



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

Smart, Secure, Open

What is behind the slogans?

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



ETS6 Professional - Smart, Secure, Open

Secure



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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!



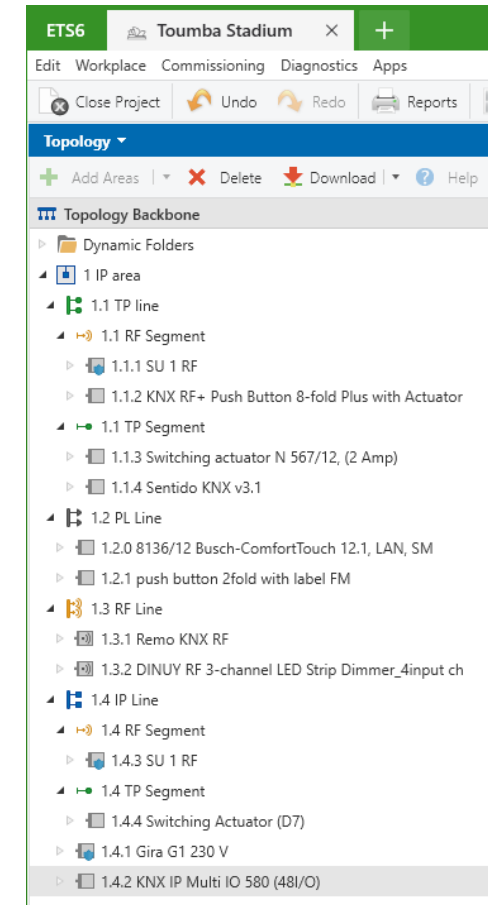
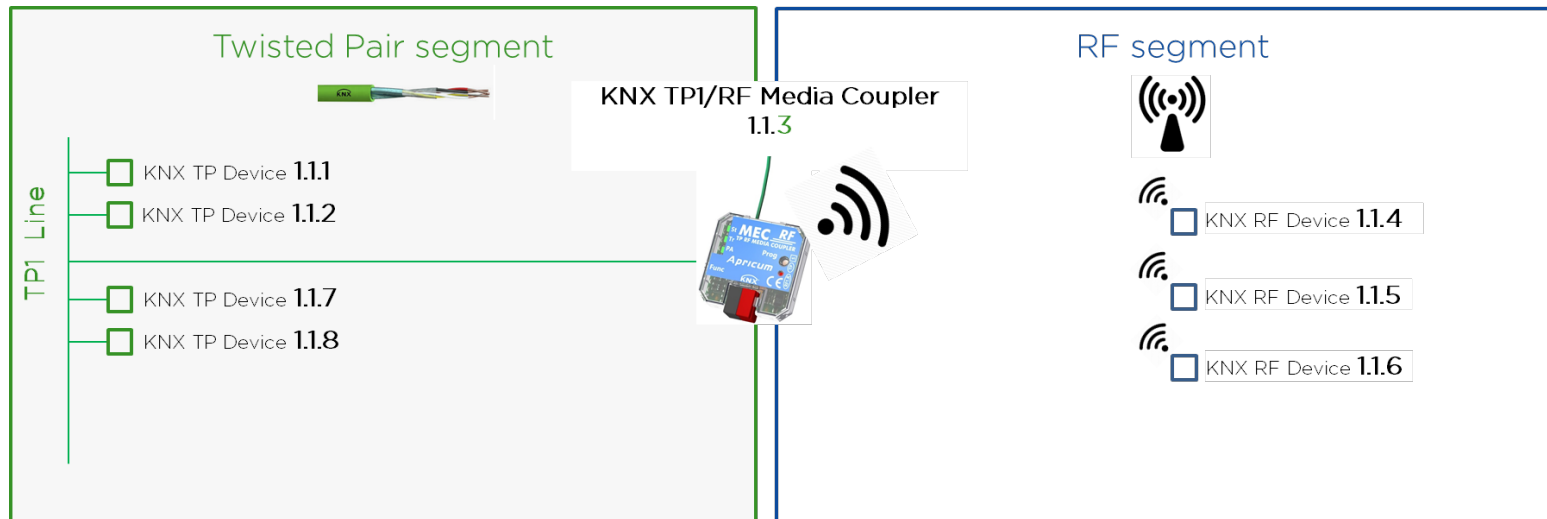
ETS6 Professional - Smart, Secure, Open

