



Smart home and building solutions.  
Global. Secure. Connected.

# ETS6 Professional

New features & functionality

**Smart, Secure, Open**

Futurasmus 20 Years, 2021.05.06  
Vassilios Lourdas, Tools Team Leader





**ETS6 Professional – The integration of information, design & technology**

# **ETS6 Professional**





# ETS6 Professional – Smart, Secure, Open

KNX Association presents the new ETS6 Professional!

**Smart!**

**Secure!**

**Open!**

**User Experience & User Interface**

**New KNX network capabilities**

**KNX IoT**





## **ETS6 Professional – Smart, Secure, Open**

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**Smart, Secure, Open**

**What is behind the slogans?**

**Explanation > Implementation > Advantages & Benefits**



## **ETS6 Professional – Smart, Secure, Open**

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# **Secure**



## **ETS6 Professional – Smart, Secure, Open**

### **Explanation > Implementation > Advantages & Benefits**

An KNX installation is a live organization, it evolves and changes together with its inhabitants' habits and needs. Extending it however might be a cumbersome task when new devices require topological changes because they are of different media type (e.g. RF) or KNX Data Secure support.

## **Secure**

Support of the KNX Segment Coupler and KNX Security Proxy Coupler features and scale the installation to the maximum!

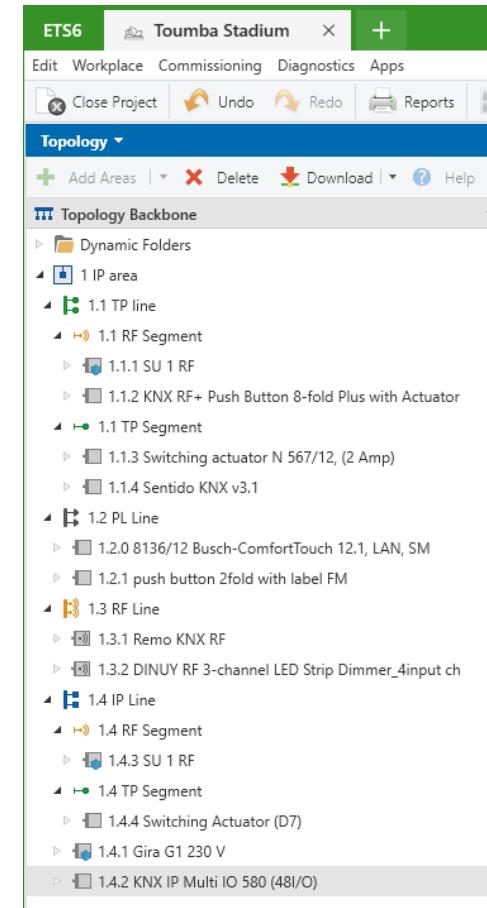
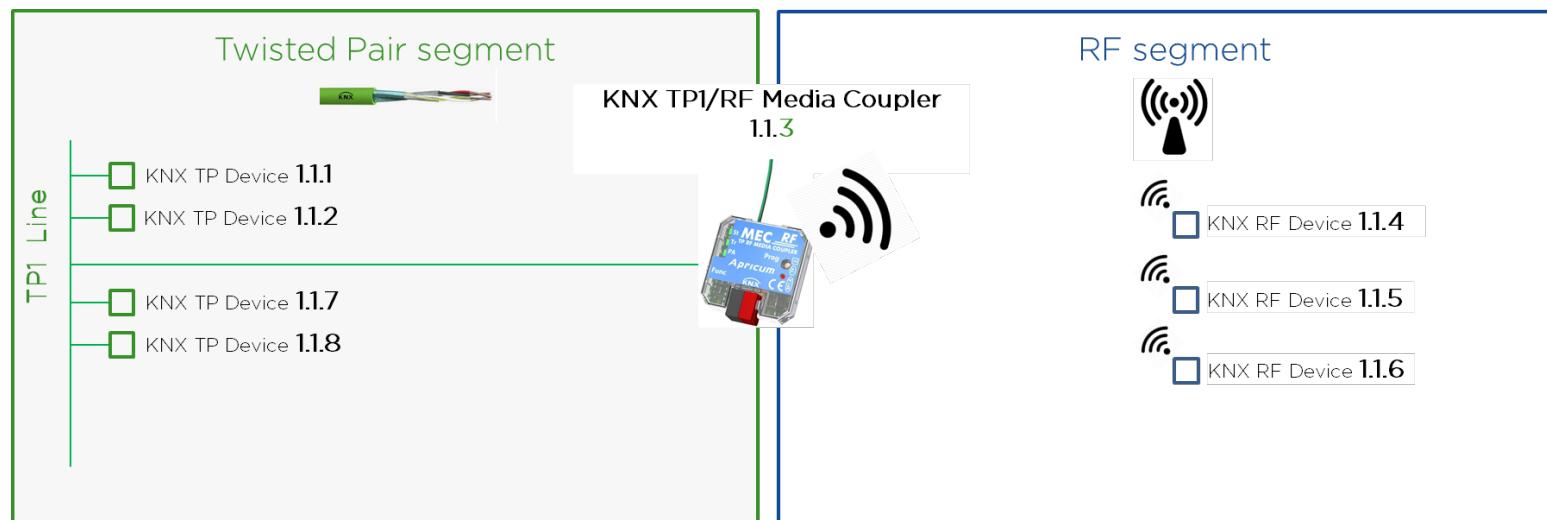
# ETS6 Professional – Smart, Secure, Open

## Explanation > Implementation > Advantages & Benefits

### ETS6 Professional supports KNX Segment Couplers

which are devices that allow...

- ... extending an existing KNX TP1 Line with RF devices
- ... extending an existing KNX TP1 Line with TP1 devices with filtering
- ... connecting lots of small TP1 islands to KNXnet/IP with filtering



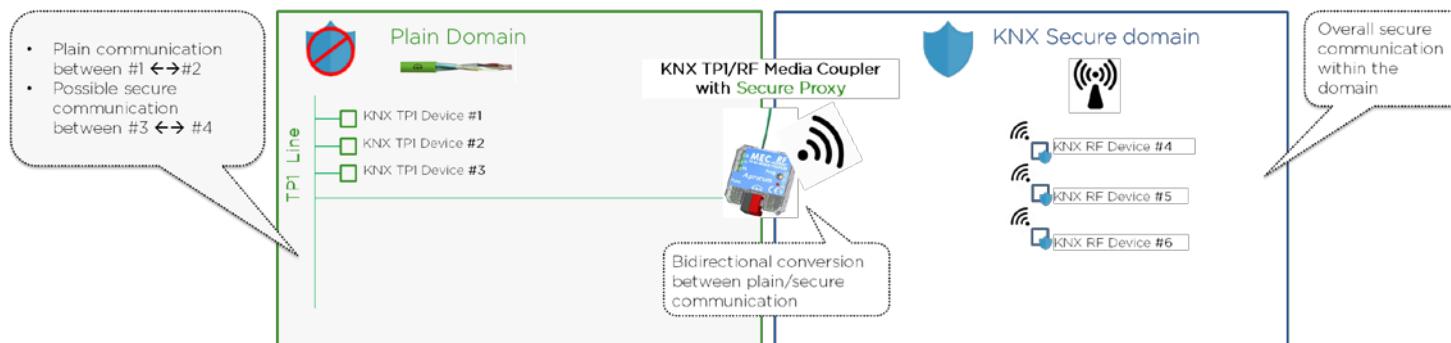
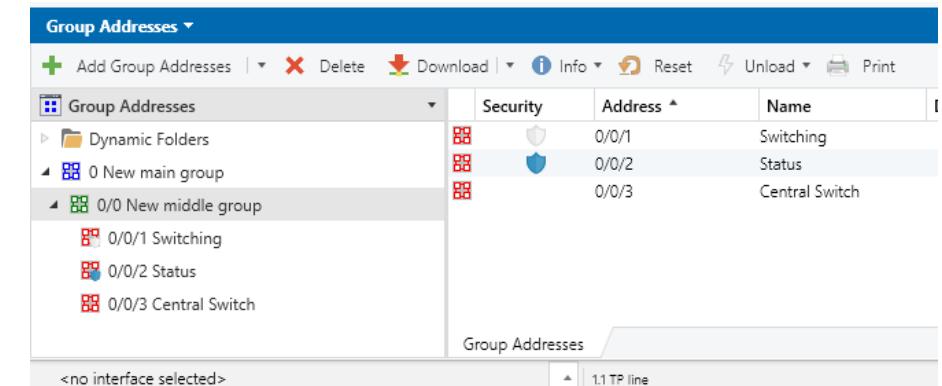
# ETS6 Professional – Smart, Secure, Open

## Explanation > Implementation > Advantages & Benefits

**ETS6 Professional** supports KNX Secure Proxy

which is a device that allows...

- ... securing the KNX communication in open Subnetworks (KNX Data Security)
- ... securing the configuration of devices in the installation (KNX Data Security, KNX IP Secure Device Management)
- ... securing run-time communication of certain applications (KNX Data Security)

Group Addresses

Group Addresses	Security	Address	Name
Dynamic Folders	0/0/1		Switching
0 New main group	0/0/2		Status
0/0 New middle group	0/0/3		Central Switch
0/0/1 Switching			
0/0/2 Status			
0/0/3 Central Switch			

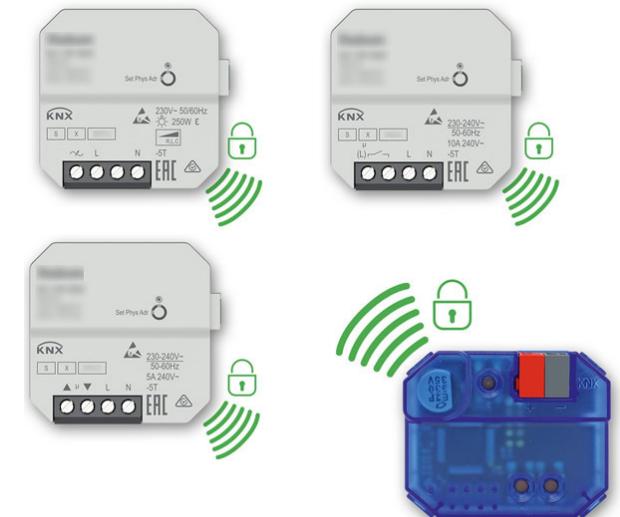
<no interface selected>

1.1 TPI line

# ETS6 Professional – Smart, Secure, Open

**ETS6 Professional** supports new generation of KNX RF devices (KNX RF Multi S-Mode)

- Based on device runtime capabilities **from an ETS6 product entry**
- Easy to configure **since nothing is to be done by the installer**
- **Secure**, as KNX Data Security is mandatory
- Configuration of frequencies for each link (Ready, Multi Fast, Multi Slow), **is automatically done by ETS6**
- Activation of Fast ACK **is done by default**
- Configuration of ACK slot number **is automatically done by ETS6**



