Apricum

Operativni program
KONKURENTNOST
I KOHEZIJA

EUROPSKI STRUKTURNI
I INVESTICIJSKI FONDOVI

Europska unija
Zajedno do fondova EU

KNX – Automatizacija zgrada, povijest i tehnika

Promocija EU projekta:
„Apricum – suvremena digitalna i zelena tehnologija za suvremena KNX rješenja”

Dipl. Ing. Petar Tomić

- Apsolvent telekomunikacija na FESB-u.
- Za vrijeme studija se bavio računarskom tehnikom za zaštitu zgrada i automatsko upravljanje.
- Nakon studija razvija digitalne sigurnosne sustave za video nadzor. Instalacije sustava u kasinima Melbourn, Sidney, Makao, ..
- 1991 godine počinje kod Siemens-a u grupi za razvoj sistemskog softwera EIB. Od tada aktivno sudeluje u razvoju KNX sustava.
- 1999 godine napušta Siemens sa kolegom Klaus Adler
  Iste godine osnivaju Tapko Technologies GmbH u Regensburgu.
- Uspiješno nastavljaju tradiciju rada u oblasti automatizacije zgrada.
- 2001 se osniva Apricum d.o.o. sa proizvodnim pogonom u sjevernoj luci.

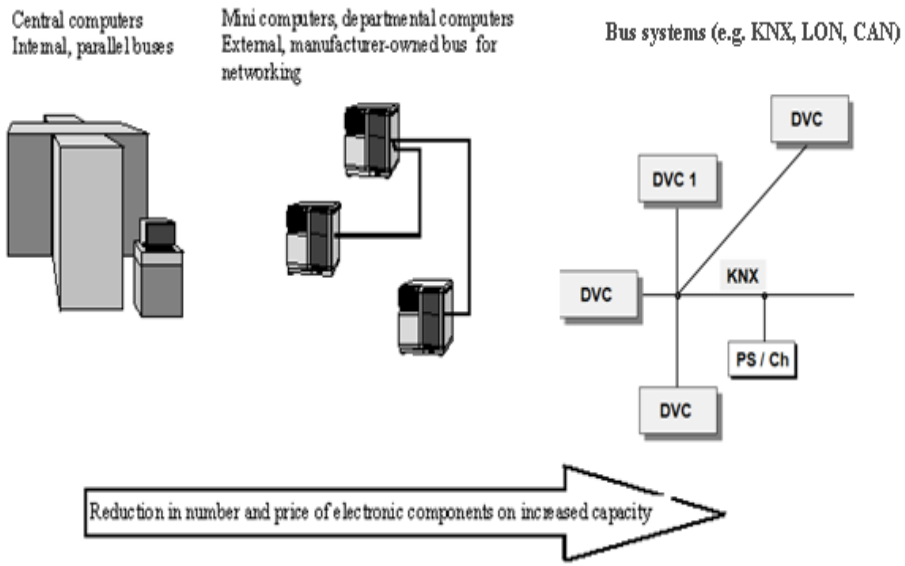
Introduction

Automation systems are increasingly popular
and important in buildings of all sizes and complexities.

Why ?

- Convenience
- Safety
- Energy efficiency
- Intelligent monitoring
- Control of residential and commercial building - smarter automation
  - lightning
  - blinds
  - complex HVAC
  - energy metering

History of Bus Systems

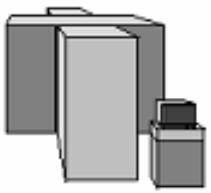


- In the 60's development of the first usable computer.
- First bus systems to connect internal components of computers.
- Miniaturisation.
- First Departmental computer
- External manufacturer-specific bus systems used for interconnection of computers.
- First PC in the 80's
- Proprietary bus systems were no longer accepted
- Customers demanding open systems.

The task of bus systems was connecting systems.
Now, it's not the bus system which connects installation components, but the bus system itself is the installation.

This is KNX. There is no central unit running a program.
The "program" is divided all over the installation in many countless intelligent network nodes, of which the interaction between them determines the complete installation function.

