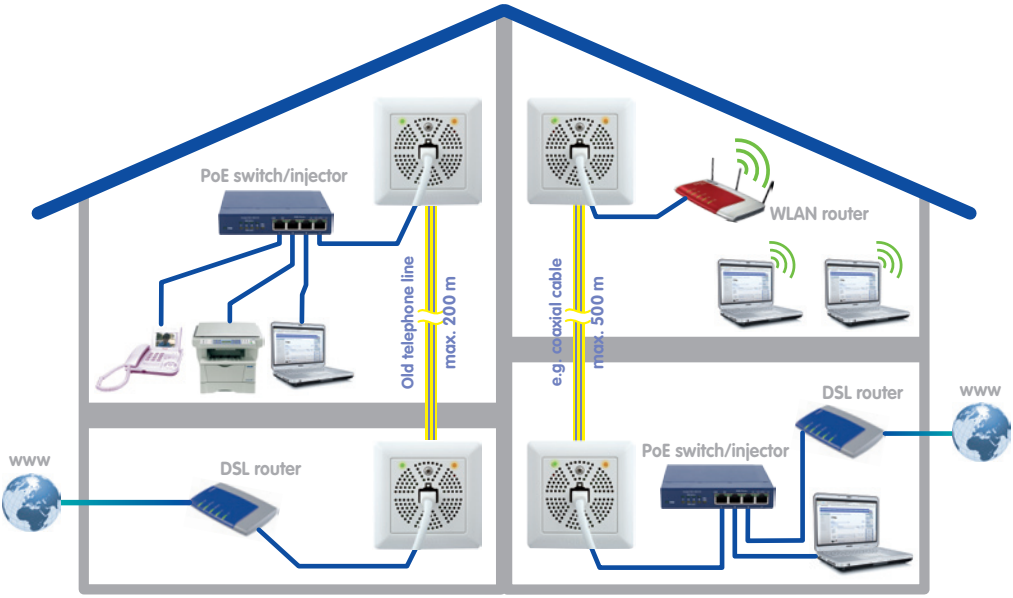
EN

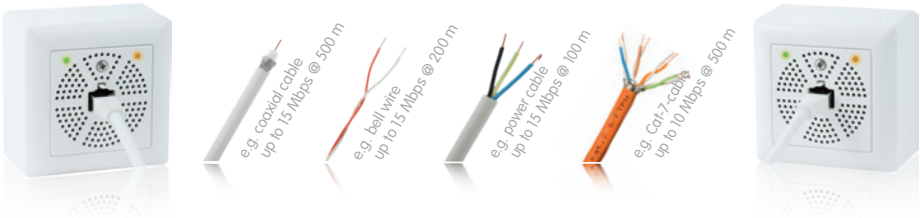
Mx2wire Media Converter

The HiRes Video Company MOBOTIX

Ethernet With PoE. Using 2-Wires.



Mx2wire turns an existing two-wire cable into a modern multimedia cable – simply, quickly and cost-effectively



09/2009

www.mobotix.com

HiRes Video Innovations

The German company MOBOTIX AG is known as the leading pioneer in network camera technology and its decentralized concept has made high-resolution video systems cost-efficient.

MOBOTIX AG • D-67722 Langmeil • Tel: +49-6302-9816-103 • Fax: +49-6302-9816-190 • sales@mobotix.com

MOBOTIX Mx2wire

Mx2wire turns an existing two-wire cable into a modern multimedia cable – simply, quickly and cost-effectively!

MOBOTIX WORLD EXCLUSIVE

THE MOBOTIX MEDIA CONVERTER – POSSIBILITIES AND LIMITATIONS

- **Mx2wire** transfers both data and power according to the PoE standard!
- **Mx2wire** does not require a separate power connection!
- **Mx2wire** uses existing telephone, power or antenna cables and therefore eliminates the enormous amount of time and effort normally required for cabling!
- **Mx2wire** is a quality product designed and manufactured entirely in Germany!

Fulfills EMC regulations

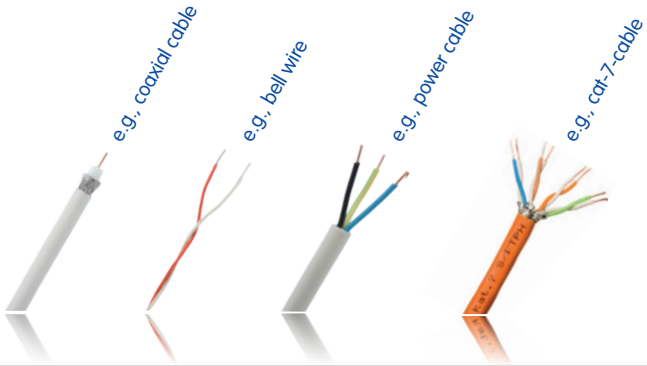
Mx2wire complies with the relevant EMC regulations for information technology devices (EMC: electromagnetic compatibility).

ENJOY THE UNIQUE ADVANTAGES OFFERED BY MX2WIRE

In many houses television, telephone and other distribution networks based on two-wire cables are already installed, but no longer used. For example, a previously cable-bound telephone system may have been replaced by an up-to-date wireless system. Existing, unused cables can now be quickly connected to Mx2wire and transformed into network connections throughout an entire building. An old analog camera can also be instantly exchanged for a digital, high-resolution MOBOTIX network camera without the need for any recabling and with all the associated benefits.

