KNX Association,
Facts & Figures about KNXnet/ IP

Document

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Acronyms

EDI	ETS Data Interface
TP	Twisted Pair
UDP	User Datagram Protocol

1 IP as KNX Communication Medium

1.1 Medium

KNX IP is the name of the IP protocol when it will be used as a pure KNX communication medium. KNX IP devices communicate with each other exclusively via KNX IP. Opposite to the KNXnet/IP Router or KNXnet/IP Tunneling Server introduced before, these KNX IP devices do not have a Twisted Pair connection.

1.2 Protocol

The IP protocol is used as a host protocol. KNX IP devices use the identical IP multicast address and runtime frame format as known from KNXnet/IP Routing. This allows KNX IP devices to also understand the frames sent by KNXnet/IP Routers and thus to communicate with KNX TP, KNX PL or even KNX RF devices. Interworking with these devices is guaranteed.

IP Datagram Details

- The KNX IP medium uses UDP IP datagram on fixed IP Port 3671
- The IP multicast address used for the KNXnet/IP Routing traffic is typically 224.0.23.12

Remark: The multicast address may vary per KNX installation connected to the same IP network.

1.3 Busload

The typical IP data rate is 10 Mbit/s or 100 Mbit/s and differs significantly from the TP1 data rate of 9,6 Kbit/s. This medium is also shared with other applications in a LAN environment. Therefore, the KNX IP medium definition is enriched with dedicated, KNX specific protocols and frames to control the frame rate and to prevent, signal and solve possible problems. This guarantees again the well-known KNX communication reliability for the applications.

A KNXnet IP router or KNX IP device is capable to process at least ~ 13.000 routing frames per second (255 KNX IP devices per line * 50 datagram's/second). A KNX IP device should be able to handle these amount to.

1.4 Topology

KNX IP can only be a main – or backbone line; it cannot be a Subnetwork underneath KNX TP1 or KNX PL. On these media however, line and backbone couplers separate and filter the communication between Subnetworks.

KNX IP devices all use the same IP multicasts address: all other KNX IP devices receive any runtime frame sent by a KNX IP device. This is not filtered by IP network components as switches and routers: on KNX IP, the topology is "flattened".

EXAMPLE: Assume devices 1.0.3 and 1.2.5 are both KNX IP devices. Frames between those are not filtered or repeated by any KNX system component.

2 ETS and KNX IP

KNX IP devices commissioned and programmed by ETS. The medium indication “5” in the mask version differentiates them from the devices on other media.

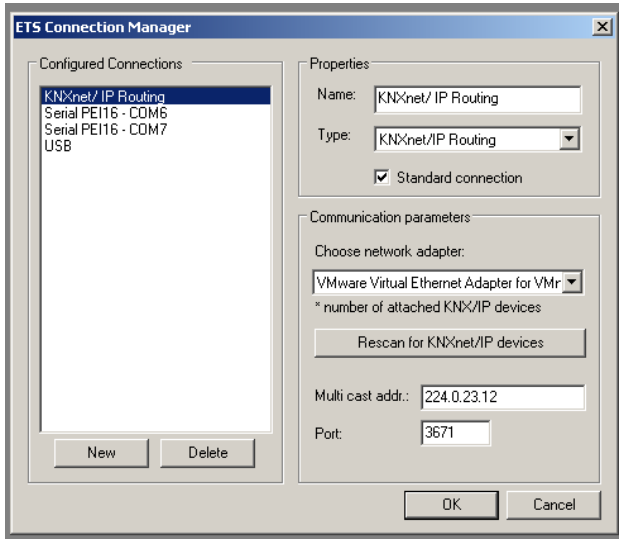
- KNX IP devices can be programmed by ETS.
- ETS may in be located anywhere in the topology: either directly to IP or somewhere in a TP line. The KNXnet/IP Routers will where necessary translate the TP telegrams into KNXnet/IP frames and vice versa.
- The full IP communication power and benefit of this new medium shows when ETS is directly connected to the IP network, because it can communicate directly with the target device **without** using any interface.
- Alternative approaches, e.g. connecting ETS with the KNXnet/IP Tunneling Server in the KNXnet/IP Router are possible as well.