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





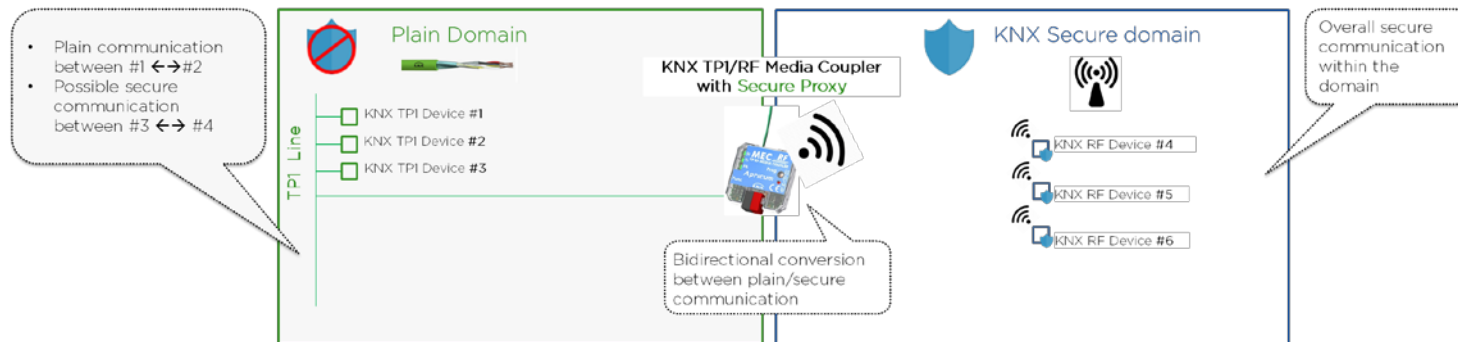
ETS6 Professional - Smart, Secure, Open

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)



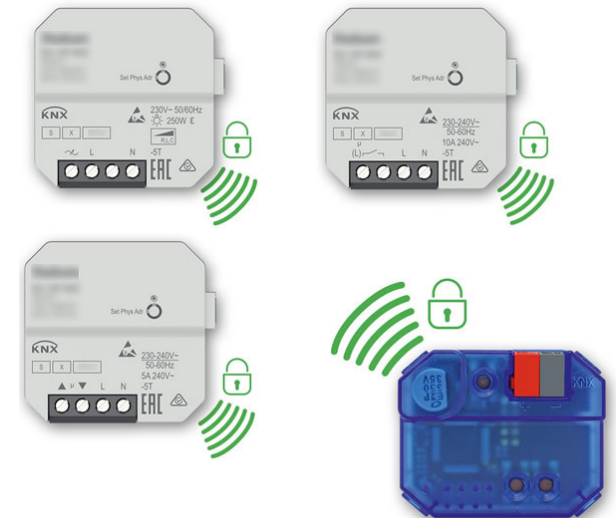
Group Addresses	Security	Address	Name
Dynamic Folders			
0 New main group			
0/0 New middle group			
0/0/1 Switching		0/0/1	Switching
0/0/2 Status		0/0/2	Status
0/0/3 Central Switch		0/0/3	Central Switch



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

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

Group Addresses	Se	Object ^	Device
Dynamic Folders		1: Channel C1 - Switch object	1.1.1 SU 1 RF
0 New main group		36: Channel 1: Switching - Output	1.3.1 Remo KNX RF
0/0 New middle group			



