KNX

BACnet

MQTT

Modbus

OPC
(DA/UA)

SNMP

Fidelio/Opera | Protel | Infor
RMS Cloud | CharPMS
VingCard Web | Kaba | Salto

DALI   EnOcean
M-Bus   DMX

Proprietary solutions

All-in-one

Building management software for medium-sized and enterprise building automation projects

Building management systems for providing security in existing KNX projects:

organizational measures and device monitoring

NETxAutomation Software GmbH

Austrian, globally active company – founded in 2001

Our customers

- Electrical planner
- Electricians
- System integrators

20 years of experience

100+ countries represented

100,000+ projects with over 100,000 data points

6,000+ active licenses

40 intern. sales- and R&D Partner

Software solutions for building automation systems

Management applications: visualization, energy reporting, automatic shading control, lighting control, project support

Integration of heterogeneous building automation networks: building management system platform (BMS Platform), OPC server

NETx BMS Platform

NETx BMS Platform

Multi-protocol gateway, visualization, alarm management, trending, scheduler, logic engine, lighting/DALI management, automatic shading control

| PC visualization clients windows based | Web visualization clients Web browser, NETx Vision (iOS & Android) | 3rd party BACnet clients | 3rd party OPC (DA/UA) clients | oBIX, MQTT & other web service interfaces for IoT devices | NETx BMS Platform for clustering | 3rd party SNMP clients |

| KNX, BACnet, Modbus, OPC (DA/UA), SNMP, MQTT | Fidelio/Opera, Infor, Protel, RMS Cloud, CharPMS, VingCard Web, Salto, Kaba | Universal XIO interface | HTTP server and other web service gateways | Hardware gateway: DALI, EnOcean, M-Bus, DMX |

Why is security important?

Is security important in the home and building automation domain?

- "Why should I bother if anyone turns my lights on or off?"
- "If someone wants to know my room temperature, I have no objections"

Security-critical services

- Access control
- Intruder alarms

Vandalism acts may have massive economic impact

- Complete wide shutdown of system in hotel
- Security attacks in functional buildings
- Mass panic in public spaces (e.g., lighting system in concert hall)
- Hospital (e.g., lighting system in emergency room)
- Building system may be entrance point to other (more critical) systems (e.g. hotel management systems)

KNX security

What about security in building automation?

All protocols (KNX, Modbus, BACnet, proprietary solutions) are or were prone to security attacks

The good news is that new security standards are available for KNX

KNX data security

Secure communication for all KNX media

KNX IP security

Additional security measures for KNX over IP networks

Is KNX security enough?

Yes, it uses state of the art cryptographic technologies which is used in other application domains (TLS/SSL, e banking, …)

But:

What about existing KNX projects that use non-secure KNX devices?

Secure communication is not enough

Secure communication is not enough

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| Example: | Denial-of-service attack in alarm system | Glass breakage sensor message when window is broken |

Broken window

Message →

Alarm

Alarm system

Secure communication is not enough

NETx AUTOMATION

Denial-of-service attack in alarm system	Glass breakage sensor message when window is broken