New Possibilities, More Convenience:

- Ethernet and PoE data transfer using a two-wire cable
- Simple connection of 10/100 Mbps Ethernet devices
- No need for expensive and time-consuming installation of network cables
- Ideal for connecting PCs, WLAN DSL routers, IP cameras, IP telephones and IP door stations
- Connected devices are supplied with up to 7 watts via PoE
- Perfect when wireless communication is not possible (due to distance to sender, thickness of walls, etc.)
- Maximum data transfer range of 500 m and data rate of up to 30 Mbps (depending on distance)
- Simple installation in standard sockets (surface- or flush-mounted)
- Developed, produced and patented by MOBOTIX Germany
- Two LEDs display connection and supply statuses
- Power supplied to Mx2wire over just a standard PoE switch
- Network extension by connecting a Cat7 cable of up to 500 m in length as a two-wire cable



World exclusive: Patented and produced by MOBOTIX

Mx2wire turns an existing two-wire cable into a modern multimedia cable—simply, quickly and cost-effectively!

MOBOTIX Mx2wire

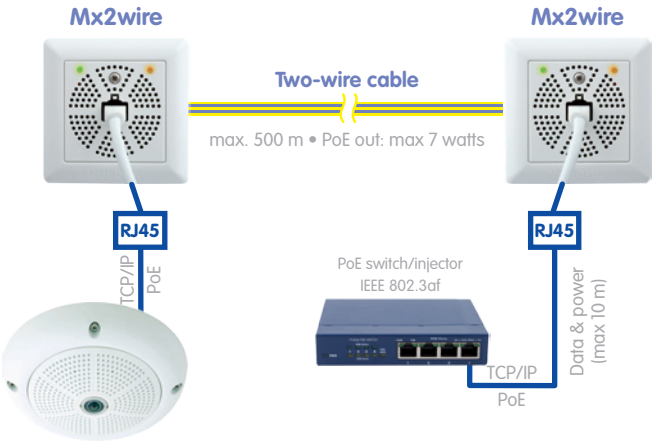
INTRODUCTION

Possible data rates and ranges are listed from page 12-14

Using the Mx2wire system from MOBOTIX, an Ethernet network with PoE can be established using existing cables up to 500 m. This means that you can utilize a two-wire cable that is no longer in use (analog telephone line, antenna cable or bell wire, for instance) to connect a 10/100 Mbps Ethernet device such as a PC, WLAN, IP camera, IP telephone or IP door station without having to lay any new cables or implement any other constructional measures. An (identical) Mx2wire unit is required at both ends of the cable, and it automatically configures itself as either the sender or the receiver (MOBOTIX patent).

Mx2wire requires a PoE power supply for its own operation

Additional network devices for Mx2wire and end devices are normally not required



The significant additional benefit of Mx2wire is that, in addition to data, the power to operate PoE end devices (Power over Ethernet according to the IEEE 802.3af standard, a MOBOTIX network camera, for example) can also be transferred via the two-wire cable.

Mx2wire is supplied via PoE from the network cable that feeds in. The connected end devices are supplied with up to 7 watts via PoE. Mx2wire does not therefore require its own power supply, as the network distributor (switch) typically supplies power over the data cables (PoE) so that the two Mx2wire units as well as the standard PoE end device are supplied.

Flexible installation options

Mx2wire is delivered in a standard socket frame in different designs, however, it can also be used with the surface-mounted socket provided.

TWO-WIRE CABLES - AN OVERVIEW

A two-wire cable is usually a two-wire copper cable whose two wires are twisted together (twisted pair). A classic two-wire cable is an analog telephone wire with a wire diameter of 0.8 mm, which, in terms of quality (according to the ISO/IEC 11801 standard), corresponds to a category 1 cable for voice transmission. Mx2wire can also be operated using untwisted cables that have at least two wires forming a physical connection between the two Mx2wire units. Please note that the quality, length and diameter of the two-wire cable used all have an influence on the transfer of data and the PoE output (see Section 1.2).

Sample performance data is provided from page 12-14

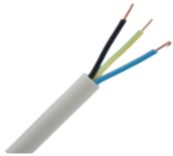
Antenna or Coaxial Cable (e.g. for an Analog Camera)

- Cable type: RG according to MIL-C-17 (coaxial cable)
- An analog camera can be easily exchanged for an IP camera
- Interference-free thanks to closed systems and cable shielding
- Range (at 10 Mbps): over 500 m

Analog Telephone Line or Bell Wire

- Cable type: JY, A2Y and YR (telephone and low-voltage cable)
- Very good availability in buildings
- Core diameter 0.6 to 0.8 mm
- Range (at 10 Mbps): over 200 m

Power Line (Should No Longer Be Live)



- Cable type: NY (installation cable)
- Widespread availability of cables
- Cables must be disconnected from the power supply!
- Wire cross-section max. 1.5 mm2
- Range (at 10 Mbps): over 200 m

Ethernet Installation Cable

- Cable type: Cat7 (S/FTP, 4x2xAWG 23, 1000 MHz)
- Long range data and power transmission
- Range (at 10 Mbps): over 500 m

Multimedia cable

Mx2wire takes over the cable function for network and PoE, therefore, the cable cannot be simultaneously used for power, analog telephone or antenna connection anymore.