ETS6 Professional - Smart, Secure, Open

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

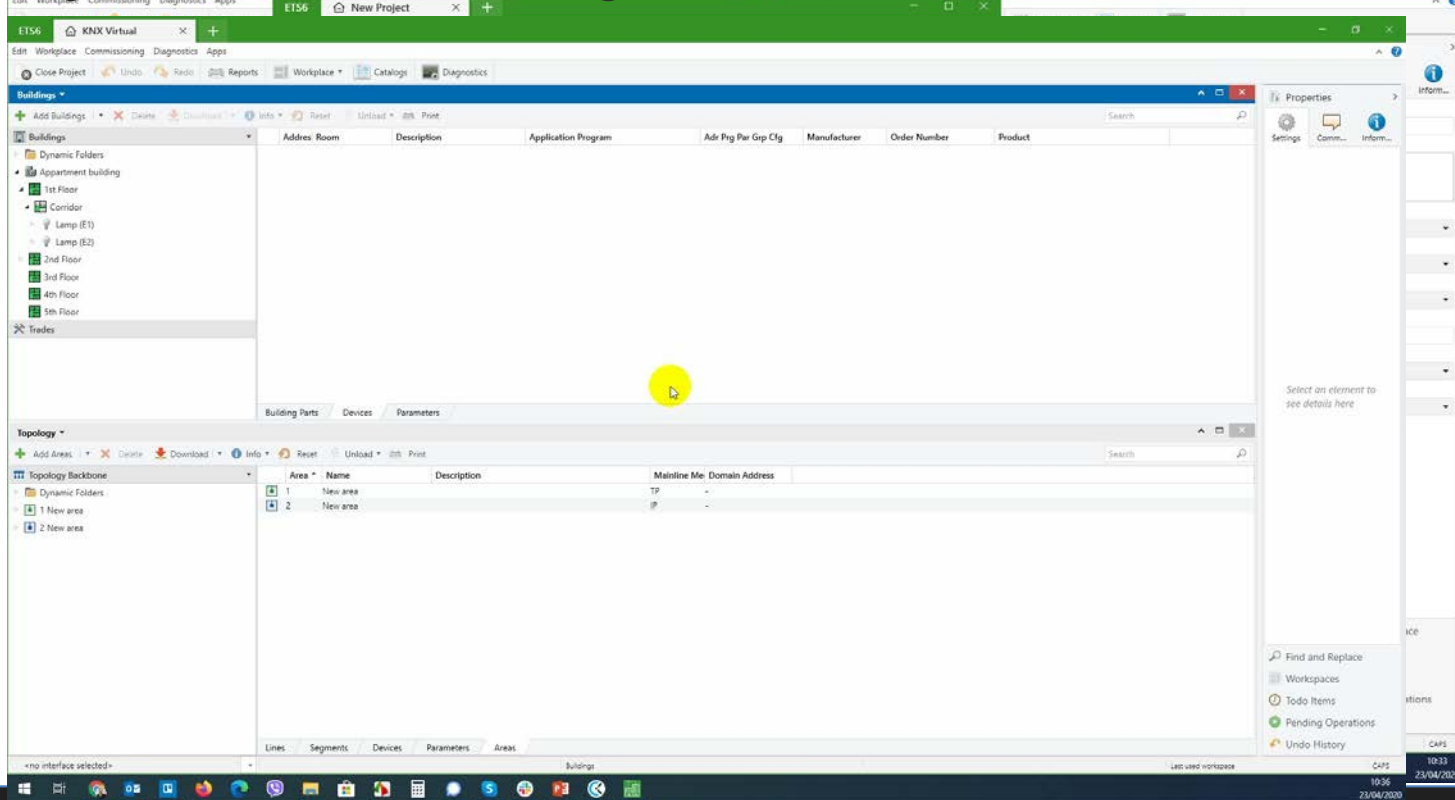
Interaction with ETS in a familiar way!



ETS6 Professional - Smart, Secure, Open

Explanation > Implementation > Advantages & Benefits

ETS6 Professional can be launched by dragging the current main window and dropped anywhere, thus creating a new (additional) ETS6 main window





ETS6 Professional - Smart, Secure, Open

Explanation > Implementation > Advantages & Benefits

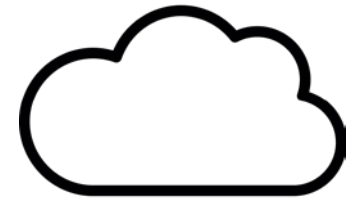
ETS6 Professional supports cloud licensing additionally to dongle-based licensing!