# ETS6 Professional – Smart, Secure, Open

## Explanation > Implementation > **Advantages & Benefits**

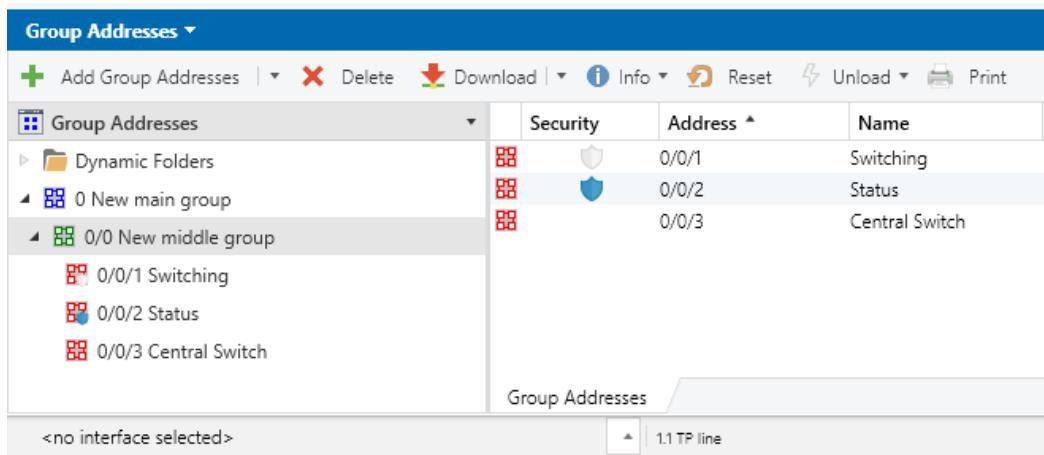
### **Scale the project topology and structure (almost) freely**

Create a line segment adding devices from different medium type (e.g. RF) and keep the addressing scheme!

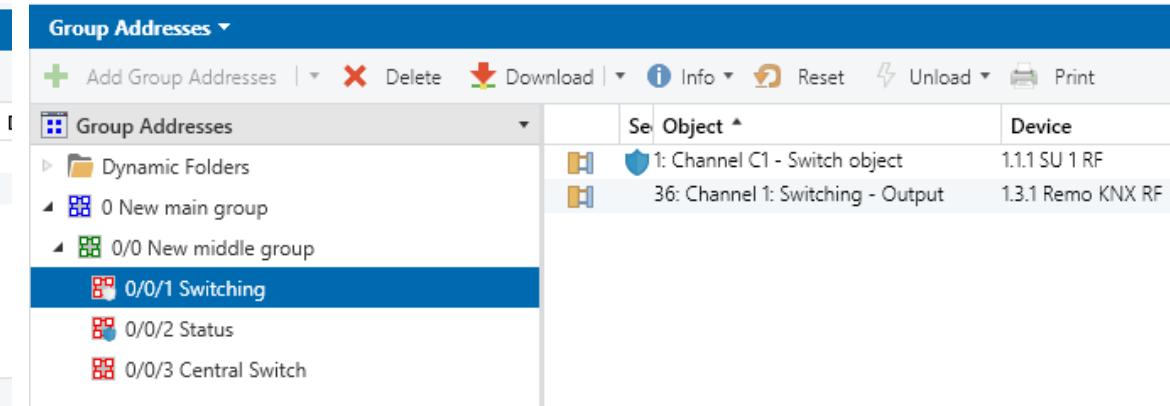
### **Use KNX Secure devices together with plain KNX devices now possible**

A function can be used plain or securely depending on the input.

**Secure**



Security	Address	Name
0/0/1	Switching	
0/0/2	Status	
0/0/3	Central Switch	



Object	Device
1: Channel C1 - Switch object	1.1.1 SU 1 RF
36: Channel 1: Switching - Output	1.3.1 Remo KNX RF



## **ETS6 Professional – Smart, Secure, Open**

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# Smart



## **ETS6 Professional – Smart, Secure, Open**

### **Explanation > Implementation > Advantages & Benefits**

People nowadays use internet browsers more and more to accomplish daily tasks. ETS6 Professional approaches them seamlessly introducing a ‘browser-alike’ User Experience with flexible tab and window handling.

# **Smart**

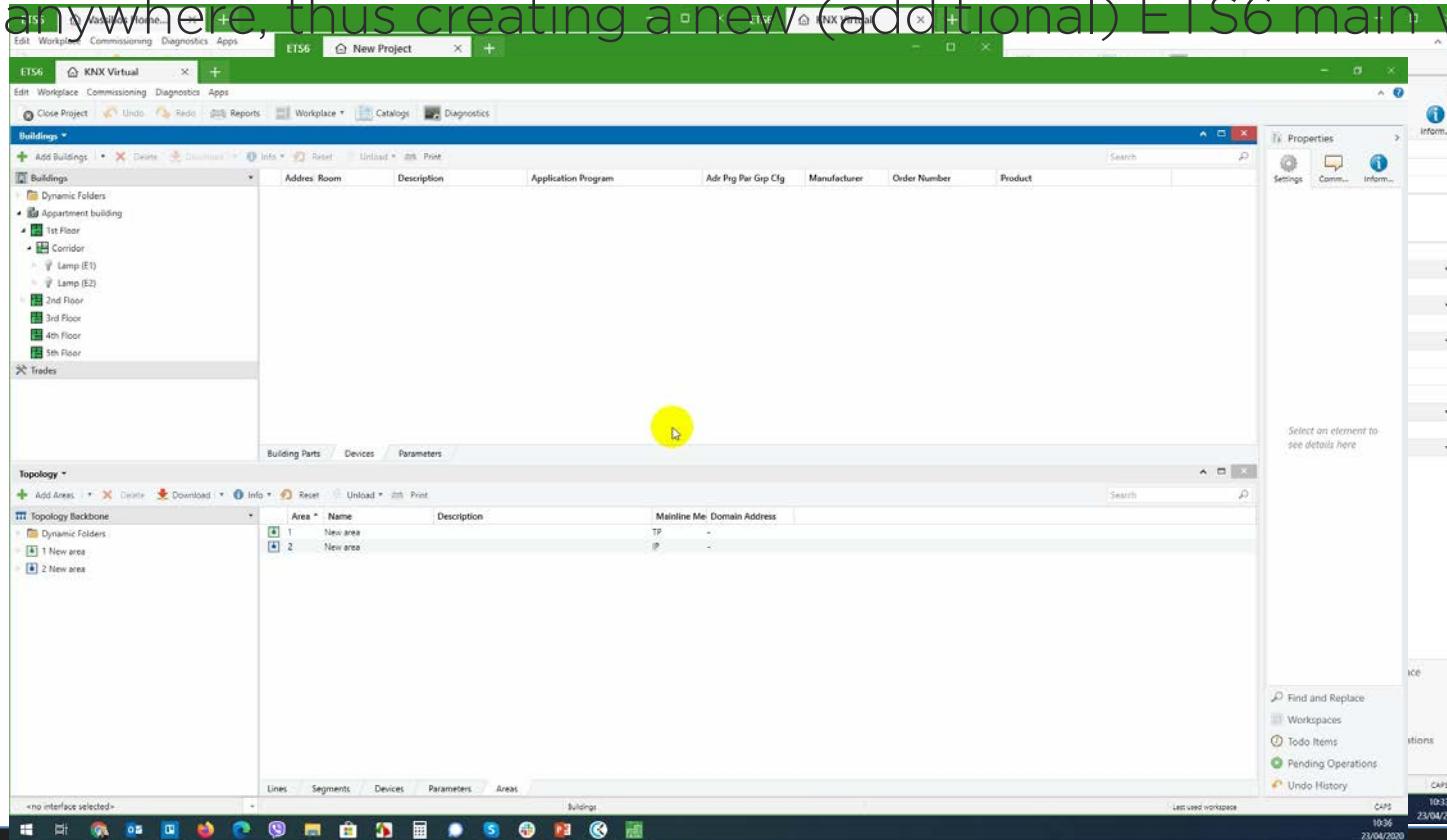
Interaction with ETS in a familiar way!



# ETS6 Professional - Smart, Secure, Open

## Explanation > Implementation > Advantages & Benefits

**ETS6 Professional** database and tooling now has current main window and dropped anywhere, thus creating a new (additional) ETS6 main window





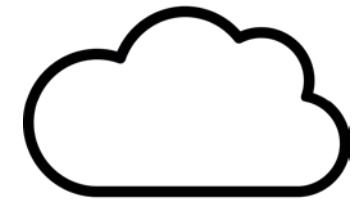
# ETS6 Professional – Smart, Secure, Open

## Explanation > Implementation > Advantages & Benefits

**ETS6 Professional** supports cloud licensing **additionally** to dongle-based licensing!



or



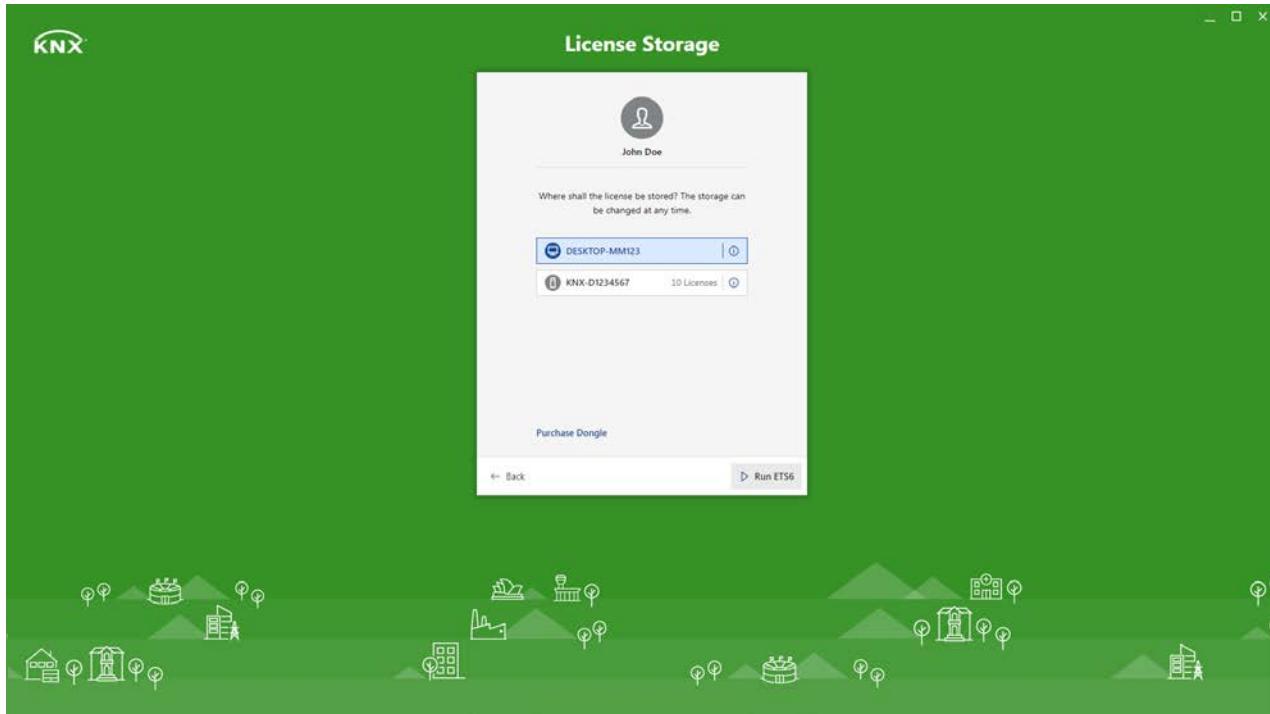
Re-use the KNX dongle if you already have one!



