



## The role of home and building control in the smart city

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# The home: 50 years ago

- **Electrical System**

- Some light bulbs operated by mechanical switches
- some sockets



- **Heating/Cooling**

- Central area only (e.g. kitchen stove or living room fire place)



- **Communication means**

- Simple letter
- Fixed telephone
- Radio, from late 50s onwards TV





# The home now



## ▪ Electrical System

- Garden Lighting, Dimming and Mood lighting
- Electrically operated blinds and sun shading
- Access (badge) and Anti-intrusion systems
- Alarm systems
- Household appliances



## ▪ Heating and Cooling

- Individual room control
- Weather dependant temperature control
- Renewable energy (solar, wind, heat pumps, ...)



## ▪ Communication means

- Home cinema
- iPod, Sound systems
- (wireless) Internet
- Mobile telephony
- ...



# Why home and building control?

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## ▪ Conventional installation

- Island approach: every application domain (lighting, sun blind control, HVAC, ...) works independently
- Heat consumption : not aware of heat production
- Loss of resources



## ▪ The solution

- Connecting individual systems in a home or building network
- One single system: no use of gateways to couple individual islands
- System shall be multi-vendor and multi-application



## Smart Home/Buildings: general advantages

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- Scalability – Investment in the future
  - first smart home installation may be limited to one single application
    - Lighting
    - Heating, ventilation, air conditioning
    - Shutters, blinds and sun shading
    - Metering, energy management
- Considerable reduction of energy consumption
  - Examples: presence detectors, window contacts, day light intensity sensors, individual room control, schedulers, CO2 sensors for passive ventilation, sun shading to reduce heating in winter and cooling in summer
- Increased comfort/security
- Distant monitoring/maintenance of networked devices
- Answer to changing social trends
  - Ageing of people (Ambient Assisted Living)
  - Increase in single person households
  - Both adults in families working
  - Increased urbanization
  - Shrinking resources
    - Anyway requires increased use of ICT in homes and buildings





## KNX History and activities (1)

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- Technical solution invented by consortium of German manufacturers end of 80s
- **KNX Association** founded May **1990**
- Pools three former bus associations EIBA, Batibus and EHSA
- Profit organization with headquarters in the suburbs of **Brussels**
- **Income** from
  - Membership contributions
  - Certification of KNX compatible devices (symbolized by the KNX Trademark)
  - Certification of training centers
  - Licensing of uniform KNX planning and commissioning tool ETS – No sale of electronics
- **International Standard**
  - KNX is cooperating partner to CENELEC
  - KNX Protocol, its media (TP, PL, RF, IP) and management procedures are standardized in Europe as EN 50090 (CLC) and EN 13321-1/2 (CEN)
  - Standardized on world-wide level as ISO/IEC 14543-3
  - Standardized in China as GB/Z 20965





## KNX History and activities (2)

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### ■ **KNX members**

- Currently more than 250
- Including key players in the electrical, HVAC, white goods, audio market
- Including SMEs as well as multinational companies
- Companies predominantly with European headquarters but some also in Asia/USA – representation in 32 countries worldwide
- Number of involved manufacturers more quadrupled since 2005!
- Offering ISO/IEC 14543-3 compatible solutions ranging from system components/stack implementations to complete off-the-shelf devices

### ■ **IPR (Intellectual Property Rights)**

- KNX technology is royalty free for KNX members

### ■ **KNX Certification**

- Of Products: by third party test labs – ensuring compatibility with standard and true interoperability with products of other manufacturer
- Of training centers : guaranteeing world-wide uniform training on KNX system





# KNX' role in a sustainable city (1)

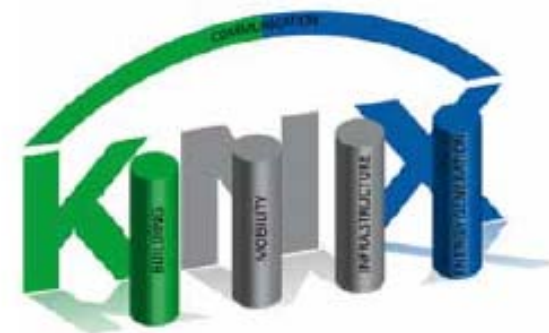
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## ▪ Buildings

- Energy actuators → allow to measure consumption as well as switch individual electric loads
  - Finding source of high energy consumption!
- Intelligent household meters with connection to KNX
- Displays → visualize energy consumption to the inhabitants – inform on current tariff – data available in the home/building (not in the cloud)

## ▪ Mobility

- Using excess energy from own renewables to charge e-car
- Controlled charging → shift loading to period of lower demand (e.g. night, instead of early evening)
- Information from charging station to building controller that e-car is plugged – remote or user initiated start of charging process
- (if needed) feeding stored energy of e-car back into grid



## KNX' role in a sustainable city (2)

### ■ Infrastructure

- Linking distributed properties via IP as if they were one single building
- Making optimum use of one's own energy production capacity (e.g. car park for e-cars)
- Property spanning energy management/visualization, even remotely

### ■ Energy

- Counter by load management:
  - high demand during low renewables production
  - Low demand during high renewables production
- Storing energy currently not possible on such scale
- Instead of adjust energy supply to demand → adjust demand/load to available energy
  - Energy gain highest with applications like HVAC (set to Eco Mode)
  - Some appliances (e.g. white goods) – switching on/off may be prevented by running program
- Use of time-variable electricity rates → encourage customers to consume when energy is cheaper





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**Thank you for your attention!**

**Want to be part of the KNX  
community?**

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