Broken window

Message →

Disorder

Unauthorized person

No alarm
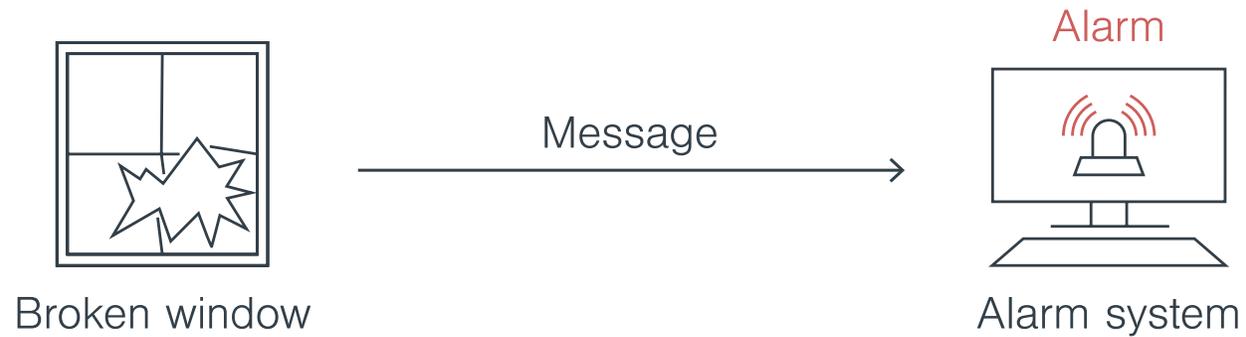
Alarm system

Secure communication is not enough
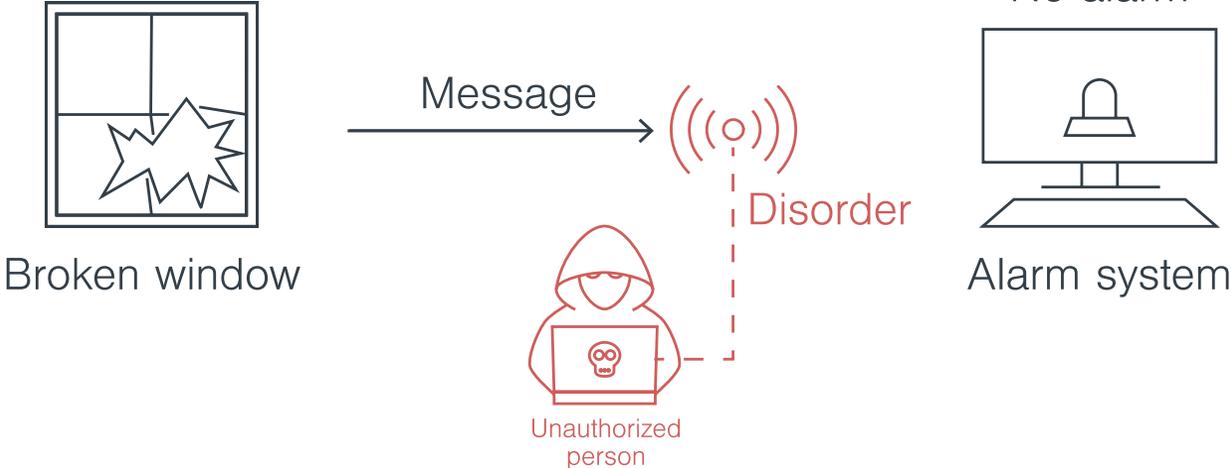
More secure solution: sensor sends "OK" message periodically	If message is missing alarm is raised

Window undamaged — Regular OK message → No alarm, Alarm system

Broken window — No message → Alarm, Alarm system

Secure existing KNX projects
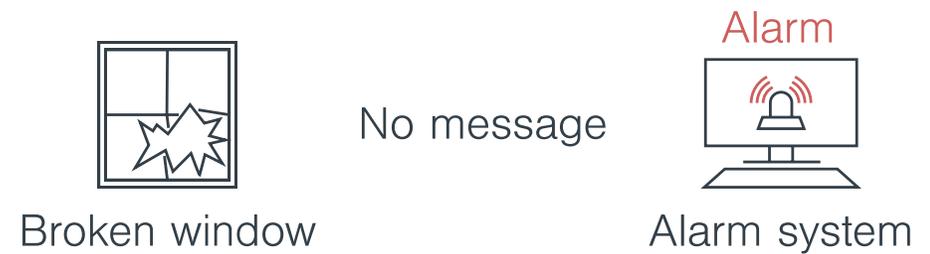
Use organizational measures!

- Isolate building automation networks
- Use defence-in-depth methods
- Train the electrical engineers and integrator to use technologies in a right and secure

Use additional software tools at the building management level

Building management systems that provide additional countermeasures against security attacks

| Intrusion detection | Device monitoring and logging | Alarm systems | Visualizations that support TLS connections |