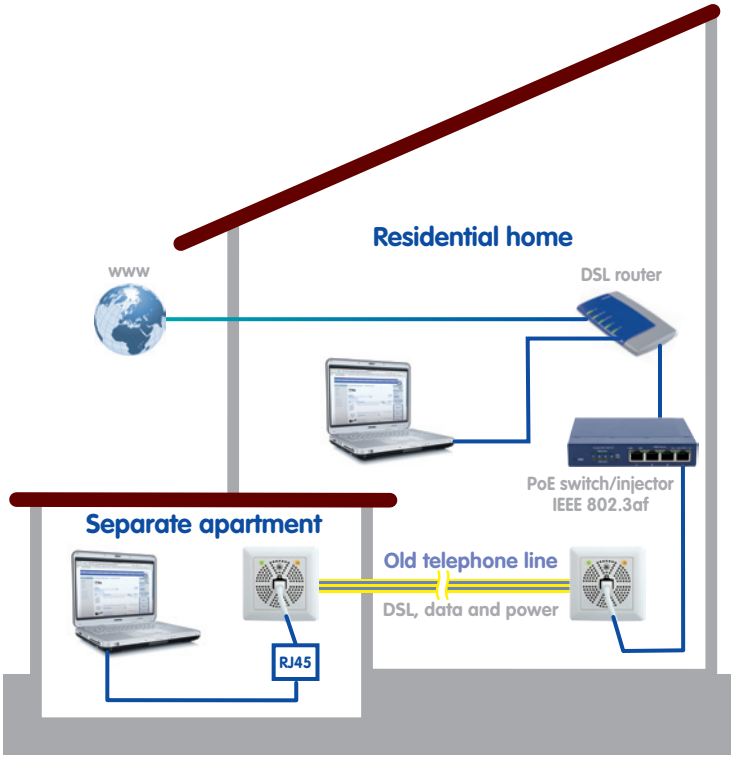
MOBOTIX Mx2wire

APPLICATION EXAMPLES

a) Connecting A PC To The Internet In A Separate Apartment

An Internet connection exists on the ground floor of a house and a PC in a separate apartment is to be linked to this. The concrete walls and/or distance make a network extension via WLAN impossible. In this example, Mx2wire is simply connected to the two wires of the analog telephone line that is no longer being used. All that Mx2wire requires to supply power to the end device (PC) and for its own consumption is a PoE switch or injector.

Mx2wire eliminates the enormous amount of time and cost normally required for cabling simply by reusing the old telephone line as a network cable

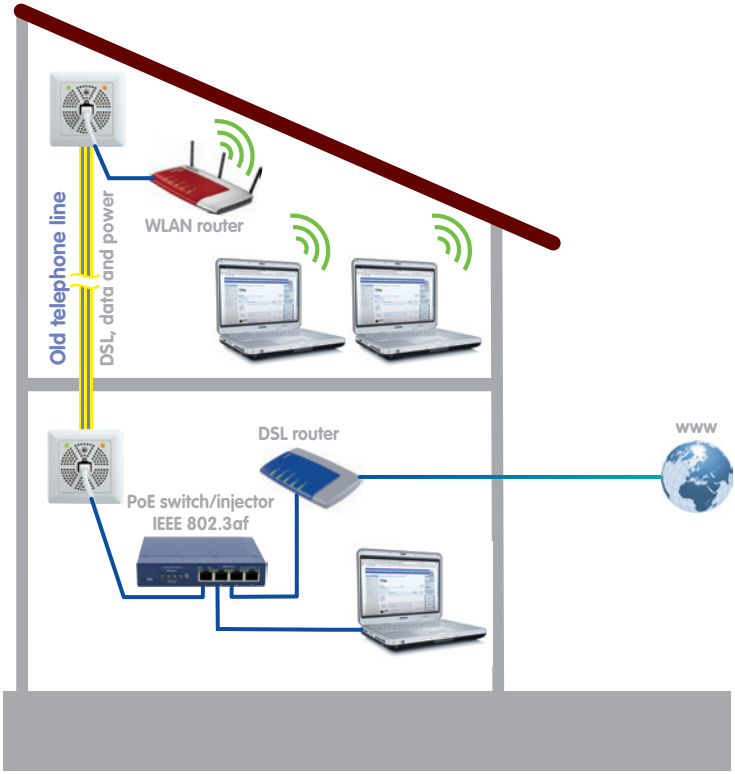


Device Required for the PoE Power Supply (according to IEEE 802.3af):

All Mx2wire installations require a suitable PoE power supply (Class 0). Here, you can always choose between a standard PoE switch/router or the MX-NPA-PoE set that is available from MOBOTIX as an accessory.

b) Connecting A WLAN Router To A Remote DSL Connection

The DSL connection is on the ground floor. Several PCs located two floors higher are to be connected to this. WLAN cannot be used over the entire distance. The distance from the router on the ground floor to the second floor can once again be bridged by Mx2wire and an analog telephone line, for example. By connecting a WLAN router to the Mx2wire unit on the second floor, the PCs there can now access the Internet via WLAN.



Power is supplied to the WLAN router via the Mx2wire devices (max. 7 W)

The concrete ceiling makes it impossible to set up a WLAN connection to the top floor

MX-NPA-PoE-Set:

The MOBOTIX PoE injector – compact, robust and flexible.

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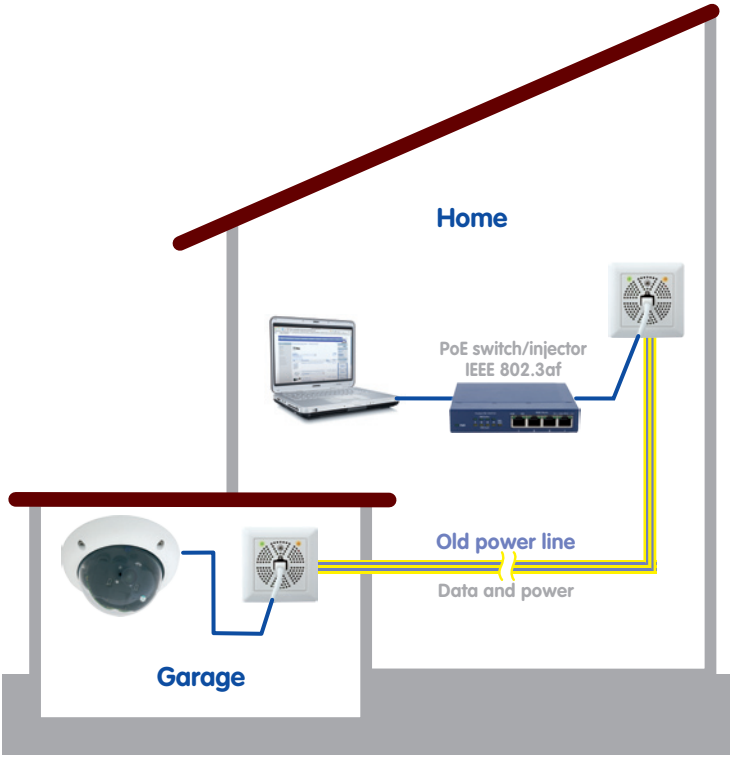
c) Connecting An IP Camera To A PC