ETS6 Professional



or



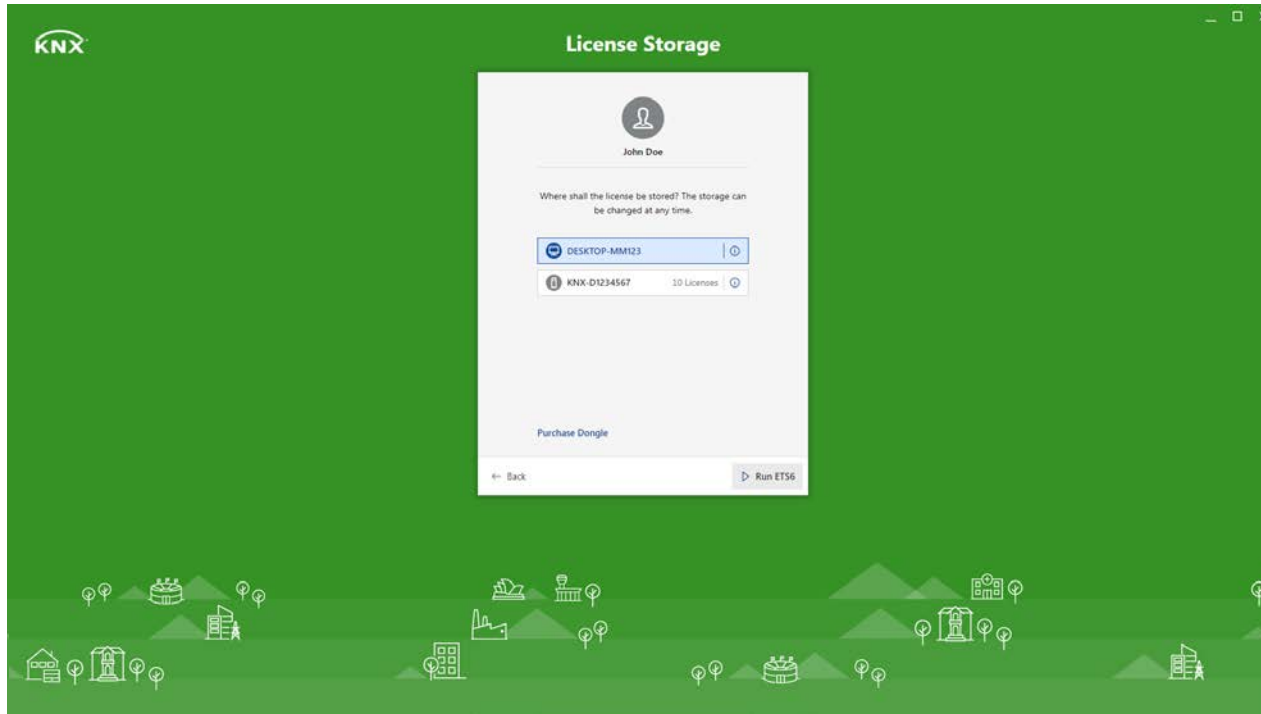
Re-use the KNX dongle if you already have one!