Defence in depth in hotel projects

Insecure integration

Defence in depth in hotel projects

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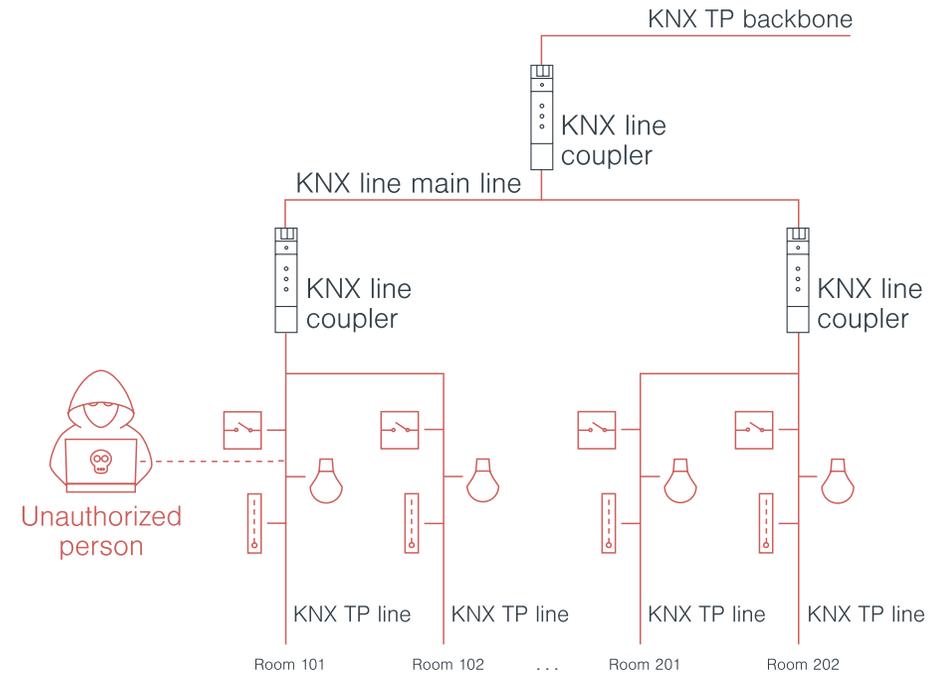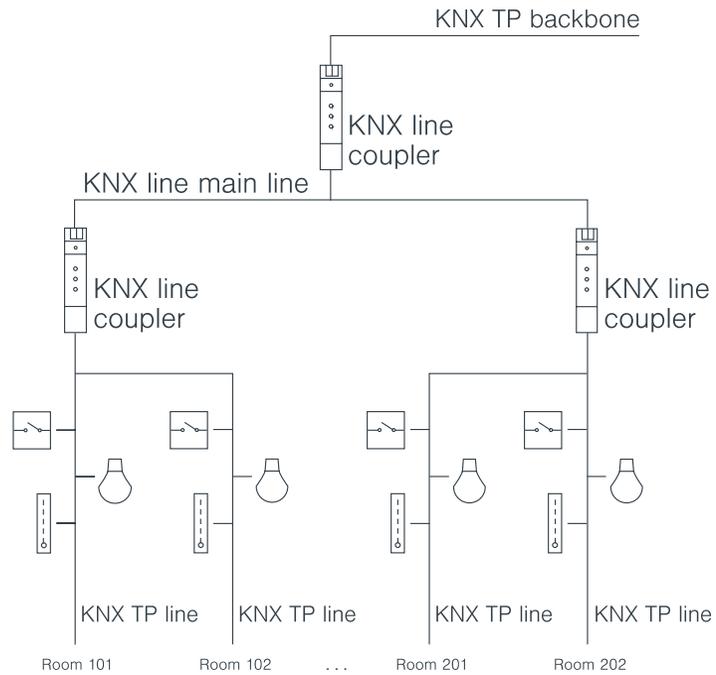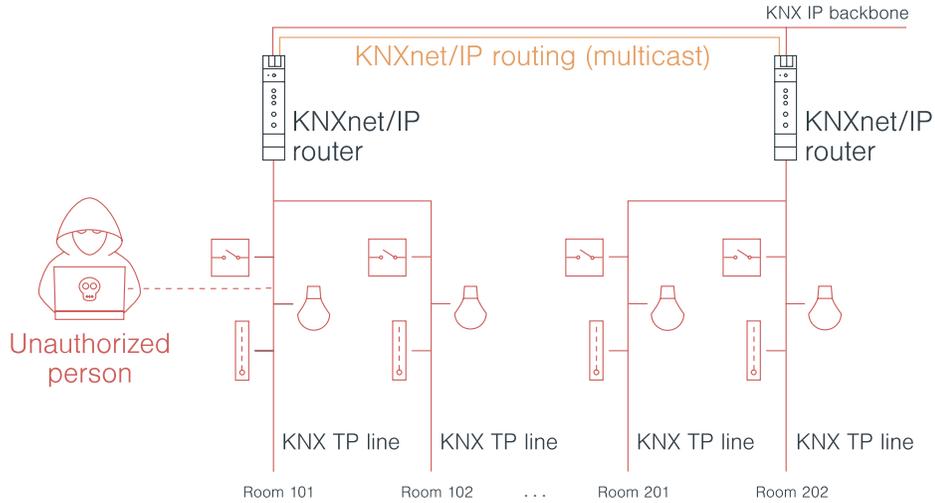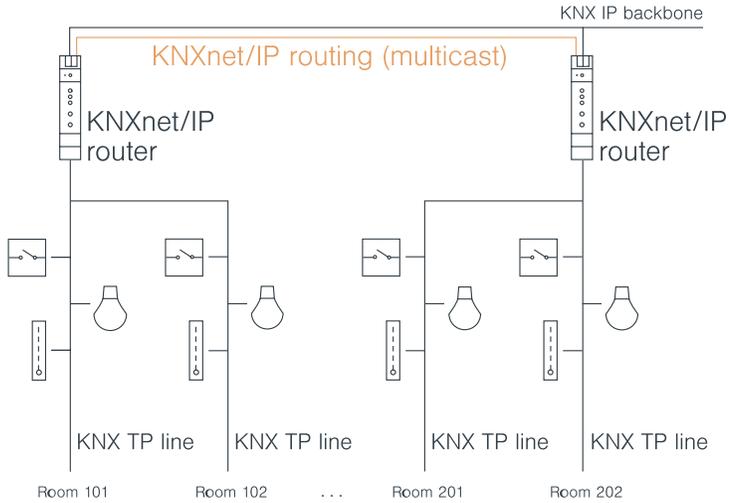
Security by isolated rooms