History of Bus Systems

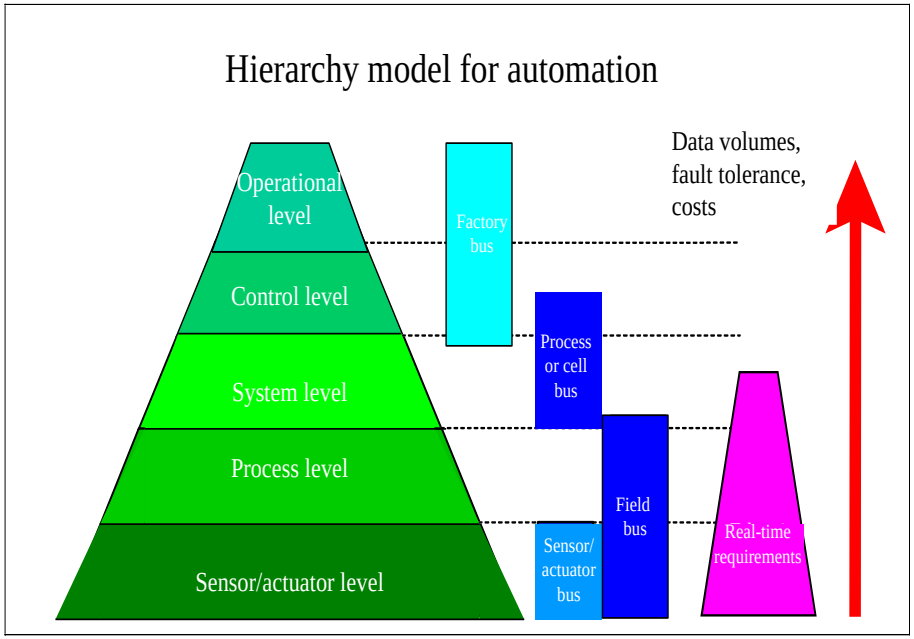
Beginning	1st development stage	2nd development stage	3rd development stage (current situation)
Central computer, internal parallel buses	Bus systems and microprocessors are used increasingly but the systems are incompatible or show signs of compatibility problems	Further market penetration of bus systems, compatibility is aimed for, manufacturers enter into cooperations, bus sytems are standardised	Further market penetration of bus systems, networking between systems, merger of systems, inclusion of public networks (Internet), RF networks
	Building - Sigma i-Bus - Netzbus X10 - Building Management System	Building - EIB, LON, manufacturer-owned systems (Z-Bus, PHC, LCN)	Building - KNX - Building automation with LAN technology - RF networks
	Automation - PLC Networking - field bus	Automation - Profibus, Interbus, CAN, LON	Automation - Industrial ethernet - WAN and LAN technology - WLAN
	EDP - Microchannel - VESA local bus	EDP - PCI-Bus - Ethernet	EDP - USB bus - WLAN

Reduction in number/price of electronic components on increased capacity

Areas of Application for Bus Systems

- development of bus systems for computers -> the area of application more widespread.
- first development stage: bus and microcomputer systems were used in building automation.
  , the functions available were only very limited and the systems were seldom compatible with each other.
- Today exist many different bus systems.
  Bus systems supported by a united group of manufacturers gain a significant market position: e.g. KNX
- Such systems may sometimes be too expensive, so simple, good value and even proprietary systems gain a certain market share
- In these past few years, RF bus systems have been introduced next to “wired” bus systems. These RF bus systems are gaining an increased significance in building services engineering due to the fact that they can be used for fast changing applications as well as in the renovation industry.

Hierarchy Model for Automation



- Each bus system can be categorised in the model.
- Many bus systems also cover several levels.
- The KNX bus is categorised in the area of the field buses.

- Data volumes, fault tolerance and costs are increasing with the level.
- Reaction time is decreasing.
- Not every application requires all the levels of this model e.g. the KNX can already be used sufficiently as a field bus.

- For a complex application, such as the administration and management of distributed properties, a mixture of different bus systems is used.
- Different KNX systems are interconnected via Ethernet or linked with an existing intranet or the entire Internet world.

