KNX Solutions

KNX Association International

www.knx.org

Agenda

1. **KNX Solutions – Overview**

2. **KNX Solutions – Project Examples (KNX Award Winners)**

Smart Metering & Smart Building

Task:

- Visualization and Smart Metering as well as the demonstration of the option of installing active tariff management

Smart Metering & Smart Building

Solution:

- This KNX solution makes it possible to monitor the consumption of each KNX unit connected to the system.

- The system is used to record and evaluate the data so that users can readily see the consumption of the various media

- KNX helps to use energy more economically while enhancing comfort and security

KNX: The worldwide STANDARD for home & building control

Smart Metering & Smart Building

The functions of Smart Metering and Smart Buildings by KNX are:

- Display of Electricity Tariff

- Heat Consumption Meter

- Electricity Meter

- Water Meter

- Control of Filling Levels for Tanks

- Evaluation of Consumption Data

- Display of Consumption Levels

- Option of Manually Connecting and Disconnecting Electrical Equipment

Energy Efficiency

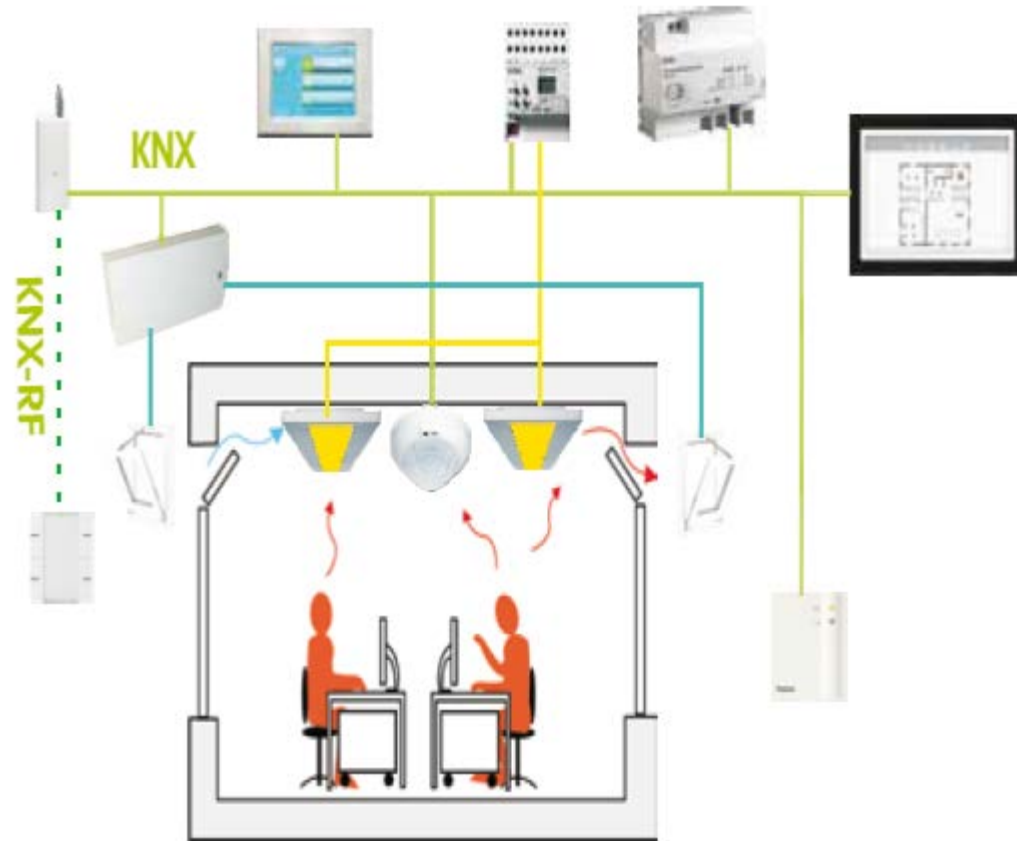**Energy Efficiency in School Buildings**

Energy Efficiency in Houses

Energy Efficiency in Industrial Buildings

Energy Efficiency in School Buildings

Task:

- An important objective of KNX automation systems is energy efficiency, the local control of which is a particular priority during school hours

KNX

KNX-RF

Energy Efficiency in School Buildings

Solution:

- A CO_2 Sensor measures the CO_2 Concentration. When the value changes, the window opens automatically
- A central unit for natural ventilation uses measured data to calculate window control strategy
- Windows are opened and closed automatically
- Lighting including Dimming is controlled automatically
- A movement Sensor takes care of constant lighting control and detecting the presence of people
- Data can be provided in refurbishment projects
- A KNX water meter monitors the sanitary facilities
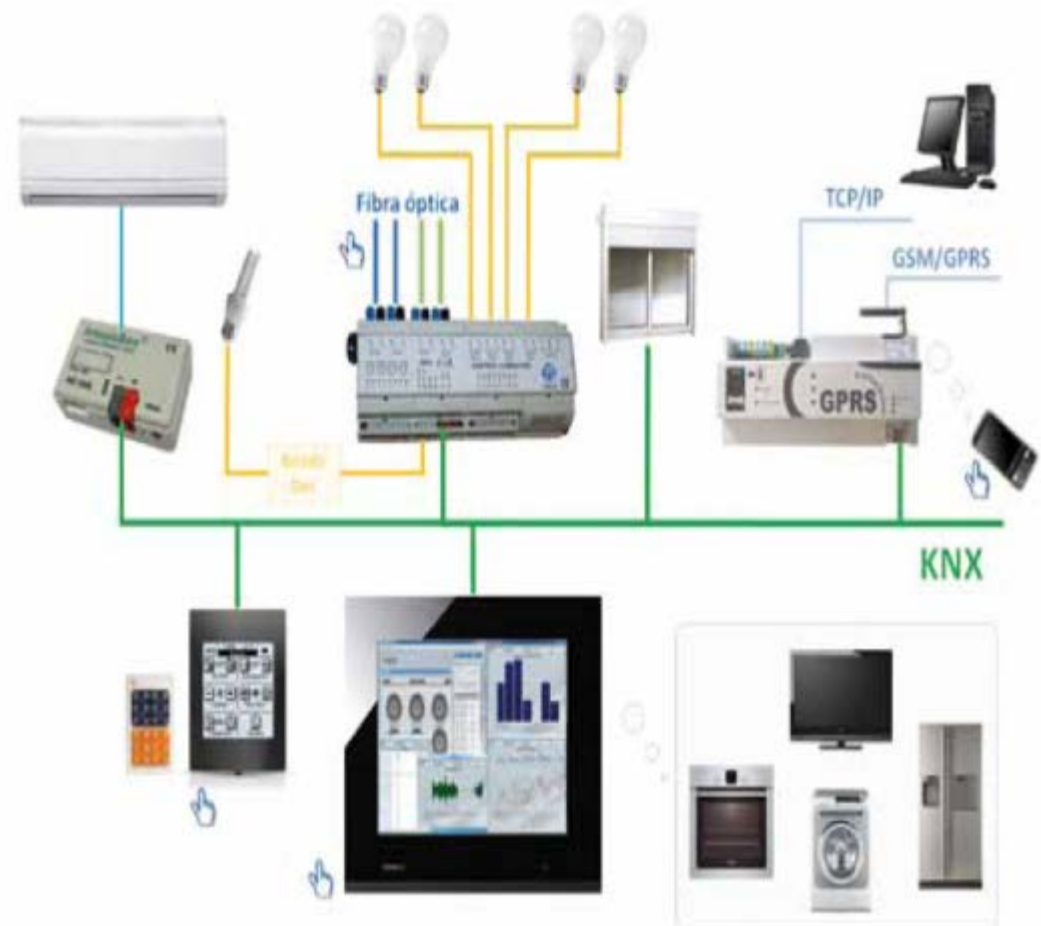
Energy Efficiency in Houses

Task:

- Rising costs of energy together with a more careful use of energy have moved up on our society's agenda. It is therefore intended to present a complete solution affordable to final users living in single houses.

Energy Efficiency in Houses

Solution

- Energy savings: increased long term value of the real estate and decreased up-grading expenses

- Customized comfort: the KNX installation can be expanded and rebuilt at any time

- All applications under control: blinds, shutters, heating valves, windows and light sensors can communicate with each other via the KNX System

Energy Efficiency in Houses

The Solution's features are:

- Dimming of lighting to suit users' needs

- Different Scenarios, according to the users' needs

- Monitoring for system overload

- Integrated thermostat for easier use and Control of HVAC

- Real-time monitoring and recording of data providing a general overview of use and allowing users to take further actions
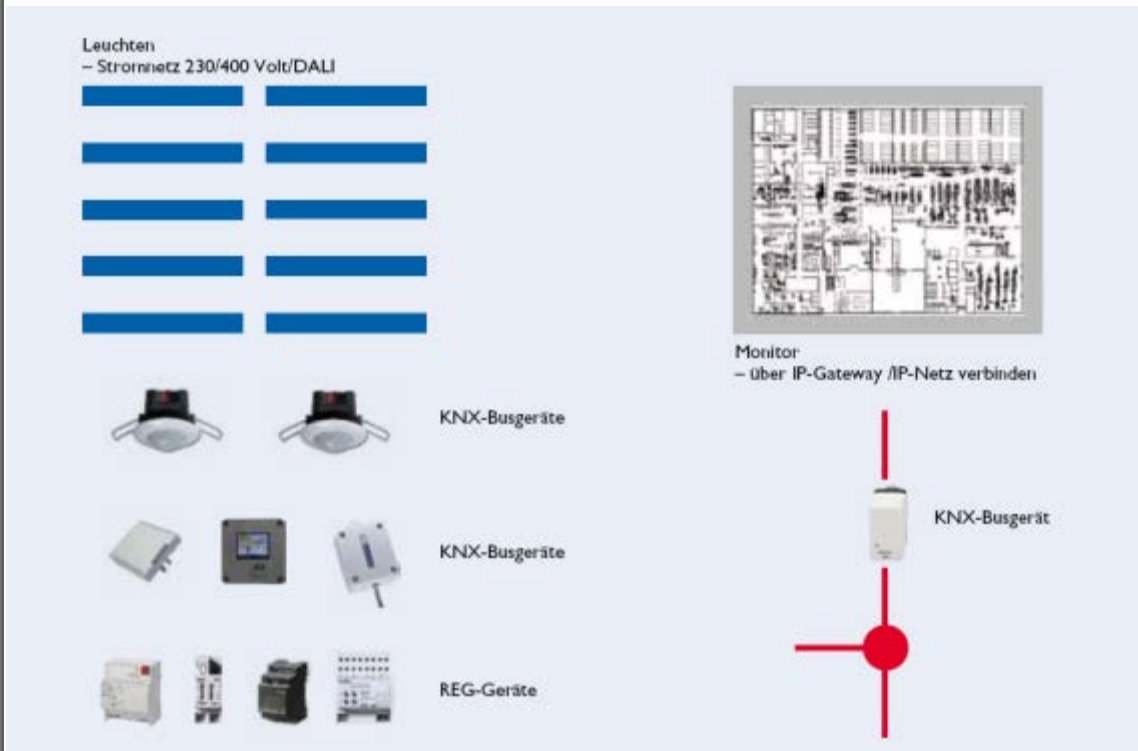
Energy Efficiency in Industrial Buildings

Task:

- Three interesting applications are used to demonstrate the multiple possibilities that KNX offers in the industrial sector

Leuchten
– Stromnetz 230/400 Volt/DALI

KNX-Busgeräte

KNX-Busgeräte

REG-Geräte

Monitor
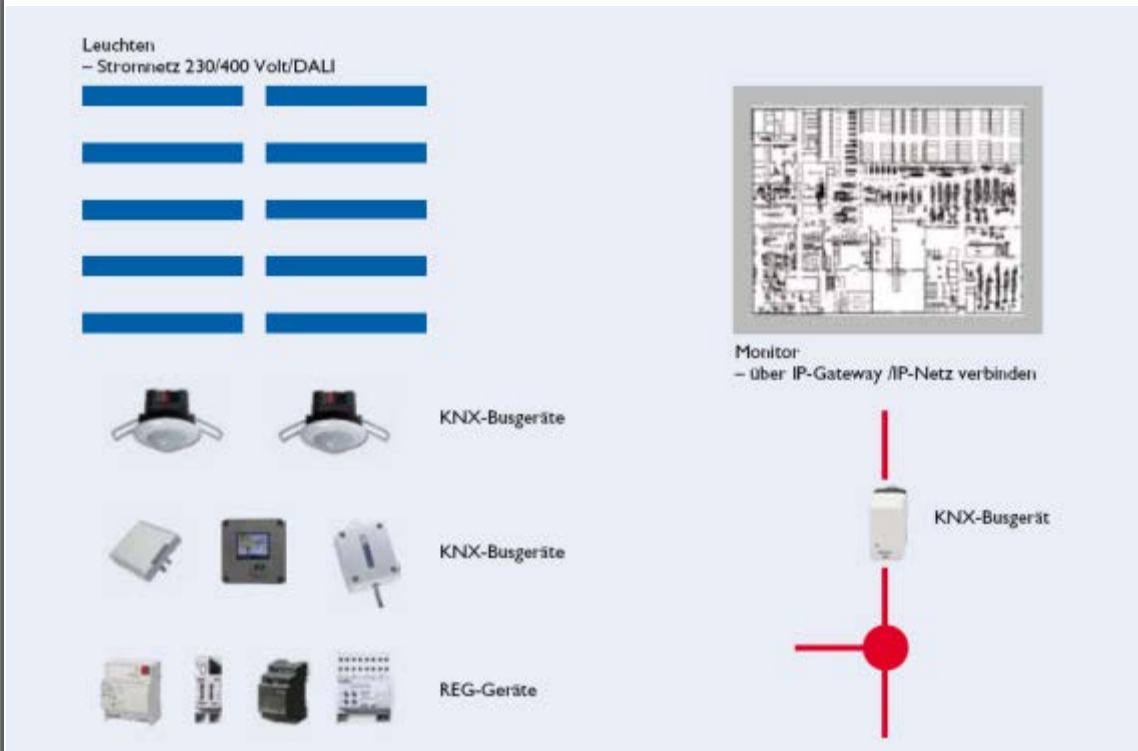– über IP-Gateway /IP-Netz verbinden

KNX-Busgerät

Energy Efficiency in Industrial Buildings
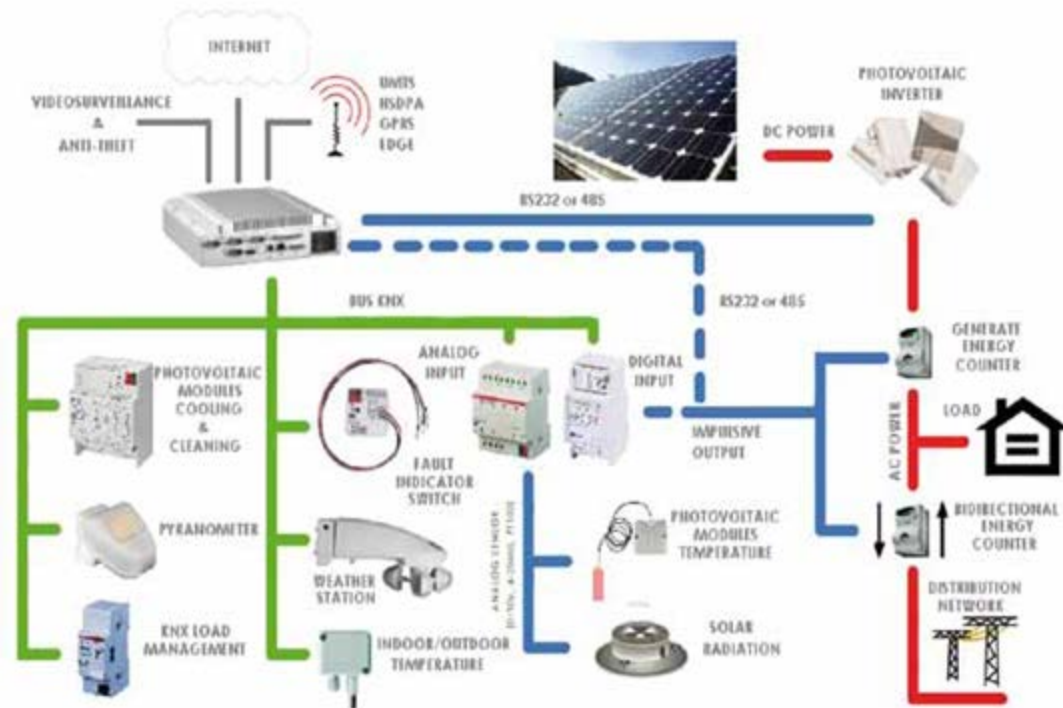
Solution:

- Distribution of heating energy and the regulation of the room temperature could be realized with KNX
- Digital lighting control ensures sufficient lighting with constant light control and emergency lighting
- The required dew point monitoring could be accomplished with newly developed KNX sensors

Leuchten
– Stromnetz 230/400 Volt/DALI

KNX-Busgeräte

KNX-Busgeräte

REG-Geräte

Monitor
– über IP-Gateway /IP-Netz verbinden

KNX-Busgerät

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Renewable Energy

Task:

- Effective collection of solar energy and efficient transformation into electricity, can be achieved via a local gateway with KNX.

- Supervision and local/remote maintenance management system for photovoltaic plants, which can universally acquire data

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Renewable Energy

Solution:

- Collection of solar energy by photovoltaic plants with KNX technology
- KNX monitors of the correct functioning of a photovoltaic plant on real time
- Management of logging data of several plants
- Comparative analysis of production and performance of different plants
- Management of technical and economical history for maintenance purposes
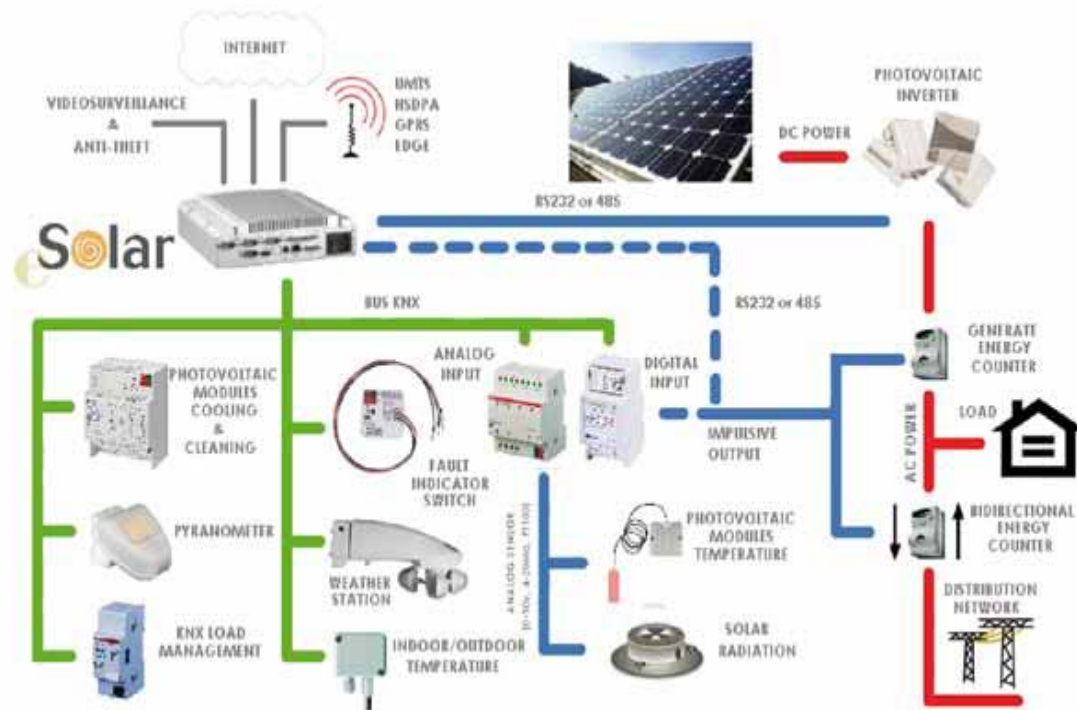
IP Control

