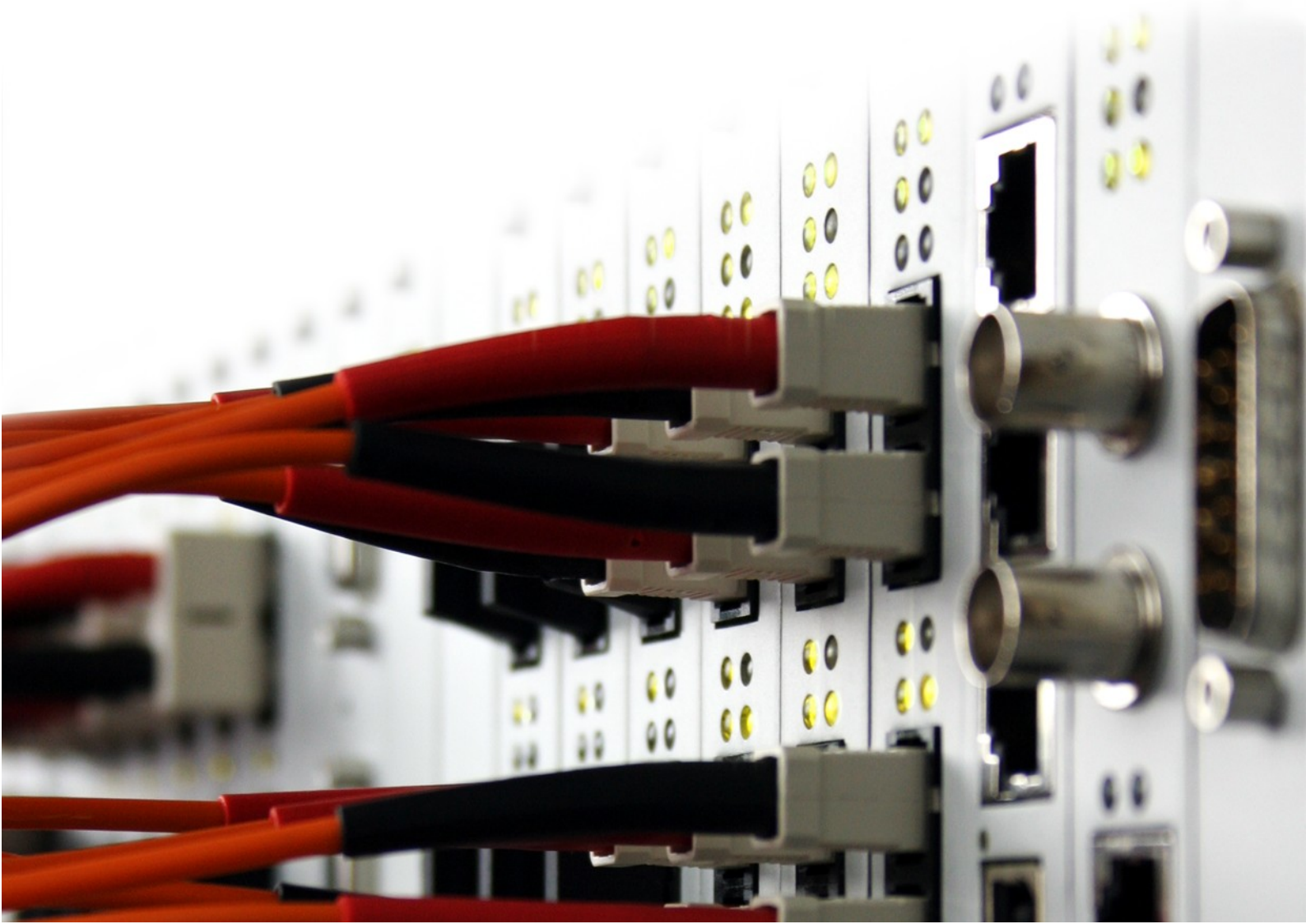
Series 52

52/XR MADI Router
Installation Guide

Version: 1.10.0



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1 Terms of Use - Legal Disclaimer

Series 52

52/XR MADI Router Installation Guide

Version 1.10.0, 21.04.2009

2 About this Book

This installation guide will provide you a short introduction how to install an 52/XR MADI Router.

The content of this manual is subject to change without notice. DHD recommends to visit the DHD website once in a while to check if there is a newer version of this document available.

Note

This manual mainly refers to the physical installation of a 52/XR. Please find more information on this device in the 52/XR manual.

The configuration of the 52/XR MADI Router is described in the Toolbox5 configuration software manual.

Please read the Routing, Scheduling und Monitoring Software - DHDOS/DHDOM manual to learn more about the set up and the usage of routing devices.

How to Use this Book

The Navigation Tree

You can find the navigation tree on the left-hand-side of the PDF document. Via the entries of this tree you can directly reach the several chapters and sections of this document. Click onto the text or the  symbol of an entry to display its content.

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Links

Links are underlined to separate them from the rest of the text. These links can be a connection to other chapters or sections in the same document or to an URL (internet address).

- Same document: The hand symbol  appears if you move the mouse over the link.
- URL: The hand symbol with an additional  appears if you move the mouse over the link.

Please notice, that you need an active internet connection to be able to execute a link to an URL.

The Meaning of Advices in the Text

Warning 	The demands and advices in this fields should be followed **unconditional**, because otherwise hardware and software products, data bases, as well as persons may suffer a loss.
Important 	The demands and advices in this fields should be followed, because these contents are necessary for the proper operation of the DHD systems.
Note 	Recommendations and further information are marked as notes. Sometimes you will also find off-topic content in this field, which is related to the actual topic.
Tip 	Tips are helpful advices, which should make work with DHD systems easier.
Weblink 	In this fields you can find links to websites, which include for example an other manual or the possibility to download a driver for the respective DHD system. Please notice, that you need an active internet connection to be able to execute a link to an URL.
Download 	You can directly open and download a file if the respective link is marked as download link (file link).

3 What is new in this version of the manual?

All sections that had been added, deleted or changed are listed below. Click on the entries to reach the respective sections directly.

Current version (1.10.0):

Chapter / Section	State	Note
Communication Controller	changed	Information added.

Version 1.9.0:

Chapter / Section	State	Note
True Output Monitoring Module	changed	Information added.

Version 1.8.0:

Chapter / Section	State	Note
Terms of Use - Legal Disclaimer	changed	Formal adaptations. Legal disclaimer added to the footer of all topic pages.

Version 1.7.0:

Chapter / Section	State	Note
Assembling Modules	changed	Pictures added.

Version 1.6.0:

Chapter / Section	State	Note
Assembling Modules	changed	Information added.
MADI Modules	changed	Information added.
Power Consumption	added	

Version 1.5.0 and before:

No changelog available.

4 Environmental Specifications

In the following you can find some general advices concerning the environment of a 52/XR. If these values and standards are not adhered, DHD can not assure the proper functionality of the device.