Mx2wire allows an old power line to be used to connect a modern, PoE-supplied IP camera including audio/video and switch functions. A standard PoE switch/router or the compact MX-NPA-PoE set including crossover function is used for the PoE power supply. A patch cable (at least Cat5) is used to connect the PC, which serves to control the camera, directly to the PoE switch.



Here, a two-wire cable, formerly used as a power connection, serves to connect an IP camera in a garage while keeping costs to a minimum

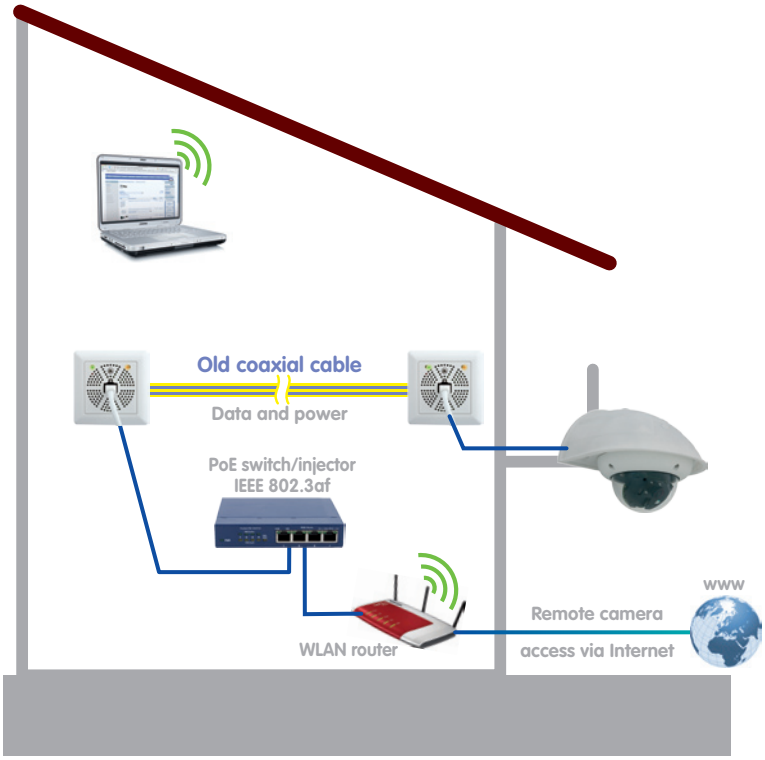
No power supply is necessary for the camera in the garage

Device Required for the PoE Power Supply (according to IEEE 802.3af):

All Mx2wire installations require a suitable PoE power supply (Class 0). Here, you can always choose between a standard PoE switch/router or the MX-NPA-PoE set that is available from MOBOTIX as an accessory.

d) Exchanging An Analog Camera For An IP Camera

Anyone who would like to benefit from the numerous cost and technological advantages of a high-resolution MOBOTIX IP camera, but has an analog camera already installed, can continue to conveniently use their existing coaxial cable. A PoE switch, whose free ports can be used to connect a control PC or further IP cameras or to set up an Internet connection for remote camera enquiries, is used as the PoE power supply for the IP camera.



Only the analog camera is exchanged for a HiRes camera; the coaxial cable can continue to be used (minimal installation effort required)

Coaxial cables are ideally suited for longer distances

MX-NPA-PoE-Set:

The MOBOTIX PoE injector – compact, robust and flexible.

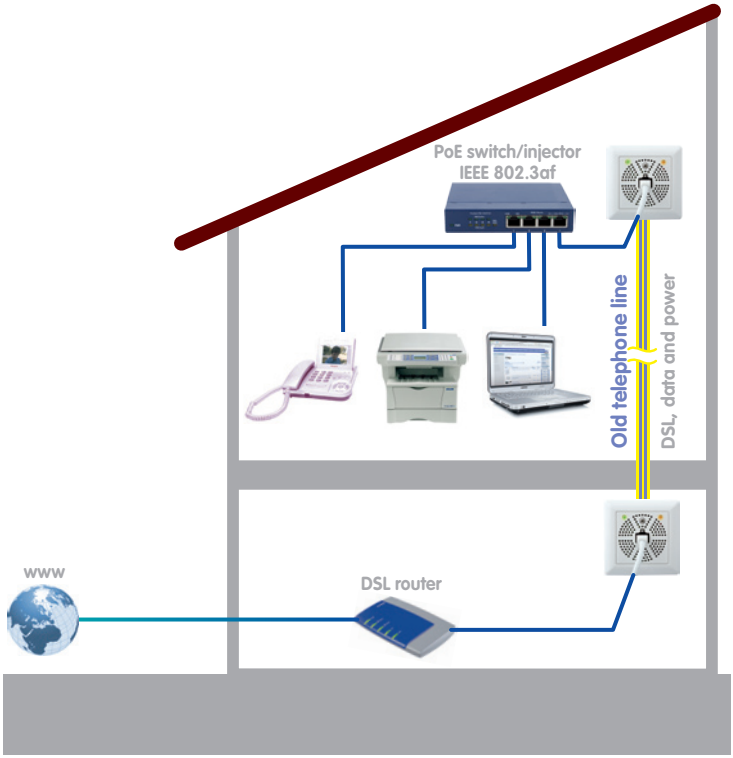
MOBOTIX Mx2wire

e) Connecting Several Network End Devices Via Mx2wire

An Internet connection exists on the ground floor. An office with various network devices (PCs, printers and IP video phones) is to be set up on the first floor. Mx2wire is connected to the two wires of the analog telephone line that is no longer used. All that Mx2wire requires to supply power to the IP telephone and for its own consumption is a PoE switch, to which the remaining network devices can also be directly connected.

