



SYSTEM SOLUTIONS FOR THE KNX STANDARD

About us

The company

Weinzierl Engineering GmbH develops software and hardware components for smart home and building technology. Our focus is on building networks based on the KNX standard. The open standard ensures the future viability of products for our customers.

Weinzierl has been operating successfully on the market for over 20 years and has been an active member of the KNX Association from the very beginning.



Our technological heart

The heart of our development solutions are our stack implementations for standardized device models and media for KNX. We offer KNX certified system software for Twisted Pair (TP), Radio Frequency (RF) and Ethernet (IP). We provide our KNX Stacks with our KNX BAOS Devices, Modules or Chips. The system software is available also as a standalone product.



Quality right from the start

Since our foundation in 2001, Weinzierl has consistently focused on quality. Quality management in accordance with ISO9001 was introduced in the early years and certified for the first time in 2003. This means that Weinzierl has been continuously certified for more than 20 years.

Our team

With our team of experienced developers and dedicated staff, we comprehensively cover the KNX system and offer extensive knowledge and expertise in intelligent building systems technology.

This enables us to achieve a high level of development depth in hardware, software and mechanics.



Expertise with system know-how

Weinzierl has its own department for system development, both for KNX stacks and for software tools. These developments form the basis for the rapid implementation of new technologies such as KNX Security.

Made in Germany

We are based in the south-east of Germany, in Bavaria. The entire team works at one location. With our own production facilities, we focus on local value creation of the highest quality. Our most important suppliers are also based in Germany.

Sustainability at Weinzierl

Weinzierl consistently focusses on sustainability in its activities. It is important to us to act in an environmentally friendly and resource-saving manner. For example, we largely cover our electricity requirements with our own PV systems and storage facilities.

We consistently avoid plastic in our packaging and minimize the volume of packaging. We also deliberately avoid having a sales force with a high amount of travelling.

First choice: KNX

A true global standard: the world of home and building automation "speaks" KNX. Whether smart home or building automation.

With its various media, KNX technology offers universal solutions for old and new buildings. KNX was the first global standard for building technology to be certified according to EN and ISO / IEC. As an active member of the KNX Association, we are helping to develop and shape the future of the standard.

Open and future-proof

Open standards are essential for cross-manufacturer solutions. The networking of a wide range of trades requires open technologies. KNX is the world's most successful standard for controlling modern buildings.

Simply secure

The security requirements in building automation are increasing.

Laws and standards will also increasingly require secure transmission of digital information.

Weinzierl recognized this at an early stage and consistently implements encryption. The majority of our devices of our devices now support KNX IP Security or KNX Data Security.



We shape the Future

The KNX standard is continually evolving. To actively support this process we are a member of the KNX System Group (KSG), the KNX Technical Board (KTB) and take part in special working groups. Thus, we always offer you the latest information and trends.

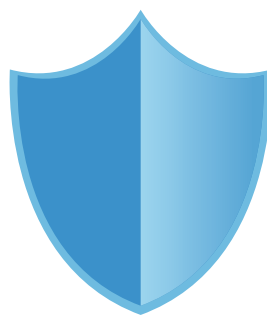
Focus on requirements

Whether in a smart home or an office building, the requirements for comfort and options for controlling air conditioning, lighting and access control are growing. At the same time, the efficient use of energy is becoming increasingly important. This can only be achieved by intelligently connecting and controlling all components.

Your Partner for KNX

The comprehensive specifications of the KNX Standard are a great opportunity for manufacturers to create new solutions for home and building automation. We advise and support you in getting started with KNX development. We provide a scalable portfolio of software, devices, modules and chips to integrate KNX connectivity into your devices and applications.

Offering professional development services and a KNX accredited test lab, Weinzierl is your partner for cost effective solutions to develop and implement your KNX devices.



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Developing: How to start

DEVELOPMENT FIRST STEPS

Making Decisions about

- Medium
- Configuration Mode
- Development Platform

While the choice of the medium and the configuration mode are typically defined by the application, the decisions regarding hardware and device model can often be difficult - especially if this is your first KNX development project.

These decisions become even more complex as they are strongly related to investments in system software, training and tools. From a long term perspective, these decisions also may influence the complete range of a manufacturer's KNX product portfolio. Therefore it is essential to select a development platform with proven flexibility and scalability for a lasting and effective development cycle.

Jump Start: OEM Devices

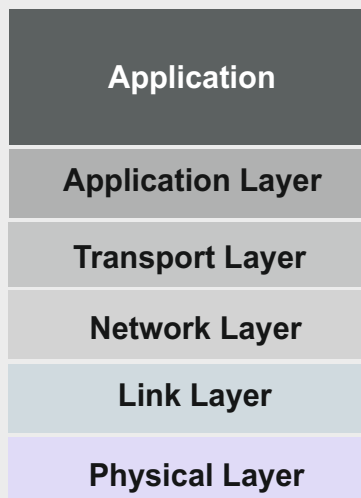
With OEM versions of our devices you can quickly offer your own branded KNX solutions. Choose between our comprehensive range of USB Interfaces, Gateways, IP Interfaces, IP Routers, our innovative IP BAOS devices and our new KNX IO series. We manage the complete production process including full customization of the devices and thus you can easily complete your product range.

Platforms for individual OEM

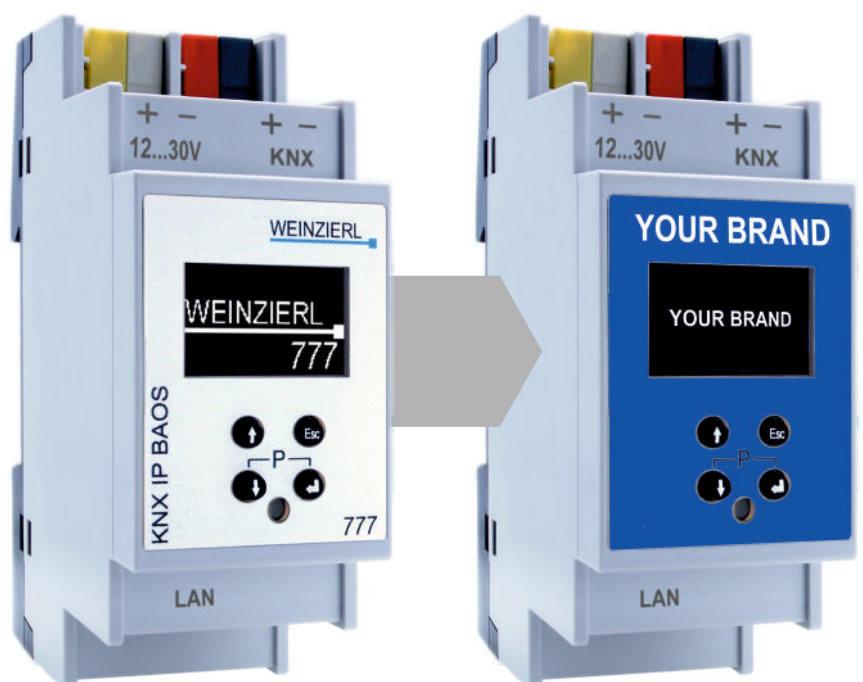
If you need more individual features for your KNX devices, we develop your KNX devices with feature sets tailored to your needs. Based on our platform concept we can create devices with unique selling points for your offering.

KNX Device Architecture

Model



Implementations



The World of BAOS

BAOS - "Bus Access and Object Server" - is a universal architecture to enable KNX connectivity for a great variety of products. Weinzierl offers a scalable set of modules and powerful devices which rapidly enable the complete integration of applications into the KNX System. BAOS Modules and Devices can be used as interfaces to connect to KNX, both on the telegram and on the data point level (the KNX Application Layer). BAOS Solutions allow an easy integration and implementation of KNX connectivity while releasing the application itself from the complexity of the KNX protocol, including the network management.