Warning

Make sure the device has the operating temperature before switching it on. Also, the relative humidity must not be exceeded. Above all, **no humidity must condense on or in the device**!

operating temperature: +5 ... +35° Celsius

relative humidity: 20 ... 85%, non condensing

Warning

Leave at least 1 HU (44mm) space below and above the frame, so that the airflow trough the device is possible. If there are more devices mounted in the rack that emit heat and/or the device is equipped with many cards, you may need to leave more space for ventilation. Moreover, do not mount a heat generating device below the frame or you have to increase the distance between the devices sufficiently. Do not cover the perforated metal plates in bottom and top of the case.

The device must be mounted **always horizontally**, with the base plate underneath and the lid plate on top.

Warning

Never mount a 52/XR frame vertically, since this will lead to overheating which can damage the electronic components!

5 Assembling and Wiring the Hardware

In the following you can find information on the mechanical assembling and wiring of a 52/XR MADI Router.

Warning

Avoid damaging components by electrostatic discharge (ESD).

Before you touch or mount electronical components, make sure you do not carry any electrostatic charges. Earth yourself using a grounded metal object (heater, rack) to divert electrostatic charges immediately before you touch electronical components.

5.1 Assembling Modules

Insert modules into a 52/XR frame in the following way:

- Plug the module into a slot. Take care, that you plug the card into the red tracks on the top and the bottom of the frame.
- Fasten the two screws on top and bottom of the module.

The available modules for the 52/XR are listed in the following table:

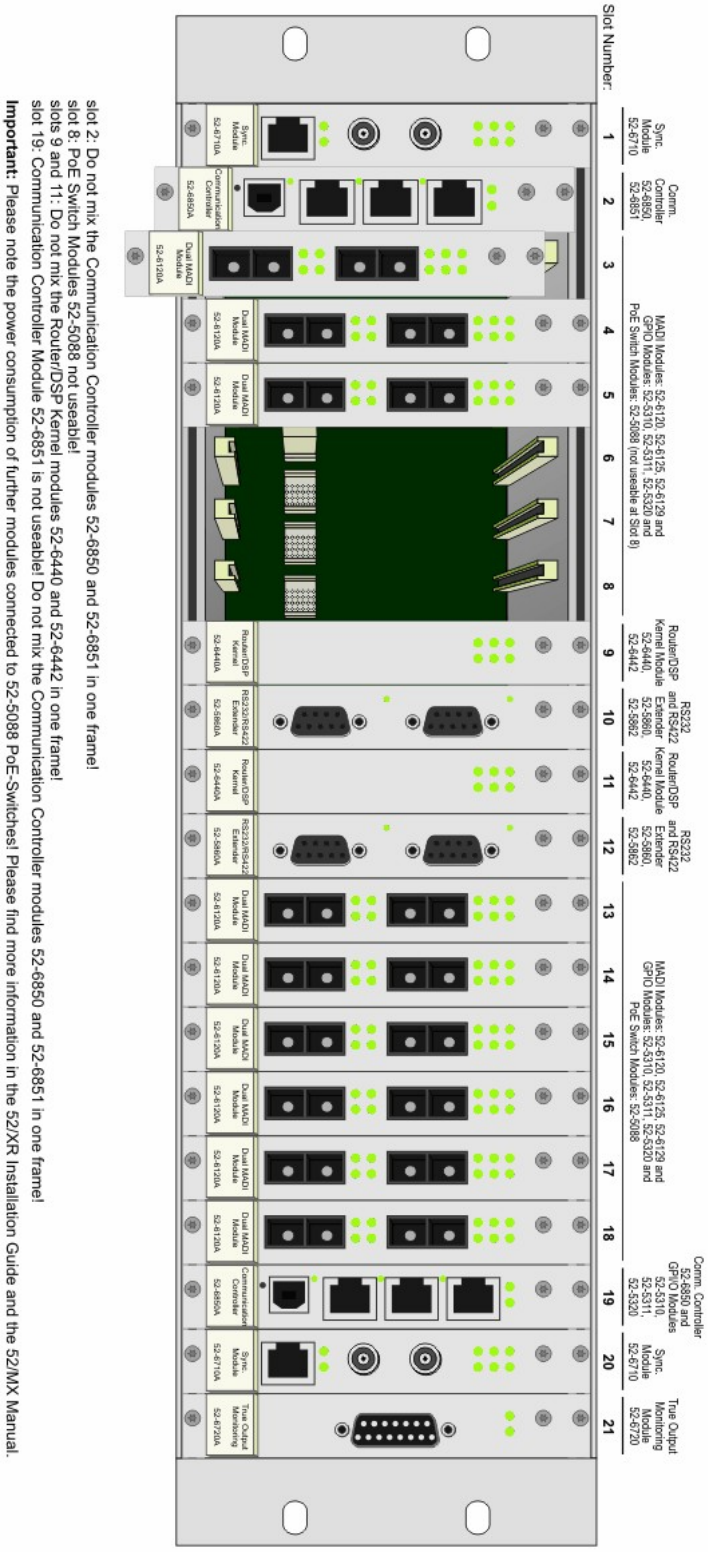
Important

In the right column of the table you can find, in which slots the respective modules can be used. **Do not** plug the modules into other slots as advised in the table, because this may damage the hardware.

Type of Module	Can be Used in Slot Number
52-6120A - XR Dual MADI Module, multi mode	3-8, 13-18, 24-29, 34-39
52-6125A - XR Dual MADI Module, single mode	3-8, 13-18, 24-29, 34-39
52-6129A - XR Dual MADI Module,multi/single	3-8, 13-18, 24-29, 34-39
52-5310A - MB/XD/XR GPIO Module, 8 out, 4 in	3-8, 13-19, 23-29, 34-40
52-5311A - MB/XD/XR GPIO Module, 8 out, 4 in	3-8, 13-19, 23-29, 34-40
52-5320A - XD/XR GPIO Module, 16 out, 4 in	3-8, 13-19, 23-29, 34-40
52-6440A - XR Router/DSP Kernel Module 4096	9, 11, 30, 32
52-6442A - XR Router/DSP Kernel Module 2048	9, 11
52-6851A - XR Communication Controller	2, 19

Type of Module	Can be Used in Slot Number
52-6850A - XR Communication Controller, redundant	2, 19
52-6710A - XR Router/DSP Sync. Module	1, 20
52-6720A - XR True Output Monitoring Module **Note** Please find detailed information on the 52-6720A True Output Monitoring module in the Routing, Scheduling und Monitoring Software - DHDOS/DHDOM manual.	21, 42
52-5860A - XD/XR RS232/RS422 Extender	10, 12
52-5862A - XD/XR RS232/RS232 Extender	10, 12
52-5088A - MX/XR PoE Switch Module	3-7, 13-18, 24-28, 34-39