Task:

- The task scenario is the refurbishment of a commercial building
- Applications include centralized and decentralized lighting and HVAC control
- Approx. 30,000 data points had to be subdivided into several KNX Worlds
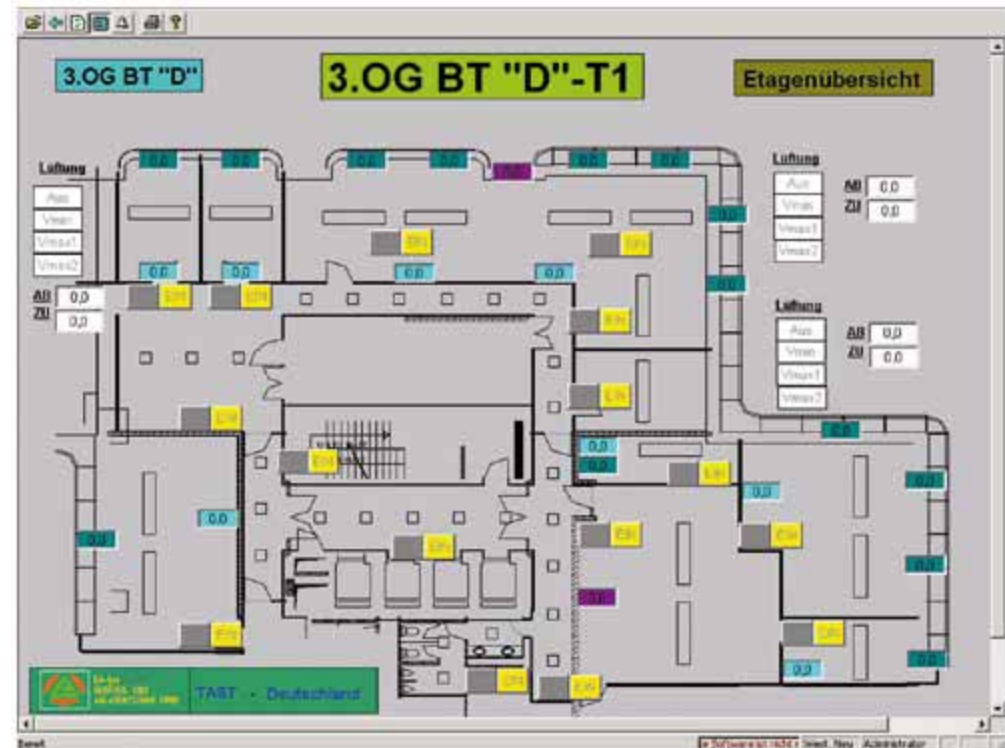
IP Control

Solution:

Eight KNX Worlds were connected via glass fiber cables and media couplers

The functions of every world:

- control of lighting and blinds via buttons and central functions
- Decentralized HVAC control for every individual room
- Central functions are enabled via coupling to the building control system as well as central KNX visualization
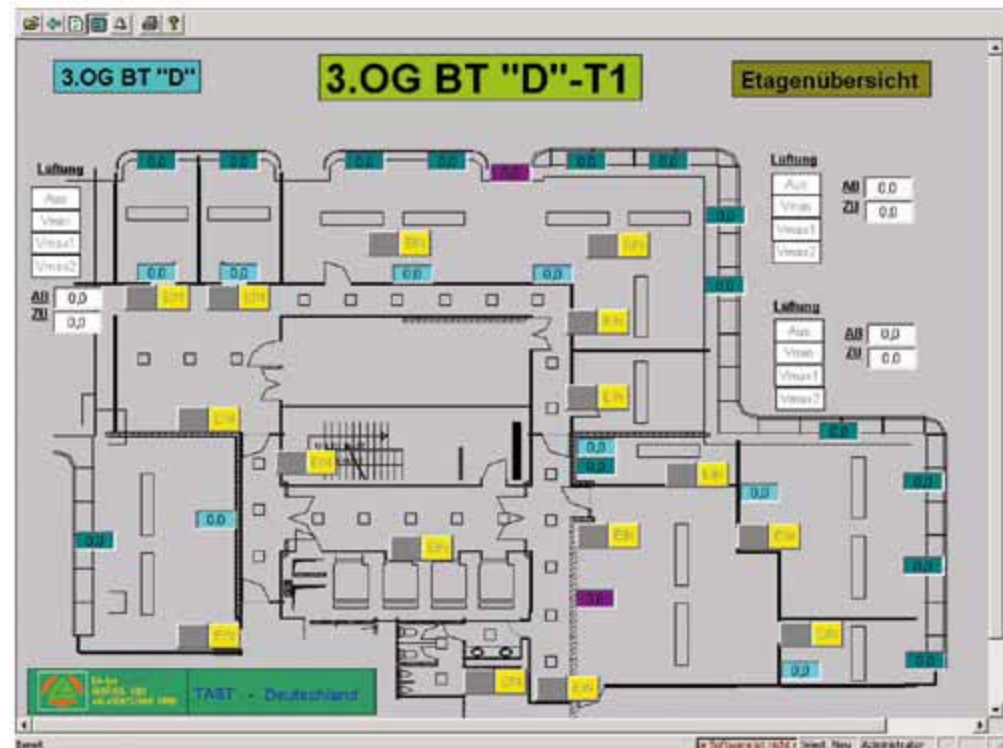
LED Control

Task:

- Attractive Lighting through modern LED technology to be used in shops, shop windows, lobbies, bars or in the home
- Changes of color temperatures to create different kinds of mood lighting
- Control via special lighting control devices
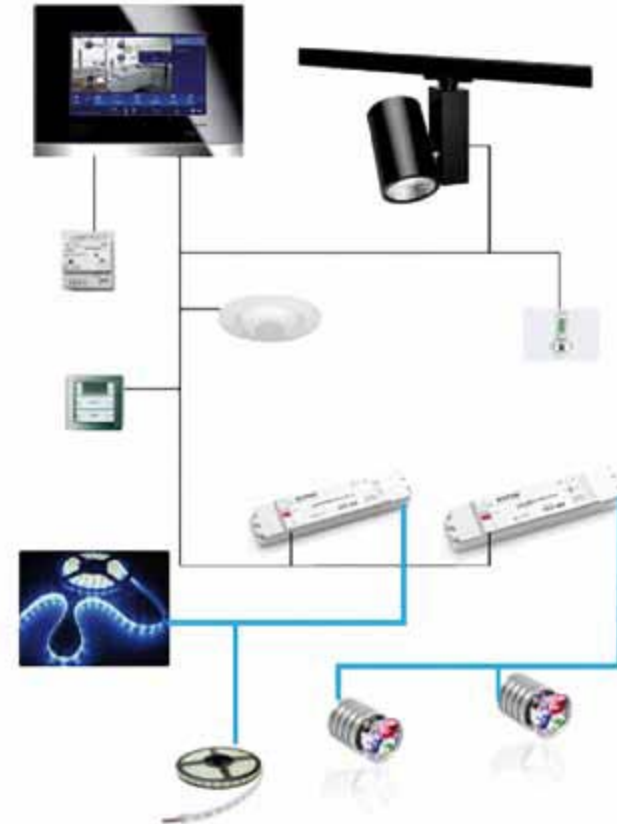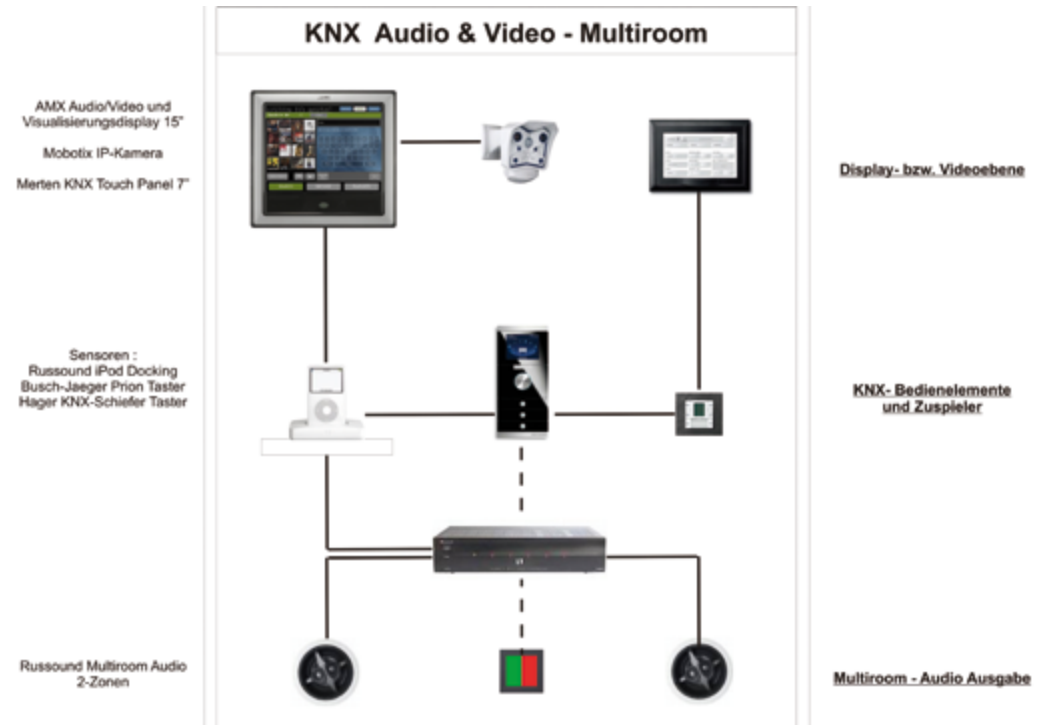
LED Control