# ETS6 Professional – Smart, Secure, Open

## Explanation > Implementation > Advantages & Benefits

**ETS6 Professional** implements an intuitive licensing workflow to help you enable its features quickly.

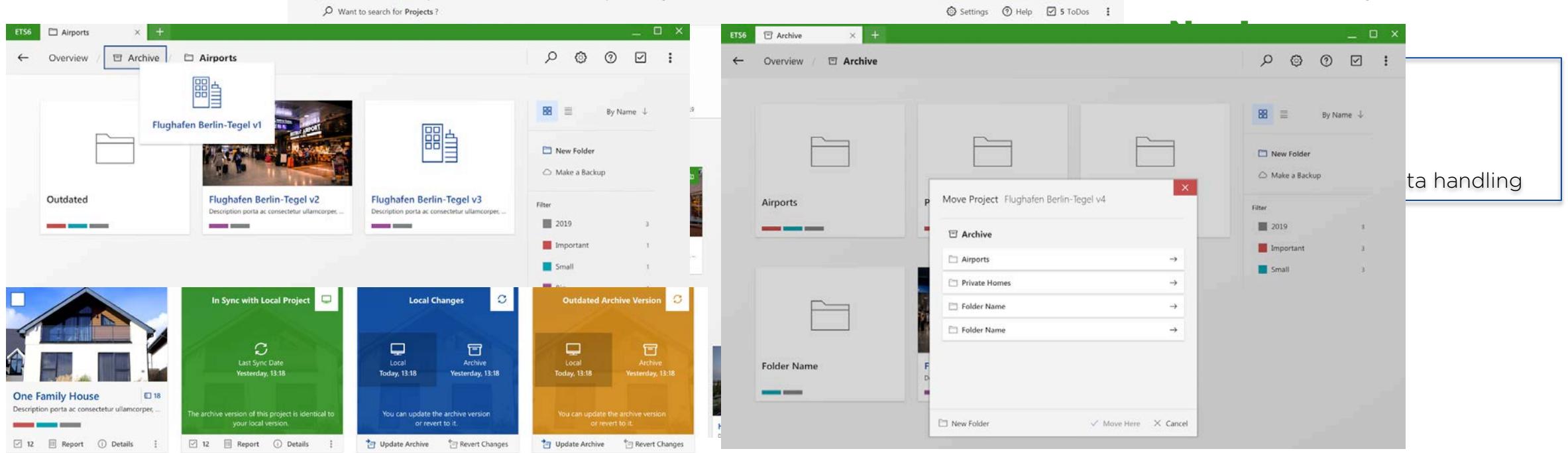


# ETS6 Professional - Smart, Secure, Open

## Explanation > Implementation > Advantages & Benefits

**ETS6 Professional** starts with an adaptive dashboard, where the projects can be quickly clustered and sorted.

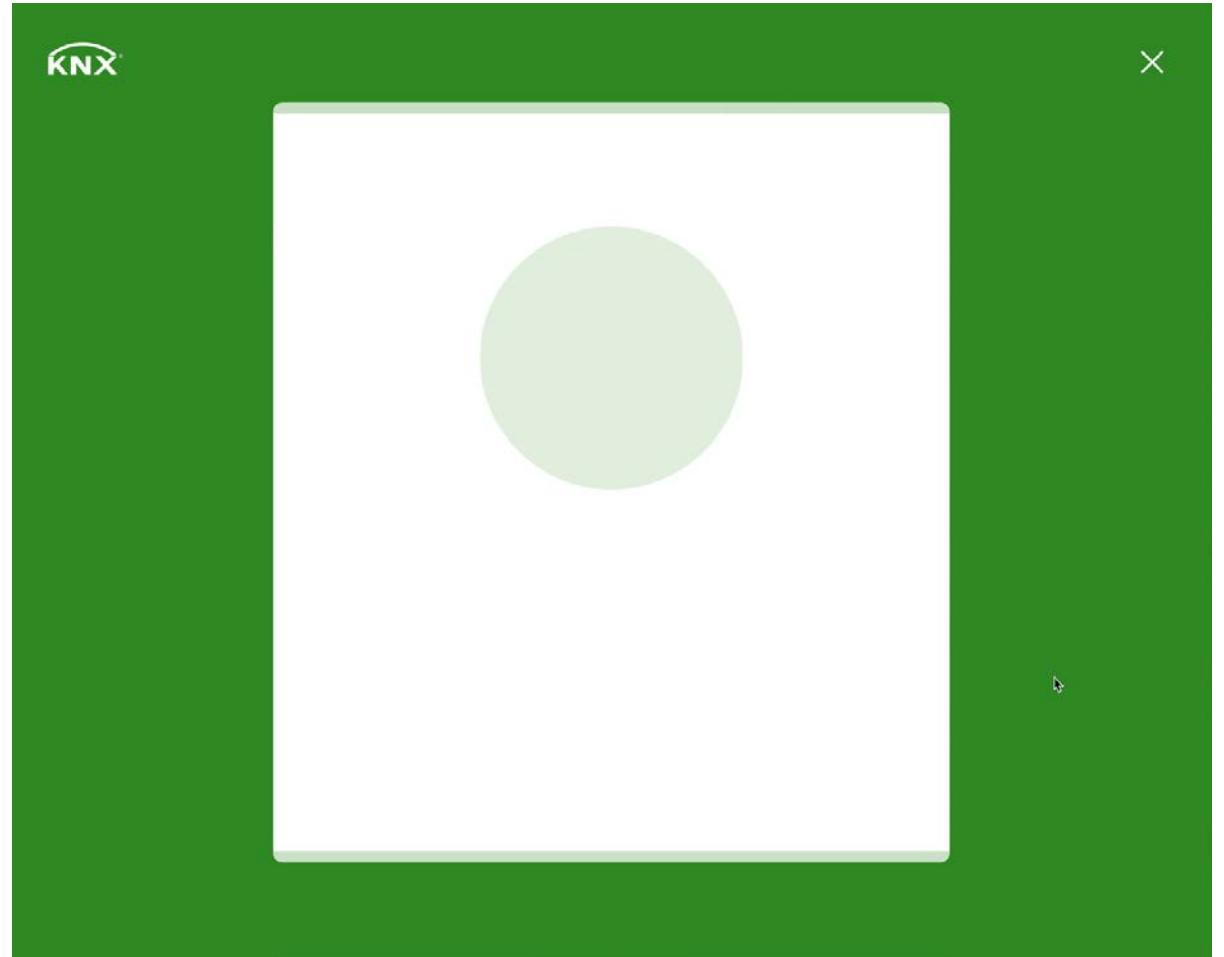
**ETS6 Professional** simplifies the project collaboration with the enhanced Project Archive!





## ETS6 Professional – Smart, Secure, Open

- Never miss an important update again!
- Release notes always available before each update.
- Keeping ETS up-to-date ensures continuous improvements and stability of your ETS.



# ETS6 Professional – Smart, Secure, Open

## Explanation > Implementation > **Advantages & Benefits**

Smart

### **Eases the project handling**

Faster access to the project data allow you to find your project quickly and start working!

### **Flexibility when working on projects, like a web browser**

Tabs and windows can be dragged & dropped to allow software adaptions when needed.

### **Simplified licensing workflow & new cloud license**

Guidance through the licensing steps and use ETS6 Professional without any hardware dependencies

### **Never miss again critical updates**

Update notifications become prominent including feature & bug fix information prior to the installation.



# ETS6 Professional - Smart, Secure, Open

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# Open



## **ETS6 Professional – Smart, Secure, Open**

### **Explanation > Implementation > Advantages & Benefits**

ETS is implementing a graphical user interface, in which the interface objects mimic their real-world counterparts in how they appear and/or how a user can interact with them.

# **Open**

KNX IoT represents KNX in the outside world implementing semantic project information and tagging



# ETS6 Professional - Smart, Secure, Open

## Explanation > Implementation > Advantages & Benefits

**ETS6 Professional** adds in the background semantic information to Locations, Functions, Function points, Channels, Group Objects.