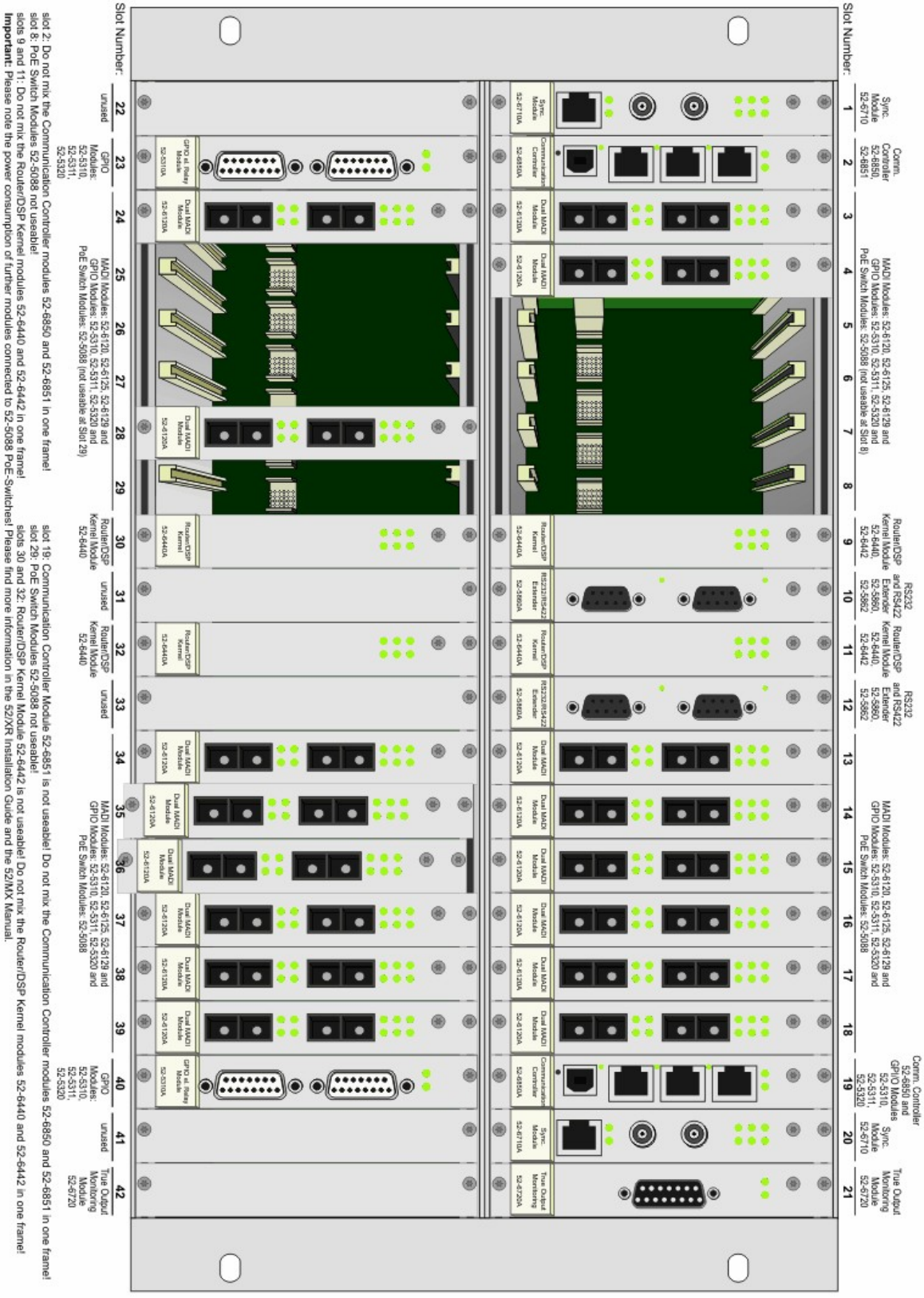
The features of these modules are written down in the 52/XR list of modules. May be you will find some more modules in the current 52/XR list of modules then in the table above, because the list in this document is not getting updated regularly. Please ask your local DHD partner for help if you are unsure how to install these modules.



slot 2: Do not mix the Communication Controller modules 52-6850 and 52-6851 in one frame!
slot 8: PoE Switch Modules 52-5088 not useable!
slots 9 and 11: Do not mix the Router/DSP Kernel modules 52-6440 and 52-6442 in one frame!
slot 19: Communication Controller Module 52-6851 is not useable! Do not mix the Communication Controller modules 52-6850 and 52-6851 in one frame!

Important: Please note the power consumption of further modules connected to 52-5088 PoE-Switches! Please find more information in the 52/XR Installation Guide and the 52/MX Manual.

Possible modules for the slots of a 52/XR MADI Router 3HU frame.



Possible modules for the slots of a 52/XR MADI Router 6HU frame.

5.1.1 Power Consumption

In the following table, you can find the power consumption of each single 52/XR module.

Important

Please note the maximum of 200W in total for each 3U or 6U router frame when using 52-5048 power supplies.

		Example 1: 3U Router Frame		Example 2: 6U Router Frame	
Module	**Power Consumption [in W]**	**Number of Modules**	**Number of Modules * Power Consumption [in W]**	**Number of Modules**	**Number of Modules * Power Consumption [in W]**
52-6120	3	12	36	24	72
52-6125	3	0	0	0	0
52-6129	3	0	0	0	0
52-5310	1	0	0	2	2
52-5311	1	0	0	0	0
52-5320	1	0	0	0	0
52-6440	10	0	0	4	40
52-6442	10	2	20	0	0
52-6850	5	2	10	2	10
52-6851	5	0	0	0	0
52-6710	2	2	4	2	4
52-6720	2	1	2	2	4
52-5860	1	2	2	2	2
52-5862	0	0	0	0	0
52-5088	1	0	0	0	0

		Example 1: 3U Router Frame		Example 2: 6U Router Frame	
52-4015	10	0	0	0	0
52-4515	10	0	0	0	0
52-6500	15	0	0	0	0
52-3456	15	0	0	0	0
		needed power in total: **74W**		needed power in total: **134W**	

Important

Please note the power consumption of further modules connected to 52-5088 PoE-Switches!

5.1.2 Redundancy Options

If required, you can operate the 52/XR MADI Router in different redundant ways.

Power Supply Redundancy

An 52/XR MADI Router can be equipped with a redundant power supply pack. Thus, the internal and external electric power supplies of the device becomes more reliable.

Tip

We recommend to feed power supplies from different mains supply systems to prevent power failures.

The 52/XR MADI Router can optional be operated with two power supplies of the type 52-5048 (48V/200W).

Sync Module Redundancy

An 52/XR MADI Router can be equipped with a redundant synchronisation module. Thus, the device becomes more reliable concerning the internal and external synchronisation.

The 52/XR MADI Router can optional be operated with two synchronisation modules of the type 52-6710.

Controller Redundancy

An 52/XR MADI Router can be equipped with a redundant communication controller module. Thus, the device becomes more reliable concerning the communication in the configuration network (communication with configuration PCs).

The 52/XR MADI Router can optional be operated with two communication controller modules of the type 52-6850.

Router / DSP Kernel Redundancy

An 52/XR MADI Router can be equipped with a redundant router / DSP kernel module. Thus, the device becomes more reliable concerning the routing and DSP processing.