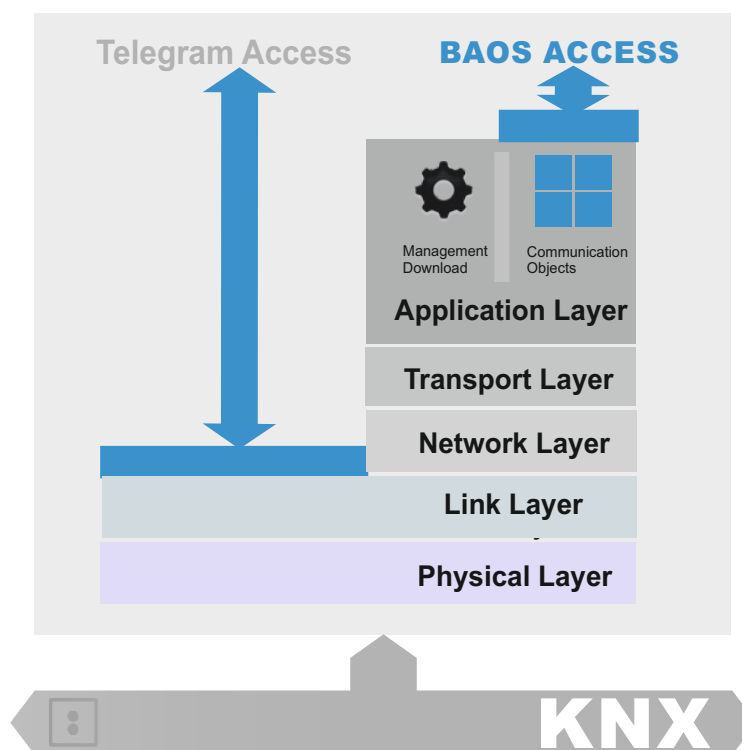
Telegram Interface

BAOS modules and devices provide an interface to the KNX network on telegram level. Regardless whether frames are individual or group addressed or broadcast telegrams. The BAOS implementation allows direct access via cEMI (common external message interface) protocol according to the KNX Standard.

Object Server

Main use case of the BAOS architecture is communication using the integrated object server. Client applications don't need to handle KNX telegrams but can access data points. This level of abstraction decouples the application from the KNX system and KNX commissioning can be done via ETS® software.

BAOS



SDKs and Demo Application

For a fast and easy integration of BAOS solutions into application and devices, Weinzierl provides free demo code and SDKs (software development kits).

Generic Database

For all KNX BAOS modules and devices, Weinzierl provides a generic ETS entry with free configurable data points and free parameter bytes. This speeds up getting started in KNX development with just a few steps. Individual ETS entries can be created using the KNX MT (Manufacturer Tool - available from KNX Association).

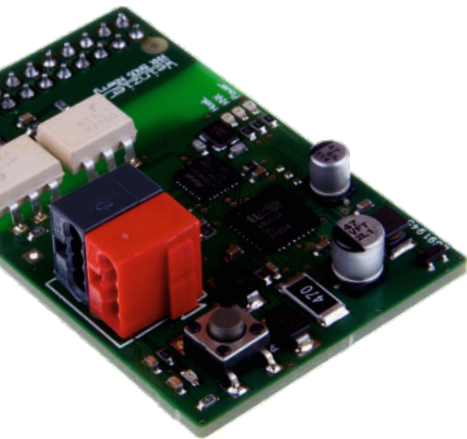
BAOS connectivities

- **KNX BAOS Serial** modules allow full integration of KNX connectivity into any embedded device with UART connection.
- For more complex devices running an OS like Linux the **KNX BAOS USB** connectivity is a perfect option. USB protocol is implemented according to KNX standard.
- **KNX IP BAOS** devices enable connectivity via IP/LAN connection (even via Wi-Fi). KNX IP solution supports multiple connections in parallel. In addition the KNX IP BAOS 777 supports RESTful web services.

SERIAL

Weinzierl BAOS Serial Modules

A quick and efficient solution to connect your devices with KNX are KNX BAOS modules. The modules include both a KNX transceiver and a micro-controller with a certified KNX stack. Communication with the module is executed via the reliable Serial Protocol FT1.2. It enables sending and receiving of KNX telegrams according to the cEMI (common external message interface) format. However, the main use case is the communication on the datapoint level.



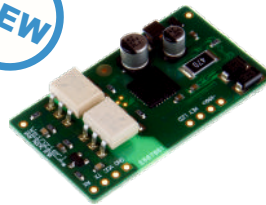
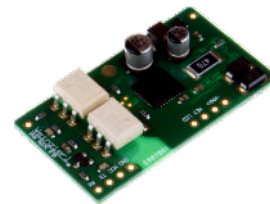
KNX BAOS Starter Kit (Art.-No. 5240)

To start your development project, a BAOS Development Kit is available which contains:

- Development board
- KNX BAOS modules 830 / 832
- Tools and Demo Software
- Manual

KNX BAOS Module 830 (Art.-No. 5171)

The KNX BAOS Module 830 offers a generic data base with 1000 group objects/data points, galvanic isolation and is powered via the bus.



KNX BAOS Module 830.1 *secure* (Art.-No. 5499)

The KNX BAOS Module 830.1 *secure* is the first KNX Module supporting KNX Security. As an option also the communication with the host can be encrypted with an AES based algorithm.

KNX BAOS Module 832 (Art.-No. 5239)

Same feature set as the model 830. The KNX BAOS Module 832 provides power for the application without galvanic isolation.



KNX BAOS Module 840 RF (Art.-No. 5209)

The wireless member within the modules family is the KNX BAOS Module 840 RF: it is the wireless variant (KNX RF) of the KNX BAOS Module 830 and implements KNX RF with full ETS support.

KNX BAOS Module 838 kBerry (Art.-No. 5208)

The KNX BAOS Module 838 kBerry is an adaptation of our KNX BAOS modules specifically made for the Raspberry Pi. It can be attached directly to the pins of the Raspberry Pi and communicates via a serial port. A free SDK is available for download.



Future proof

The KNX USB Interfaces 312 / 332 as well as the KNX USB Module 322 implement a complete KNX Stack with communication objects and BAOS protocol V2. Thus, both offer the possibility to extend devices with USB connection to full KNX devices, which can even be programmed by ETS.



KNX USB Interface 312
(Art.-No. 5229)

*KNX USB Interface
Support of KNX Long Frames
BAOS Binary Protocol*

Fully compliant

An USB link is suitable to extend state of the art hardware with KNX connectivity. The KNX USB BAOS solution is fully compliant with the KNX USB specification of the KNX Standard. It is based on HID reports and uses standard cEMI frames for the telegram interface. Via the normal local device management the BAOS protocol can be discovered and activated.



KNX USB Module 322
(Art.-No. 5257)

*Functionality like Art.-No. 5254
PCB without enclosures
Size: 39.2x14.5 mm
Solder connectors provided
for KNX and USB*

KNX USB Module 323 secure
(Art.-No. 5446)

*Functionality like Art.-No. 5445
PCB without enclosures
Size: 39.2x14.5 mm
Solder connectors provided
for KNX and USB*



Simple Configuration via ETS

In BAOS mode the device behaves like a normal end device in the KNX system. The individual address can be assigned by ETS as usual. The KNX programming mode can be operated via the host protocol. The application download programs the communication tables as well as user parameters. The generic database, which is available from Weinzierl, can be used for first steps. Of course also for the USB option it is possible to implement individual ETS entries with application specific data points and parameters.