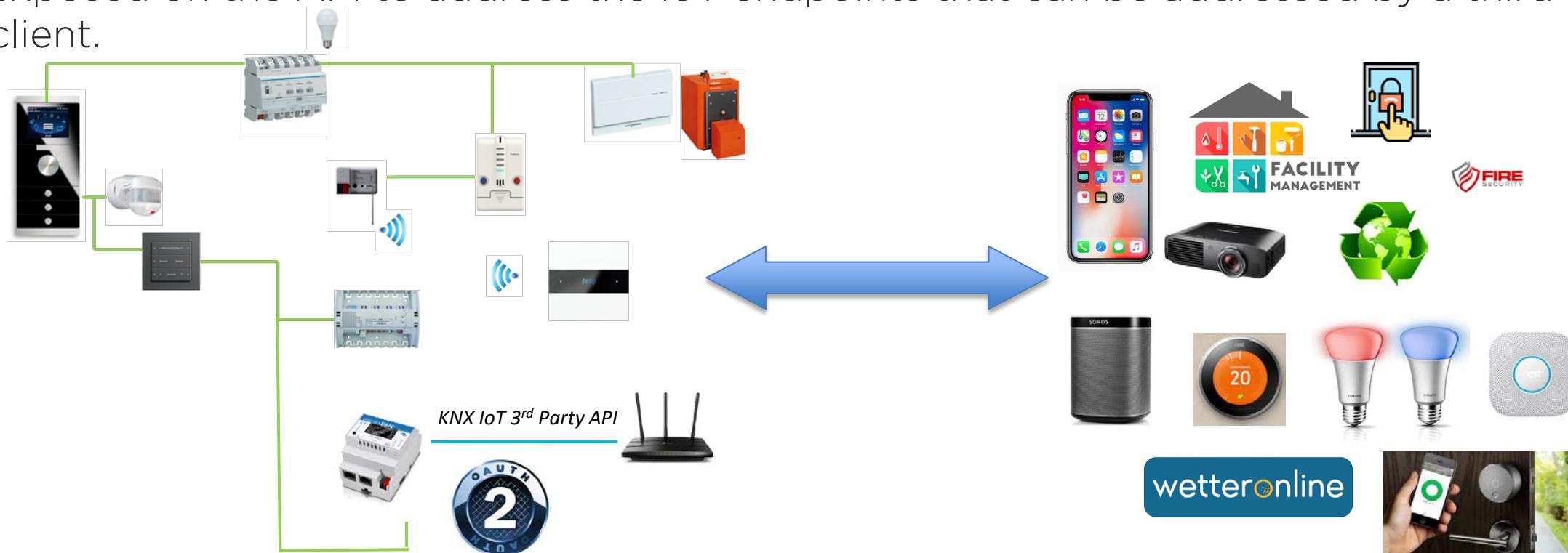
The screenshot shows the ETS6 Professional software interface. On the left, a tree view of a building structure labeled 'Buildings' includes 'Dynamic Folders', 'My Castle', 'Auxiliary Building', 'Part North' (with 'Dog Washing' and 'Garage'), 'Part South' (with 'Bar'), 'Main Building' (with 'First Floor' and 'Ground Floor'), '#0 Main Corridor' (with 'Main Cabinet'), '#1 Office' (with 'Lighting @Door', 'Sun Control', '1.1.4 Office - Push Button @Door', 'Left Rocker'), and '#2 Bed Room' (with 'My Light @Bed', '1.1.1 Bed Room - Push Button @Bed', 'Left Rocker' (with '0: Rocker Left - Switch value', '1: Rocker Left - Switch Status', '2: Rocker Left - Dimming Control', '3: Rocker Left - Dimming Value', '4: Rocker Left - Dimming Status')). On the right, a table lists 'Group Addresses' with columns: Address, Name, Description, Centre Pass T, Data Type, Length, and No. of. The table shows entries for 'Switching (set)', 'Switching (status)', 'Dimming (control)', 'Dimming Value (current value)', 'Dimming Value (set)', 'Role: SwitchOnOff', 'Role: InfoOnOff', 'Role: DimmingControl', 'Role: InfoDimmingValue', and 'Role: DimmingValue'. A red box highlights a row for '0/0/160' with the label 'Function Point (Group Address)'. Four arrows point from the tree view to labels: a green arrow points to '#1 Office' with the label 'Location'; a blue arrow points to 'Lighting @Door' with the label 'Function'; a grey arrow points to 'Left Rocker' with the label 'Channel'; and a black arrow points to '0: Rocker Left - Switch value' with the label 'Point (Group Object)'.

Address	Name	Description	Centre Pass T	Data Type	Length	No. of	
0/0/160	Switching (set)	Role: SwitchOnOff	No	No	switch	1 bit	2
0/0/161	Switching (status)	Role: InfoOnOff	No	No	switch	1 bit	2
0/0/162	Dimming (control)	Role: DimmingControl	No	No	dimming...	4 bit	2
0/0/163	Dimming Value (current value)	Role: InfoDimmingValue	No	No	percenta...	1 byte	2
0/0/164	Dimming Value (set)	Role: DimmingValue	No	No	percenta...	1 byte	2

# ETS6 Professional – Smart, Secure, Open

## Explanation > Implementation > Advantages & Benefits

**ETS6 Professional** export to the KNX IoT 3<sup>rd</sup> Party API, contains all semantical data to be exposed on the API to address the IoT endpoints that can be addressed by a third party client.





# ETS6 Professional – Smart, Secure, Open

## Explanation > Implementation > **Advantages & Benefits**

### **One single KNX standardized solution for all KNX manufacturers**

3rd Party Adapters to KNX can focus on one single interface to access a KNX installation

open

### **Integration with other systems that are not directly KNX compatible**

Seamlessly integrate other systems to the KNX project without any hassle.



## ETS6 Professional - Smart, Secure, Open

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**More?**



# ETS6 Professional – Smart, Secure, Open

**ETS6 Professional** provides browsing style navigation history per panel

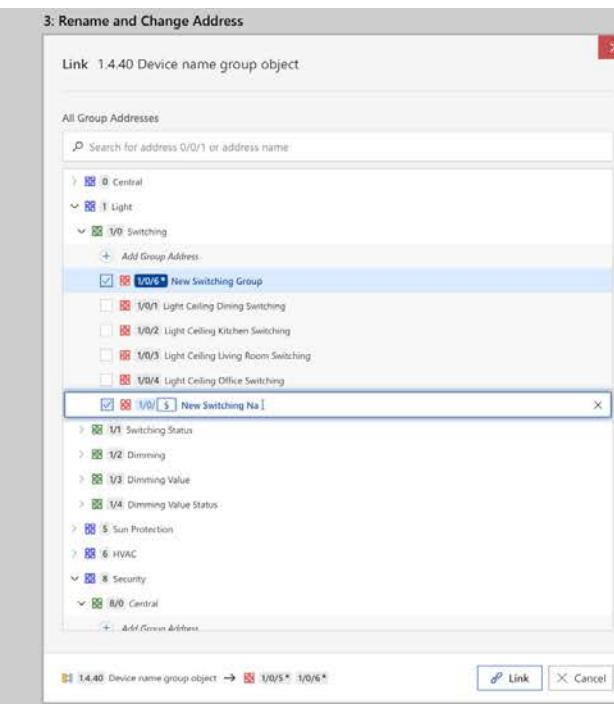
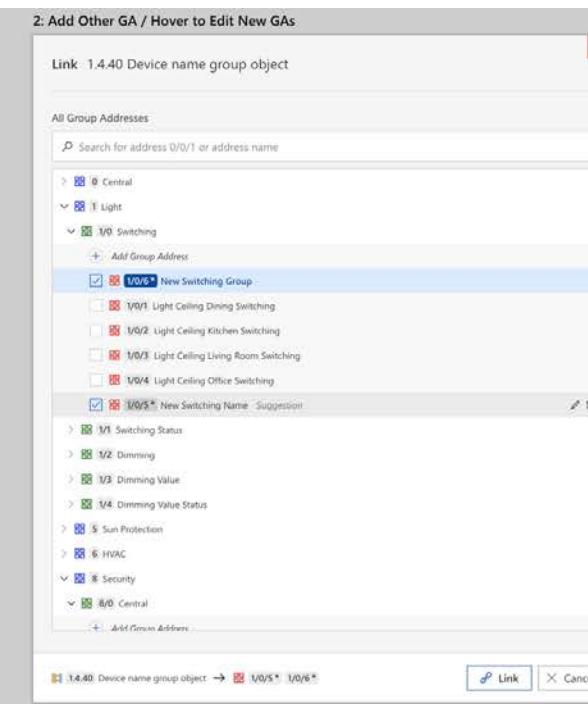
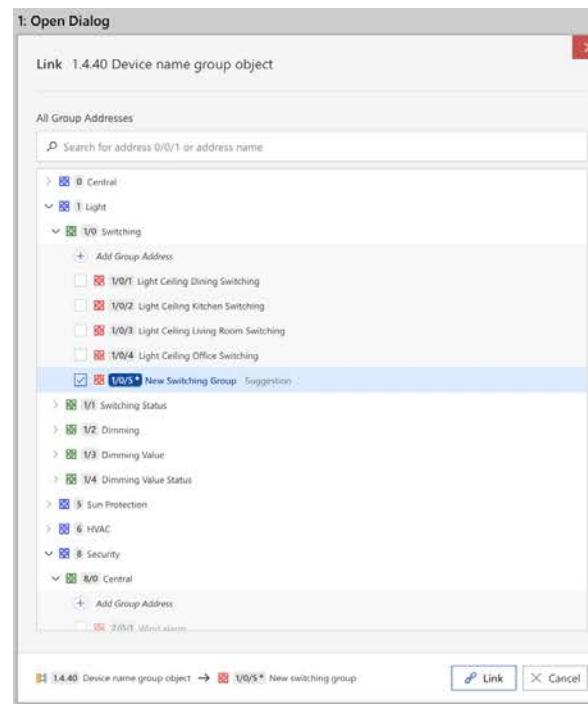
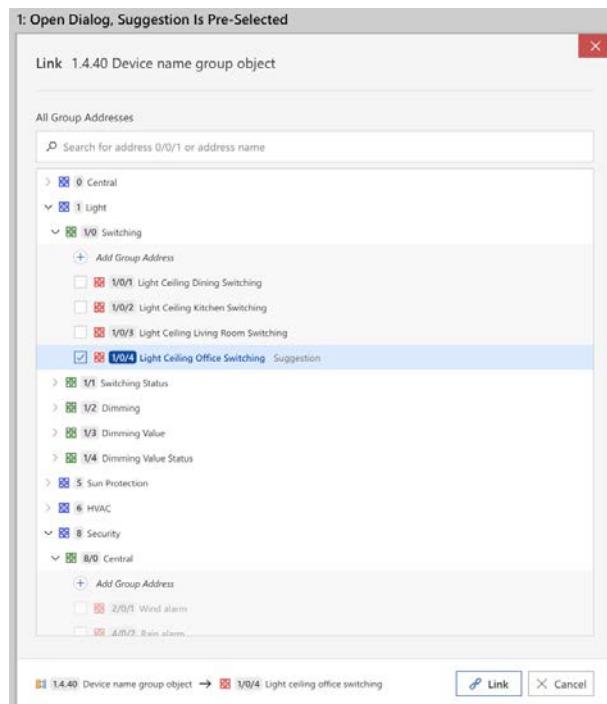
The screenshot shows the ETS6 Professional software interface. The top navigation bar includes 'One Family House' and 'Overview' tabs, along with 'Edit', 'Workplace', 'Commissioning', 'Diagnostics', 'Extras', and 'Windows' menu items. Below the menu is a toolbar with 'Undo', 'Redo', 'Print', 'Workplace', 'Catalogs', and 'Diagnostics' buttons. The main content area has a blue header bar with 'Buildings' and a navigation breadcrumb: 'Main House Dublin > Downstairs > TV Room'. The main table displays 'Building Parts' with columns for 'Trade', 'Description', and 'Room'. The table lists six items: 'Ceiling light' (Dimmable light, TV room), 'Wall light' (Dimmable light, TV room), 'Desk light' (Dimmable light, TV room), 'Effect light' (Switchable light, TV room), 'South window' (Sun protection, TV room), and 'Floor heating' (Heating, TV room). The 'TV Room' category is highlighted in the navigation tree on the left.