The following redundancy options are possible for the 52/XR MADI Router:

	Router / DSP Kernel module of the type 52-6440	**Router / DSP Kernel module of the type 52-6442**
3 HU frame	two modules	two modules
6 HU frame	two modules (if only the upper backplane is used) or four modules (if the upper and the lower backplane are equipped with redundancy)	two modules (if only the upper backplane is used) If you want to use both backplanes of an 6 HU 52/ XR, you have to use modules of the type 52-6440.

Note

It is not possible to use Router / DSP Kernel modules of different types in one device!

MADI Redundancy

Slot 13 to 18 (and slot 34 to 39 in a 6 HU frame) can be operated in a normal or a redundant mode. If switched to redundant, a MADI port duplicates the signals of the corresponding port on the left side of the router backplane. That means, if you want to safeguard the channels of the MADI module in slot 5, you have to plug the redundant module into slot 15 and to assign this module to be redundant with the configuration software Toolbox5.

5.2 Wiring the Modules

In the following sections you will find some advises how to wire the 52/XR modules.

The features of the modules are written down in the 52/XR list of modules.

5.2.1 MADI Modules

Use the MADI ports for multi-channel audio connection to other devices. Therefore you need fiber optic cables with SC duplex connectors.

Note

The MADI ports on 52-6120 modules are intended for the use with multi mode fiber optic cables and the MADI ports on 52-6125 modules are dedicated for the use with single mode fiber optic cables. The MADI module 52-6129 provides multi mode and single mode interfaces. Use the upper port for multi mode connections and the lower port for single mode connections.

5.2.2 Communication Controller

The Communication Controllers 52-6850 and 52-6851 are used as communication interface between the router and the ethernet network for configuration and controlling. You can find three RJ45 connectors and one USB interface on these modules.

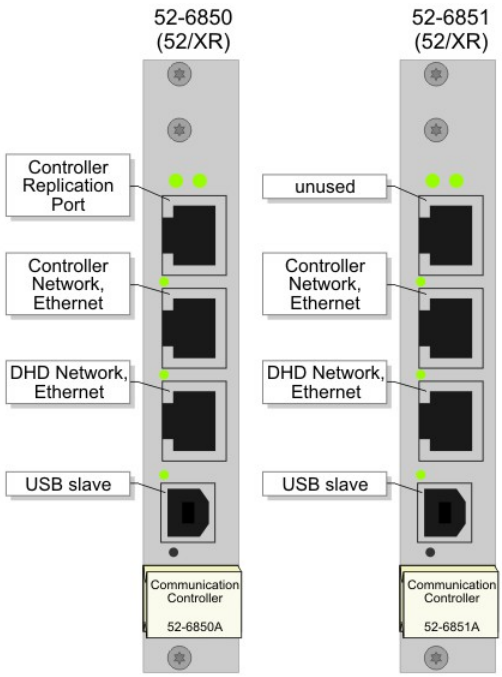
If you install two 52-6850 Communication Controller modules into your 52/XR frame, you have to connect there controller replication ports (the upper RJ45 connectors) with each other via a crossed CAT5 cable. This connection is used for data synchronisation. The upper RJ45 jack of a 52-6851 Communication Controller module has no function at the moment.

Use the middle RJ45 jack to connect other components that should be integrated in the DHD system. These components can be for example:

- a talkback panel for controlling the talkback matrix inside the router,
- a switching panel for controlling the crosspoints of the router
- or a mixing console.

For configuration and controlling processes, the device can be connected to a PC or local network via the lower RJ45 connector. The DHD system can get any IP address in this network.

Use the USB interface of the communication controller module if you want to connect directly to the device for maintenance.



52/XR Communication Controller modules.

General Information

Please use CAT5 cables continuous for wiring. But DHD recommends to use CAT6 cables for longer distances. The maximum length of the Ethernet cable between two modules of the Controller network is **100 meters** (for instance between the Communication Controller of the router frame and a PoE switch or between a PoE switch and 52-4050 Controllers - that are included in the Series 52 console and Q-Panel frames). Use only switches in the DHD network and the controller network, which are shipped and/or recommended by DHD for the usage in these networks. Especially the switches must be **Unmanaged Switches** working with a speed of **100 Mbit/s**.

The following switches are tested by DHD and are recommended for the usage in DHD Ethernet networks:

Manufacturer	Type
3com	Superstack 3, Baseline Switch 16 Port 10/100 Ref. 3C16470
3com	Superstack 3, Baseline Switch 24 Port 10/100 Ref. 3C16471
Allied Telesyn	AT-FS713FC/SC 12x RJ45 1x SC http://www.alliedtelesyn.de
Allied Telesyn	AT-FS708 8x RJ45 http://www.alliedtelesyn.de

5.2.2.1 Extender

There are two extender modules available for the communication controllers 52-6850 and 52-6851. Please find the usage of the DSub connectors in the following table.

Type of Module	Wiring Option
52-5860A - XD/XR RS232/RS422 Extender	• The upper DSub-9 connector is an RS232 port for maintenance purposes. • The lower DSub-9 connector is an RS422 port for external control applications.
52-5862A - XD/XR RS232/RS232 Extender	• The upper DSub-9 connector is an RS232 port for maintenance purposes. • The lower DSub-9 connector is an RS232 port for external control applications.

5.2.3 Synchronisation Module

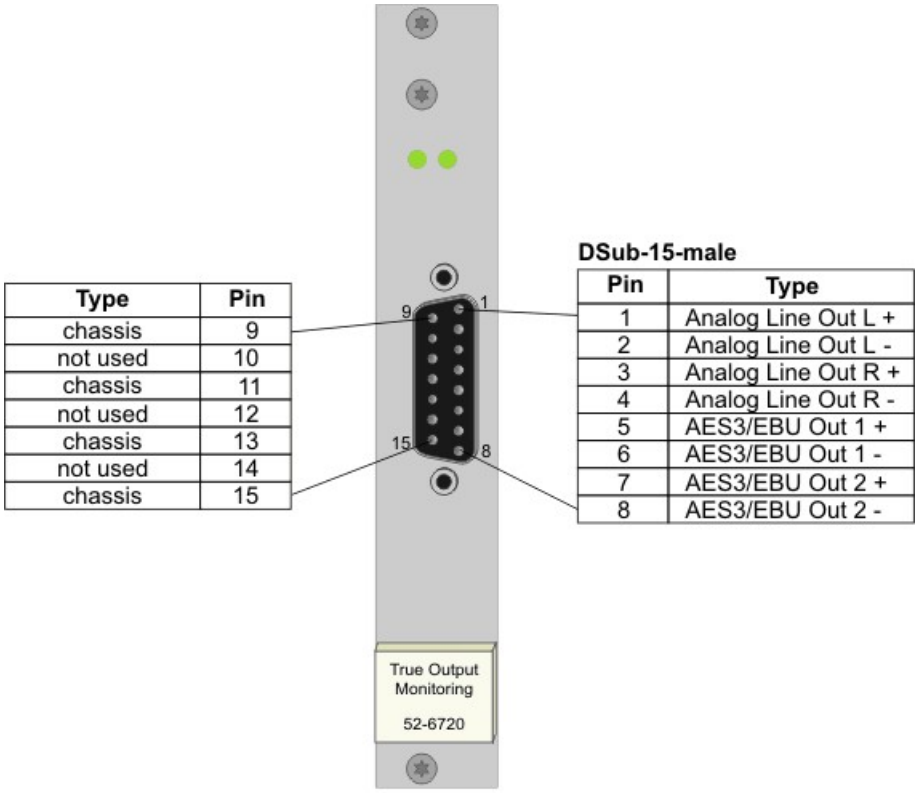
A 52-6710 Synchronisation Module comes with three connectors. These are two BNC connectors and one RJ45 jack.