Case by case

Integrated as module 322 or stick 332 in a device the KNX USB BAOS solution achieves a full value KNX device with possible individual ETS entry and KNX certification. Placing the stick as external device or using the rail mounted version 312 allows handling KNX connectivity as an option which can be added case by case.



KNX USB Interface Stick 332
(Art.-No. 5254)

*KNX USB Interface
Support of KNX Long Frames
BAOS Binary Protocol*

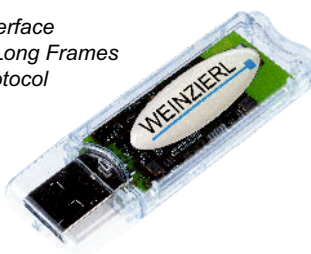


KNX USB Interface Stick 333 secure
(Art.-No. 5445)

*(Art.-No. 5445)
KNX USB Interface
BAOS Binary Protocol with security
Support of KNX Long Frames*

KNX RF USB Interface Stick 340
(Art.-No. 5110)

*(Art.-No. 5110)
KNX RF USB Interface
Support of KNX Long Frames
BAOS Binary Protocol*



Integrated KNX Stack

Switching to the BAOS protocol enables the full KNX Stack integrated in the KNX USB BAOS device or module. The communication switches from data link layer (telegrams) to application layer (data points).

IP connectivity - since 2006

More than 15 years ago it already became obvious that IP connectivity will be of great importance in home and building control. The KNX IP BAOS architecture has established to become the most successful solution nowadays to connect non-KNX devices to KNX networks via IP.

Binary style and web services

KNX IP BAOS devices map KNX data to an IT-friendly API (Application Programming Interface). The BAOS protocol is implemented in a binary style. The KNX IP BAOS 777 even supports a RESTful API. Thus, IP BAOS devices greatly reduce the effort to connect any IP featured applications. Even control or visualization tools can smoothly be integrated into KNX.

BAOS configuration via DCA

For BAOS Modules and Devices a generic ETS entry is available providing a list of all available data points. It allows to select a data point type and to fill-in a name for each data point. In addition, a so-called DCA (Device Control App) is available now. It enables the import and export of a BAOS configuration via a csv-file. A DCA is a kind of plug-in in ETS. It is shown as an additional tab for each device.

RESTful Services

The KNX IP BAOS 777 in addition supports a RESTful service API. Via RESTful services the device provides the complete semantic information required to control the installation. It can be used to find all rooms and extract the installed functions. Each function is a set of data points with a well-defined relation like control, status feedback and of course the RESTful Services provide access to the KNX data points which hold the runtime data. A web socket notification system (server push) is implemented for fast indications. Using the RESTful services, it is possible to integrate a KNX installation in other control systems fully automated without dealing with KNX specific data and without the use of an additional editor.

KNX IP BAOS 773 (Art.-Nr. 5262)

*KNX IP Interface with Object Server
KNX IP Tunneling: 5 connections
BAOS IP: 10 connections
Up to 250 data points
Power supply via KNX bus*

KNX IP BAOS 774.1 secure

The KNX IP BAOS 774.1 *secure* is the secure version of our well-tried KNX IP Object Servers 773/774. It supports KNX data and KNX IP security and allows also the protection of the BAOS communication on IP. For the encryption of the BAOS protocol the principles of KNX IP security has been re-used. The device supports up to 1000 data points. For getting started we provide a generic ETS entry. Application specific implementations for ETS are possible as well.





KNX IP BAOS 774
(Art.-Nr. 5263)

As KNX IP BAOS 773
Up to 1000 data points



KNX IP BAOS 774.1 secure
(Art.-Nr. 5475)

As KNX IP BAOS 774
Support of KNX Security

KNX IP BAOS 777
(Art.-Nr. 5193)

KNX IP Interface with Object Server
Web Server with Visualization
RESTful web services
KNX IP Tunneling: 8 connections
BAOS IP: 10 connections
Up to 2000 data points
Timers with astro function
Power supply: External supply
12..30 V DC or PoE
Power consumption: < 2 W

IP

Residential Gateway

While all KNX BAOS solutions provide an object server with an interface on data point level the KNX IP BAOS 777 in addition provides a description of the control network of a building. Via RESTful JSON API it retrieves semantic information about the KNX installation.



Simple and powerful visualization

Using ETS, the installer defines the rooms and which functions are available to the client. The KNX IP BAOS 777 encodes the rooms of a building as well as the available functions as a set of meta data. While a room is seen as a collection of functions, a function is a collection of data points representing a specific KNX interworking function.



E-mail services

The integrated e-mail functionality allows the easy setup of push notifications for individually selected functions and data points.

Smart Integration

The semantic information stored in the KNX IP BAOS 777 is used by the web visualization of the device. All information about rooms and function origin from parameter settings in ETS. The web visualization internally uses the same RESTful API which is also accessible from remote applications.



Timers with astro function

The timers - synchronized via Network Time Protocol (NTP) and visible in the web visualization - are just one possible front end of the timer functions provided by the BAOS API. Timers can also be created and started by any client, e.g. mobile apps. As timer functions are running on the BAOS device no further client activities are necessary.



Logging

The KNX IP BAOS 777 has an integrated data logger which can be enabled for any configured data point.



STACK

KNX Communication

Each device which communicates via a KNX network needs an implementation of the KNX protocol. The KNX protocol is specified according to the OSI reference model (Open Systems Interconnection) as a set of layers.

The KNX system is a decentralized network. The runtime communication is mainly based on group telegrams in multicast. To participate in the KNX runtime communication each device must be configured, e.g. group addresses must be assigned.

Typically this is done via the official ETS® commissioning software available from the KNX Association. The configuration can be loaded into the distributed devices via the KNX network during the device download. The management procedures are quite complex and are also part of the KNX Standard.

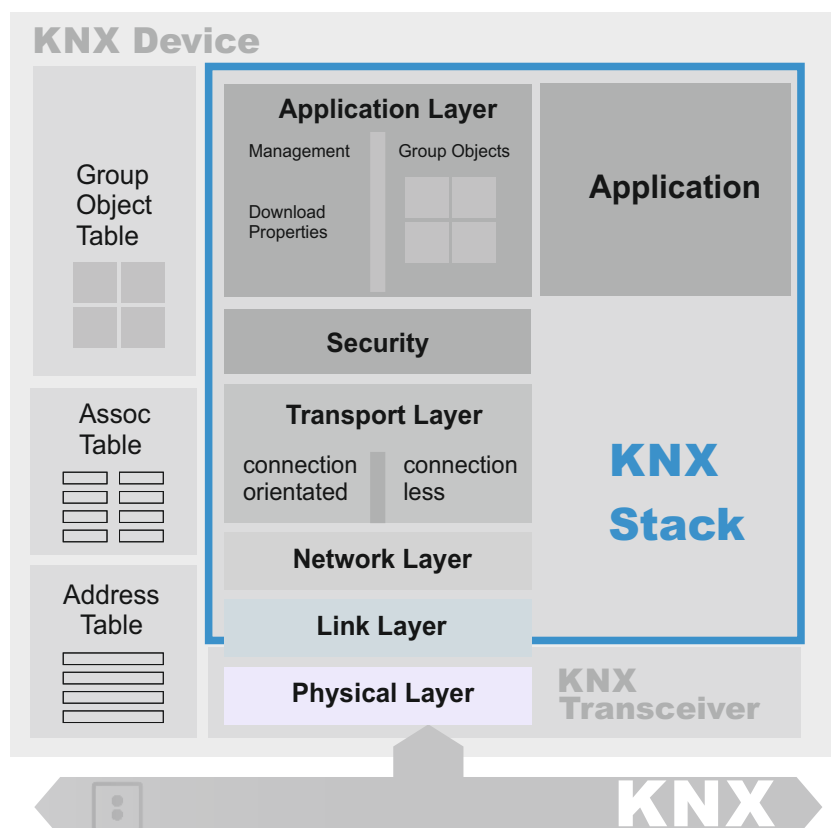
In contrast to the runtime communication the network management is asymmetric. A KNX device which can be loaded via the network is called a KNX management server. It offers services like memory write to the programming tool which is called a KNX management client.