Bus systems across different companies

	Control concept	Number of bus devices	Expansion	Transmission medium	Topology	Applications	Internet addresses
KNX	Distributed bus system with random bus access	58384 addressable devices, whereby many devices have realised several input/output points	700 metres per galvanic unit, possible to extend complete system by many kilometres	Twisted twin core cable, Powerline, radio, individual sections of optical fibre	With twisted twin core cable: Free tree structure	Lighting, blind control, heating, ventilation, access control, monitoring, visualisation and load management	www.knx.org www.knx.de www.knx-professionals.de
LON Local Operating Network	Distributed bus system with random bus access	32385 devices per domain. Several input/output points are often implemented in a device	Very varied, depending on the selected transmission type and transmission speed. In general, similar expansions to the KNX system can be achieved	Various types with twisted twin core cable, coaxial cable, Powerline, radio, infrared, fibre glass	Very varied depending on the selected transmission type	Complete applications for lighting, blind control, heating, ventilation, monitoring, load management and visualisation	www.echelon.com www.lonmark.org www.lno.de

Company-specific bus systems

	Control concept	Number of bus devices	Expansion	Transmission medium	Topology	Applications	Internet addresses
Dupline **Dupline®**	Bus system with central channel generator which is also aware of central control tasks	128	approx. 10km	Twin core cable without special requirements. Shielded TP cables to improve the interference response	Line, star, ring in any combination	Lighting, blind control functions, monitoring and reporting, visualisation	www.doepke.de
LCN Local Control Network LCN® Gebäudeleittechnik	Distributed control	Max. 250 modules in 120 buses = 30000 modules in total, whereby each module can contain several inputs and outputs	1km per bus	Free cores in 230V system	free	Lighting, blind control, logic functions, heating, visualisation, recording of measured values	www.lcn.de
niko	Mixture of central and distributed control	approx. 5000	Maximum installed cable 1000m, distance between actuator and sensor 350m	Twin core cable	Star, tree	Lighting, blind control, heating	www.niko.be
PEHA PHC PEHA	Mixture of central and distributed control	64 per central controller Max. 4 central controllers	1000m between two modules	Twin core cable between the modules	Line	Lighting control, blind control, logical functions, heating, visualisation	www.peha.de

RF bus systems

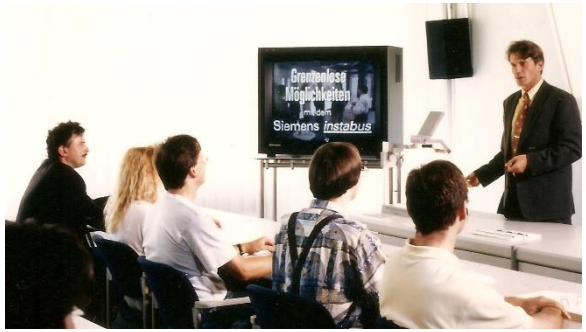
	Used frequency	RF range	Number of bus devices	Internet Address
Z-Wave	868 MHz	30 – 200 m	232 devices	www.z-wave.com www.z-wavealliance.org
ZigBee	868 MHz and 2400 MHz	10 -100 m	A device can operate up to 240 other devices	www.zigbee.org
EnOcean	868 MHz and 315 MHz	30 – 300 m		www.enocean.com
Moeller RF bus	868 MHz	30 – 50 m direct,	Max. 200 components	www.moeller.net

History of KNX 1

8.May.1990: **E**uropean **I**nstallation **B**us Association (EIBA) was founded by 15 European manufacturers in Brussels.
Goals: Promotion, distribution, development and standardization

First implementation was done by engineers of Siemens in Regensburg.
The twisted pair communication system was realized by Hermann Zierhut.
The system software group under Peter Ferstl was formed by
Klaus Adler, Siegfried Ellmann and Petar Tomic.

Driving the organisation of EIBA,
certification procedures and standardisation was Dr. Wolfdietrich Weber.



Tomić ,Reitmeier, Mühlfenzl, Ellmann, Adler

Cijela razvojna ekipa EIB

Klaus Adler

Joost Demarest, Petar Tomić

Peter Ferstl

Olivera Tomić, Franz Kammerl, Petar Tomić

Schott, Sperlich, Zirkl

History of KNX 2

1996 to 1999 the self-awareness of the organization is changing. Heading for international level.