The BNC connectors can be used to establish a TTL wordclock or AES3/EBU connection. The upper BNC connector is dedicated as input, but the lower BNC jack can be switched to be an output. Use BNC cables with a characteristic wave impedance of 75 Ohm. AES3/EBU synchronisation is also possible via the RJ45 jack.

Beside these options it also possible to synchronise the 52/XR MADI Router via the MADI ports 3.1 and 13.1. Moreover, the 52/XR can be synchronised internal.

5.2.4 True Output Monitoring Module

The outputs 1 to 4 of the 52-6720 module provide analog signals and the outputs 5 to 8 digital signals in the AES3/EBU format. Please find the detailed pin out for the DSub-15 connector of the TOM module in the following picture.



"chassis" meint, nur verbunden mit Gehäuse des Gerätes und Steckergehäuse, jedoch nicht mit der internen Schaltungsmasse, da galvanisch getrennt

"chassis" means wired to DSP frame enclosure and connector housing, but not to internal circuit ground of the module because it is galvanically isolated

Pin out for the 52-6720 True Output Monitoring Module.

Note

Please note, at least one `52-8550 Routing/Scheduling Software` or `52-8551 Routing Software` license is needed to be able to control the 52-6720 TOM module with the DHD Operation Manager. Without one of these licenses it is not possible to route signals to the outputs of the module and to control the options of the module (level etc.)!

More information on the TOM module and its use can be found in the `DHDOS/DHDOM - Routing, Scheduling and Monitoring Software Manual`.

6 Connecting the Device to a PC

The configuration of a 52/XR MADI Router is done with the aid of a PC. Usually the ethernet interface of the controller module is used to establish the connection. The next section describes how to configure and use this interface of the communication controller.

In addition to the ethernet interface, each controller module has an USB interface. It replaces the RS232 interface known from the former DHD systems, but the transfer rate of the USB interface is comparable with the ethernet connection. Please follow this description to start the operation of the USB interface.

6.1 Configuring the Ethernet Interface

Every 52/XR MADI Router is equipped with an ethernet interface (with two ethernet interfaces in case of controller redundancy). The interface - an RJ45 female connector - is located on the communication controllers. It is a standard twisted pair interface with a data transfer rate of 100Mbit/s. The interface complies with the 100Base-TX, IEEE 802.3u standard.

The ethernet connection of the 52/XR MADI Router allows communication with DHD application software, as well as with conventional applications like Telnet and web browsers on one or more PCs.

Important

Please urgently note the network specifications before using the ethernet interface of a 52/XR MADI Router.

If the 52/XR MADI Router is not run according to the network specifications, DHD cannot guarantee the proper operation of the device.

6.1.1 IP Basic Settings

Before delivery, each 52/XR MADI Router is configured with an IP basic setting. This setting accords to a certain pattern, unless the customer indicates different requirements in his order.

Each controller with an integrated ethernet interface has a dedicated network address, the so-called MAC address (`MAC - Media Access Control`). This address is always unambiguous and unique. DHD owns the MAC address range `00:0A:63:00:00:00` to `00:0A:63:FF:FF:FF`, therefore this address is also referred as serial number of a DHD device.

A network-compatible controller module is always identified in a network by its MAC address. As the first 3 Bytes of all DHD MAC addresses always are identical, only the last 3 Bytes are indicated in DHD software applications.

Note

If you find the term "MAC address" in the context of a DHD system, it always refers to the last three Bytes of the actual address, although this is, strictly speaking, incorrect.

These last 3 Bytes of the MAC address are used for composing the IP address for the basic setting. Please find below an example for the MAC address 10:00:02:

- Every single Byte is translated into the decimal format: `10h = 16, 00h = 0, 02h = 2`
- Afterwards the decimal numbers are strung together; 10 is prepended, and all numbers are separated by periods: `10.16.0.2`

The subnet mask is automatically set to `255.0.0.0`, according to the classification of this IP range.

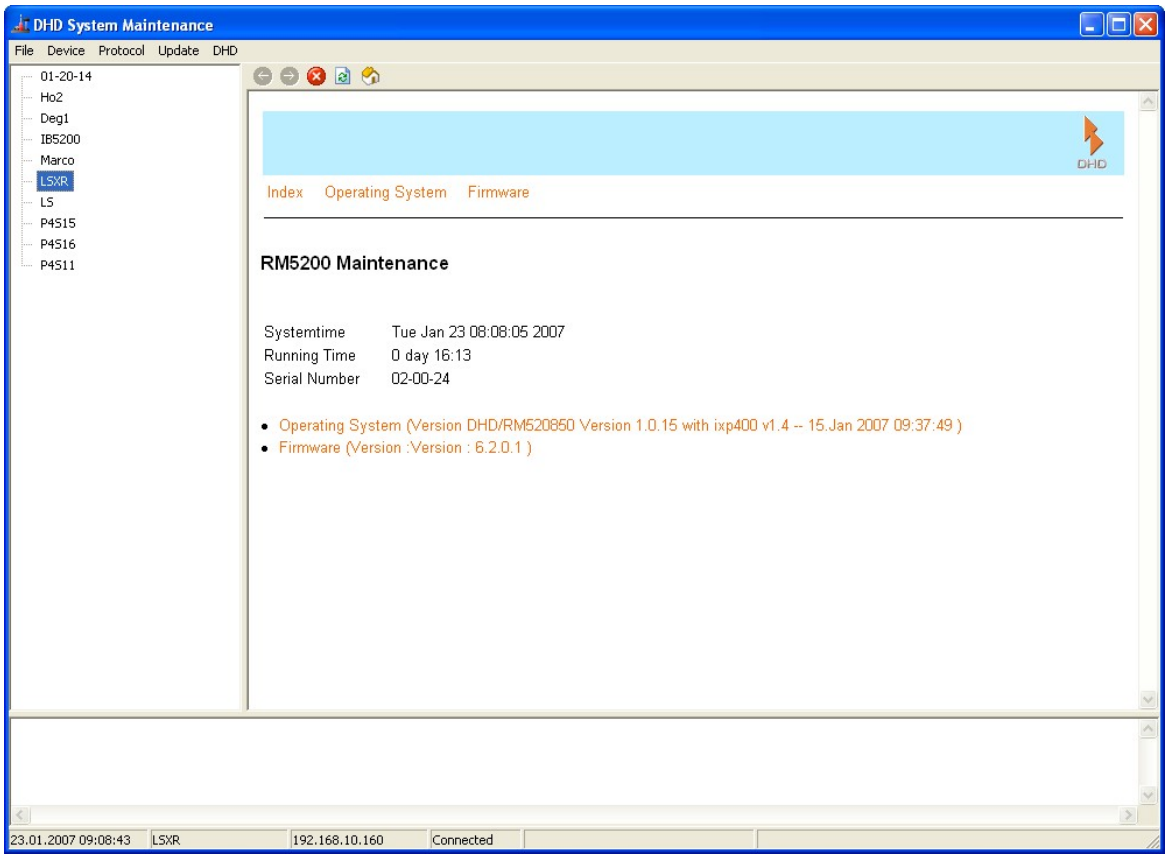
Thus the following IP basic setting results for the example device:

- `IP address: 10.16.0.2`
- `Subnet mask: 255.0.0.0`

Please learn in the following chapter how to change these settings and adjust them to your IT environment.