KNX Stack for End Devices

Typically, the term “KNX Stack” is used for the system software of a KNX device. A KNX Stack is the firmware which can be used to develop KNX devices like sensors or actuators. Our KNX Stacks are globally used by many well-known manufacturers for a great variety of KNX devices which are produced in high quantities today. A KNX device is always based on a device model. A device model specifies both the management procedure (how the device is configured via the bus) and identifies the resources available in the device (e.g. the maximum size of the connection table).

KNX Stack for Tool Programming

A program running on a PC typically is not managed by the ETS Software. Therefore, no KNX Device Stack is required. For PC based solutions we provide access to KNX telegrams as well as to KNX services within the framework of our Software Development Kit kDrive.



SECURE

KNX Stack NGS: System B

Without a doubt: System B is the most powerful device model in the KNX standard and a truly scalable solution. System B is very flexible and can be used on different media. System B supports the following media:

- KNX TP (Twisted Pair)
- KNX RF (Radio Frequency)
- KNX IP (KNXnet/IP, Ethernet)

KNX Security

In the near future home and building automation will no longer be accepted without security. With KNX Data Security management telegrams as well as run time communication are secured by a complex set of keys and counters. The encryption and decryption are based on AES-128 algorithm. Our KNX Stack NGS fully supports KNX Data Security as an option. Already today a high number of KNX secure devices are available based on our KNX Stack NGS.



The KNX Stack NGS is available with the option KNX Data Security. It requires some additional hardware resources and encapsulates all security aspects independent from the application:

- Security Algorithms and Resources
- AES128 Encryption/Decryption (software or hardware)
- Security data storage
- Extended memory services
- Extended property services
- Group object diagnostics
- Bootloader

Bootloader

For KNX Security a requirement, for many other devices a useful option: A bootloader is needed whenever the complete firmware of a device must be updated in the field. The Weinzierl KNX bootloader is fully based on KNX standard.

Supported Microcontroller

As our KNX Stack NGS implementation is not dependent on special controller architectures the KNX Stack NGS can run on any existing microcontroller family as long as a minimum of features are available. But following the trend in industry we now focus on microcontrollers with ARM Cortex M core.

To be able to provide a “ready to develop” solution, we offer our software already optimized and certified for different controller families - please contact us.

Development Hardware

Another advantage of Weinzierl's KNX Stack implementation is in the uniform concept and design of the provided evaluation hardware. The evaluation boards for KNX RF, for KNX TP and KNX IP system software are very similar regarding their schematics and therefore can be used without significant changes by the same application.

KNX Stack NGS

COMPACT and PLUS

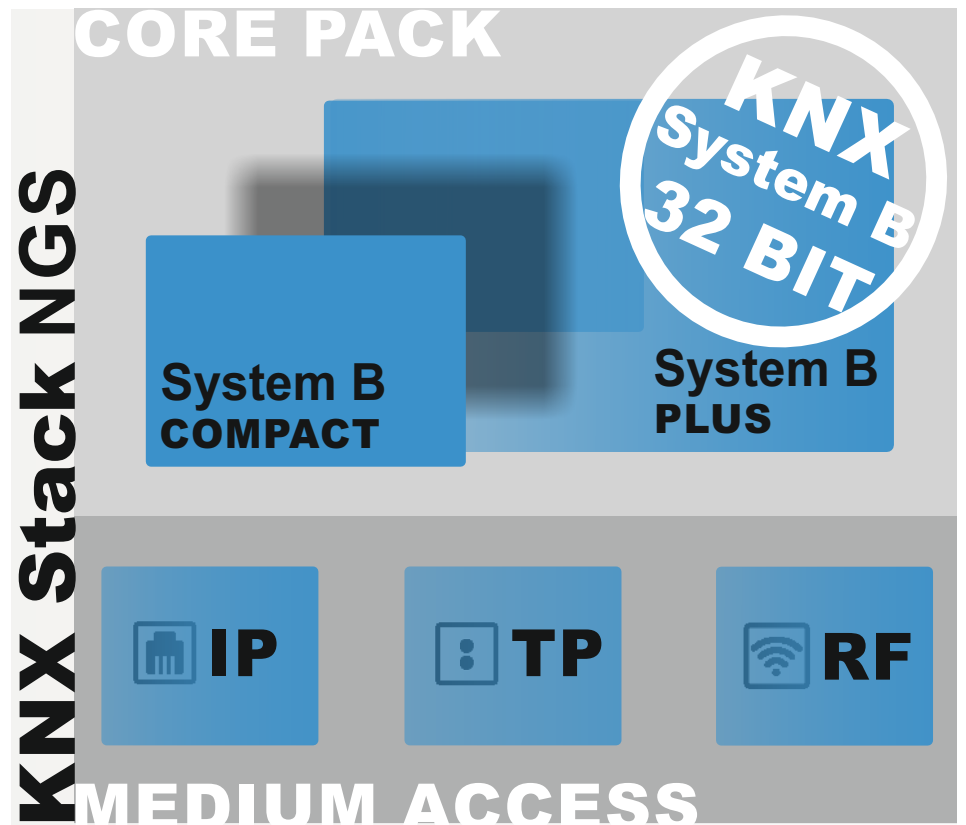
As the most flexible device model for KNX, System B is suitable both for simple devices as well as for complex devices that impose significant demands in terms of KNX resources. For this reason our KNX Stack NGS is available in the following editions:

- KNX Stack NGS **COMPACT**
- KNX Stack NGS **PLUS**.

Both editions – COMPACT and PLUS – share the same code basis. This simplifies the change between both versions. Virtual address spaces are used that are resolved at the driver level and mapped to the corresponding physical storage areas. So applications can easily be ported to different platforms.

Complex Performance

The PLUS edition of the KNX Stack NGS specifically targets complex devices with a 32-bit architecture. It is optimized to ensure high performance for all application sizes. For complex devices it is not only required to support bigger tables. Regardless of the number of group objects, in any case they have to be processed “in-time”. While the COMPACT edition is based on code saving search algorithms, the PLUS editions use additional lookup tables that allow quick access via indices. The processing of the communication objects has also been accelerated and a linear search through all objects is avoided with the use of additional buffers. This increases the demand on memory - however, a significant reduction of CPU clock speed is possible. Furthermore, long frames enable faster downloads.



COMPACT ADVANTAGES

The COMPACT edition of the KNX Stack NGS comes with a small footprint but enables a complexity which is suitable for the majority of today's KNX devices. The Weinzierl System B implementation is very scalable and allows a migration to the even more powerful PLUS edition – making the COMPACT edition future proof. choice for small devices.

Device model: System B

- Up to 255 group objects
- Up to 64 kB loadable memory

PLUS ADVANTAGES

The most obvious advantage of the PLUS edition is the number of available group objects. While the COMPACT version supports up to 255 objects, the PLUS version allows thousands of group objects. To achieve this, the formats of the communication tables (group address, association and group object tables) use the extended format for System B. The PLUS version also offers a significantly increased address space. The configuration data like parameters and tables can be loaded into a range of up to 1 MB via the bus. The extended address range can also be used to load application code via the bus – possible within an ETS download.