Integration of EIB with EHS (Electronic Home System) and BCI (Bati Bus).

May 1999. Foundation of a new organization: Konnex Association.
- Realization and distribution of a common standard, called KNX.
- **Konnex Association >200 leading companies world wide participated**

2004: European standard for building automation EN 50090

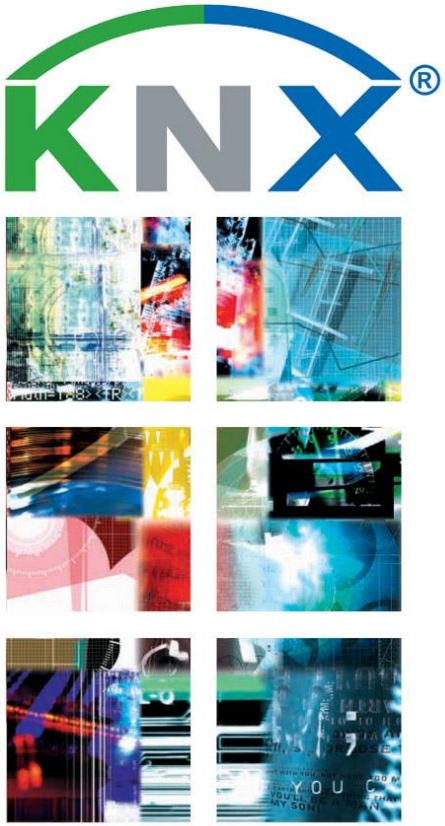
History of KNX 3

Change of consciousness of the manufacturers, global markets, liberation from local interests, integration of all areas of electro installations in buildings, culminated in:
01.01.2006 foundation of the KNX Association.

The KNX Association inherits EIB-technique, enriched by positive aspects from BCI and EHSA.

2008 Important achievement: the KNX system became the international standard for building automation.

„The world´s only open STANDARD for home and building control ISO/IEC 14543 & CENELEC EN 50090 & CEN EN 13321“

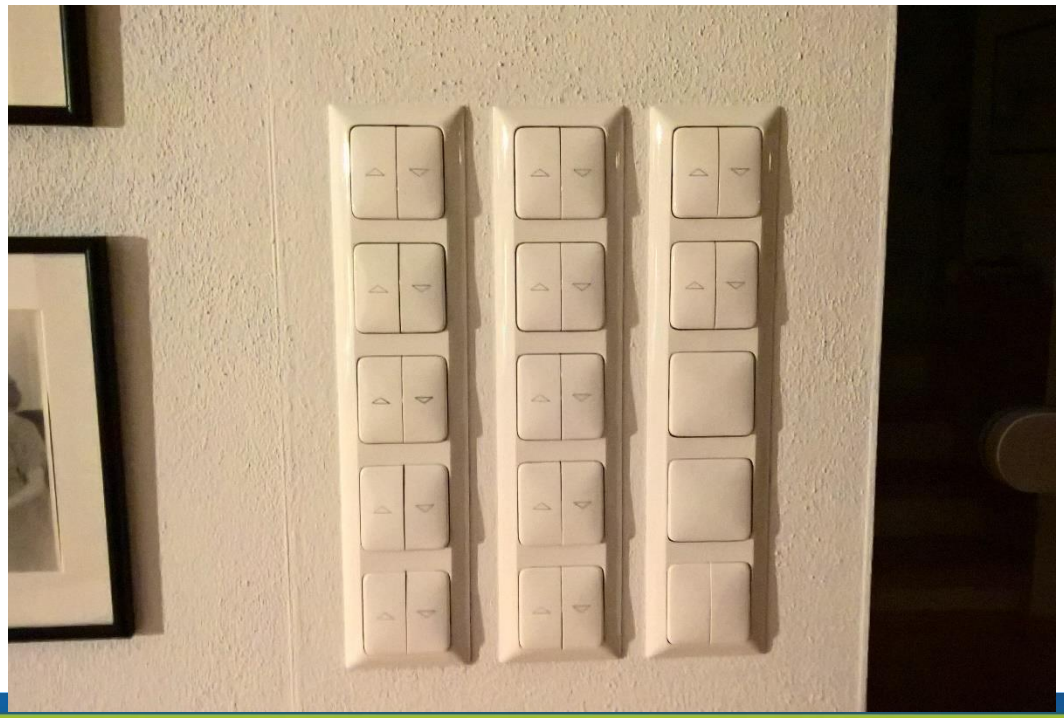


www.knx.org

Why KNX ?