No KNXnet/IP routing!

Isolated IP network

KNXnet/IP interface

KNX TP line   KNX TP line   KNX TP line   KNX TP line

Room 101   Room 102   . . .   Room 201   Room 202

No KNXnet/IP routing!

Isolated IP network

KNXnet/IP interface

Unauthorized person

KNX TP line   KNX TP line   KNX TP line   KNX TP line

Room 101   Room 102   . . .   Room 201   Room 202
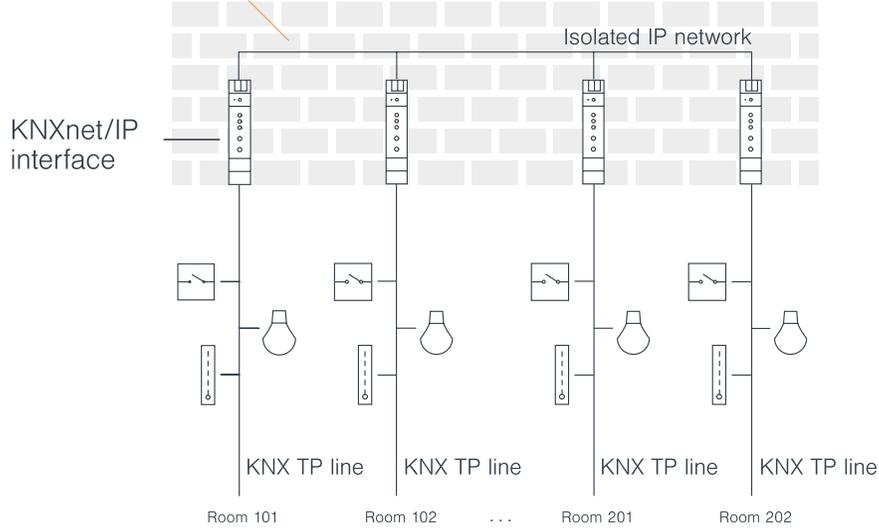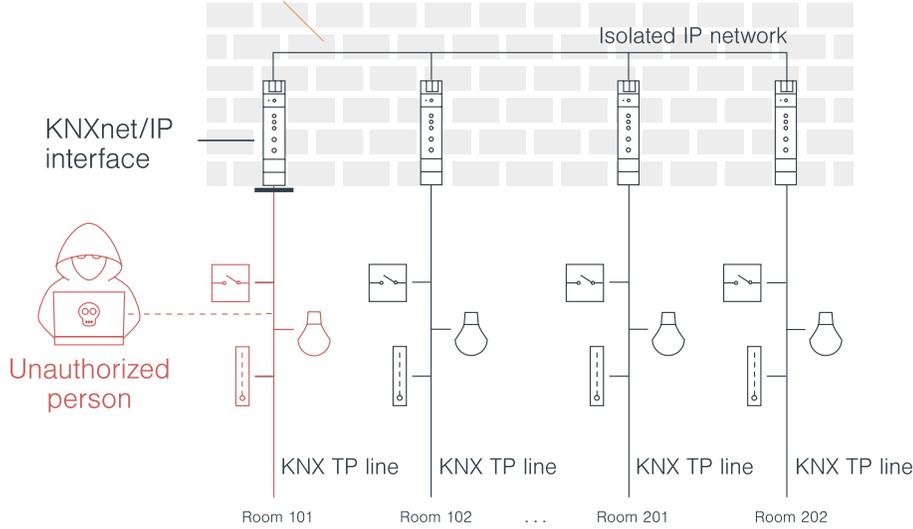
No KNX communication between rooms is necessary

- No KNXnet/IP routing is necessary
- KNXnet/IP interfaces instead of KNXnet/IP routers can be used (much cheaper)

What about central commands like changing set points?

- Using Building Management System (BMS) software

Defence in depth in hotel projects

Secure central management using BMS solution

KNXnet/IP tunneling connection (unicast)