Solution

- LED lighting technology for KNX

- Universal dimming and sequencing actuator for KNX as a direct interface to the LEDs for switching and dimming

- A KNX presence detector and light sensors are used for automation purposes

- KNX Sensors and Controlling devices, as well as LED strips, spots, and spot lights rails to create lighting scenarios

- The System is accessed and controlled either via a pushbutton or via a touch panel
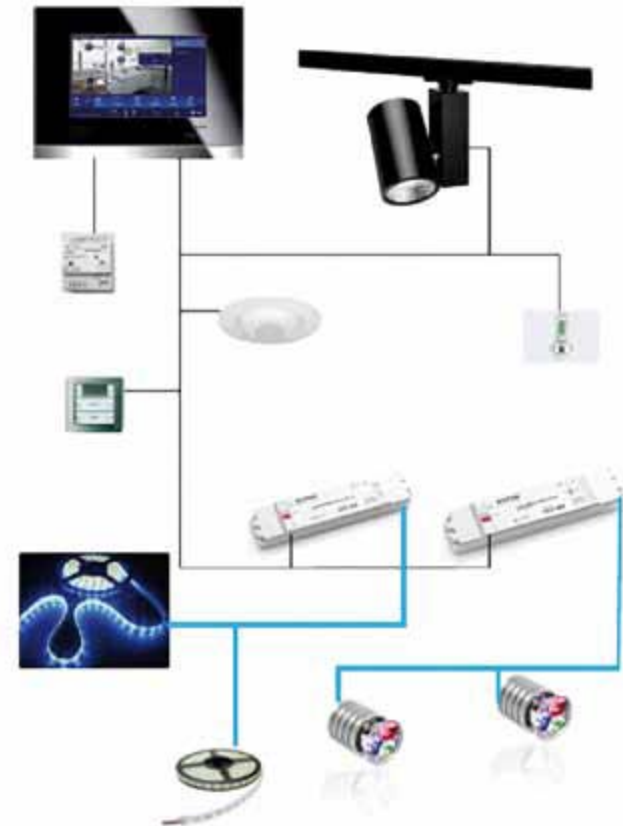
Audio & Video Control

Task:

- Integration of an independent Audio and Video systems into one common KNX A/V Multiroom System

KNX Audio & Video - Multiroom

AMX Audio/Video und Visualisierungsdisplay 15"

Mobotix IP-Kamera

Merten KNX Touch Panel 7"

Sensoren :
Russound iPod Docking
Busch-Jaeger Prion Taster
Hager KNX-Schiefer Taster

Russound Multiroom Audio 2-Zonen

Display- bzw. Videoebene

KNX- Bedienelemente und Zuspieler

Multiroom - Audio Ausgabe

Audio & Video Control

Solution:

- The installation of different touch displays with their respective surfaces shows the multiple options for operating equipment with respect to technology, design and operating comfort

- Connection of all Audio & Video devices with only one single bus installation

- Support of external memory for own audio and video files

- Individual listening to music or watching videos in every room

- Activation of audio and video content and adjusting the volume via conventional buttons or KNX bus Buttons

KNX Audio & Video - Multiroom

AMX Audio/Video und Visualisierungsdisplay 15"

Mobotix IP-Kamera

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Multiroom - Audio Ausgabe
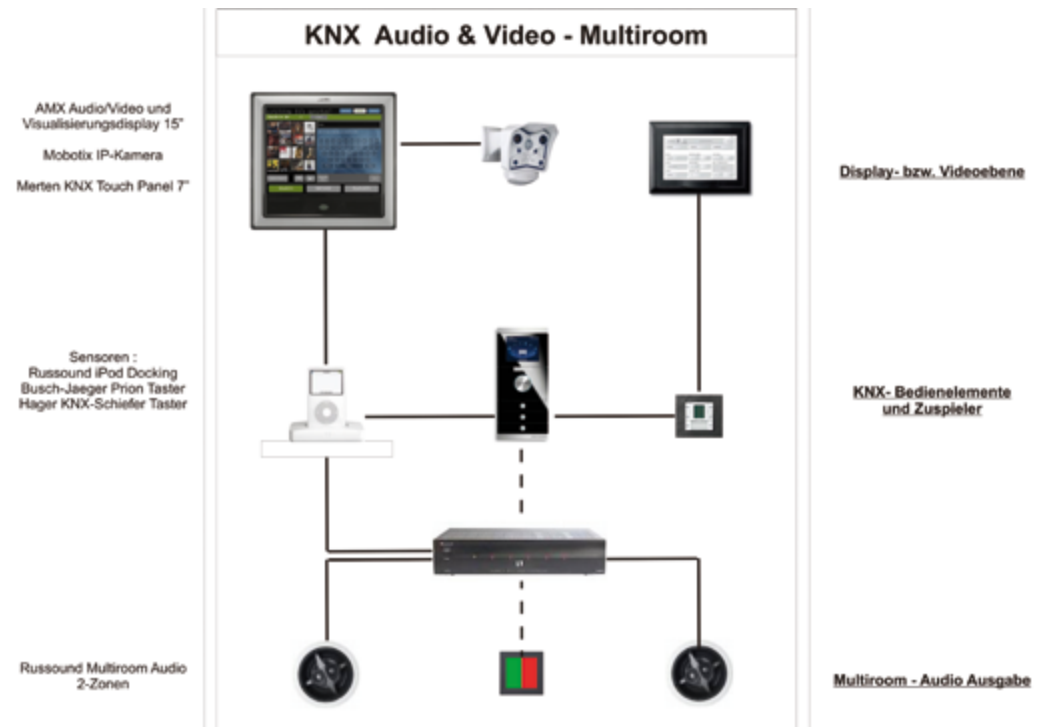
iPhone®Control

Task:

- Realization of a KNX control for iPhone, iPod Touch and iPad

iPhone®Control

Solution:

- Apple's® mobile devices communicate with the system via a WLAN connection and with KNX

- Wireless integration offers both maximum flexibility and maximum functionality

- Audio and video controls are integrated as well

- This solution offers an easy entry into the world of home and building automation at a truly competitive price

WLAN Control

Task:

- A minimalist solution that allows users to create and monitor lighting scenarios and to switch HVAC appliances or security functions

WLAN Control

Solution:

- Without a central computer all home data such as switching status and temperatures are available on the KNX bus

- This feature was used in the development of freely configurable software for media remote control and enables server-less central control, monitoring and data recording

- Apart from simple switching actions, users can set lighting scenarios and save them in the actuators according to the KNX specification
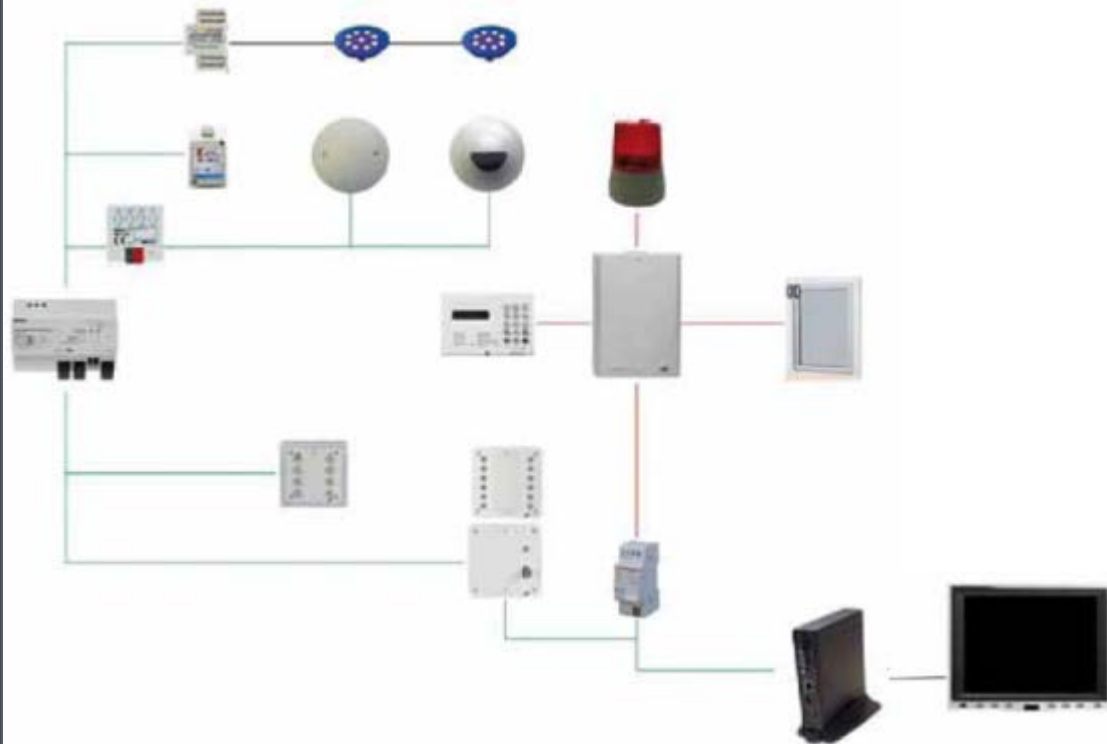