KNX
The worldwide STANDARD
for
home and building control

Why KNX ?



KNX – Advantage No. 1

- CENELEC

EN 50090 – the only European Standard for Home and Building Electronic Systems (HBES) based on KNX.

- CEN

EN 13321-1 – the European Standard for Building Automation based on KNX.

- ISO/IEC

ISO/IEC 14543-3 – the World`s only Standard for Home Electronic Systems (HES) based on KNX.

- GB/T

GB/T 20965 – Chinese Standard for Home and Building Control based on KNX

- US Standard (ANSI/ASHRAE 135)

KNX – Advantage No. 2

Guaranteed Interoperability through neutral certification

1. KNX is the only home and building control standard running global certification schemes for
   A. Products
   B. Training Centers
   C. Persons

2. Product compliance is checked at neutral third party test laboratories

KNX Logo guarantees interoperability between products of different manufacturers and applications

KNX – Advantage No. 3

KNX = High Product Quality

1. KNX Association requires *high level production and quality control* during all stages of the product's life

2. All manufacturers have to show compliance to *ISO 9001* = prerequisite for product certification

KNX – Advantage No. 4

One Tool – the Engineering Tool Software ETS™!

1. One PC software tool for
   A. Design
   B. Configuration
   C. Diagnostics
2. Tool is *manufacturer, devices and application* independent – integrator can combine products of different manufacturers and applications in one installation
3. Tool is extendable with customized Apps

KNX – Advantage No. 5

Fit for use in ALL applications in home and building control!

KNX – Advantage No. 6

Fit for use in all kinds of buildings!

1. New or Existing Buildings
2. One family houses or large size buildings
3. Easy extendible/adaptable to new needs

KNX – Advantage No. 7

Support for different transmission media

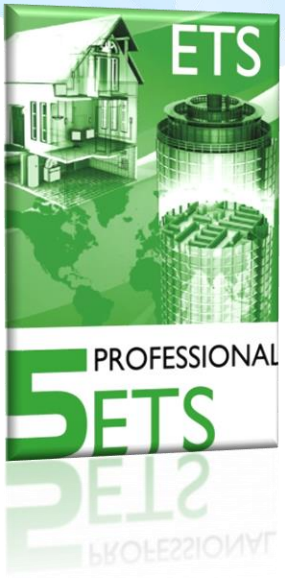
1. *Twisted Pair*

2. *Power Line*

3. Radio Frequency

4. *Ethernet/WIFI*

KNX – Advantage No. 8



Support for different configuration Modes

1. *System Mode*
   - A. Configuration with PC (ETS)
   - B. Prior basic course training recommended
   - C. Any size of installation

2. *Easy Mode*
   - A. Configuration without PC
   - B. No prior training necessary
   - C. Small or medium size installations

KNX – Advantage No. 9

Easy coupling to other systems

1. KNX members offer large variety of gateways to couple to other systems
2. Examples
   A. Mapping to BACnet
   B. Interfacing with DALI