Building Parts	Trade	Description	Room
Main House Dublin	Ceiling light	Dimmable light	TV room
Downstairs	Wall light	Dimmable light	TV room
Hall	Desk light	Dimmable light	TV room
MDB 1	Effect light	Switchable light	TV room
SDB 1	South window	Sun protection	TV room
Kitchen / Living Room	Floor heating	Heating	TV room



# ETS6 Professional - Smart, Secure, Open

**ETS6 Professional** implements an optimized 'Link with' dialog to link Group Addresses faster!

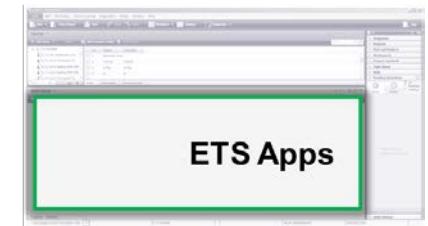




# ETS6 Professional – Smart, Secure, Open

**ETS6 Professional** maintains 30 years of backwards compatibility!

- **Maintain compatibility with existing KNX (and EIB) devices!**
  - All KNX (and EIB) certified can still be configured with ETS6 Professional!
- **Maintain compatibility with existing plug-ins, DCAs & ETS Apps**
  - Existing x86 plug-ins will continue to work with ETS6 Professional.
  - Existing DCAs & ETS5 Apps will continue to work in ETS6 Professional\*.



*\* prerequisite to have been built against ETS5 SDK v5.7*

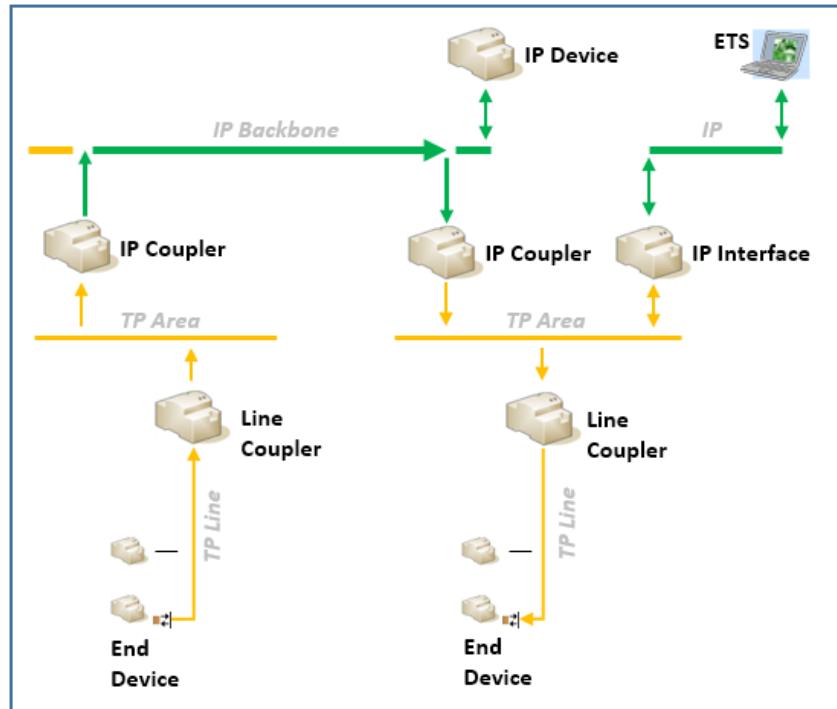


**ETS6 Professional – Smart, Secure, Open**

# Using KNX Secure in ETS6

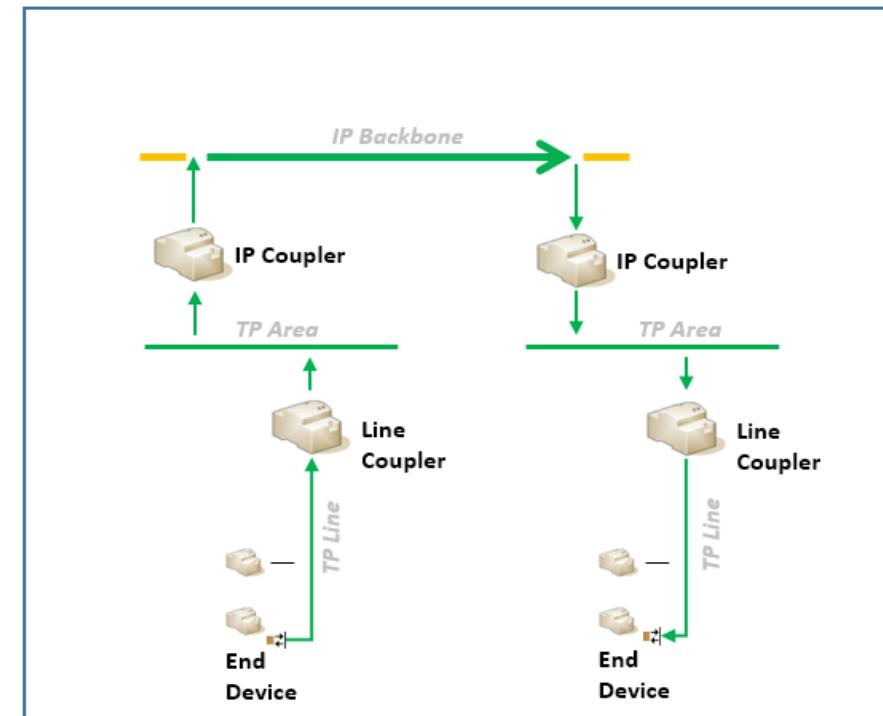
# Using KNX Secure in ETS6 – Introduction - KNX Secure Overview

## KNX IP Secure



All KNX telegrams between the two (or more) IP Couplers are encrypted

## KNX Data Secure



The group communication of a particular sender (one or more group objects) to another group object(s) is encrypted

— Plain communication  
— Secured communication



## Using KNX Secure in ETS6 – KNX Secure Facts

### KNX Secure Application Scope

KNX Secure covers the following main application scenarios in a KNX installation.

- Secure Communication on IP
- Secure Communication between end devices across media
- Secure Communication during configuration

### KNX Secure Attack Vectors

The following threat scenarios or possible attacks on the KNX system are effectively thwarted by KNX Security:

- Telegram Repetition
- Telegram Manipulation
- Telegram Visibility

# Using KNX Secure in ETS6 – KNX Secure Facts

## KNX Secure used algorithms

KNX Secure uses AES128 CCM for encryption/authentication and elliptic curve Diffie-Hellman for a secure key exchange

- *Advanced Encryption Standard (AES)* is a standard encryption algorithm (ISO/IEC 18033-3)
  - *Block size: 128 bit*
  - *Key size: 128 bit, 192 bit or 256 bit*
  - *Consists of:*
    - Substituting bytes
    - Shifting rows
    - Mixing columns
    - Add round key

*Several animations exist on the Internet (<https://www.youtube.com/watch?v=mlzxpkdX>), usage in KNX (KNX IP Secure)*

- Elliptic curve Diffie- Hellman key exchange is a worldwide standardized and widely used algorithm to share a common secret key on an unsecure communication channel

# Using KNX Secure in ETS6 – KNX Secure Facts

## Security of ETS KNX Projects with KNX Secure #1

- Every ETS project using KNX Secure requires increased “security level” for the project data itself (not allowed to view passwords used in project) → ETS projects therefore need to be password protected
- ETS displays the required password strength.

 Set Project Password  
Andre Berger-GE

A good password should consist of at least eight characters, at least one number, one uppercase letter, one lowercase letter, and have a special character.

New Password  
   
Weak

Confirm Password

 Set Project Password  
Andre Berger-GE

A good password should consist of at least eight characters ✓, at least one number, one uppercase letter, one lowercase letter ✓, and have a special character.

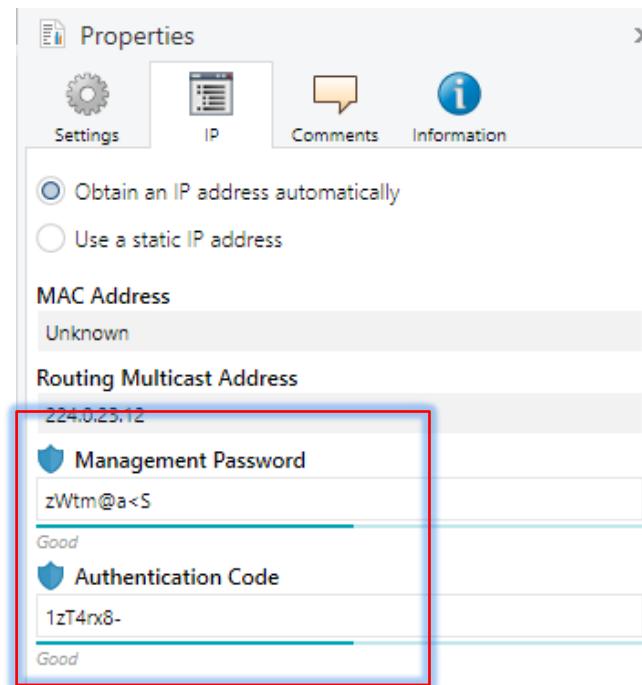
New Password  
   
Very good

Confirm Password

# Using KNX Secure in ETS6 – KNX Secure Facts

## Security of ETS KNX Projects with KNX Secure #2

- Every KNX Secure device used in a secure way in an ETS project also has individual passwords. Also here ETS displays the password strength in a proper way.



# Using KNX Secure in ETS6 – KNX Secure Facts

## Keys in an ETS KNX Project with KNX Secure #1

- When using KNX Secure features of devices, an individual device and/ or the IP backbone key for the “secure” communication need to be maintained. These keys are stored and maintained by ETS in a safe way, even when projects are exported.



The screenshot shows the ETS6 software interface for a project with security enabled. The title bar reads "Project with security / Security". The main table displays device keys:

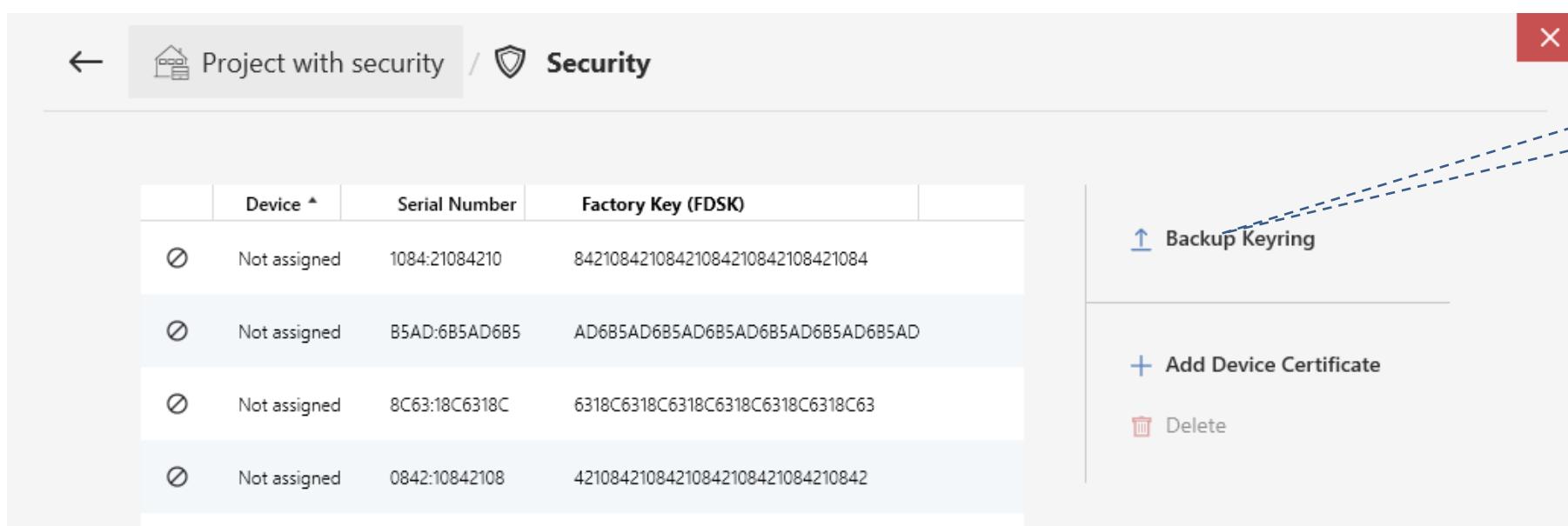
	Device	Serial Number	Factory Key (FDSK)
Ø	Not assigned	8C63:18C6318C	6318C6318C6318C6318C6318C6318C63
Ø	Not assigned	B5AD:6B5AD6B5	AD6B5AD6B5AD6B5AD6B5AD6B5AD6B5AD
Ø	Not assigned	1084:21084210	84210842108421084210842108421084
Ø	Not assigned	0842:10842108	42108421084210842108421084210842

A dashed box highlights the "Factory Key (FDSK)" column, and the text "Device (individual) Keys" is placed next to it.