NETx BMS Platform

Isolated IP network

KNXnet/IP interface

Unauthorized person

KNX TP line   KNX TP line   . . .   KNX TP line   KNX TP line

Room 101   Room 102   Room 201   Room 202

Intrusion detection with BMS
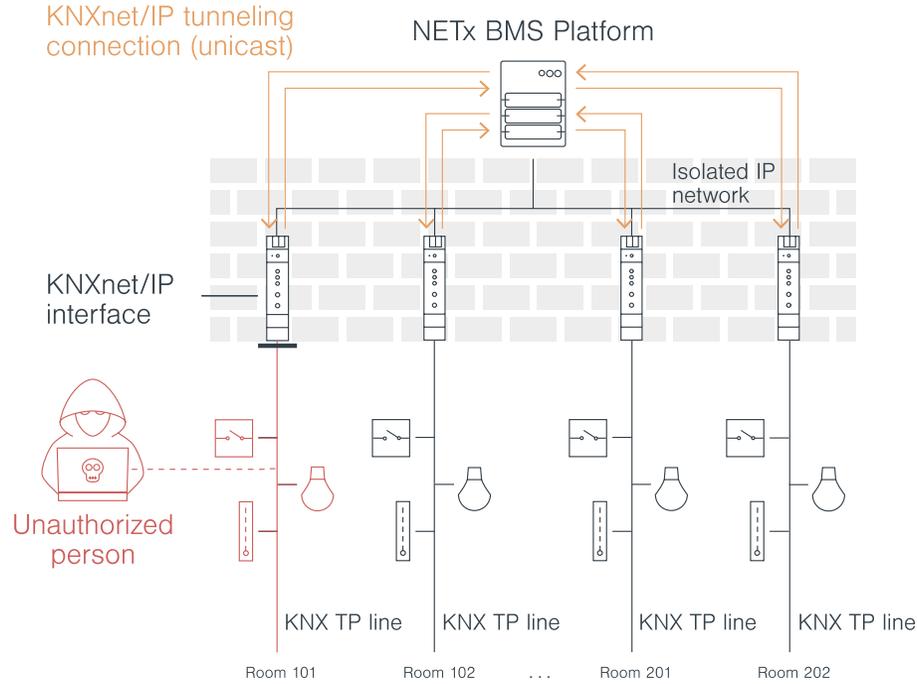
Device monitoring
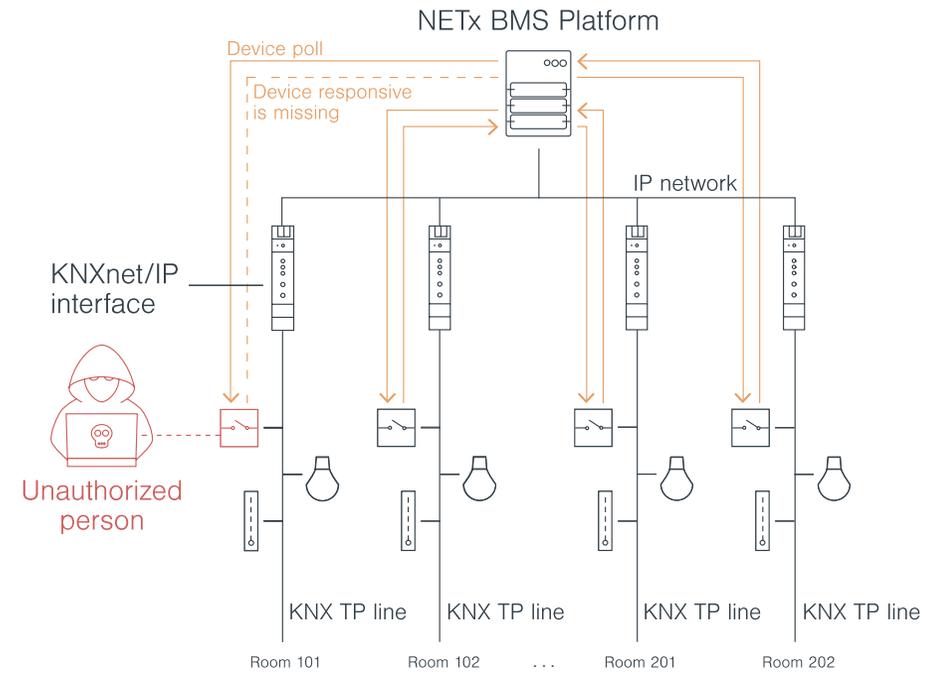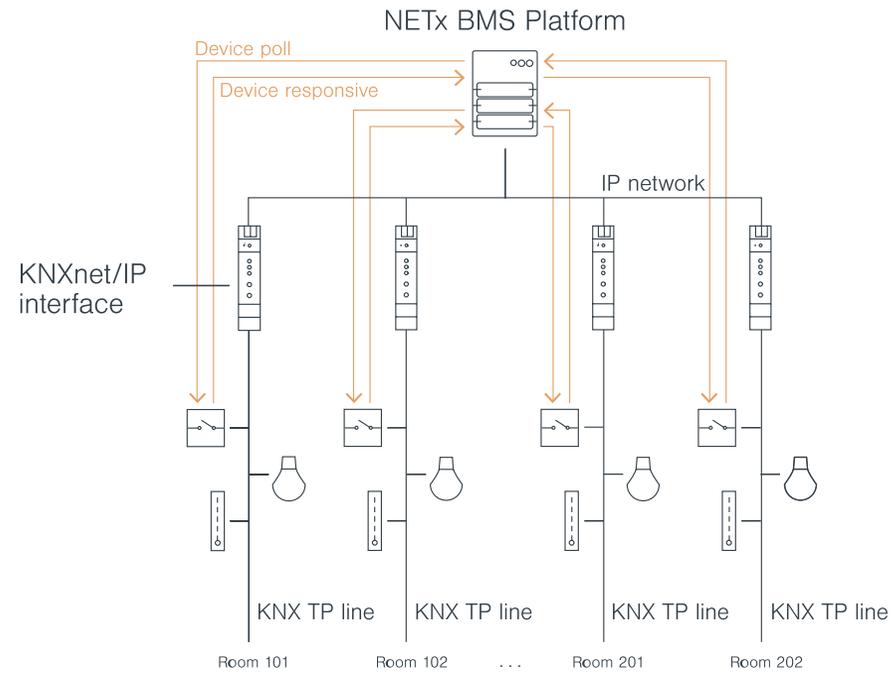
Intrusion detection with BMS

| Device polling using KNX management request	If device is not responding within appropriate time, alarm is raised	No bandwidth problem due to multiple point-to-point tunnelling connections	Data source information is also available

Isolation of the IP network

What to do if the IP network can not be isolated?