2.1 Establishing a connection with KNXnet/IP Routing

The KNXnet/IP routing EDI uses the KNX/IP routing protocol and does not require, like the standard KNX/IP EDI, a KNX/IP tunneling server. It is possible to configure the individual address in the ETS. The individual address will be saved in the registry. The default address is 15.15.1. Depending on the IP address the tunneling or the routing EDI will be used. If the IP address is in the area 224.0.0.0/16, it is a KNX IP multicast address and the routing protocol will be used, otherwise the tunneling protocol.

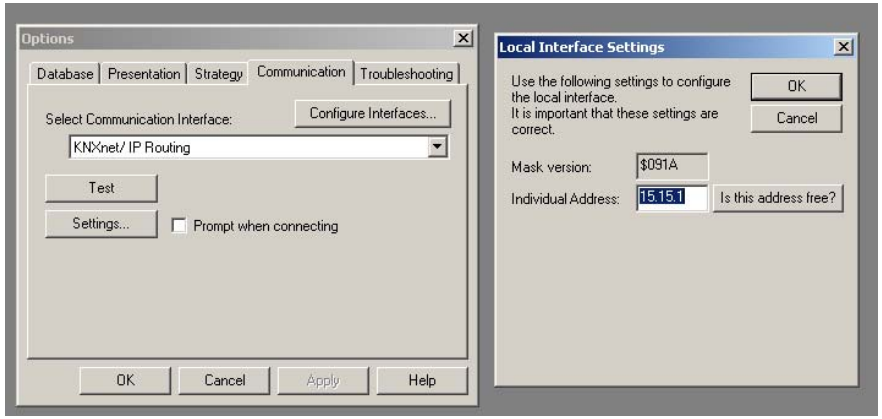
2.1.1 Configure the connection in the connection manager

To configure an “KNXnet/ IP routing” connection, it is necessary to insert in the connection manager as an IP address a KNXnet /IP (system) multicast address, e.g. “224.0.23.12”



2.1.2 Setting the individual address

The individual address is usually set in the local interface settings dialog. The address will be saved user-specific in the registry.



2.2 Examples

In order to put examples, two of them will be shown here.

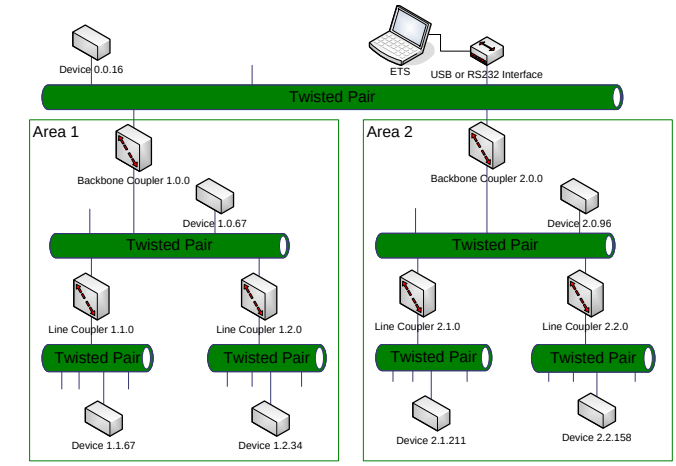
First Example: a complete area of a classic full TP installation needs to be connected to a faster backbone.

Second Example: Nearly as first example; instead of an entire area, the request is to connect just one line of the same area to IP.