KNX – Advantage No. 9

KNX is independent from any hard- or software technology

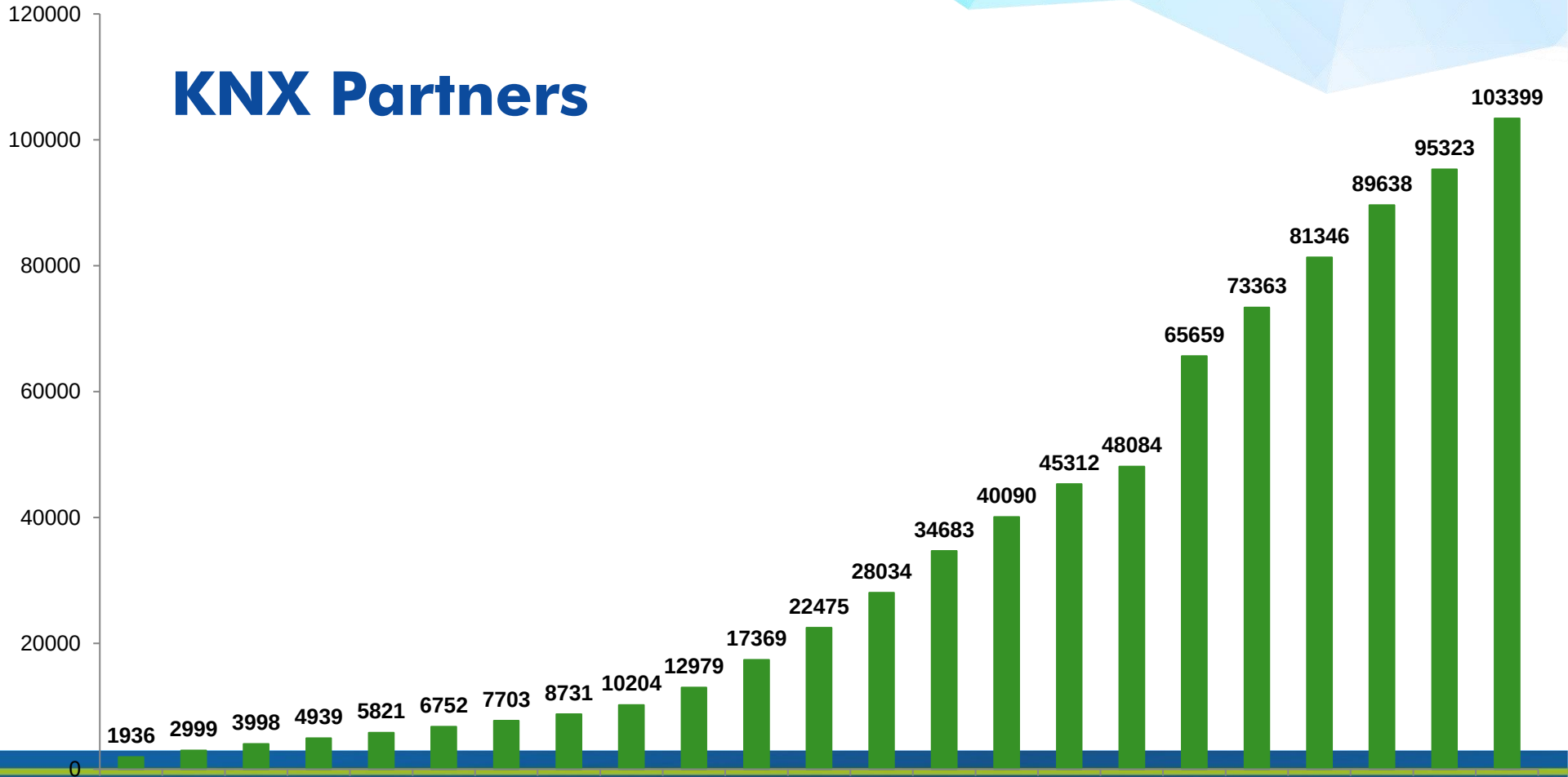
1. KNX manufacturers can develop own protocol solution
   1. From scratch
   2. On basis of existing certified system components from other KNX members

2. KNX is completely FREE of additional royalty fees: No IPR royalties to be paid for KNX standard features used in KNX certified products to other KNX members