Device model: System B

- Up to thousands of group objects
- Up to 1 MB loadable memory

Medium Access Packages

The Weinzierl KNX Stack NGS is not only scalable but also modular. Both the COMPACT as well as the PLUS edition of the Core Pack can be used for each KNX medium. Medium Access Packages which contain all medium related firmware are available for


- KNX TP (Twisted Pair)
- KNX RF (Radio Frequency)
- KNX IP (KNXnet/IP, Ethernet)

KNX TP

Twisted Pair is still the most used medium in KNX. Devices connected to TP bus can be powered over the bus. Our Medium Access Package for KNX TP contains all TP related firmware and drivers for KNX UART transceivers and development boards.

KNX TP FEATURES

- High reliability
- Adequate bandwidth
- Power supply for devices
- Low cost



For new designs we recommend the latest generation transceivers such as:

- Elmos E981.03
- Elmos E981.23
- Siemens TP-UART2
- ON Semi NCN5121
- ON Semi NCN5130


They combine a power supply with quite high output current and a small footprint on the PCB.

KNX RF

Radio Frequency (RF) is the wireless alternative in the KNX standard. In locations that are not suited for cabling KNX RF is used for wireless data transmission. KNX wireless devices can be configured in the same professional way as standard TP products.

KNX RF FEATURES

- Medium access over standard ISM Transceiver
- Evaluation board
- Reference Designs
- RF Modules




The Medium Access Package for KNX RF contains all RF related firmware parts for the KNX Stack NGS. For KNX RF no dedicated KNX hardware is required. The KNX RF standard differentiates between (true) bidirectional and semidirectional devices which are bidirectional for configuration and unidirectional in runtime to save energy.

KNX IP

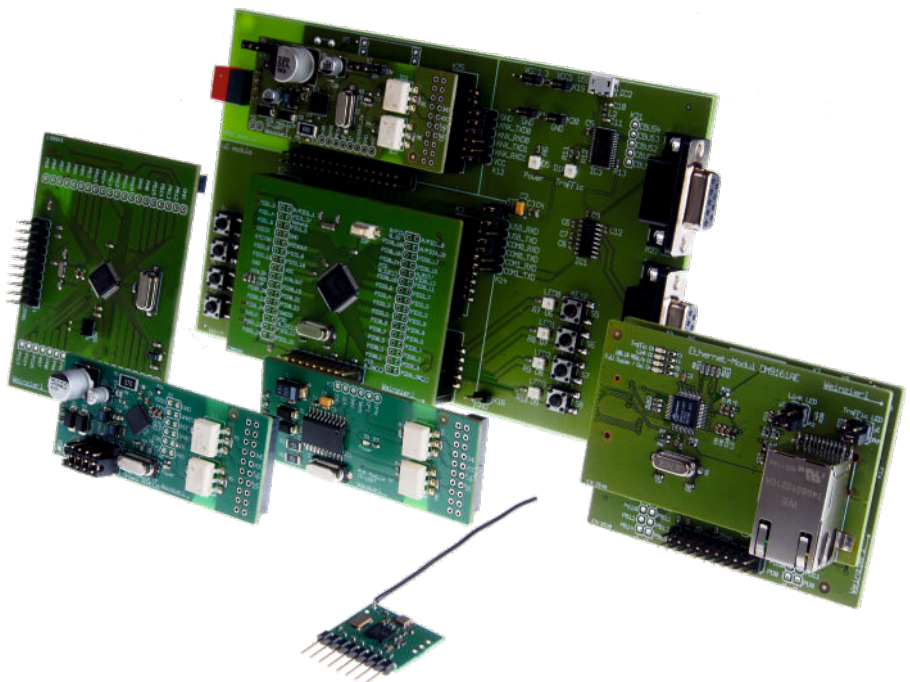
The Internet Protocol (IP) is integrated in KNX as a stand alone medium and is on the same level as TP or RF. KNX IP devices enable the use of powerful KNX features - like configuration modes and interworking - also on IP.

KNX IP FEATURES

- High bandwidth
- Usage of existing infrastructure
- Evaluation board



KNX IP opens the door to top level communication within a building (e.g. telecommunication, multimedia, etc.) and allows an entirely new class of KNX devices. Transmission of KNX messages via Ethernet is defined as part of the KNXnet/IP protocol based on UDP. The Medium Access Package for KNX IP contains the stack extensions required for IP communication including a UDP/IP stack. Additional hardware with an Ethernet connection is part of the solution package.



KNX Stack for Linux kTux

KNX Stack for Linux

Today many devices for home and building automation use a Linux platform. Typical examples are boilers, HVAC devices, photovoltaic converters or charging stations for electrical cars. So there is a high demand for KNX connectivity for Linux based products.

While the core of the KNX Stack can be implemented as a Linux application or process, the media access for KNX TP as well as for KNX RF requires external hardware.

As a ready-to-use solution kTux is a KNX Stack implementation for Linux. The Software is based on our KNX Stack NGS. The access to KNX TP and KNX RF is realized via USB interfaces. For the medium KNX IP the IP sockets of the operating system are used.

The result is a full value KNX device which can be managed by ETS® commissioning software and can of course be certified according the KNX Standard. kTux is available with KNX Security and can be extended with the function of a KNX IP Interface.

Architecture of the kTux Solution

A binary executable file handles the management and communication of the KNX system completely by itself. An application can access the API of the KNX Stack via a TCP/IP socket. It uses the Weinzierl BAOS protocol, which is well established for many years. An implementation for the client side of the BAOS protocol is available for free.

kTux solution is available for:

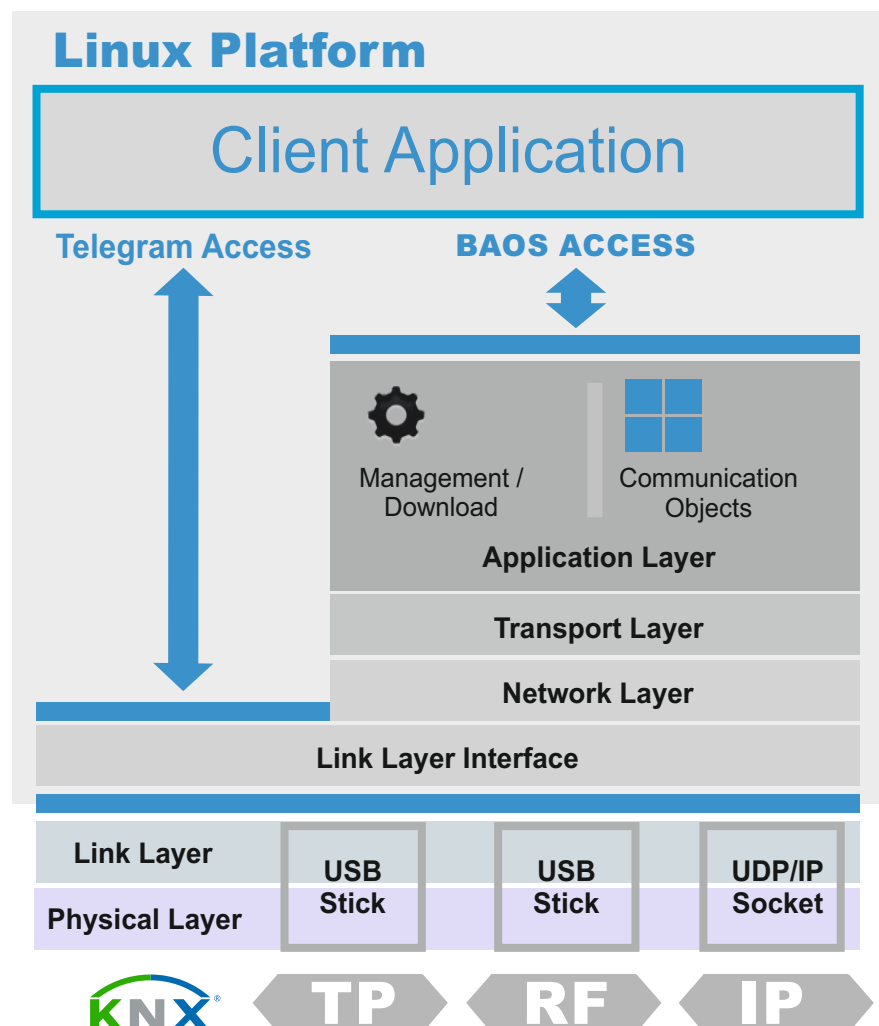
- KNX TP (Twisted Pair), bus access via USB Stick or Module
- KNX RF (Radio Frequency), bus access via USB Stick or Module
- KNX IP (Internet Protocol), bus access via IP/Ethernet



Getting started with kTux

We provide a couple of demo versions for free on our web page. With these demos we mainly cover popular platforms like Ubuntu or the Raspberry PI®. Customizations for your individual requirements are available on request.