6.1.2 IP Configuration

The IP settings of a 52/XR MADI Router are no longer defined in the configuration file, but directly in the systems communication controller. To set IP parameters, please use the `Maintenance Window`, an application, which is implemented in Toolbox5. You can open the Maintenance Window by clicking the according command in the `View` menu or by pressing `F7` on your keyboard. The application opens in a window with three sections:



View of the Maintenance window after opening.

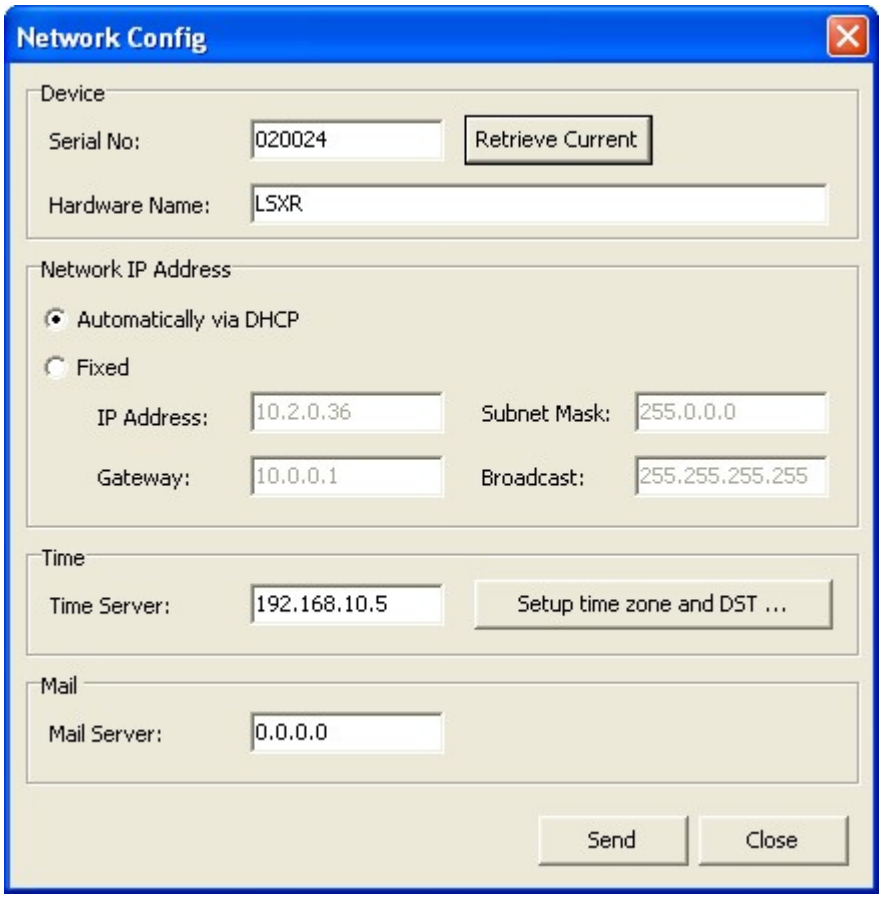
In the left upper part of the window, beneath the menu bar, you can see a list of the Series 52 systems accessible in the network. On the right side next to it, in the largest part of the window, you can see system information of the device which is selected in the left-handed list. Above the status bar in the lower part of the window, current messages are displayed, sent by DHD systems in the reachable network.

You have two options to adjust the IP settings of a Series 52 system, depending on the following conditions:

a. You can see the respective device in the list in the left part of the maintenance window.
b. You **cannot** see the respective device in the list in the left part of the maintenance window.

If you can see the device in the list (a)

1. Right-click on the displayed device name.
2. A context menu appears. Select the `Network Config...` command from this menu.
3. A window opens, displaying the current IP configuration of the device.



The Network Config window shows the current IP configuration of the device with the serial number which is entered in the Serial No text field.

Serial No - The Serial Number

The device of which you can see the network settings, is always represented by its serial number (`Serial No`). This serial number is unambiguous and is only valid for one single controller. You can use the field to read out settings of devices that are located in a different network segment. Read more about this in section "If you do not see the device in the list (b)".

Hardware Name - The Device Name

You can provide every Series 52 system with a device name (`Hardware Name`) which will specify the device. This name will help you to identify the device in the network. You can choose any name up to 20 characters; however, no space characters are allowed. Not allowed special characters are rejected on entering.

Automatically via DHCP - Automatic IP Assignment by a DHCP Server

If there is a DHCP server on the network, which is also supposed to carry out the IP configuration of the 52/XR MADI Router, please just select the `Automatically via DHCP` radio button.

Fixed - Fixed IP Setting

If you cannot access a DHCP server or you want manually carry out the IP configuration, please first select `Fixed` and then fill in the according values (`IP Adress, Subnet Mask, Gateway, Broadcast`) into the activated text fields.

Important

In case of questions about the parameters to be set, please contact your IT department or your network administrator.