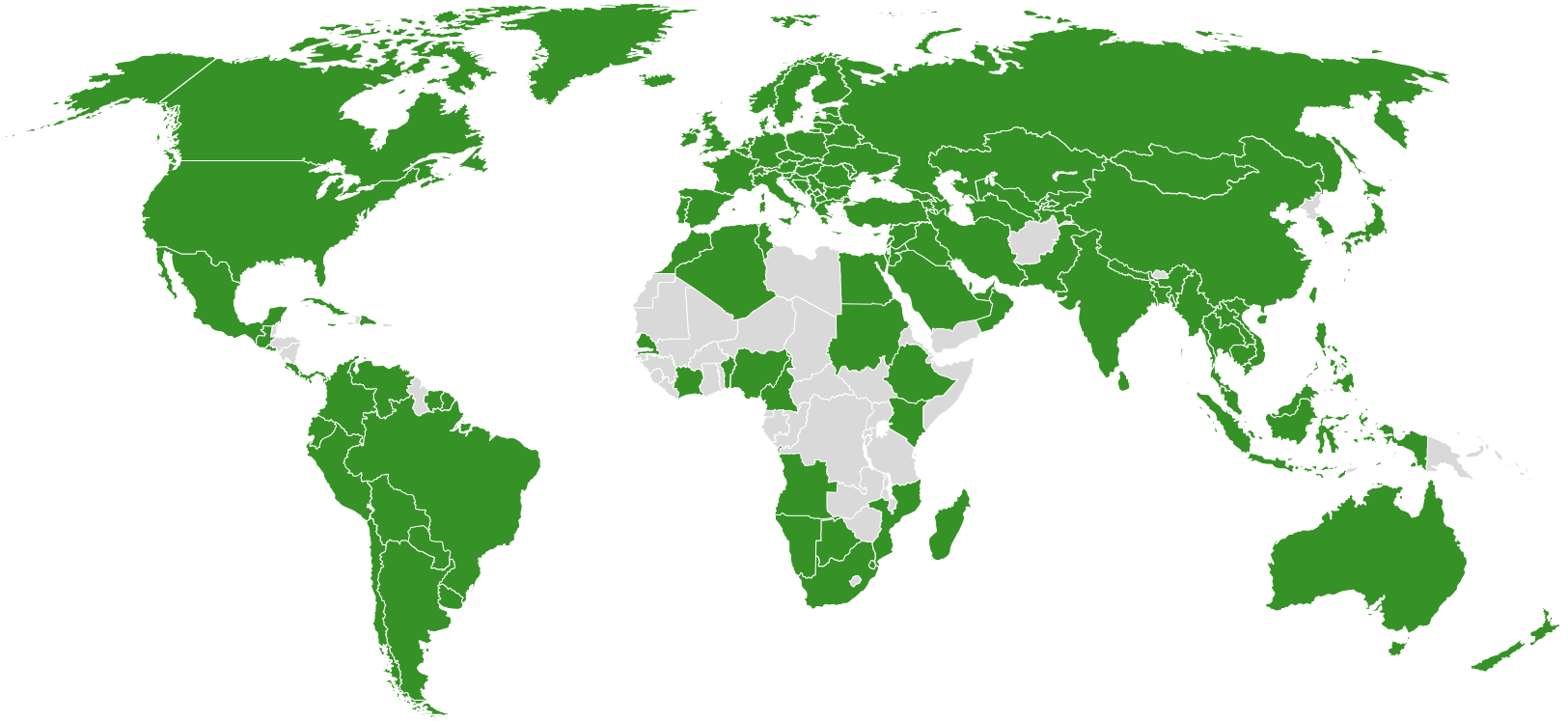
KNX Facts & Figures 2022

- 500 KNX Members in 47 countries
- 8000 certified KNX Products
- 17 Test Labs in 9 countries
- 111219 KNX Partners in 181 countries
- 505 Training Centers in 71 countries
- 177 Scientific Partners in 40 countries
- 23 Userclubs in 21 countries
- 24 Associated partners
- 44 National Groups
- KNX Projects in more than 190 countries

KNX Partners



KNX Projects in more than **190 countries**



Conclusion

1. **KNX** ranked the **top 1st communication protocol/ecosystem** known by industry professionals present in the smart home market

2. **62+%** Smart Home professionals specify the KNX technology in their integration projects.

3. **KNX is 3 times ahead** of main competitors present in the smart home market (CSA/Zigbee….)