Generic ETS entries are available for a jump start into your application development. Our busmonitor and analyzer Net'n Node supports the BAOS protocol and allows you to analyze the BAOS communication as well as the KNX on any KNX media. Last but not least our support team will assist you to find the best solution for your KNX connectivity and to implement your solution from scratch up to KNX certification.



ETS Product Entry made quick

One major task in application development is the representation of the device in the ETS. Each application is represented in ETS as a set of group objects, parameters and dependencies. The outline of the application can be created with the KNX Manufacturer Tool (KNX MT). This task is quite complex and time consuming. In parallel the application code which runs in the device must be fully in line with the application defined in the ETS. Even a single mistake ends in an unpredictable behavior of a device.

Just write it down

kScript solves these problems by using a script based development system. The basic idea is to define the outline of the device only once and create the application framework for the device in parallel to the application for the ETS. As both tasks use the same input the output is always in-line - both the static and the dynamic parts including all dependencies and translations. For a programmer the most effective and universal way to describe relations is text. Human readable text is still the basis of all modern programming languages. To avoid the invention of a new syntax for KNX application a well-tried scripting language has been chosen: Python. It is a popular script language in the fields of automation and testing.

Faster and more efficient

The usage of a programming language enables all options of programming. So scripts can use loops which are a typical requirement for multi-channel devices. Also sub functions can be used and text can be created automatically, like 'Channel 1' and 'Channel 2'. The application script is handled as an integrated file of the application. It can be edited in the IDE (Integrated Development Environment) of the project. The execution of the script is just a prebuild command. As output the script library creates the xml-file as input to MT. In addition it creates the binary data as input for the KNX Stack. This is on the one hand a set of c-files which hold any data as arrays of bytes and on the other hand a set of header files which allow an easy access to configuration data. The configuration data can be used directly by the Weinzierl KNX Stack NGS. Also the application code can use the output data to access group objects and parameter settings.

Instant Changes

One essential advantage of the integrated solution becomes visible if a change of the application is requested. Any modification can easily be done in the script. After a run a new ETS entry is generated and new application data for the stack that is automatically in-line.

BENEFITS kScript

- Script as unique base for application description
- Fast editing in standard text editor
- Usage of loops, conditions etc.
- Usage of functions
- Automated generation of ETS entry (static and dynamic part)
- Automated generation of application data
- Fully compatible with ETS and KNX MT

kScript

Main elements

The main elements of the script are:

```
# Create the ETS XML application framework
application_program()

# Add a parameter
type_restriction('TP_ENABLE', 8, [('YES', 1), ('NO', 0)])
parameter('CHANNEL_1_VALUE_1', 'TP_ENABLE', 'SUB_MCB_4')

# Add a channel and a parameter block
channel('DYNAMIC', 'CHANNEL_0', number=0)
par_block('CHANNEL_0', 'CHANNEL_0_BLOCK')

# Add a group object
go_type('GT_INFO', '1.001')
go('CHANNEL_0_BLOCK', 'GO_CH_0_1', number=1, go_type_key='GT_INFO')

# Defining dependencies
# Add go when value of CHANNEL_1_VALUE_1 is "YES"
go('CHANNEL_0_BLOCK.CHANNEL_1_VALUE_1.(YES)', 'GO_CH_0_2', number=2)
```

BAOS Protocols

KNX IP BAOS devices support two separate BAOS protocols: a binary protocol and a RESTful web services protocol. While the BAOS Binary protocol is recommended for controller applications, the BAOS web services are intended for web applications. For both styles of the BAOS protocol a free SDK is available. The free variant of the Net'n Node bus monitor and analyzer supports the BAOS binary protocol as a client tool for development and test.

Responsive Apps

The Object Server stores the most recent values of the installation, even if no client is connected. This means that when a client reconnects all states are available with short latency and without value reads via the KNX bus. For mobile devices, which are not typically permanently connected to KNX, this feature is essential for responsive operation and control.

SDK for BAOS Binary Services

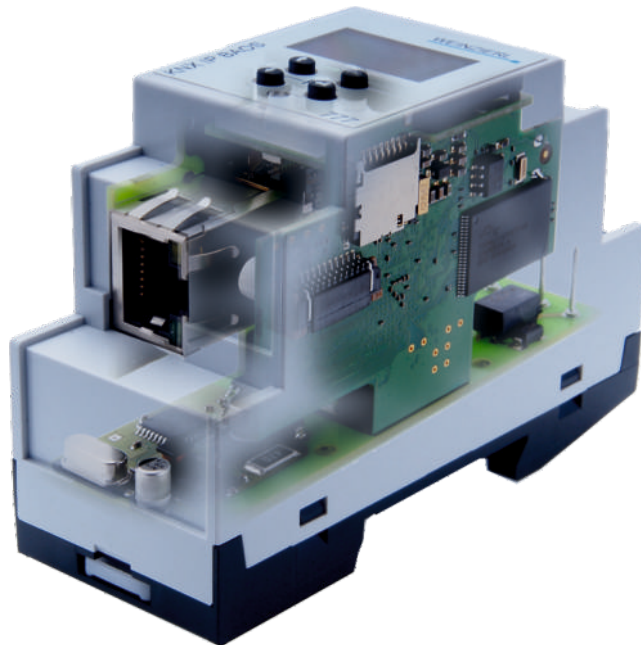
The Software Development Kit (SDK) for BAOS Binary Services is a C++ implementation of the KNX BAOS Binary Protocol. It can be used for a rapid development of native applications for KNX control which are using our KNX BAOS Chips, Modules or KNX IP BAOS Devices. The SDK reduces the effort to integrate the BAOS protocol into your platform e.g. on Linux.

BAOS RESTful

The KNX IP BAOS 777 does not only allow access to the KNX network for runtime communication. Via the BAOS architecture these devices can also provide semantic information about the installation, including rooms, installed functions and data points. The source of all this information is the configuration done in ETS. The ETS product entry with building structure allows the configuration of a complete visualization without the need of an additional editor. For getting started we provide free sample code in Java Script which shows you the access to the RESTful BAOS API.

BAOS configuration with DCA

For all KNX BAOS Modules and Devices a generic ETS product database is available. Each database provides a list of all available data points. It allows to select a data point type and to fill in a name for each data point. In addition, each module and device supports the configuration with a DCA (Device Configuration App), which makes it possible to export the configured data points into a CSV file and to import already exported configurations. The DCA is displayed as a separate tab in the project window when the corresponding device is selected.