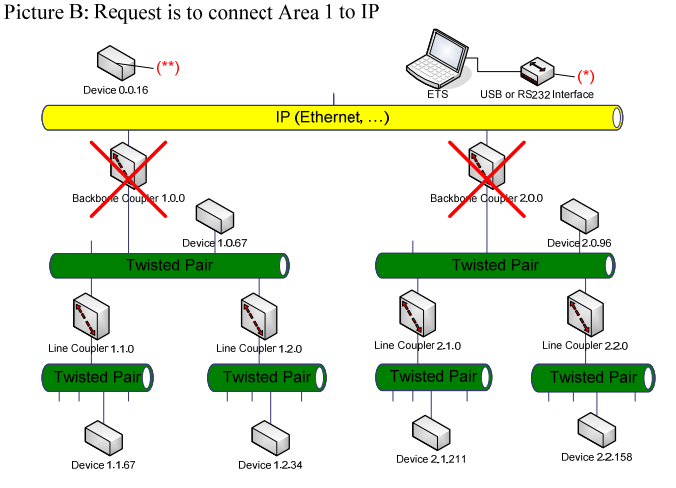
Both examples point out what are the consequences and how they need to be built up.

Example 1:

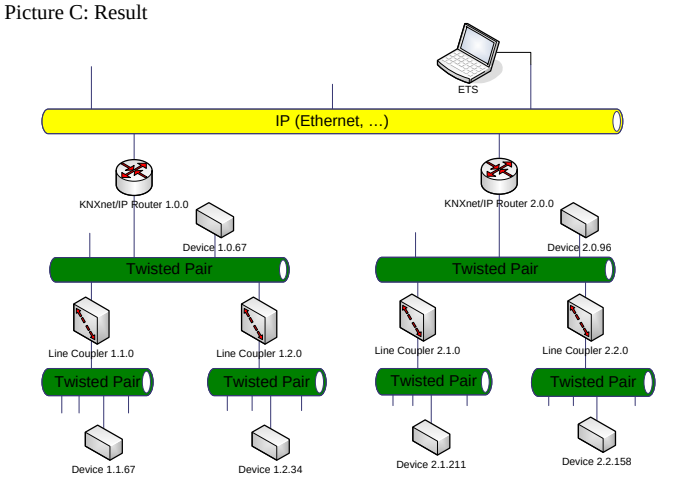
Picture A: Initial situation – a classic Twisted Pair installation



Picture B: Request is to connect Area 1 to IP



Picture C: Result



Picture B:

Connecting Area 1 to IP has as a consequence that also Area 2 needs to be connected to IP.

Picture C:

This can be done by replacing the two backbone couplers 1.0.0 and 2.0.0 with KNX/IP Routers – while using the same individual addresses.

Remarks:

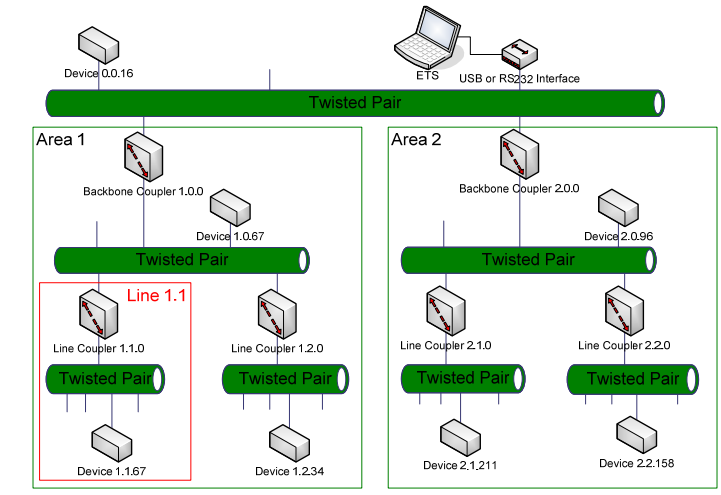
(*)
The USB or RS232 interface is not longer necessary with this ETS3 version (ETS3.0f). ETS can connect directly via LAN connector.