Wifi - Control

Lights
Blinds
Heating

Safety & Surveillance

Task:

- Integration of all security functions into one system for all applications

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Safety & Surveillance

Solution:

- Sensor applications, alarm management and user concepts
- By using KNX, flexible security concepts can be put into practice with different functionalities.
- Besides Burglar alarm and motion protection, Fire alarms for KNX and water detectors can be applied for additional security and monitoring functions
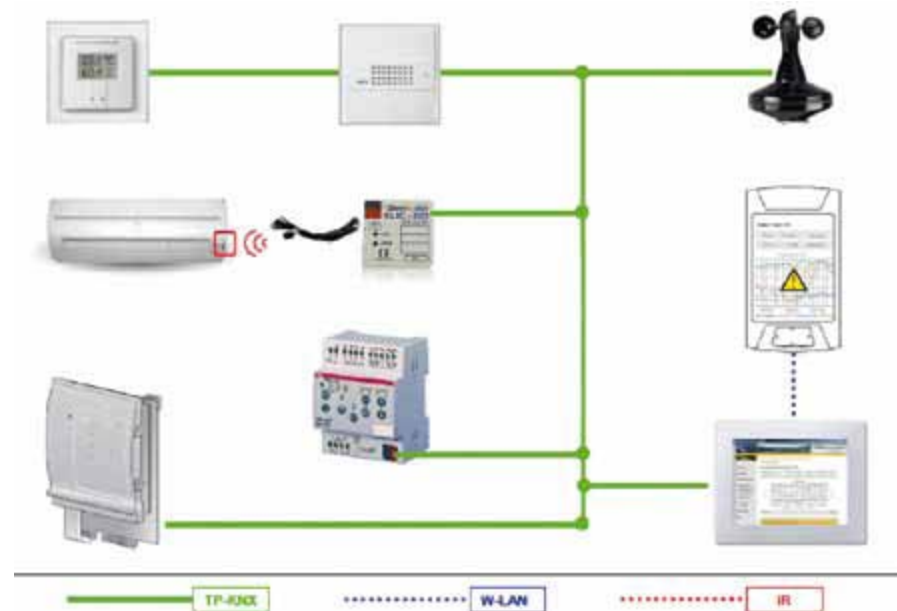
KNX: The worldwide STANDARD for home & building control
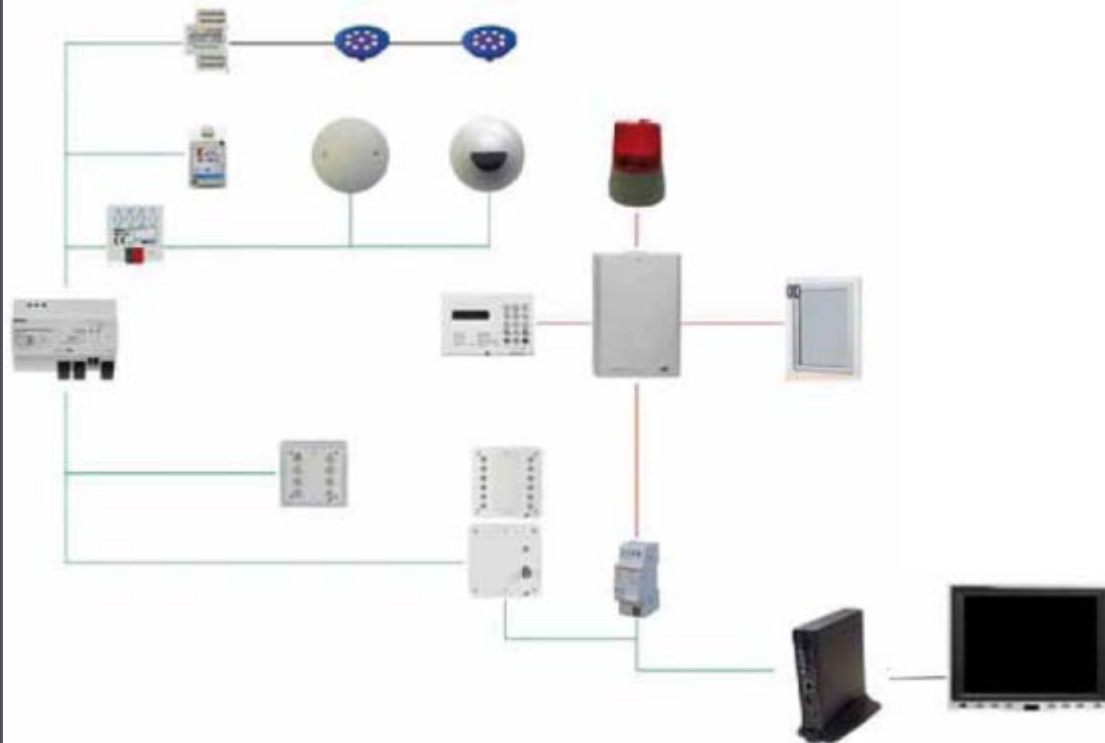
Heating, Ventilation & Air Control (HVAC)

Task:

- Central control system as well as remote control for heating, ventilation and air conditioning
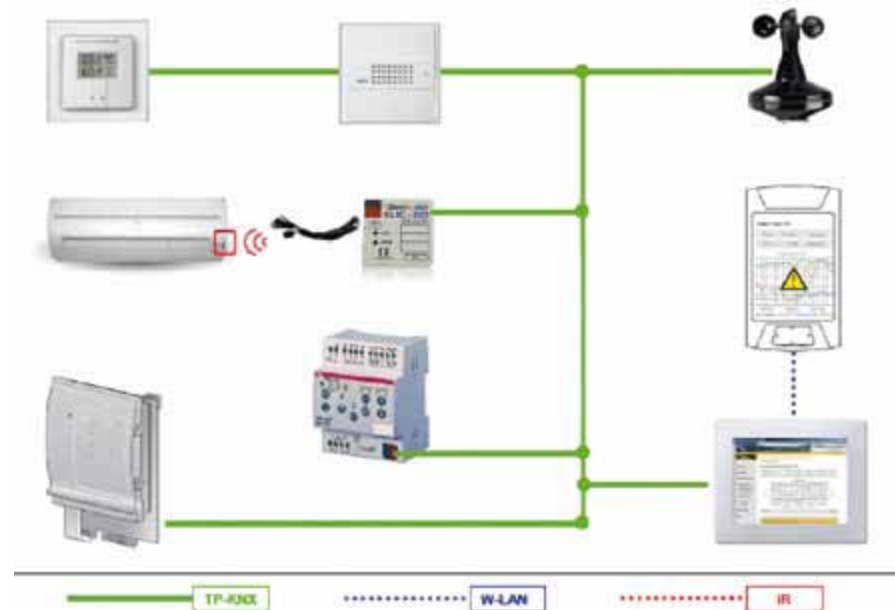- Special focus is on maintaining the values for air quality

| TP-KNX | W-LAN | IR |

# Heating, Ventilation & Air Control (HVAC)

Solution:

- Sensors for temperature, humidity and CO_2 content measure the air quality

- For monitoring the air quality in the archives data for CO_2, humidity and temperature are recorded and saved automatically

- Values are used to control the split air conditioning units and by a KNX controller to control the heating system

- All functions are linked to transmit data, alarm and fault messages via intranet and telephone network

TP-KNX .... W-LAN .... iR

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Heating, Ventilation & Air Control (HVAC)

Solution:

- This system makes it possible to carry out remote parameterization via ETS

- A KNX weather station supplies further data for the lighting, the blind system etc., such as precipitation, wind speed, daylight levels and a DCF77 time signal

- In addition to "KNX TP", the transmission medium "KNX RF" is used

—— TP-KNX	········· W-LAN	········· iR

KNX: The worldwide STANDARD for home & building control
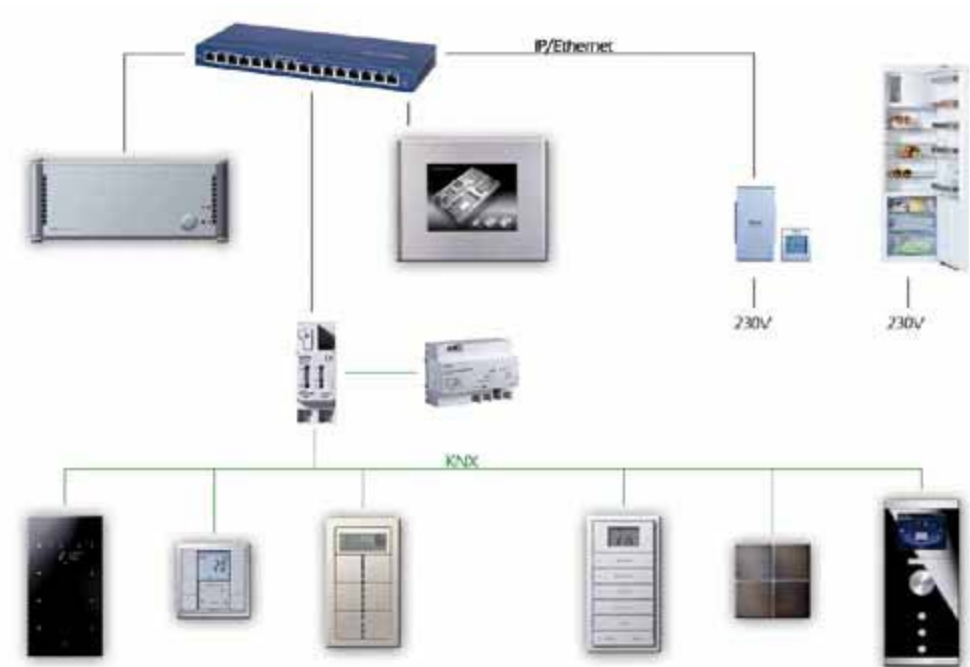
Kitchen Control