GET request sample

GET request to <http://192.168.1.2/rest/structured/views/rooms>
Response with status 200 and body:

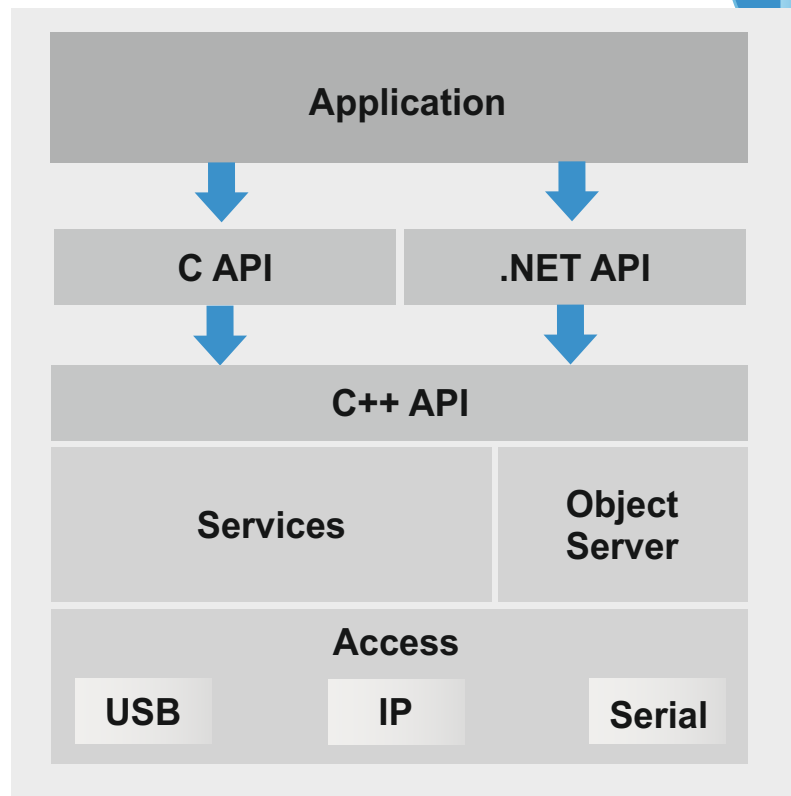
```
{
  "groups": [
    {
      "function_count": 8,
      "id": 1,
      "name": "Building",
      "url": "http://192.168.1.2/rest/structured/views/rooms/1",
      "view": "rooms"
    },
    {
      "function_count": 15,
      "id": 2,
      "name": "Living room",
      "url": "http://192.168.1.2/rest/structured/views/rooms/2",
      "view": "rooms"
    }
  ]
}
```

SDK kDrive

kDrive by Weinzierl Engineering is a powerful software development kit (SDK) for KNX communication via KNX standard interfaces on the telegram level. It is implemented as a cross-platform software component library with a high grade of flexibility. kDrive defines a complete ecosystem for the rapid development of KNX applications on platforms with POSIX (like) operating systems, such as Linux and Windows. Application programming interfaces (APIs) are available in C++, C and .NET.

Ready for Security

With increasing demand on the markets for KNX devices supporting KNX Secure, kDrive is ready for KNX Data Security and KNX IP Security.



Application area

The purpose of kDrive is to enable the development of KNX software on different operating systems. It can be the basis for visualization tools as well as for individual management clients. A common use case is the implementation of test tools for production.

All KNX Media

The kDrive library can be used for all media in KNX via standard serial, USB and IP interfaces. kDriveExpress is the binary distribution of the kDrive Library. It is available as free and as commercial license. The following components are currently available in the framework of kDriveExpress:

- Telegram access
- Services

PUT request sample

PUT request to <http://192.168.1.2/rest/datapoints/values>
Body of request:

```
{
  "command": 3,
  "datapoints_values": [
    {
      "id": 103,
      "value": {
        "B": 0,
        "G": 125,
        "R": 78
      }
    }
  ]
}
```

Response with status 204

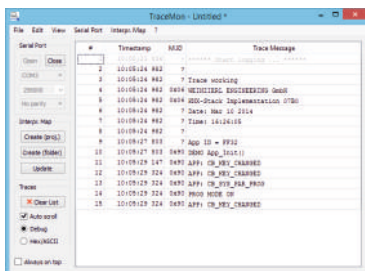
Development Tools

Development Tools

Quality of development depends highly on the tools being used during development. It is a great benefit for the customer to work with powerful tools from one source. Due to the common look and the uniform user interface of the tools the developer saves time and resources.

TraceMon: Debug Support

One big advantage of our unified software model is the overall debugging concept. In parallel to any available hardware debugger via JTAG interface the KNX system software offers additional debug support. The developer has access to a software debugging system that traces debug information via, for instance, an on-chip UART of the microcontroller. TraceMon is very resource saving as the main operation is done on the PC and not on the KNX device itself.

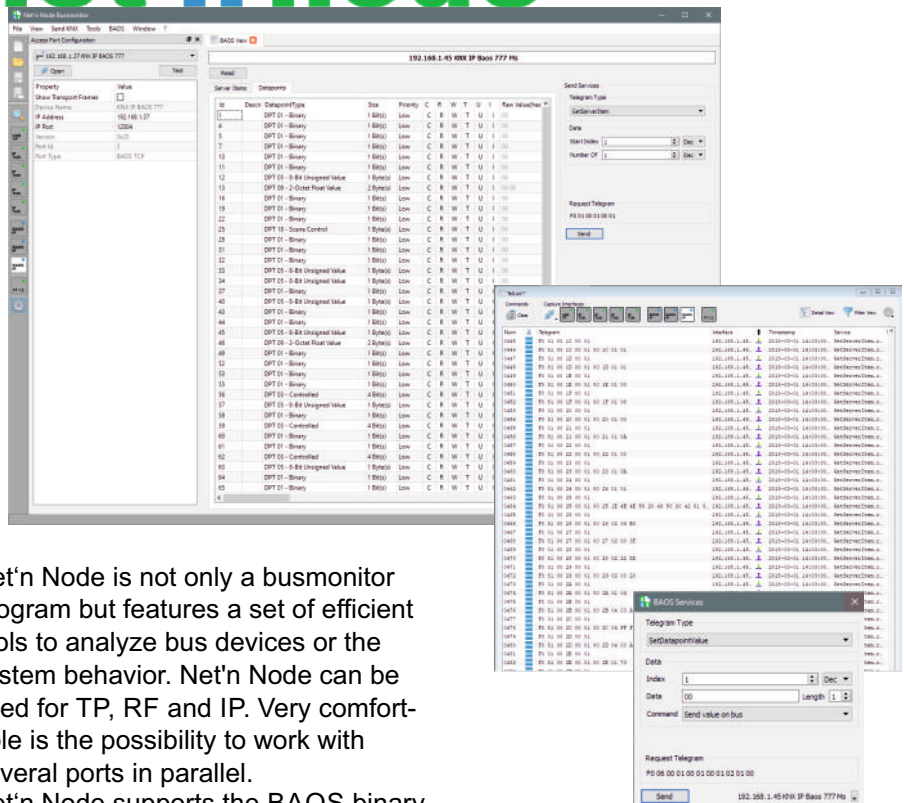


The level of the debug information (e.g. errors, warnings) can be set separately for every software module or can be turned off completely. Customer finds the same debugging procedures and settings in all of our KNX stacks. For the view of the debug output on PC, TraceMon is part of our solution package.

Net'n Node: Bus Monitor

During the development of components for a bus system it is important to have a detailed view in what is going on in the devices and in the complete system. To analyze the behavior of a bus device or the interworking of the system, a protocol analyzer is required. The Software Net'n Node is our comprehensive tool for the KNX development.

net'n node



Net'n Node is not only a busmonitor program but features a set of efficient tools to analyze bus devices or the system behavior. Net'n Node can be used for TP, RF and IP. Very comfortable is the possibility to work with several ports in parallel. Net'n Node supports the BAOS binary protocol via serial, USB or IP connection. A free version of Net'n Node is available at www.weinzierl.de.