Using KNX security standard: secure KNXnet/IP tunnelling

KNXnet/IP tunneling connection (unicast)

NETx BMS Platform

Unauthorized person

Open IP network

KNXnet/IP interface

Unauthorized person

KNX TP line

KNX TP line

KNX TP line

KNX TP line

Room 101

Room 102

...

Room 201

Room 202
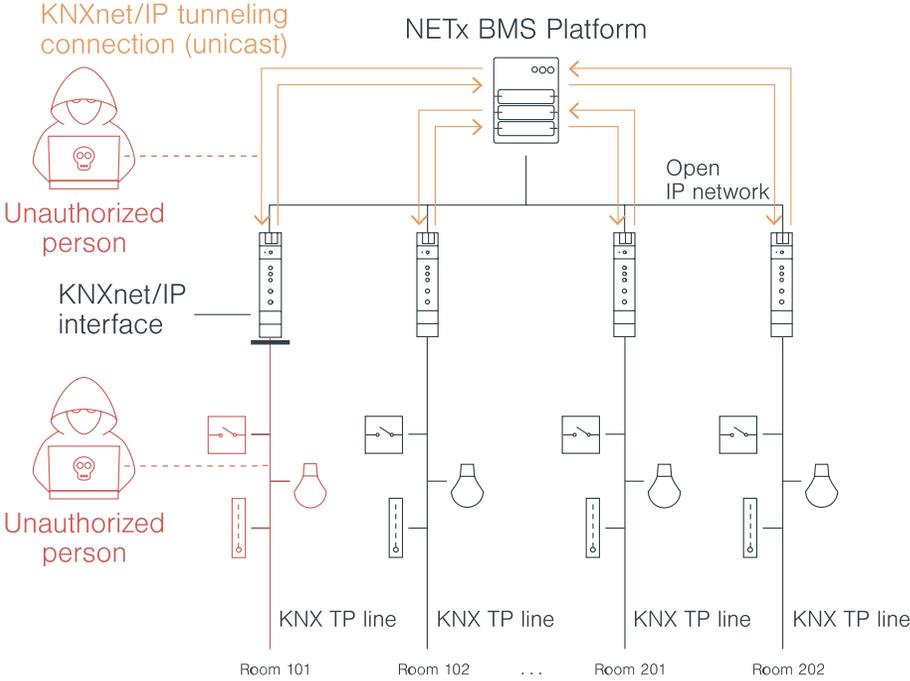
Secure KNXnet/IP tunnelling

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New KNXnet/IP security protects communication between BMS Platform and KNXnet/IP routers and interfaces

Malicious users with access to IP network cannot disturb KNXnet/IP communication

Unauthorized person

NETx BMS Platform

Secure KNXnet/IP tunnelling connection (unicast)