Mail Server

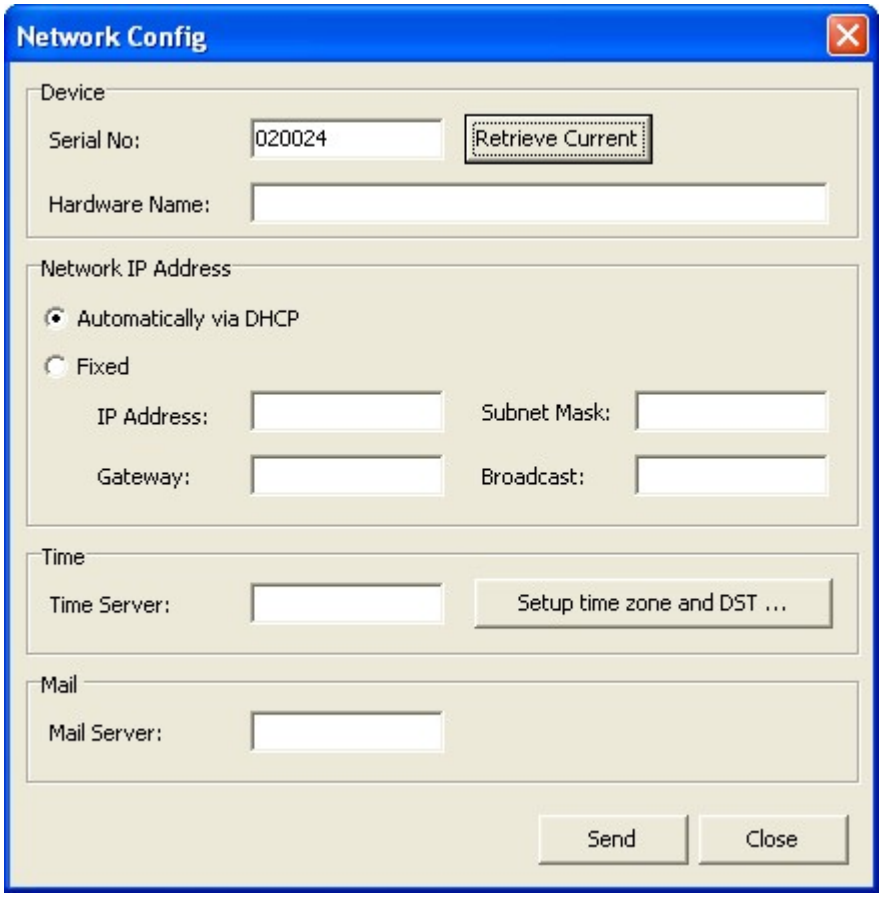
This text field has no function yet and does not need to be filled in.

Time Server

Series 52 systems run with an internal system time which can be synchronised to a time server (NTP - Network Time Protocol). For this, please enter the IP address of your time server in the text field `Time Server`.

If you cannot see the device in the list (b)

1. Click on the `Device` command in the menu.
2. Select the `Network Config...` command from this menu.
3. The `Network Config` window will open; all its text fields are empty.



Enter the serial number of the device, for which you want to change the IP configuration, in the "Network Config" window.

4. Enter the serial number of the device into the `Serial No` text field. Hit the `Retrieve Current` button afterwards.

This will send a query into the network, searching for network devices outside of the subnet. If the 52/XR MADI Router should be located outside of the subnet of the PC, it will answer anyway and transmit its current IP settings. The settings are then displayed in the `Network Config` window, where you can change them.

You can change the data according to the principle described in the section "If you can see the device in the list (a)". The process is completed when you send the changed data to the device by hitting the `Send` button.

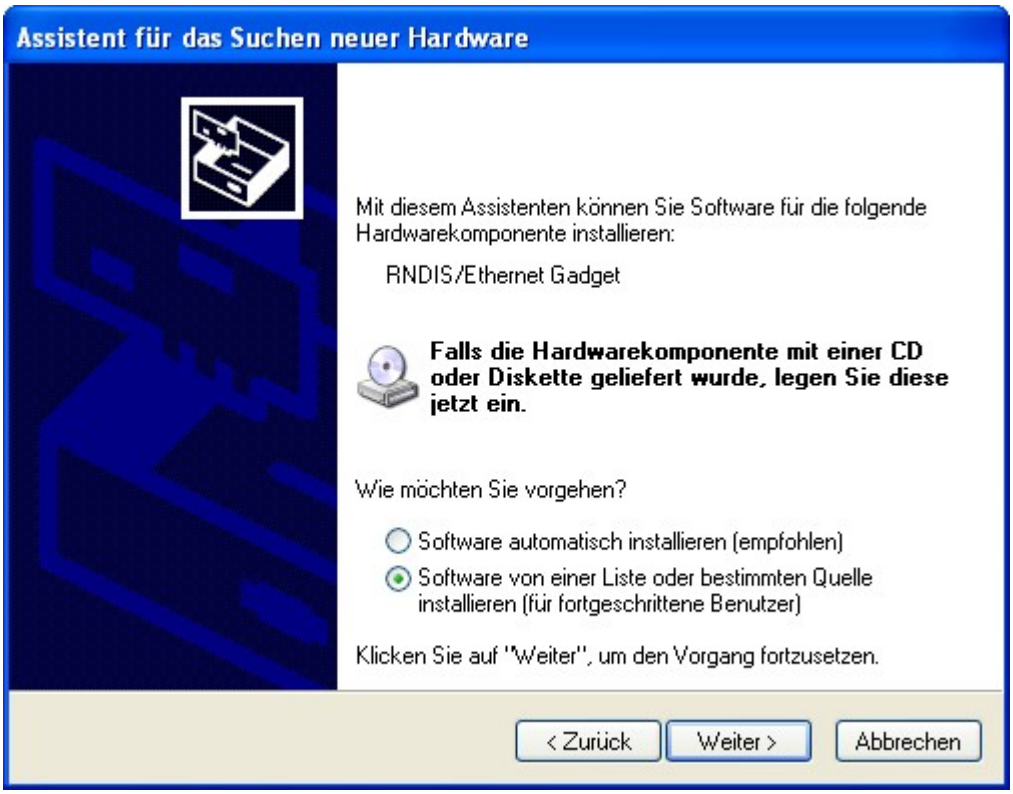
6.2 The USB Interface

You can connect 52/XR MADI Router devices to a PC via USB. 52-6850 and 52-6851 modules have an according USB interface (B type, USB 2.0). Use the interface for instance in case you do not want an ethernet connection or if you want to locally connect a PC to the 52/XR MADI Router for maintenance purposes. In order to use the USB interface of the 52/XR MADI Router, first you have to install a driver on your PC.

Installing the USB Driver

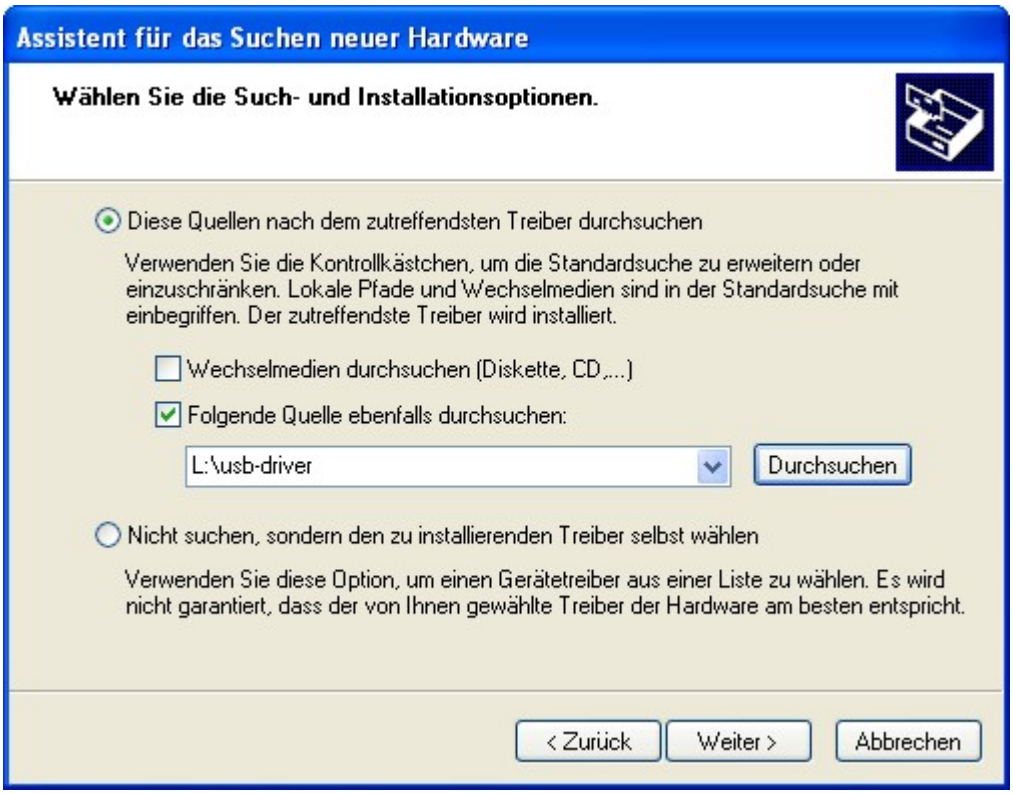
For the installation you need the file `MX-XR_usb-install.inf`. An access to the DHD-update download area is required, to be able to download this file. Please contact DHD or your DHD sales representative if you need this file and you do not hold a login for this website.