Net'n Node FEATURES

- Sending and receiving telegrams over KNX
- Analysis of a KNX system
- Analysis and control of single devices
- Reading out group objects
- Programming of bus devices
- Support of BAOS Protocol
- Access to KNX over serial, USB and IP Interfaces and Routers
- Support of KNX Security

Accredited Test Lab

Cross-manufacturer compatibility of various applications and products is one of the main columns of the KNX system. This is achieved by the advanced certification system of the KNX Association. All devices with a KNX logo must be tested by a test laboratory accredited by the KNX Association for compatibility.

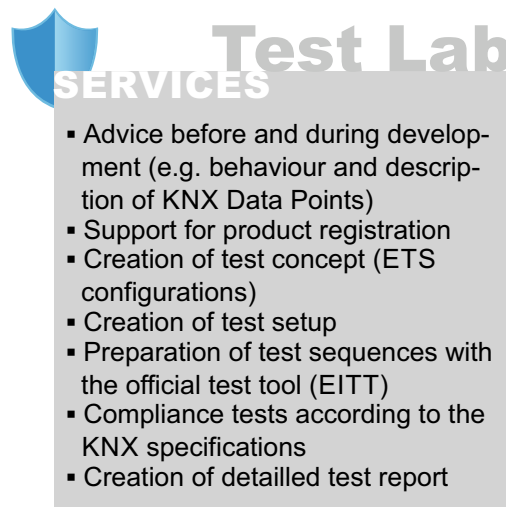


KNX Secure ready

Weinzierl operates its own officially accredited Test Lab for:

- System Software (KNX Stack)
- Applications (KNX interworking and functional test)
- KNX Security

The Test Lab completes our range of system solutions for KNX as we are able to test all system software and applications including those which support KNX IP Security and KNX Data Security.



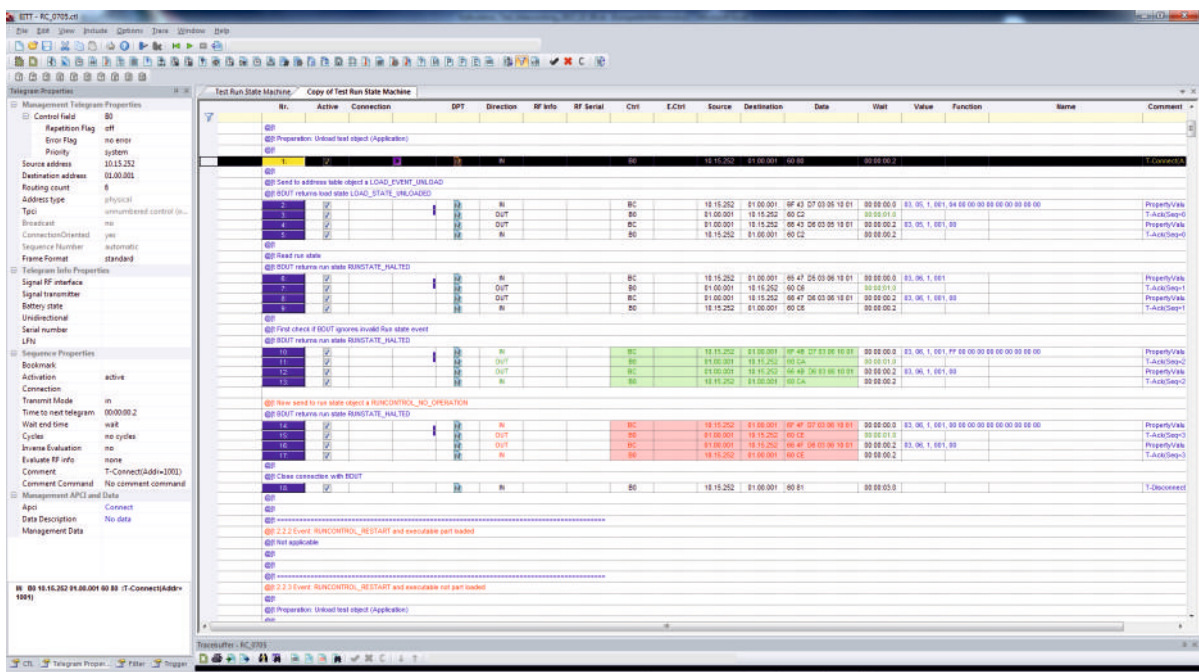
Development Services

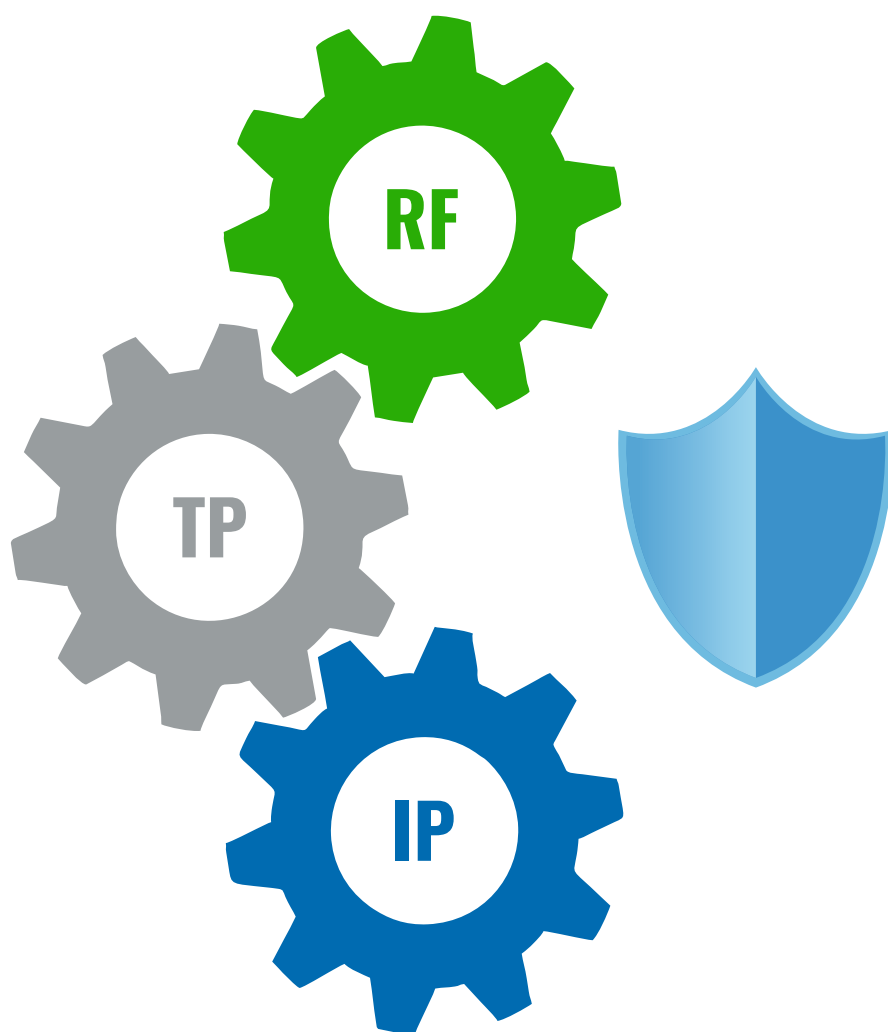
Apart from a great product idea system design is THE basis for successful development. Our system analysis includes both the integration of your product in the current KNX environment as well as architectural design of new KNX devices.

If you are interested in individual solutions or complete device development, we offer application development services including hardware design, programming and system integration. With broad experience in the development of bus components and systems, we are looking forward to finding solutions tailored specifically to your requirements. Of course, KNX product certification is also included in our service portfolio.

Support

For development projects we offer support for our customers. In addition, we offer our consulting and training services also independently of product development.





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