(**)
The TP device 0.0.16 cannot be connected to IP directly – this might have additional consequences and hence require possible clarification with the responsible person.

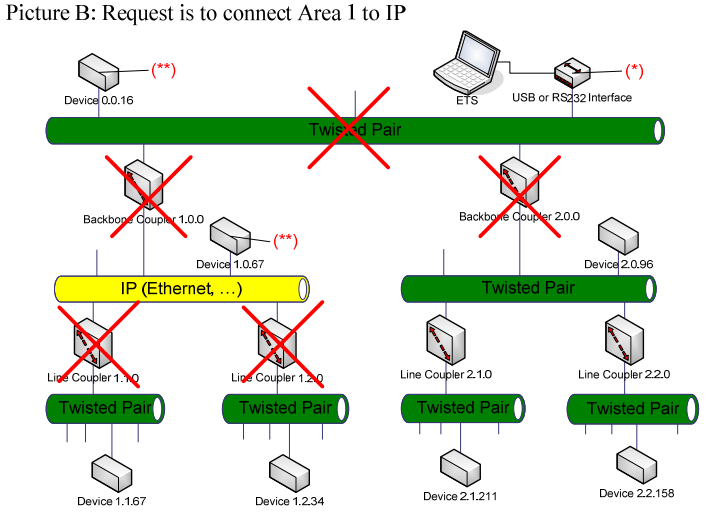
In theory, a 1:1 (functional) replacement with a KNX IP Device is necessary, the other possibility is to transfer removed functionality logically to other/ to be added TP devices.

Example 2:

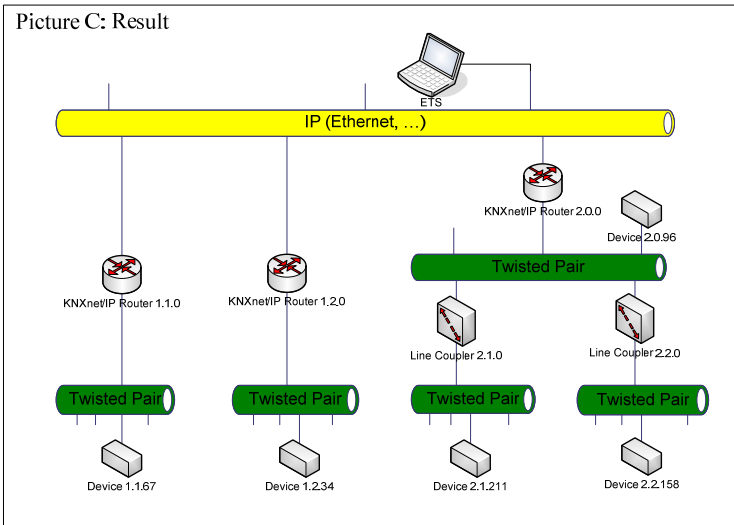
Picture A: Initial situation – a classic Twisted Pair installation



Picture B: Request is to connect Area 1 to IP



Picture C: Result



Picture B:

Connecting Line 1.1 has the following consequences:

- Line 1.2 needs to be connected to IP too
- the backbone coupler with individual addresses 1.0.0 will simply disappear
- the entire Area 2 needs to be connected to IP too

Picture C:

This can be done by replacing:

- the two line couplers 1.1.0 and 1.2.0 with KNX/IP Routers – while using the same individual addresses
- the backbone coupler 2.0.0 with a KNX/IP Router – while using the same individual address

Remarks:

(*)
The USB or RS232 interface is not longer necessary with this ETS version. ETS can connect directly via LAN connector.

(**)
The TP devices 0.0.16 and 1.0.67 cannot be connected to IP directly – this might have additional consequences and hence require possible clarification with the responsible person.

In theory, a 1:1 (functional) replacement with a KNX IP Device is necessary, the other possibility is to transfer removed functionality logically to other/ to be added TP devices.