The PoE switch on the first floor serves to supply power to the Mx2wire device in the basement

Mx2wire turns the former telephone line into a network cable for several end devices in the office

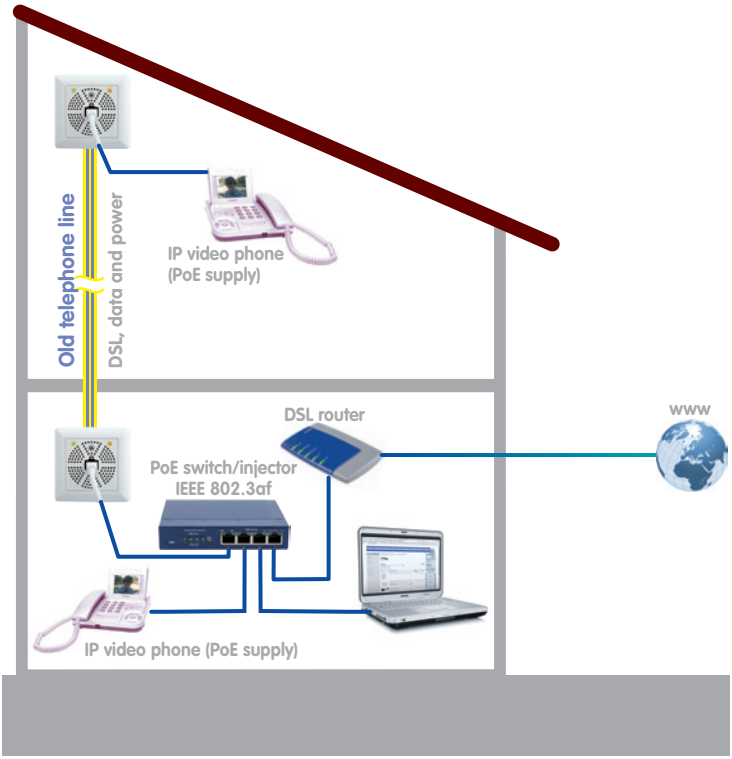


Device Required for the PoE Power Supply (according to IEEE 802.3af):

All Mx2wire installations require a suitable PoE power supply (Class 0). Here, you can always choose between a standard PoE switch/router or the MX-NPA-PoE set that is available from MOBOTIX as an accessory.

f) Replacing An Analog Telephone With An IP Video Phone

A DSL connection and a PC can be found on the ground floor. An analog telephone line extends upstairs from the ground floor. Mx2wire is used to transform the telephone line into a network cable that can transport data as well as power. The old telephones can easily be replaced with IP video phones that are also supplied with power from the PoE switch via Mx2wire.



No power connection is required for the Mx2wire device and IP telephone as up to 7 watts of power can be supplied via PoE

MX-NPA-PoE-Set:

The MOBOTIX PoE injector – compact, robust and flexible.

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POSSIBLE DATA RATES AND CABLE LENGTHS

Please also read the note on page 14

The data rates shown in the tables are net data rates, also referred to as the payload, which are given in Mbps (1 byte = 8 bits). In contrast to the gross data rates (including the data load for the operation of the system) that are usually provided when the performance data of DSL connections is specified, for instance, the amount of data shown here is the actual amount of data that is fully available to the end device operated on the Mx2wire receiver unit. As an example, a **MOBOTIX network camera** only requires a data rate of approximately **2.5 Mbps**.

By correctly combining or twisting additionally available wires to form two wires or cables, the maximum transmission line for data and power can be considerably increased

Notes
When long cables are used, voltage drops may make it impossible to supply end devices with power, so a separate power supply must be provided. In other words, the data range is generally greater than the maximum power transmission line.
Only a network patch cable with a usual maximum length of 10 meters should be connected directly to an Mx2wire unit in order to bridge the path to the next device (switch, router, PC, PoE injector or IP camera, for example).
No provision is made by MOBOTIX for any further extension of the network, for example, by connecting a longer network patch cable to Mx2wire.
It is also not possible to link more than two Mx2wire units.

PoE Power Level Classes (IEEE 802.3af Standard):

Mx2wire always logs on as a Class 0 device and supplies end devices with up to 7 watts of power (up to Class 2)

Class	Max. Power Consumption	
0	**0.44 W – 12.95 W**	**for Mx2wire**
1	0.44 W – 3.84 W	
2	**3.84 W – 6.49 W**	**for end device (max.)**
3	6.49 W – 12.95 W	

The tables on the next page contain sample performance data that was obtained by MOBOTIX under real conditions and using standard benchmark test procedures.

MOBOTIX network cameras – economical and powerful

Less than four watts are enough to power a high-resolution MOBOTIX network camera, including all integrated features such as motion detection and long-term internal storage connected and supplied via the two-wire cable.