# Using KNX Secure in ETS6 – KNX Secure Facts

## Keys in an ETS KNX Project with KNX Secure #2

- Monitoring a KNX (Secure) installation → for a valid use case (e.g. external visualization or diagnostics) it is necessary to get hold of the keys used in the ETS project in a (secured) way → keyring exported file



The screenshot shows the ETS6 interface for a 'Project with security' under the 'Security' tab. On the left, a table lists four devices with their serial numbers and factory keys. On the right, a sidebar provides options for managing the keyring.

Device *	Serial Number	Factory Key (FDSK)
∅ Not assigned	1084:21084210	842108421084210842108421084
∅ Not assigned	B5AD:6B5AD6B5	AD6B5AD6B5AD6B5AD6B5AD6B5AD6B5AD
∅ Not assigned	8C63:18C6318C	6318C6318C6318C6318C6318C6318C63
∅ Not assigned	0842:10842108	421084210842108421084210842

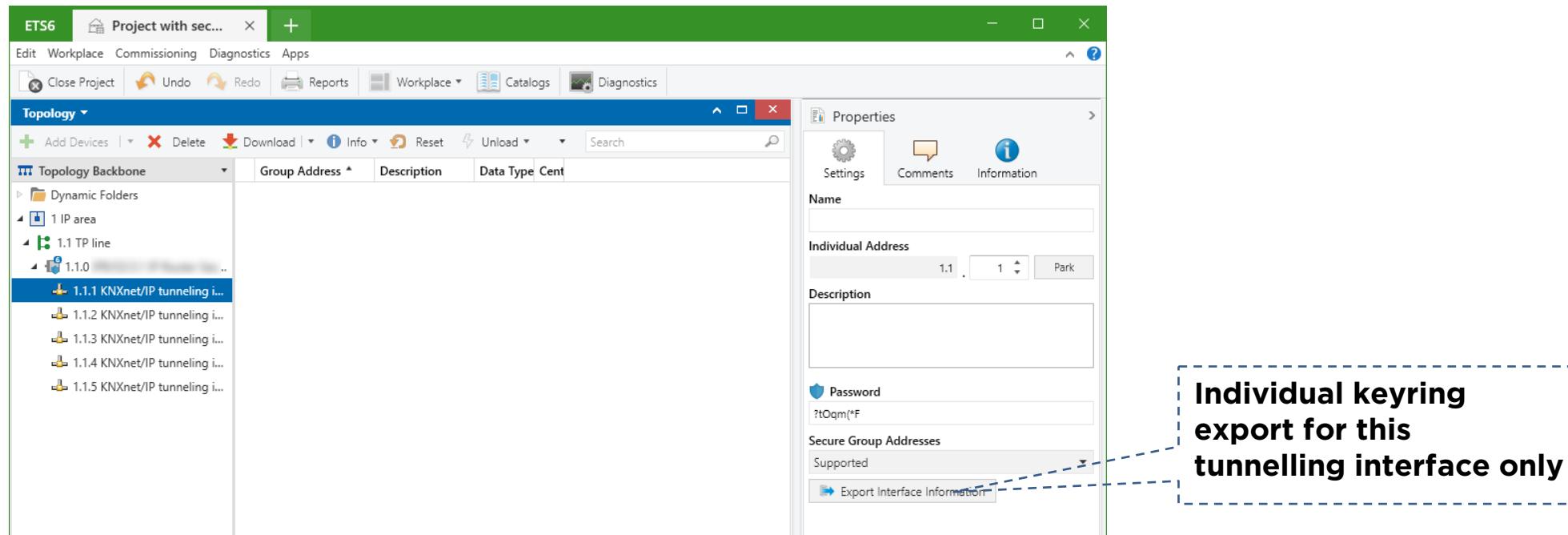
**Keyring export function of entire installation (XML file)**

- Backup Keyring
- Add Device Certificate
- Delete

# Using KNX Secure in ETS6 – KNX Secure Facts

## Keys in an ETS KNX Project with KNX Secure #3

- Monitoring a KNX (Secure) installation → for a valid use case (e.g. external visualization) it is necessary to get hold of the keys used in the ETS project in a (secured) way → keyring exported file





## Using KNX Secure in ETS6

# KNX Secure Types

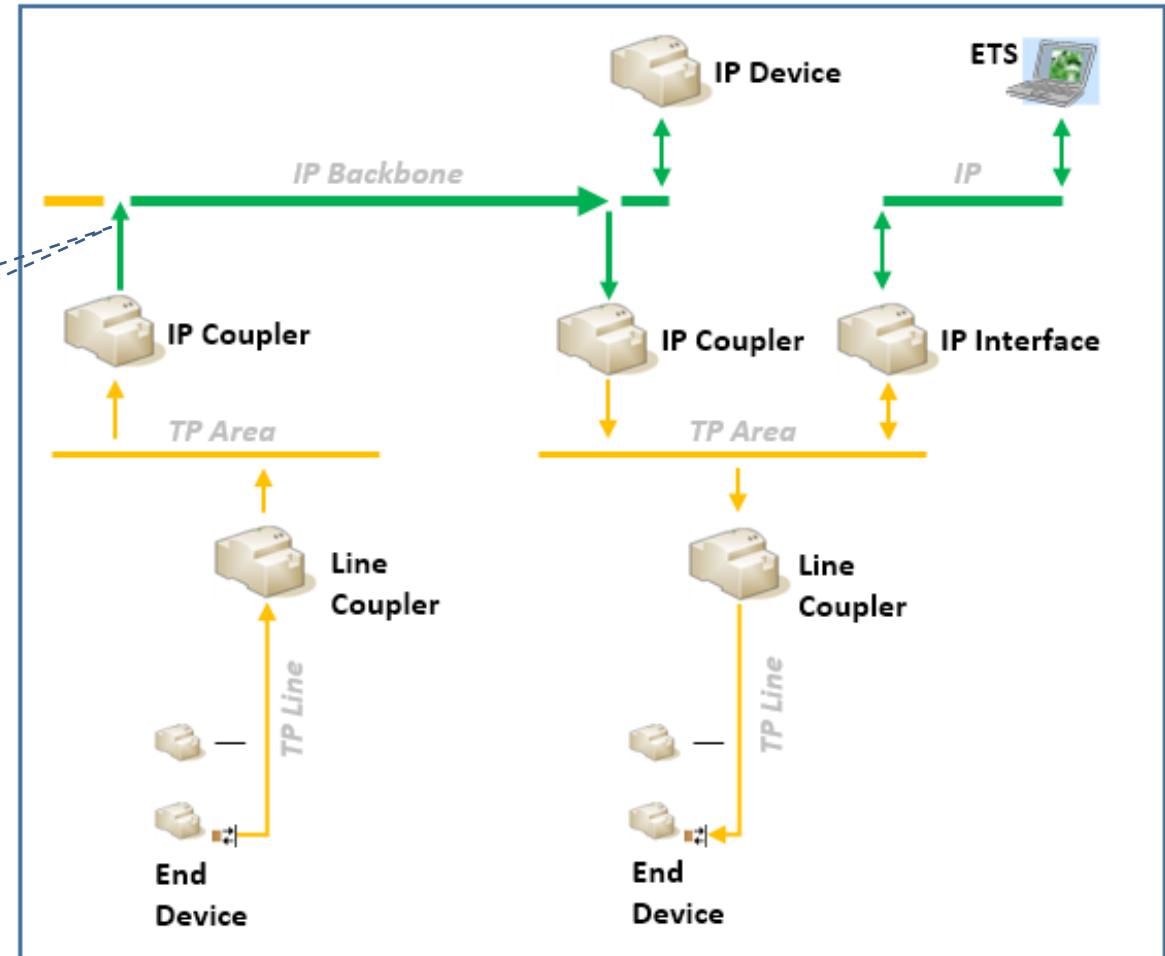
# Using KNX Secure in ETS6 – KNX Secure Types

## KNX IP Secure, Technology

KNX IP Secure encrypts the entire KNXnet/IP frame.