ETS6 Professional – Smart, Secure, Open

Explanation > Implementation > Advantages & Benefits

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



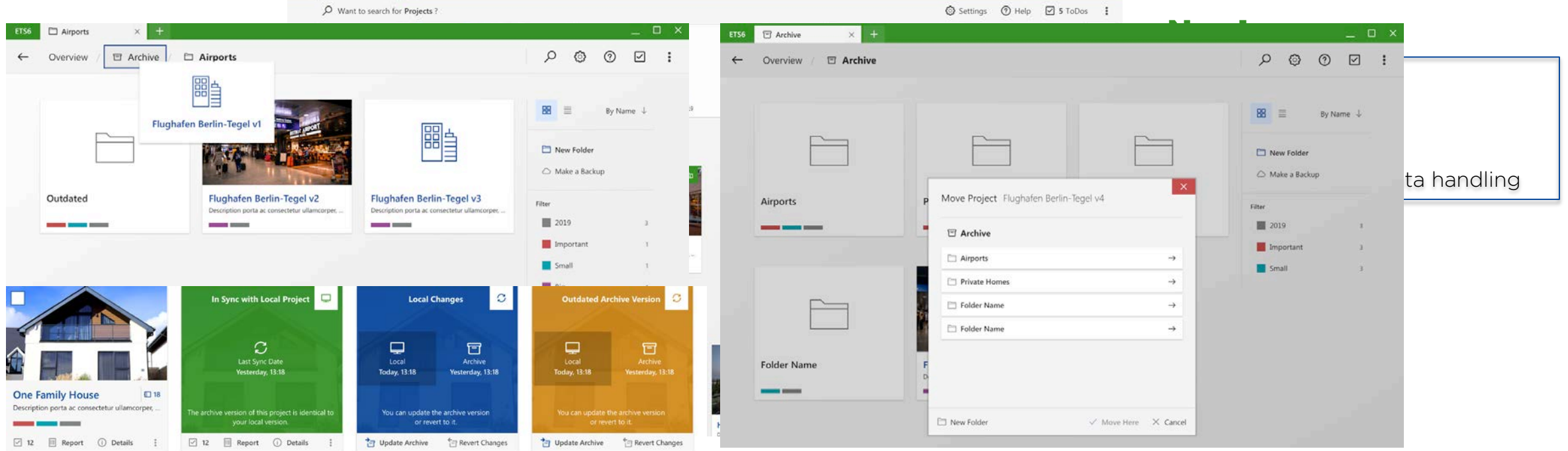


ETS6 Professional - Smart, Secure, Open

Explanation > Implementation > Advantages & Benefits

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

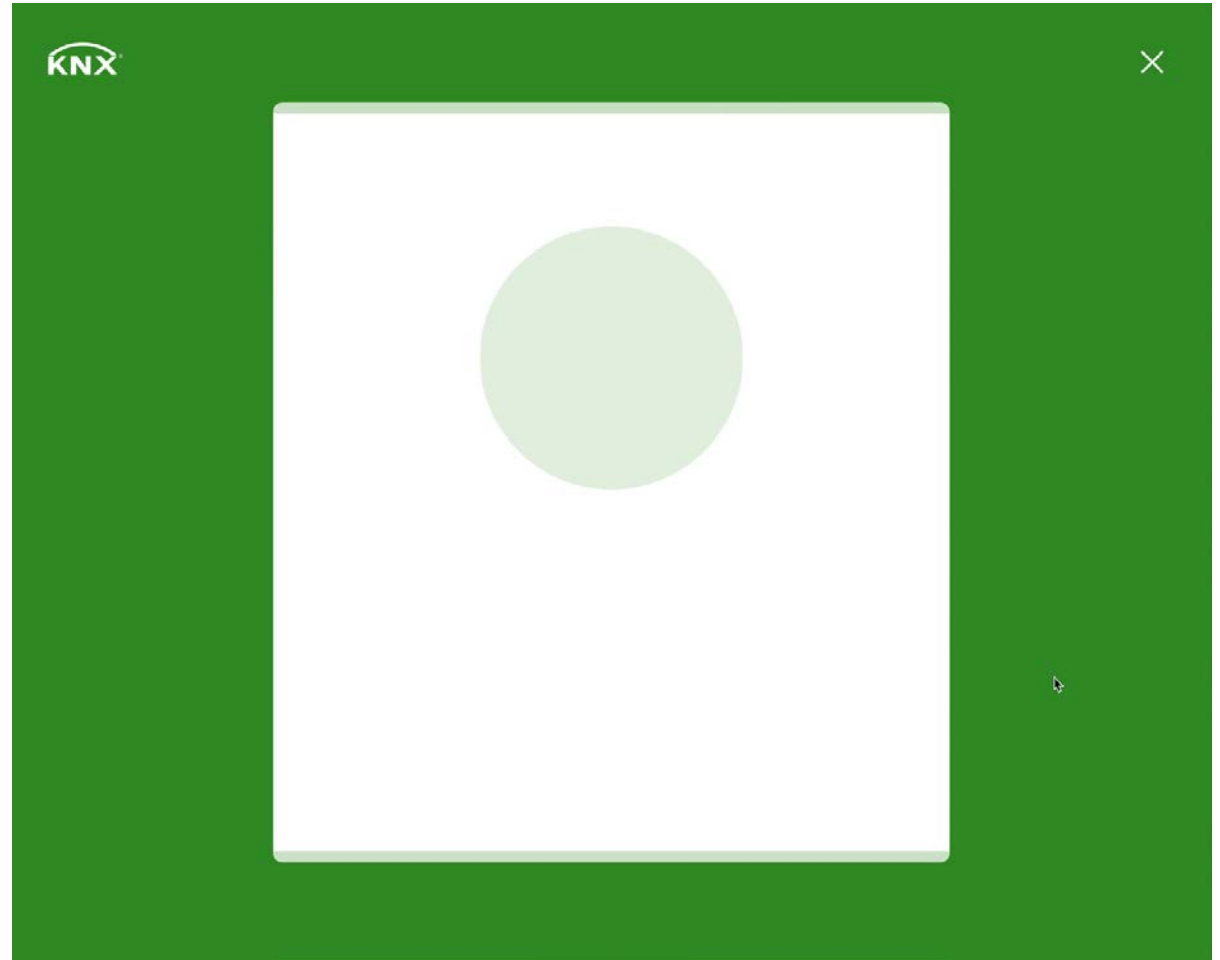
ETS6 Professional simplifies the project collaboration with the enhanced Project Archive!