Comparative Tables For The Transfer Rates Of Data And Power Depending On Cable Length And Cable Type

Details on the listed cable types is provided on page 5

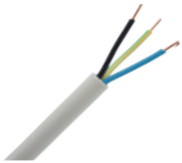
Antenna or Coaxial Cable

Thickness	Length of Coaxial Cable 50 m	100 m	500 m
0.6 mm Inner conductor	Data: 30 Mbps PoE Class: 2	Data: 25 Mbps PoE Class: 1	Data: 15 Mbps PoE Class: N/A

Telephone Line and Bell Wire

Thickness	Length of Telephone Line/Bell Wire 50 m	100 m	200 m
0.6 mm	Data: 25 Mbps PoE Class: 2	Data: 20 Mbps PoE Class: 1	Data: 10 Mbps PoE Class: N/A
0.8 mm	Data: 30 Mbps PoE Class: 2	Data: 25 Mbps PoE Class: 2	Data: 15 Mbps PoE Class: 1

Installation Cable



Thickness	Length of Installation Cable 50 m	100 m	200 m
1.5 mm^2	Data: 20 Mbps PoE Class: 2	Data: 15 Mbps PoE Class: 2	Data: 10 Mbps PoE Class: 2

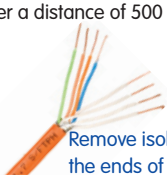
Network Installation Cable

Type	Length of Network Installation (Use of All 4 Wire Pairs, See Below) 200 m	300 m	500 m
Cat7	Data: 30 Mbps PoE Class: 2	Data: 20 Mbps PoE Class: 2	Data: 10 Mbps PoE Class: 2

Mx2wire can also be used to extend the range of an Ethernet connection that would otherwise be limited to just 100 m in length (between the PoE switch and end device). **For this purpose, a Cat7 installation cable is converted to a two-wire cable as follows: Open the four twisted wire pairs and remove approx. 7 mm of insulation from the ends. Then connect the four white wires together to one cable and the four colored wires together to another cable and attach wire-end sleeves.** In conjunction with Mx2wire, PoE class 2 power can be transmitted over a distance of 500 m at a data rate of approx. 10 Mbps.

Please also read the explanations and the note on page 14

Open the 4 twisted wire pairs



Remove isolation from the ends of all 8 wires

Combine 4x white and 4x colored

Use 2 wire-end sleeves to connect to the two Mx2wire connectors

Due to physical constraints, cables exceeding a certain length can still transfer data but not power. When installations have no PoE-supplied end devices (PCs, for example), the range of the two-wire cable may increase significantly, provided that low data rates are sufficient for the application.

MOBOTIX Mx2wire

The value for the power transmission capacity of a cable of a particular thickness and length is given as a PoE class (see table on page 12). This means that the power supply and full functionality of a PoE end device in the specified class (1 or 2, depending on the cable cross-section and length) is guaranteed on the Mx2wire receiver unit. The sender is the Mx2wire unit that is supplied directly from the PoE switch.

Note on Data Transfer Rates and Cable Lengths

We have tested the product very carefully and, instead of specifying non-recurrent peak values, we only provide the important net data rate, which was measured over a long period of time. However, we can provide **NO GUARANTEE of possible cable lengths, data rates and power transmission**, as various physical factors are not within the area of responsibility of MOBOTIX (sources of interference such as machines or power cables, the condition and quality of the cables used, etc.). The nominal data rate, connection length and power transmission can only be individually tested and determined at the place of installation.

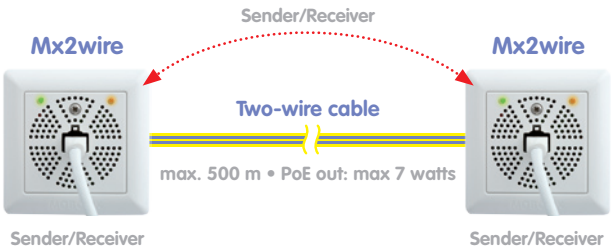
The sender is the Mx2wire unit that receives power from the switch, as data is transferred in both directions

AUTOMATIC CONFIGURATION OF SENDER AND RECEIVER

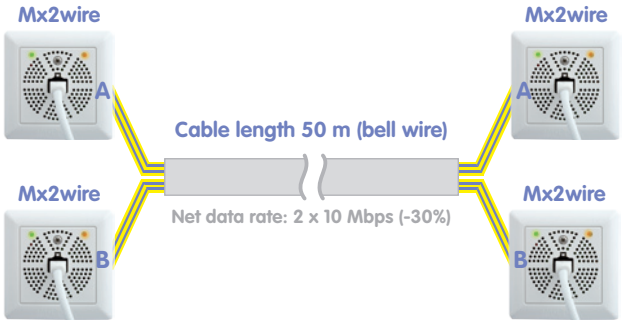
When data and power are sent via the two-wire network cable, a (feeding) Mx2wire unit functions as the sender while the other unit functions as the (data) receiver. Communication between the Mx2wire units is possible in both directions, as the 'sender' and 'receiver' roles always configure themselves automatically.

Transmitting and receiving in both directions

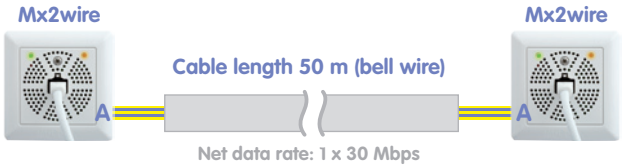
Power can be supplied from both sides, even simultaneously



MULTIPLE COEXISTENT MX2WIRE UNITS



Cables that are right next to each other can interfere with one another and reduce data rates



Example: A 50-meter long 4-wire cable (bell wire), of which two wires are used for each pair of Mx2wire units (A and B)

The data rate is 10 Mbps for each Mx2wire pair (from A to A and from B to B). If only one pair is connected (only A, see the figure above), the net data rate of Mx2wire is 30 Mbps. The reduced data rate in this example is due to the cables interfering with each other.