All KNX telegrams between the two (or more) IP Couplers are **SECURED**

— Plain communication  
— Secured communication



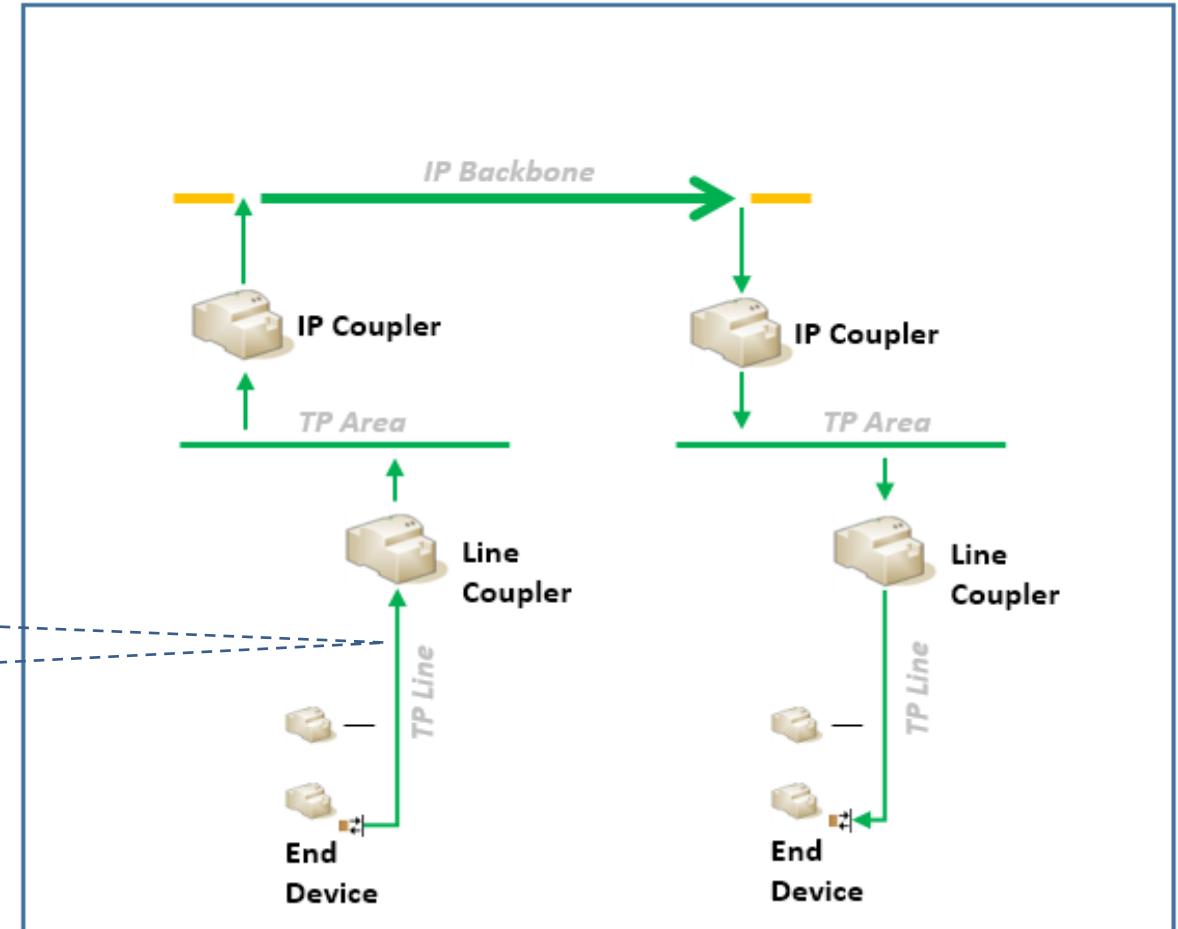
# Using KNX Secure in ETS6 – KNX Secure Types

## KNX Data Secure, Technology

KNX Data Secure encrypts only the APCI and the payload.

The group communication of a particular sender (one or more group objects) to another group object(s) is **SECURED**

— Plain communication  
— Secured communication

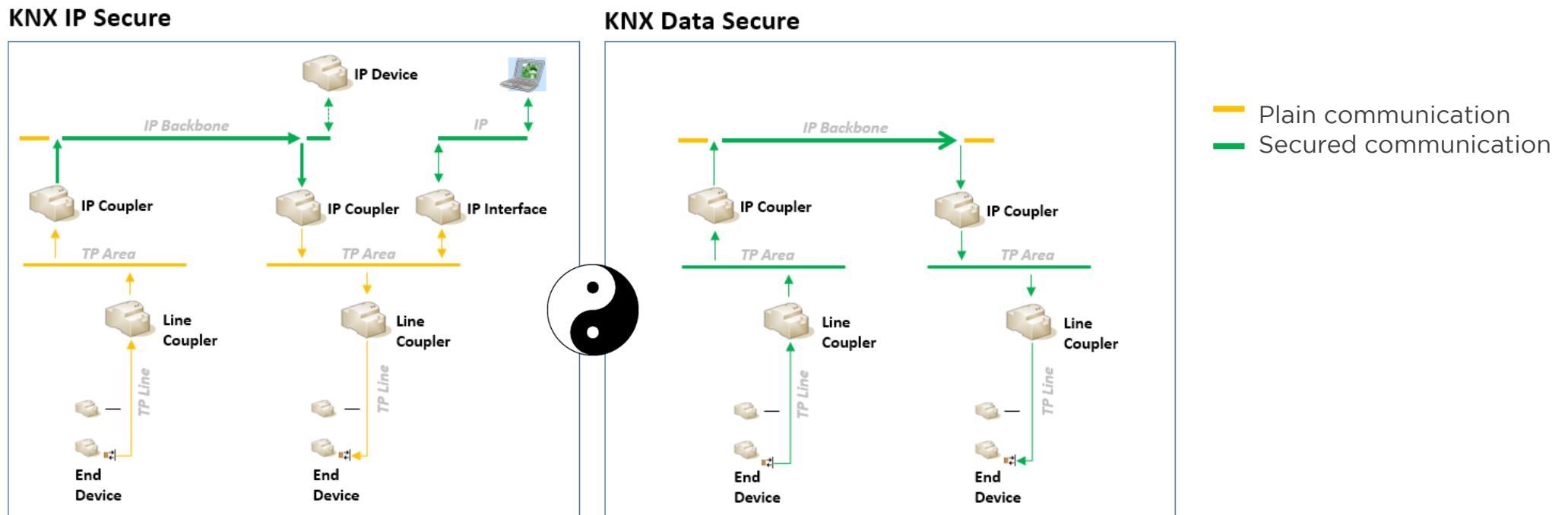


# Using KNX Secure in ETS6 – KNX Secure Types

## KNX Secure, Combined

KNX IP Secure and KNX Data Secure can be combined in an ETS project/installation.

ETS handles the key management/distribution, establishes 'secure links' and downloads these links in KNX Secure devices independent of the KNX Secure types.





## Using KNX Secure in ETS6

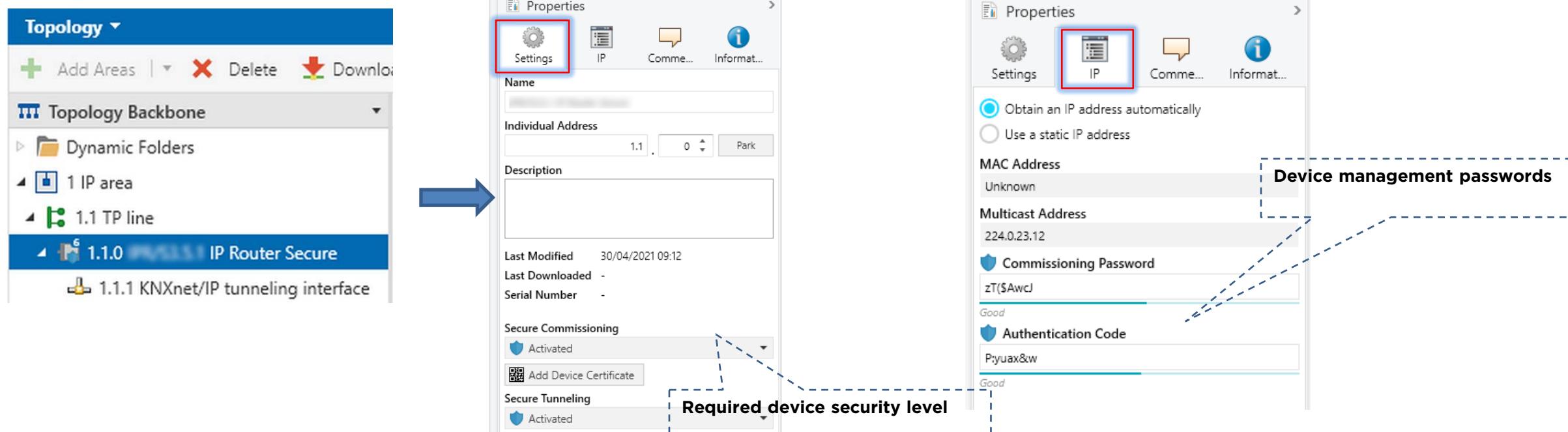
# KNX Secure in ETS6

# Using KNX Secure in ETS6

## KNX IP Secure, IP Devices

The KNX secure level of IP **devices** (e.g., on the backbone) is part of the **device** properties.

- Possible levels are **Activated/ Deactivated**. There are dependencies between this level and the backbone (e.g. the need to set the Level to **Activated** for such devices when backbone is secure)

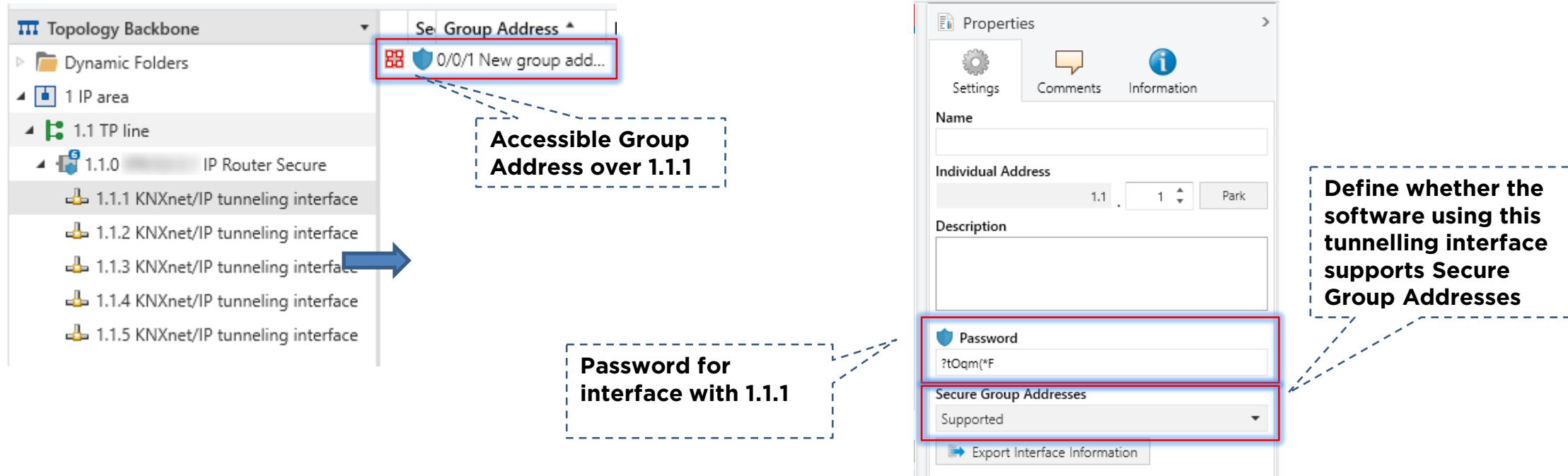


# Using KNX Secure in ETS6

## KNX IP Secure, IP interfaces

The KNX secure level of IP **interfaces** is (also) part of the **device** properties.