Secure KNXnet/IP interface

IP network

Unauthorized person

KNX TP line   KNX TP line   KNX TP line   KNX TP line

Room 101   Room 102   . . .   Room 201   Room 202
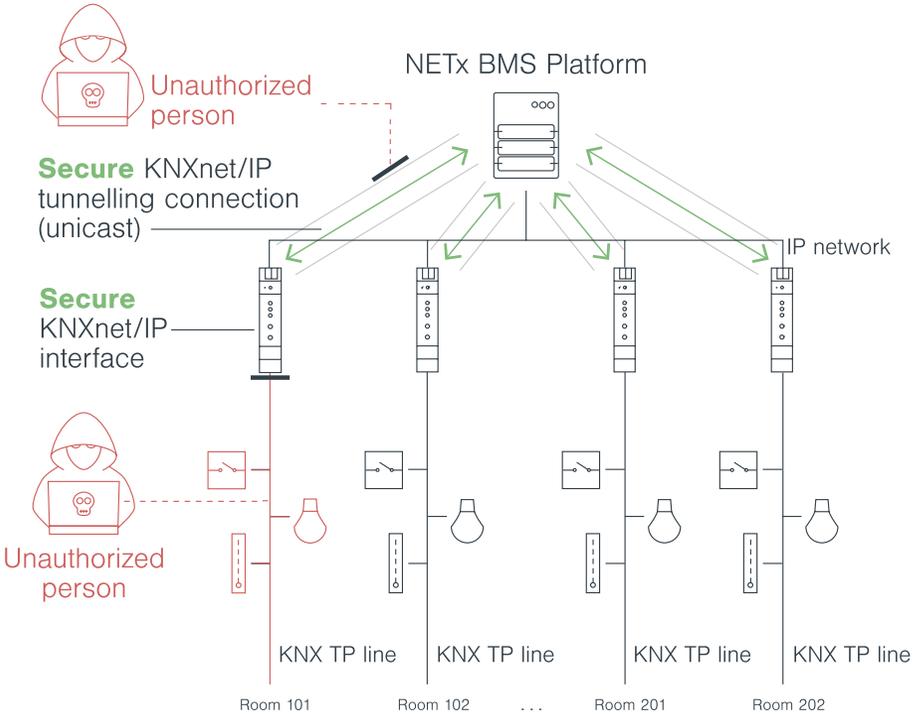
Secure visualization with NETx BMS Platform

NETx BMS Platform provides web based visualization

Pure HTML5 and JavaScript https support using TLS

Username/password authentication

Secure KNXnet/IP tunnelling driver
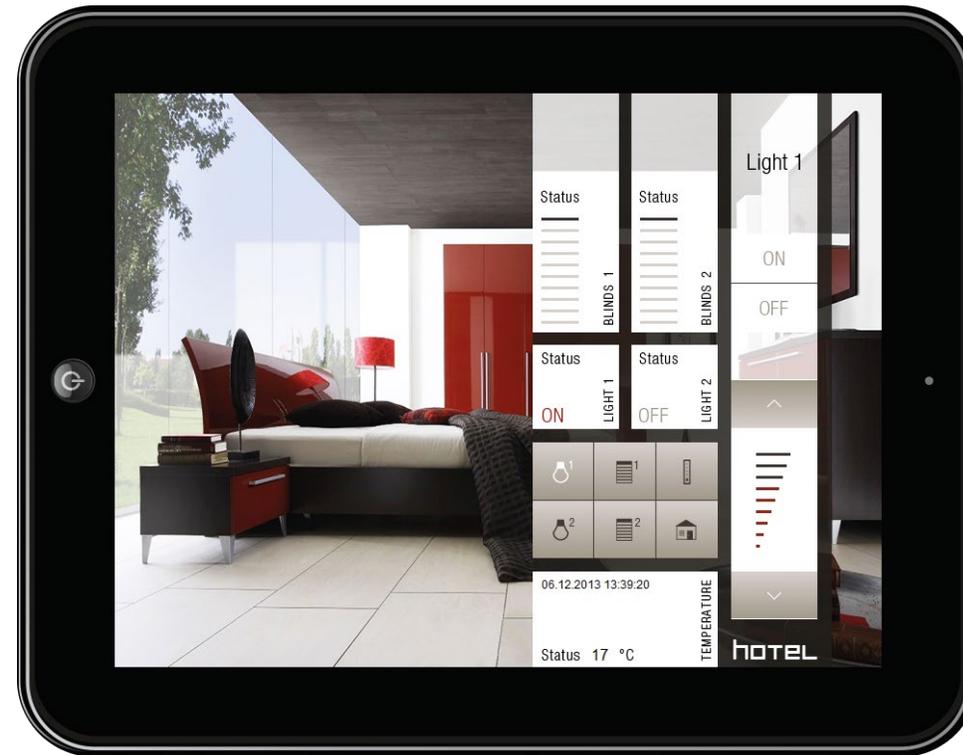
Available for NETx BMS Platform

Secure KNXnet/IP tunnelling

Can be used with new secure KNXnet/IP routers and interfaces

www.netxautomation.com