Task:

- Integration of high-level comfort security and energy efficiency in "intelligent buildings"

- Requirements for central controls in kitchen technology should be equally high

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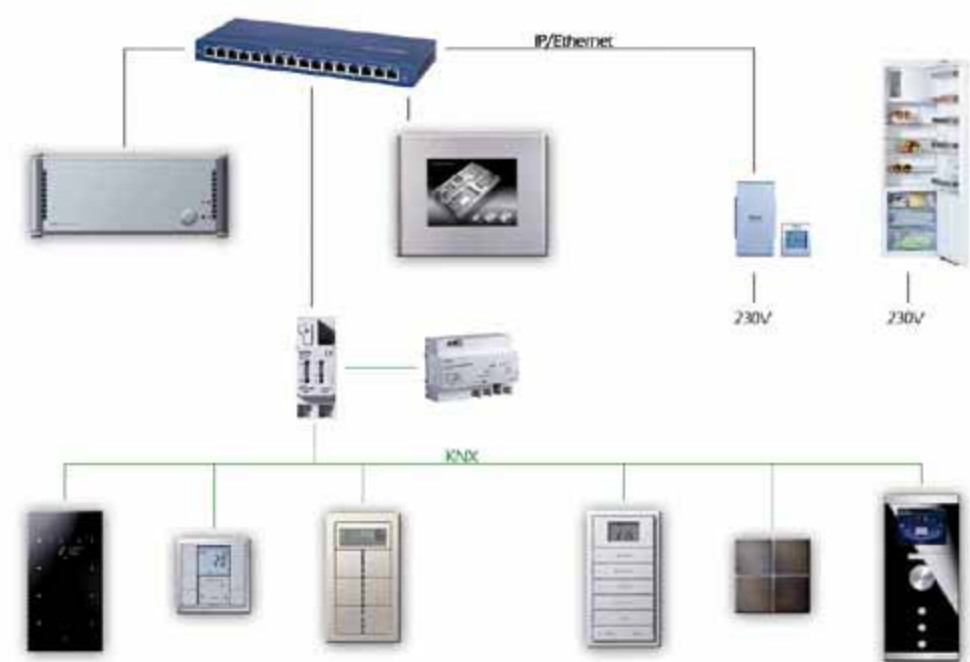
Kitchen Control

Solution:

- A remarkable feature of this KNX solution is a three dimensional representation of floor plans, building elements and exterior views in the visualization

- The entire KNX technology within the house or building is integrated:

  - *Actuators for switches, dimmers, blinds, etc.*

  - *Controls for individual rooms are installed as well as window contacts for multiple uses.*

  - *They allow turning off heating radiators when the window is open, they are used to check the window status and they serve as a burglar alarm*

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Kitchen Control

**The functions of this solutions are:**

- *Switching and controlling of kitchen technology and kitchen appliances*
- *Temperature control and set-point adjustment for connected refrigerators*
- *Switching and dimming of lighting*
- *Use of pre-set lighting scenarios*
- *Composition of lighting scenarios with respective dimmer values*
- *Set-point adjustment and creation of temperature profiles for heating radiators*
- *Documenting and querying of weather data*
- *Checking of windows and doors*
- *Control of media systems etc.*
- *Access to internet functions such as weather service, schedules, telephone calls, e-mail, etc.*
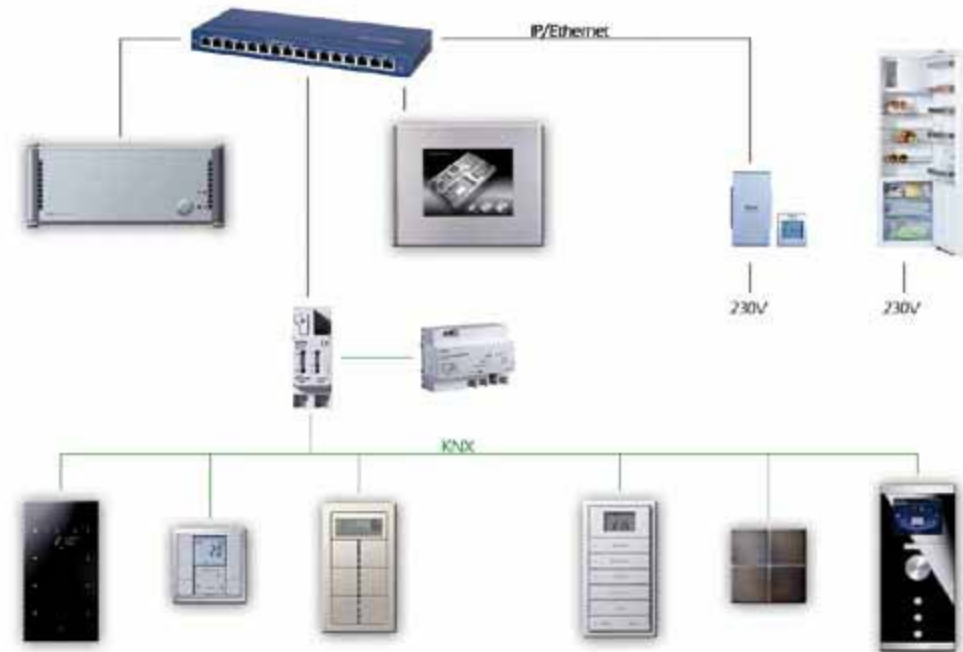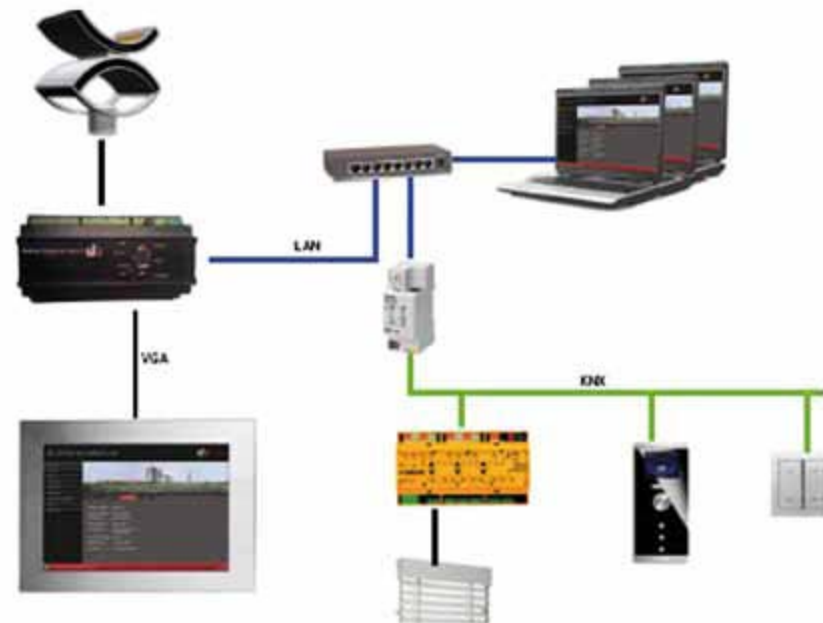
Sun Blind Control

Task:

- Ensuring comfort levels at the workplace and at the same time enhancing the energy efficiency of the building
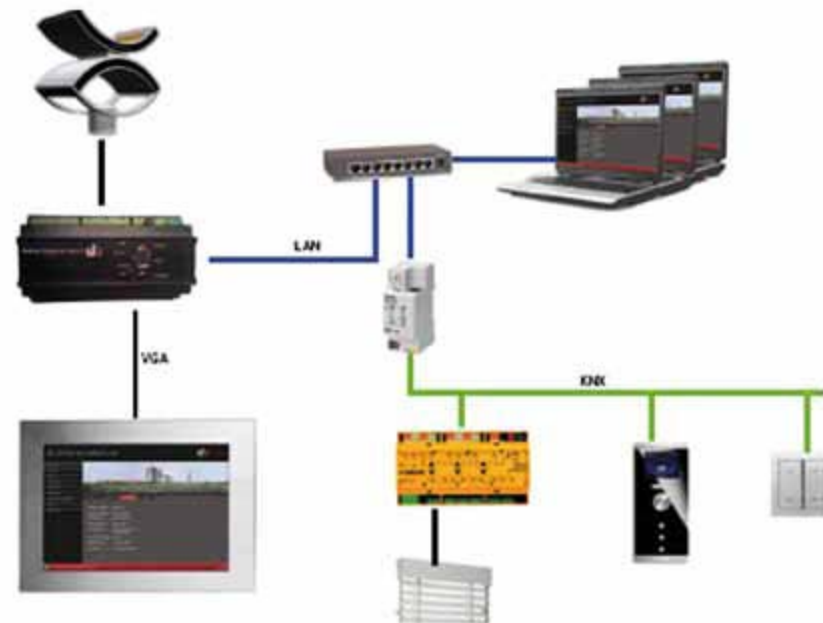
Sun Blind Control

Solution:

- A weather station with four centrally placed light level sensors provides data regarding solar radiation, wind and rain throughout the day

- Movement sensors in the offices detect the presence of persons

- Solar screening, taking the sun's current position and angle of irradiation, and any shadows cast by parts of the building

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Sun Blind Control

Solution:

- The blinds are moved by conventional actuators

- Artificial light is switched on via movement sensors if required

- In summer the blinds will close fully in order to avoid heat gain

- In winter the louvres open wide to allow solar gain

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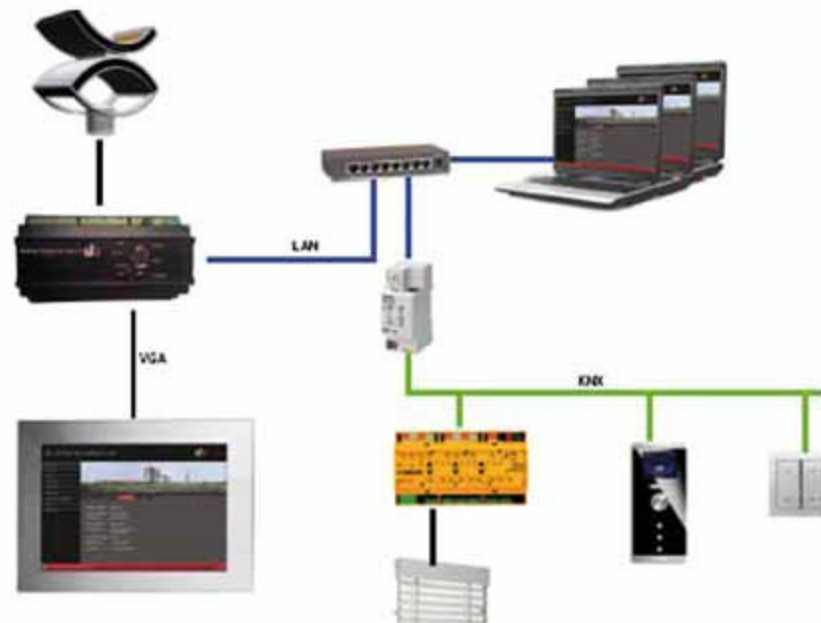
Ambient Assisted Living

Task:

- Implementation of KNX technology as a part of refurbishments that make it possible for older people to live in their own homes and offer safety in certain risk situations.

Ambient Assisted Living

Solution:

- KNX movement sensors for localization as well as gathering information from the use of buttons for detecting activities

- Integrations of all sensors with the lighting system, HVAC system, blinds, shutters, security, ect.

- Possibilities to get connected with respective phone numbers in case of emergency

- Integrated load control to prevent accidents
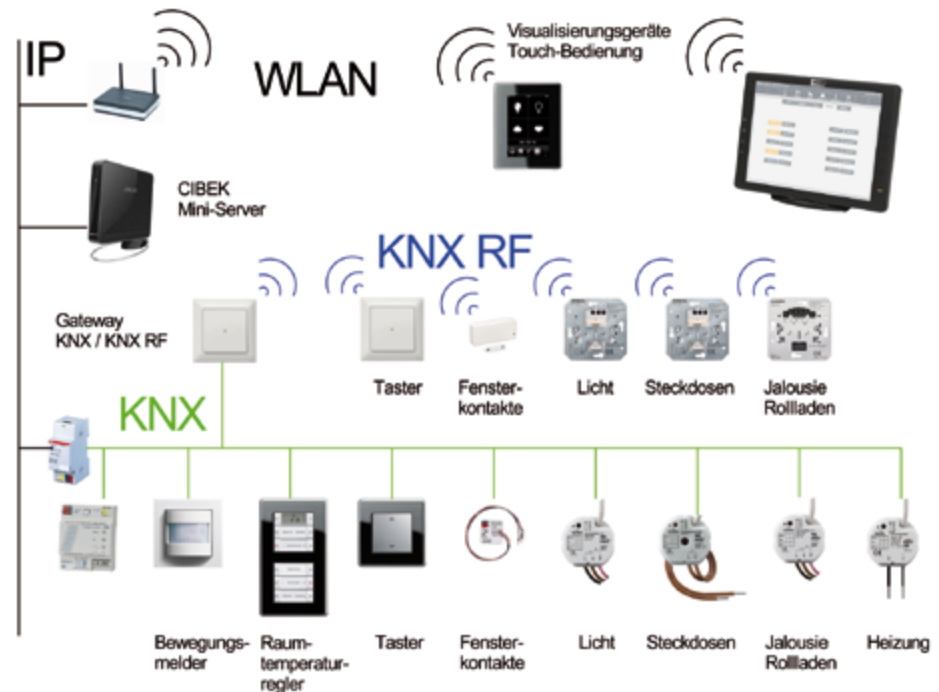
2. KNX Solutions – Project Examples (KNX Award Winners)

Three-fold Networking for Car Showroom

"Autoarona SpA"
by MAPE s.a.s. (Italy)

Central management via KNX / IP and internet

KNX-controlled lighting spots create customer-friendly highlights in the Autoarona showroom

Benefits provided by KNX in this project:

- Changes to the services are quick and easy to carry out
- All different services functions can be linked to one visualization facility
- Integration of the intruder alarm system
- Remote control and maintenance via KNXnet/IP interface
- Networking of KNX installations in three different locations via KNXnet/IP and internet
- Interfaces with the HVAC control system, the intruder alarm system and fire alarm system
- Intruder alarm system is linked to lighting functions

Outstanding Reference in Moscow

VTB Bank
by EcoProg Ltd. (Russia)

Reliable and energy-efficient building technology in the Federation Tower. Multiple tasks for KNX: energy conservation, reliability, control and representation

Benefits provided by KNX in this project:

- **High degree of dependability, reliability and quality for the operation of the lighting and air conditioning system**
- **Reduced power consumption through optimization of operating processes**
- **Comfortable operation for customers and staff**
- **Central control through integration with the BMS**
- **Constant lighting control in the offices**

Outstanding Reference in Moscow

VTB Bank
by EcoProg Ltd. (Russia)

Reliable and energy-efficient building technology in the Federation Tower. Multiple tasks for KNX: energy conservation, reliability, control and representation

Benefits provided by KNX in this project:

- **Automatic lighting control via movement sensors and BMS in public areas**
- **Manual and remotely controlled temperature setting in the offices**
- **Controlling lighting scenes in the conference rooms and top management offices in combination with media technology**
- **Central visualization of all KNX functions**

Outstanding Reference in Moscow

VTB Bank
by EcoProg Ltd. (Russia)

Reliable and energy-efficient building technology in the Federation Tower. Multiple tasks for KNX: energy conservation, reliability, control and representation

Energy savings provided by KNX in this project:

- **A constant lighting control system, which takes daylight levels into account, was installed in order to provide reliable and yet economical lighting**

- **In order to reduce energy costs, it is possible to activate different operating modes for air conditioning and heating using the KNX control system**

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Delhi International Airport with Efficient Lighting

Delhi International Airport Ltd.
by Entelechy Systems (India)

KNX shows world class format at the new Terminal 3

In public areas, KNX controls the lighting according to demand

Benefits provided by KNX in this project:

• **KNX provides the ideal basis for energy-conserving lighting control systems**

• **Basis for complex applications involving energy conservation, safety and comfort is provided by:**

  ✓ *The communication between KNX and the Building Management System,*
  ✓ *The heating, ventilation and air conditioning system*
  ✓ *The fire alarm system*
  ✓ *A Network Management System and*
  ✓ *The integration of visualization software*

Delhi International Airport with Efficient Lighting

Delhi International Airport Ltd.
by Entelechy Systems (India)

KNX shows world class format at the new Terminal 3

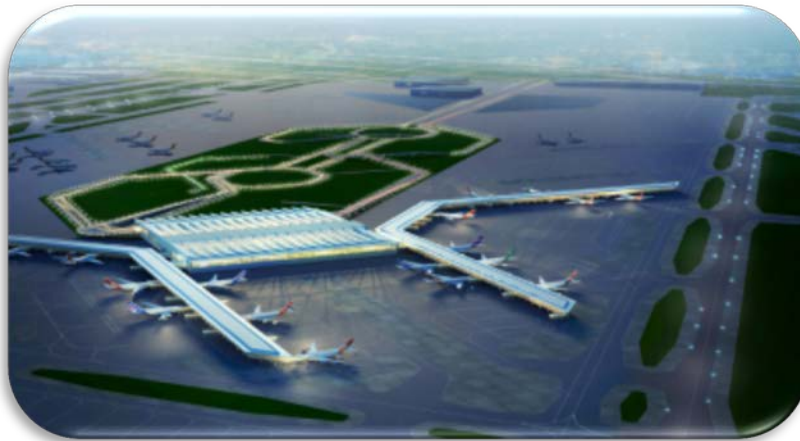*In public areas, KNX controls the lighting according to demand*

Winner KNX Award Category International – Asia

Energy savings provided by KNX in this project:

- **Scope for energy-conserving lighting management – brightness can be reduced, and automatic dimming and switching can follow patterns of demand**
- **It is possible to make maximum use of daylight, and systems can be automated using timing and occupation programs**
- **In busy areas lighting remains switched on continually at full brightness. In less-busy areas lighting is controlled according to whether the zone is activated or deactivated**
- **Lighting and HVAC in the offices and service rooms can be controlled by presence sensors to suit demand**

Home Automation – To Luxury Standard

Mark Hills
by DANA corp. (Rep of Korea)

Winner
KNX Award
Category
International – Asia

World standard in uniform design for apartment building in Seoul. Comfortable operation of KNX functions by a central touch panel: for example, menus for heating, curtains and lighting

Benefits provided by KNX in this project:

• **Central operation via LCD touch panel and remote access via mobile phone and laptop**

• **A large selection of switch ranges and uniform design of KNX operating units such as:**
  - ✓ **switches**
  - ✓ **dimmers**
  - ✓ **temperature controls**
  - ✓ **blind switches**

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Home Automation – To Luxury Standard

Mark Hills
by DANA corp. (Rep of Korea)

World standard in uniform design for apartment building in Seoul. Comfortable operation of KNX functions by a central touch panel: for example, menus for heating, curtains and lighting

Benefits provided by KNX in this project:

- **And other installation elements such as:**
  - ✓ **sockets**
  - ✓ **communication connectors**
  - ✓ **etc**

- **The interface between KNX and a local RS-485 Home Network System is unique for Korea**

Home Automation –
To Luxury Standard

Mark Hills
by DANA corp. (Rep of Korea)

World standard in uniform design for apartment building in Seoul. Comfortable operation of KNX functions by a central touch panel: for example, menus for heating, curtains and lighting.