- For external (visualization) access via (additional) tunneling interfaces, an interface password and a group address explicitly assigned to the interface is needed



The screenshot shows the ETS6 interface for configuring a KNXnet/IP tunneling interface. On the left, the 'Topology Backbone' tree shows a '1.1 TP line' with several '1.1.0' and '1.1.1' nodes. A blue arrow points from the '1.1.1' node to the right-hand configuration window. The right-hand window is the 'Properties' dialog for a specific interface. It has tabs for 'Settings', 'Comments', and 'Information'. The 'Settings' tab is active. It includes fields for 'Name', 'Individual Address' (set to 1.1.1), 'Description', and 'Password' (set to ?tOqm!\*F). A dropdown for 'Secure Group Addresses' is set to 'Supported'. A red box highlights the 'Password' field, and another red box highlights the 'Secure Group Addresses' dropdown. Dashed blue boxes with text labels are overlaid on the interface:

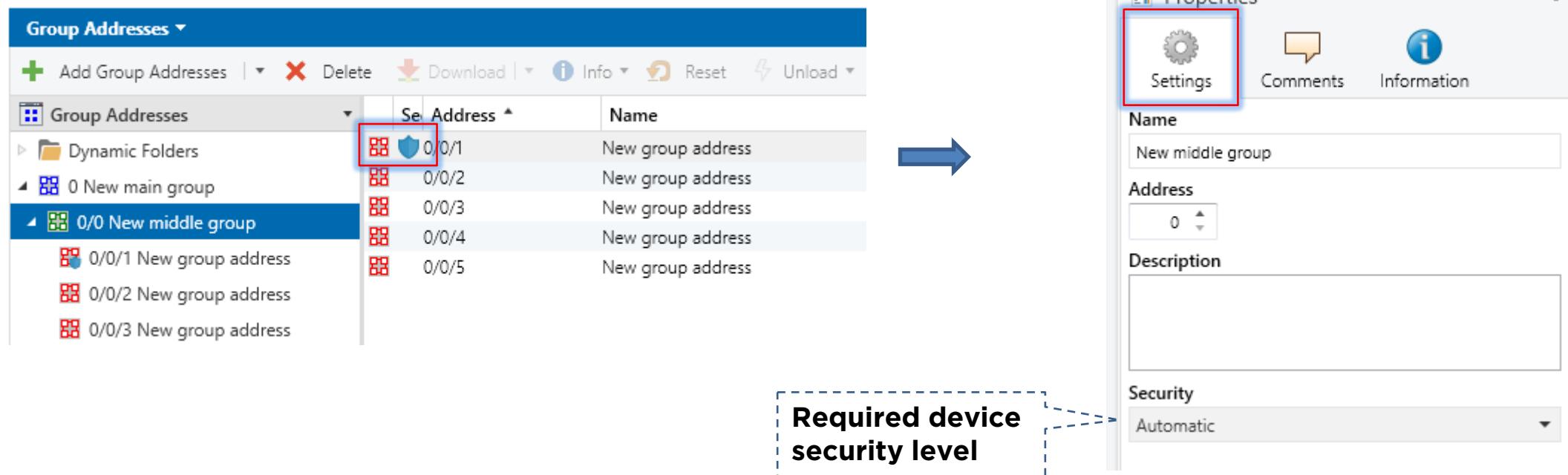
- Accessible Group Address over 1.1.1** (overlaps the 'Password' field)
- Password for interface with 1.1.1** (overlaps the 'Secure Group Addresses' dropdown)
- Define whether the software using this tunnelling interface supports Secure Group Addresses** (overlaps the 'Secure Group Addresses' dropdown)

# Using KNX Secure in ETS6

## KNX Data Secure, Group Addresses

The KNX secure level of a group address is part of the **group address** properties.

- Possible levels are **On/Off/Automatic**. There are dependencies between this level and the group addresses assigned to the group objects (e.g. the need to download such devices also secure when the group address is secure)



The image shows the ETS6 software interface. On the left, the 'Group Addresses' panel is open, showing a list of group addresses under '0/0 New middle group'. The address '0/0/1' is selected and highlighted with a red box. An arrow points from this selection to the 'Properties' dialog box on the right. The 'Properties' dialog shows the 'Settings' tab selected, with the 'Security' dropdown set to 'Automatic'. A dashed box labeled 'Required device security level' is drawn around the 'Security' setting in the properties dialog.

Address	Name
0/0/1	New group address
0/0/2	New group address
0/0/3	New group address
0/0/4	New group address
0/0/5	New group address

**Properties**

**Settings**

**Name**: New middle group

**Address**: 0

**Description**

**Security**: Automatic

**Required device security level**



## Using KNX Secure in ETS6

# KNX Secure Proxy in ETS6

# Using KNX Secure in ETS6 - KNX Secure Facts

## ETS6 Professional supports KNX Secure Proxy

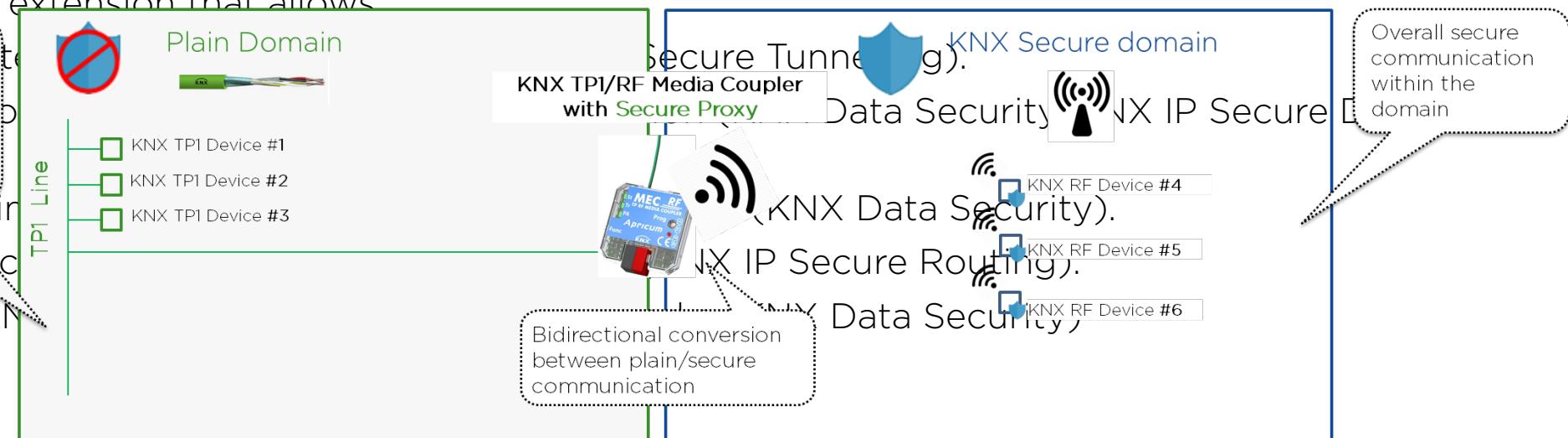
which is a controller extension that allows

- Plain communication between #1 ↔ #2
- Possible secure communication between #3 ↔ #4

5. Securing the KNX

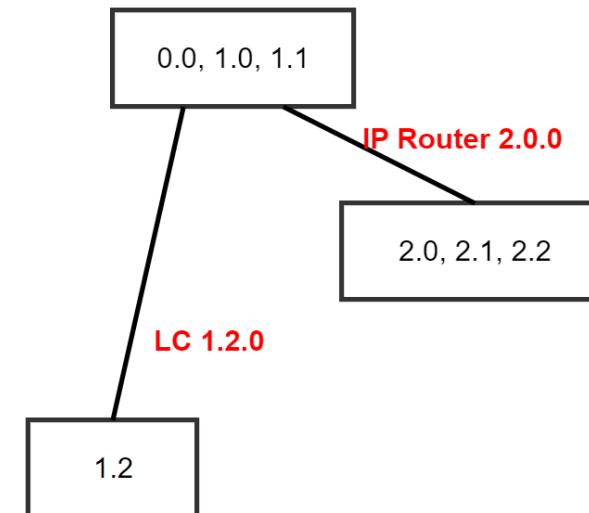
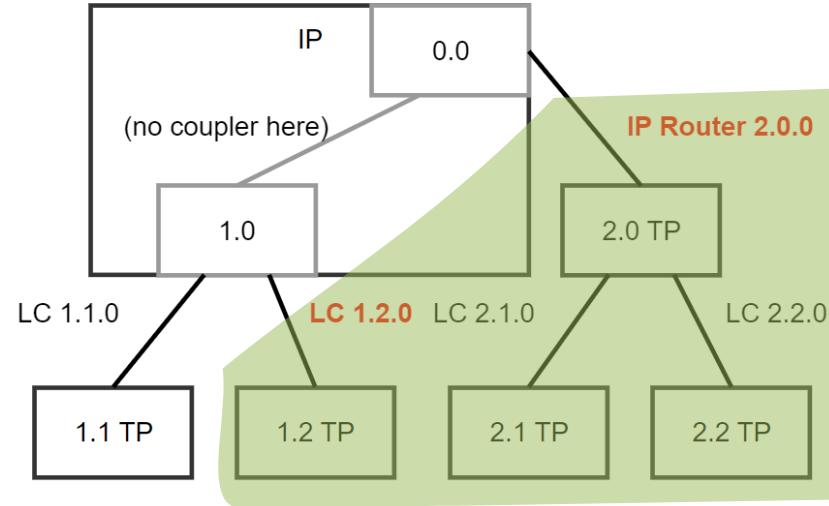
4. Securing KNX

5. Securing the KNX



## Using KNX Secure in ETS6 - KNX Secure Facts

- **ETS6** can cope with **multiple security domains** (*ETS5 only with one*), in which the security rules are the same as in ETS5
- **ETS6** can cope with the security domain borders



# Using KNX Secure in ETS6 - KNX Secure Facts

## Group communication security axioms

Axiom 1: Within a security domain communication using a specific group address is either all secure or all plain.

Axiom 2: There is a single key per group address within an installation.

Axiom 3: ETS supports only A+C, not A. (A = Authentication, C = Confidentiality)

Group Addresses

Security	Address	Name
0/0/1	Switching	
0/0/2	Status	
0/0/3	Central Switch	

Add Group Addresses | Delete | Download | Info | Reset | Unload | Print

Group Addresses

- Dynamic Folders
- 0 New main group
  - 0/0 New middle group
    - 0/0/1 Switching
    - 0/0/2 Status
    - 0/0/3 Central Switch

<no interface selected>

Group Addresses

Se. Object	Device
1: Channel C1 - Switch object	1.1 SU 1 RF
36: Channel 1: Switching - Output	13.1 Remo KNX RF

Add Group Addresses | Delete | Download | Info | Reset | Unload | Print

Group Addresses

- Dynamic Folders
- 0 New main group
- 0/0 New middle group
  - 0/0/1 Switching
  - 0/0/2 Status
  - 0/0/3 Central Switch

# Thank you!

**Vassilos Lourdas**

KNX Tools Team Leader

vassilos.lourdas@knx.org

For general questions:  
[info@knx.org](mailto:info@knx.org) - [www.knx.org](http://www.knx.org)



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