radio. It is set separately for each of the two half's of the interface. If you change one of the radio types the block diagram will immediately change accordingly.

If you have ordered the interface and cable kits for different radio types, it is important that you check the article numbers on your cable kits, so the correct radio type is connected as **Radio A** and **Radio B** respectively.

5.2.3   Tetra radios

Please note that if you are using a Tetra radio you should use the settings that include the PEI port. In this way you ensure that you get the correct information when a call starts and ends.

Tetra radios use serial ports for PEI. Most Tetra radios use serial ports with RS232 levels. For serial ports you also need to select the right Baud rate, as configured in the radio.

When the connections to the radios and the settings above are correct, you will see the text "PEI is working" below the PEI settings.

The PEI port on MTM5200/MTM5400 is usually accessed from the rear connector. Then use 5V TTL levels.

On MTM5500 (and MTM5200/MTM5400 with the PMLN4908 Data Expansion Head) the PEI port is accessed from the COM-Port on the front. Then RS232 shall be used.

5.2.4   All settings done

After the radio type is selected you will now see a real-time display showing reception and transmission to and from each radio. Receive detection from a radio is illustrated with a green arrow. PTT to the opposite radio is illustrated with a red arrow.

5.2.5   Audio gain

The gain from the AF received from one radio to the output modulating the other radio can be adjusted in 3dB steps by moving the slider under the amplifier symbol for each path. The setting is "live" so you can listen to the result while adjusting.

On radios where the volume control on the radios front panel also affects the AF level used by the X-Link, please take care that you have the volume control, on the radio front panel, at the same fixed level at all times. If possible, make it impossible to change the volume knob. Probably "half volume" is the best setting to use. Too low or too high will give a distorted audio.

5.2.6   Using the squelch output

If the radio has an output that indicates when the radio is receiving, like a squelch-detect, or a PL-detect, this is mostly preferred to use, instead of a VOX-detect in the interface.

The X-Link interface input can be set to either "active low" or "active high".

5.2.7   Audio detect level

On radios that does not have a usable squelch signal or communications port, the X-Link interface can use the level of the received audio to detect incoming voice communication (VOX).

The level for the detection can be fine-tuned so that it reacts when it should and disregards low level back ground noise and other disturbances. *See the deeper descriptions with screenshots below.*

5.3   Save changes or Revert changes

At the bottom you have two buttons affecting the settings.

While making changes they are temporarily stored in the interface.

Press [Save changes] to store all settings permanently in the interface. Or press [Revert changes] to return all settings to those stored in the interface.

Please note, that no changes are permanent unless you press [Save changes].

5.4   Fine tune the Audio Detect Level

Only when using AF level sense for Rx detect. Not for Squelch or PEI.

5.4.1   Adjusting trigger level

In the illustrations below, Radio B is selected as "Radio with AF level sense for Rx detect".

When the receiver outputs AF to the X-Link, this will be shown on the AF-Level bar graph.

You can now adjust the PTT trigger level using the slider, to find a suitable level where Radio A will start transmitting.

If the level on the bar graph gives a very low reading it can be hard to set the PTT trigger level. You can then increase the "Rx detect Pre-amp" gain so you get a better indication and then readjust the PTT trigger level. Conversely you may need to decrease the "Rx detect Pre-amp gain" if the reading is too high.
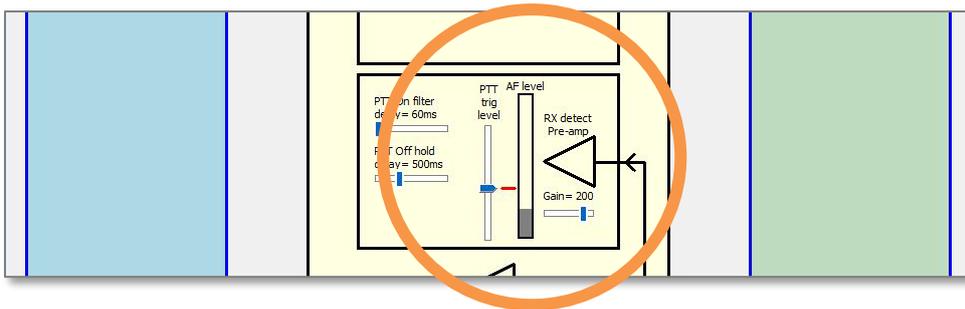
In this illustration the AF level is below the PTT trig level and no PTT command is sent
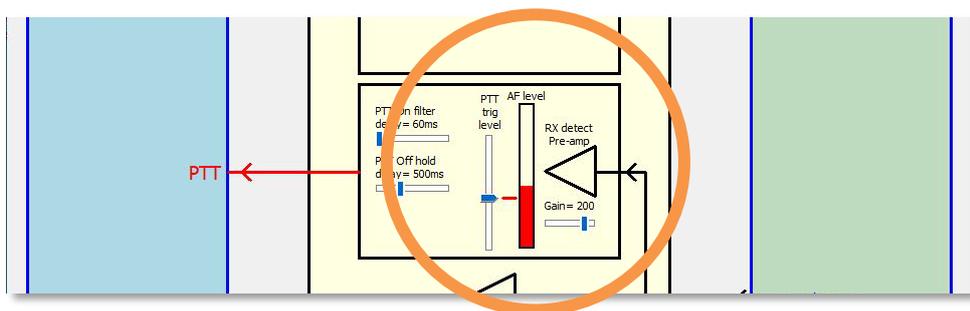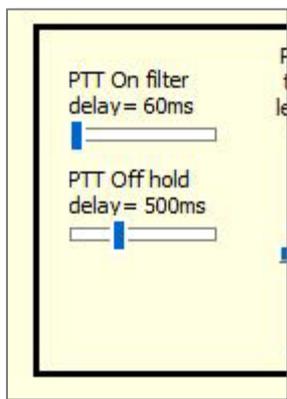

In this illustration the AF level is above the PTT trig level and a PTT command is sent to the other radio

5.4.2 Adjusting delay timers

There are also two delay timers that can be adjusted to optimize the detection performance.

- PTT On filter delay. This is the time from the first detection of AF until the PTT command is sent to the other radio. During this time at least 50% of the received AF level needs to be above the trig level in order to activate PTT. This is very useful for preventing short glitches on the received AF from triggering PTT.

- PTT Off hold delay. This is the time from the end of AF detection until the PTT command is released from the other radio. This may be useful if short interrupts in the received AF should be tolerated without stopping the PTT.

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