Energy savings provided by KNX in this project:

- **Convincing feature was the effective conservation of energy through single room control implemented within an overall uniform design**

Multimedia with ECO Mode

Los Angeles HOF Baseball Player's Mansion
by Benolli (USA)

Winner
KNX Award
Category
International Africa,
America, Australia

Los Angeles: Prominent Residence with Intelligent Building Technology

Benefits provided by KNX in this project:

- The system facilitated the installation of numerous features for this 'intelligent house' and the integration of other systems so that all functions and media can be controlled via one visualization

- An energy management system, which is activated via Eco mode, ensures a reduction of about 20 percent of energy consumption for lighting, space heating, solar screening and pool heating

- Comfortable lighting with pre-programmed lighting scenes for different events and uses

Multimedia with ECO Mode

Los Angeles HOF Baseball Player's Mansion
by Benolli (USA)

Winner
KNX Award
Category
International Africa,
America, Australia

Los Angeles: Prominent Residence with Intelligent Building Technology

Energy savings provided by KNX in this project:

• **Efficient in Eco mode:**

✓ *Switching of the exterior lighting via a timing program which uses a brightness level of 40 percent*

✓ *Automatic solar screening reacts to time switching, scenes, solar sensor and to Eco or absence scenes*

✓ *Individual room temperature control for heating, ventilation and air conditioning contributes to energy efficiency, using adjustbale operating modes, automatic temperature profiles, window contacts and a link with scene control system*

✓ *Lighting, solar screening, pool heating and HVAC operates more efficiently using dimmer functions, lower target settings and shading*

Multifunctionality in Community Center

"Wolke 14" Sonneberg
by GST Schumann (Germany)

Energy consumption for town and citizens made transparent

Benefits provided by KNX in this project:

• Automatic functions for comfort levels and for the support of events

• Energy conservation through individual room control and automatic lighting control

• Transparent consumption patterns to promote energy consciousness

• Exact data for cost accounting relating to events by different user groups

• Alarm function for technical faults and break-ins

• Flexible building service to ensure that the multi functionality of the building can be maintained in the future

KNX: The worldwide STANDARD for home & building control

Multifunctionality in Community Center

"Wolke 14" Sonneberg
by GST Schumann (Germany)

Energy consumption for town and citizens made transparent

Winner KNX Award Category National

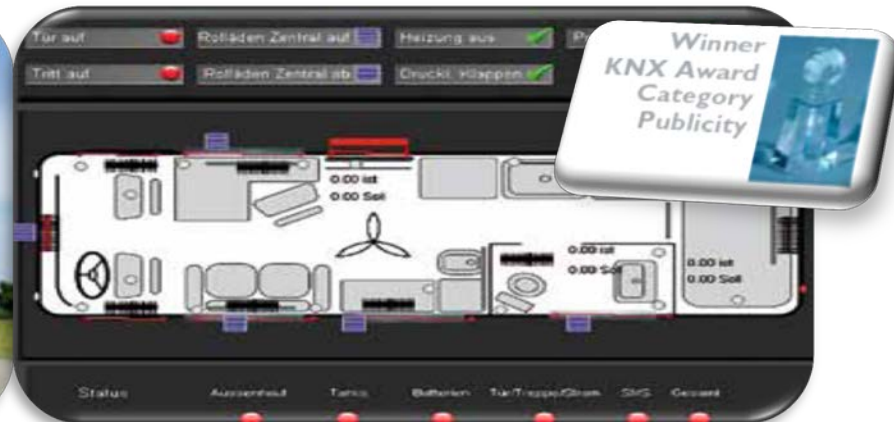**Energy savings provided by KNX in this project:**

- As this whole project was part of a project study, particular emphasis was placed on sustainability, energy efficiency and flexibility
- Energy for space heating and hot water is derived from the groundwater using two heat pumps
- The heat is distributed through a low-temperature under-floor heating system
- The room temperature is controlled individually in each room using the KNX facility
- A touch screen in the foyer of Wolke 14 is used for controlling the building technology functions and its visualization informs the public about the energy-saving functions in the building

My Smart Home is My Camper Van

KNX Wohnmobil
by KNX User Forum (Germany)

For more holiday comfort and security – The first camper van with KNX

Visualization on the mobile touch screen

Benefits provided by KNX in this project:

• **Everything works automatically: lighting with scene control, TV and audio system, blackout and solar screening and even the activation of the monitoring functions during the night and absences**

• **Improved security on the road through intruder and theft prevention and remote monitoring**

• **Helpful functions for everyday camping, such as fill level monitoring and alarms, energy management and recording the overnight camp sites using coordinates on a visualization screen**

Showroom Vividly Presents Building Automation

Show Room BIS
by BIS Group (Russia)

System integrator underpins market leadership in southern Russia with KNX showroom

In the Showroom, display boards illustrate each of the different functions that are controlled via KNX

Benefits provided by KNX in this project:

- **Flexibility and multifunctionality**
- **Compatibility between products by different manufacturers**
- **Integration of different building functions such as:**
  - ✓ **lighting**
  - ✓ **HVAC**
  - ✓ **Solar screening, etc.**

Showroom Vividly Presents Building Automation

Show Room BIS
by BIS Group (Russia)

System integrator underpins market leadership in southern Russia with KNX showroom

In the Showroom, display boards illustrate each of the different functions that are controlled via KNX

Energy savings provided by KNX in this project:

- **A model of a heating and air conditioning system demonstrates, with colourful neon tubes, how to conserve heating and cooling energy with automatic room temperature control**

Superlative Holiday Resort

Navarino
by GDS Digital Systems Ltd (Greece)

Future-proof KNX concept guarantees growth and flexibility

Luxury suite with view of the Costa Navarino

Benefits provided by KNX in this project:

- **Versatile applications for lighting, solar screening and air conditioning**
- **Options for managing the whole range of building services centrally**
- **Remote monitoring and maintenance**
- **Compatibility with different media and protocols such as twisted pair, optical fiber and KNXnet/IP for coping large distances**
- **System flexibility for coping with changes and expansion**

Success with Energy Management

Infineon/Campeon
by EIB-TECH (Germany)

Group headquarters reduces the cost of electricity for lighting through automatic KNX controls

Winner KNX Award Category Energy Efficiency

Six servers link the KNX 'worlds' in accordance with the building zones for lighting management.

Benefits provided by KNX in this project:

- **Installation of a light energy management system using decentralized bus units and one cetral server**

- **Substantial savings on lighting costs through automated switching**

- **Owing to the flexibility of the system it is easy to implement further energy management optimization measures**

- **Large selection of compatible bus sharing units for many different functions by different manufacturers**

Success with Energy Management

Infineon/Campeon
by EIB-TECH (Germany)

Group headquarters reduces the cost of electricity for lighting through automatic KNX controls

Six servers link the KNX 'worlds' in accordance with the building zones for lighting management.

Energy savings provided by KNX in this project:

- **By using automatic KNX lighting control systems it is possible to reduce the cost of electricity by double-digit percentage figures**

- **In the fourth quarter of the 2008/2009 business year alone, the concumption statistics show cost savings of about EUR 31,846 or 20 percent compared to the prvious year**

- **The company management has announced further measures for conserving energy used by the building services**

Pupils build a European 'Smart Home'

Smart Home in Europe
by Six-Nation EU Comenius Project (European Project)

Teaching Project with KNX. Next to the project's logo on the left, you can see a collage by the participating Belgian school relating to the event

Benefits provided by KNX in this project:

- **In this teaching project, pupils take the lead in designing their own 'Smart Home' of the future**

- **Their ideas and creative solutions are a good match for the international KNX Standard due to its:**
  - ✓ **many functions**
  - ✓ **large selection of compatible components and**
  - ✓ **brands and the international applicability of the system**

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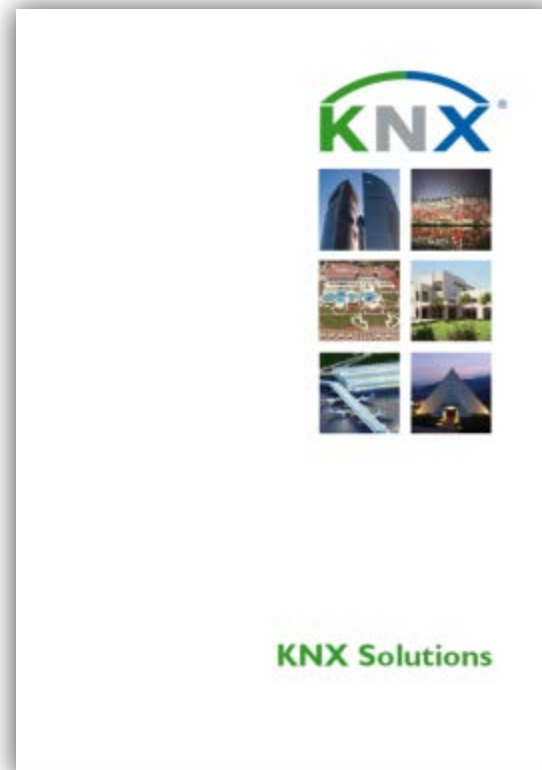

Teaching Project with KNX. Next to the project's logo on the left, you can see a collage by the participating Belgian school relating to the event

Energy savings provided by KNX in this project:

• **A first technical application was implemented at a school in Finland.**

- ✓ **The lighting system of their own classroom is controlled by a KNX system including dimmer function and lighting scenarios**

- ✓ **It is intended to increase the awareness of artificial lighting and the need and potential for saving electrical energy**

Questions?

For further information, please have a look in our Flyer

KNX Solutions

Thank you for your attention