Connect the device to your configuration PC and switch it on. Microsoft Windows™ automatically opens the "Found New Hardware Wizard". Alternatively, click on the `Hardware` icon in the `control panel` to open this dialog.



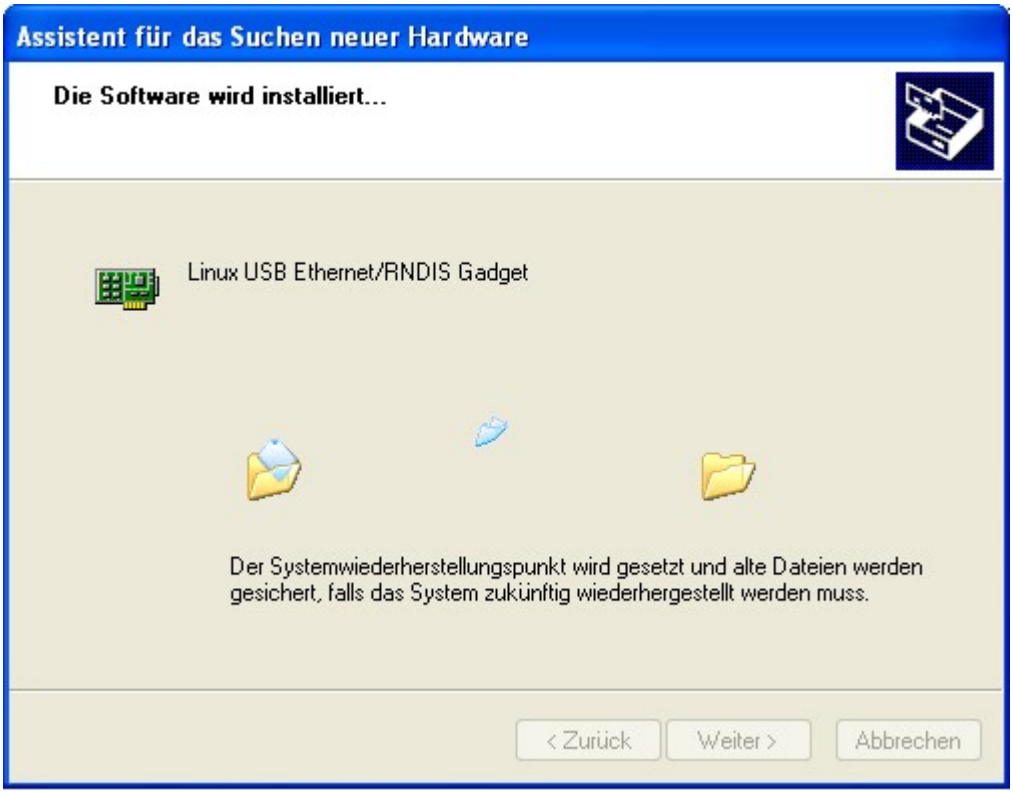
Step 1: Identification of the new hardware.

Select "Install from a list or specific location" and click `Next`.



Step 2: Setting the path.

Enter the drive and if necessary the folders, to define the path to the file `MX-XR_usb-install.inf` and click `Next`.

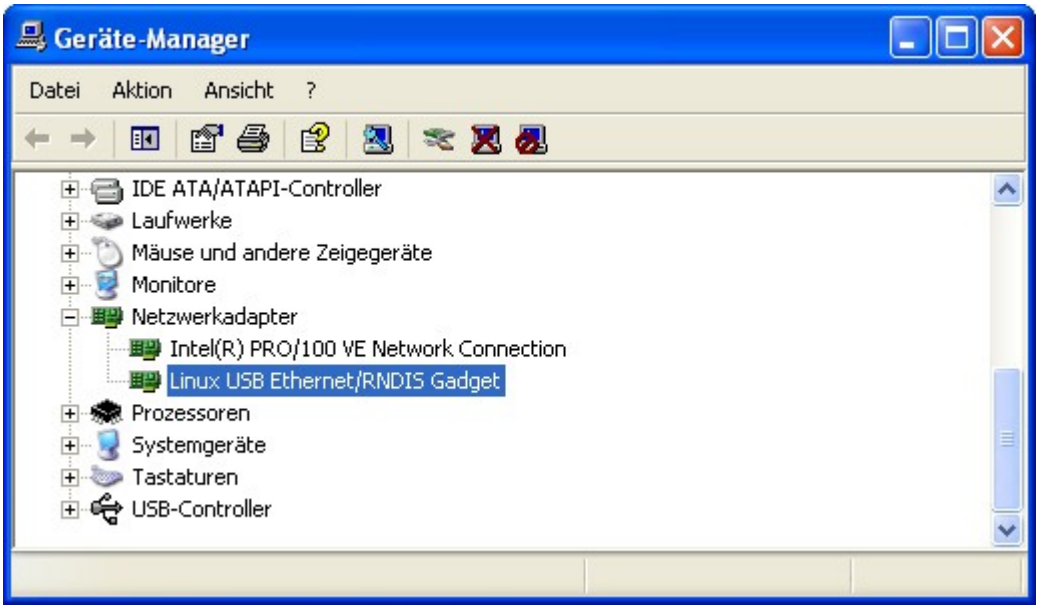


Step 3: Installing the driver.

The driver now gets installed.

Step 4: Finish the installation.

Finally the "Found New Hardware Wizard" will tell you that it has finished the installation and you can end the process by clicking the `Finish` button. From now on you can communicate with the device via the USB interface.



The device manager of the Windows™ control panel.

After the driver has been installed properly, the connection to the USB interface is simulated as a network connection. Therefore, you **do not** need to choose the USB connection in any DHD software application, because it is seen as a network connection.

Please contact your IT department or your administrator if you need help to install the driver.

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