Normally, the two pairs act like a network hub, that is, the data transferred from A to A is also available on the two units of the data path from B to B. In order to prevent this, each couple of Mx2wire units is paired at the factory, which means that they have the same network number (network ID) and can therefore communicate with each other.

The network number is located in the top right corner of every Mx2wire circuit board

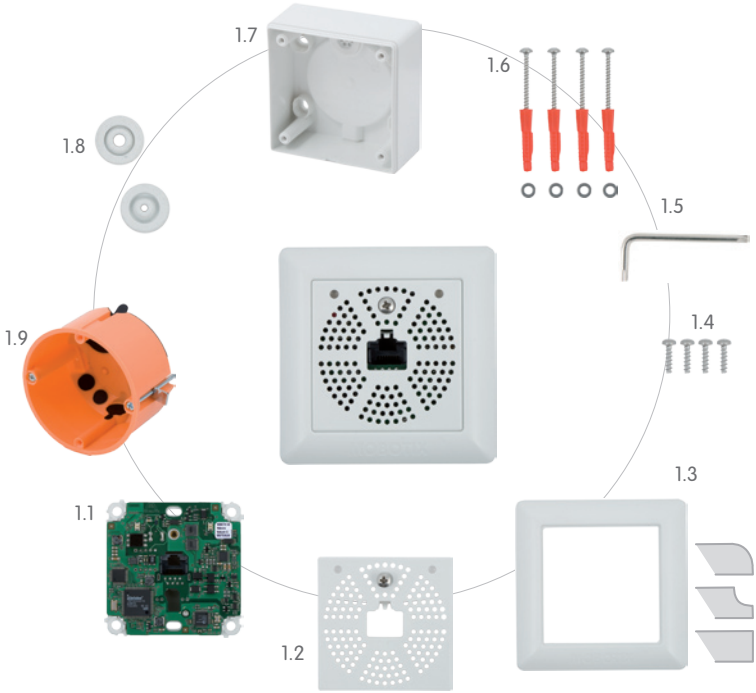
Note
Two Mx2wire units must always be used as a pair (as originally packed). The two paired units have the same network ID. The network ID is printed on a sticker located in the top right corner of the circuit board.

Two cables that are directly next to each other and "in the same cable conduit," so to speak, interfere with each other, which may lead to a reduced data rate. This is also the case when no electrical connection has been established.

MOBOTIX Mx2wire

DELIVERED PARTS

Components of an Mx2wire unit (each set contains two units)



Items 1.1, 1.2 and 1.3 are joined together when delivered and must be separated before the installation begins

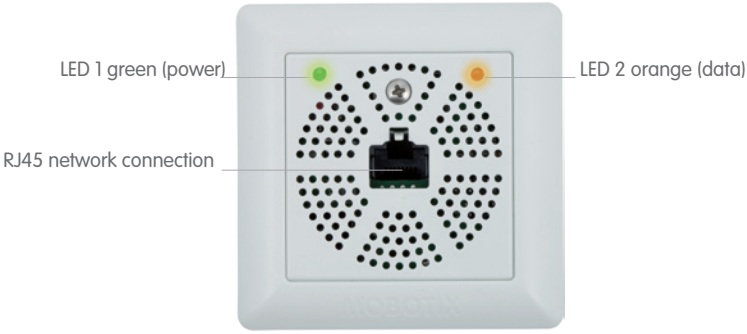
Item	Quantity	Part Name
1.1	2	Mx2wire housing and circuit board including stainless steel screw (2x11 mm)
1.2	2	Front panel including stainless steel screw (M3x12 mm)
1.3	6	White concave, convex and flat frames (two of each)
1.4	8	Self-tapping stainless steel screws (3x10 mm)
1.5	2	Torx wrench for Torx screws
1.6	8	Torx screws (M3, 5x40 mm), washers (3.5 mm), screw anchors
1.7	2	White surface-mounted socket, height of 35 mm, including 8-wire plug
1.8	4	2 plugs for 3-5 mm cables and 2 plugs for 5-7 mm cables (alternative to 8-wire plug)
1.9	2	Cavity socket

HOUSING AND CONNECTORS

The Mx2wire media converter is a set of two Mx2wire units, each consisting of a circuit board and housing, front panel, frames, flush-mounted or surface-mounted socket and assembly parts.

Connectors

- Front: RJ45 network (Ethernet network including PoE power supply)
- Rear: Two-wire (connectors 1 and 2) and MxBus (connectors 3 and 4, not yet available)



The LEDs indicate the current operating status

The terminals of Mx2wire are designed for wire cross-sections of between 0.13 mm² and 2.0 mm² (solid wire)

No multi-core cables allowed (unless equipped with wire-end sleeves)

Only connectors 1 and 2 may be used for the two-wire connection. Connectors 3 and 4 are reserved for the MxBus connection, which will be available in the future.

A robust, high-quality product – Made in Germany

Mx2wire does not have any mechanical parts and is practically maintenance-free. It also features a very high operating temperature range of -30°C to +60°C (-22°F to 140°F).

MOBOTIX Mx2wire

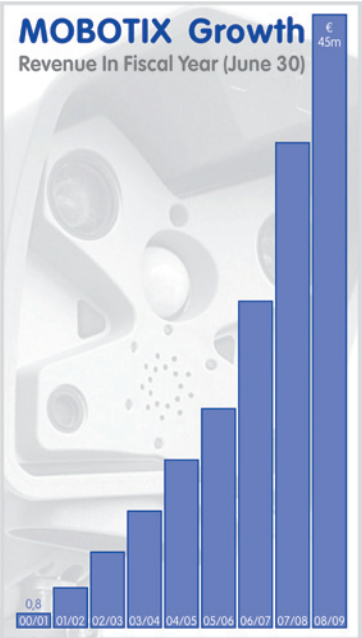
HiRes Video Innovations

The German company MOBOTIX AG is known as the leading pioneer in network camera technology since its founding in 1999, and its **decentralized concept has made high resolution video systems cost efficient**. Whether in embassies, airports, train stations, ports, gas stations, hotels or on highways – over hundred thousand MOBOTIX video systems have been in operation on every continent for years.

Pioneer In Network Camera Technology

In just a short time, MOBOTIX has climbed to second place in Europe and fourth place worldwide in terms of market share. MOBOTIX has been exclusively manufacturing megapixel cameras for many years now and with a market share of over 60%, is regarded as **the global market leader in high-resolution video systems**. In the **decentralized MOBOTIX concept**, every camera has an integrated high-speed processor and, if needed, a digital memory device (MicroSD/SD card) for long-term recording.

MOBOTIX cameras can make event-driven recordings even without a central PC or DVR and can digitally store videos long term with sound. This is why MOBOTIX solutions represent an unbeatably good value with their excellent image quality, even for small-scale installations.



Free Consulting Service

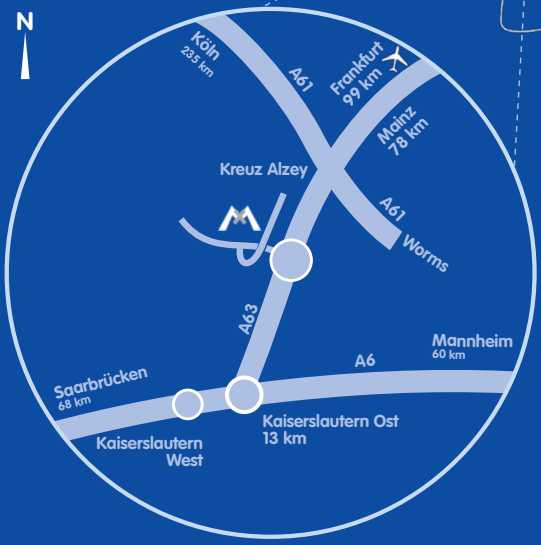
Simply call us or send us an e-mail. We will get in touch with you promptly.

With MOBOTIX, you are in the best hands right from the start. Both our in-house project managers and our experienced, highly-specialized Secure partners ensure that every system is optimally designed and installed.

Our support specialists will help you with any technical questions you may have.

MOBOTIX Training Programs And Seminars

MOBOTIX has its own training center with an extensive offering for all interested parties, customers, partners and security companies. MOBOTIX offers seminars for basic and advanced users. For more information: www.mobotix.com



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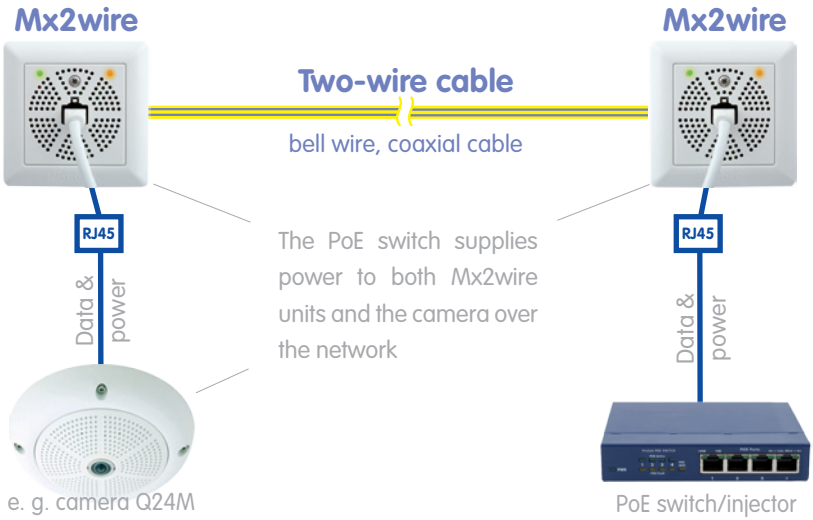
EN

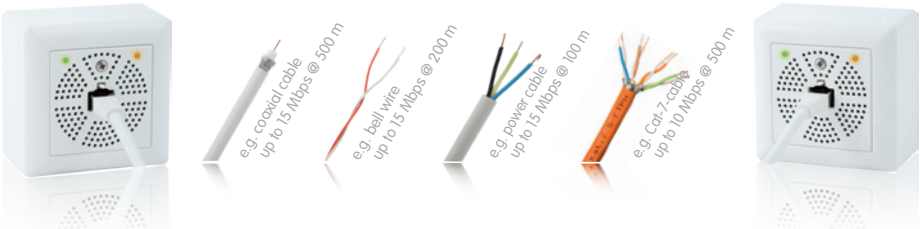
Mx2wire Media Converter

The HiRes Video Company MOBOTIX

Ethernet with PoE. Using 2-Wires.



The Mx2wire Set includes all components required to set up an Ethernet connection via an existing two-wire cable (bell wire, antenna cable). The product is delivered with two Mx2wire units, three different designer panel frames (interchangeable), surface-mounted sockets, cavity sockets and assembly parts ...



... all for €298* **(introductory price valid until December 31, 2009)**

09/2009

www.mobotix.com

HiRes Video Innovations

The German company MOBOTIX AG is known as the leading pioneer in network camera technology and its decentralized concept has made high-resolution video systems cost-efficient.

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