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 adaptations 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

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 is a project tree with a hierarchical structure of buildings and rooms. On the right is a table of group addresses. Annotations with colored boxes and arrows link terms to specific elements in the interface:

- Function Point (Group Address)**: A red box pointing to the first row of the table (Address 0/0/160).
- Location**: A green box pointing to the '#1 Office' folder in the project tree.
- Function**: A blue box pointing to the 'Lighting @Door' folder in the project tree.
- Channel**: A grey box pointing to the 'My Light @Door' folder in the project tree.
- Point (Group Object)**: A grey box pointing to the '1.1.1 Bed Room - Push Button @Bed' folder in the project tree.

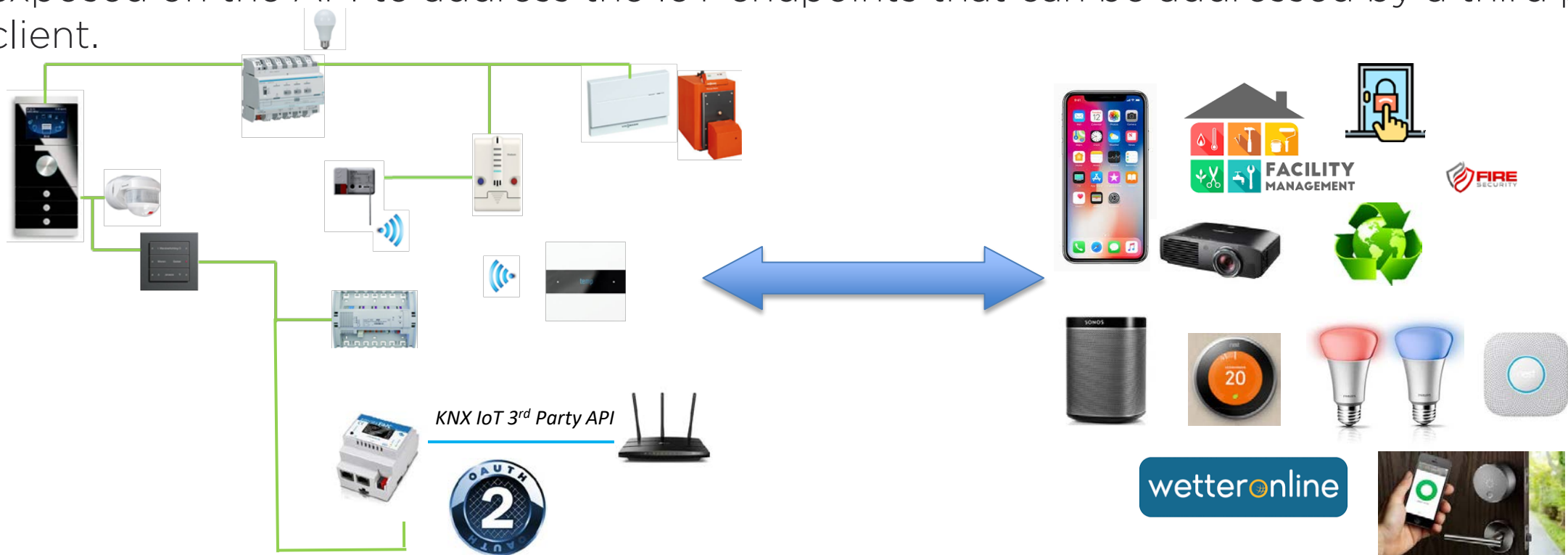
Address	Name	Description	Centre	Pass T	Data Type	Length	No. of
0/0/160	Switching (set)	Role: SwitchOnOff	No	No	switch	1 bit	2
0/0/161	Switching (status)	Role: InfoOnOff	No	No	switch	1 bit	2
0/0/162	Dimming (control)	Role: DimmingControl	No	No	dimming...	4 bit	2
0/0/163	Dimming Value (current value)	Role: 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 3rd 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**

Open

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

Integration with other systems that are not directly KNX compatible

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



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More?



ETS6 Professional - Smart, Secure, Open

ETS6 Professional provides browsing style navigation history per panel

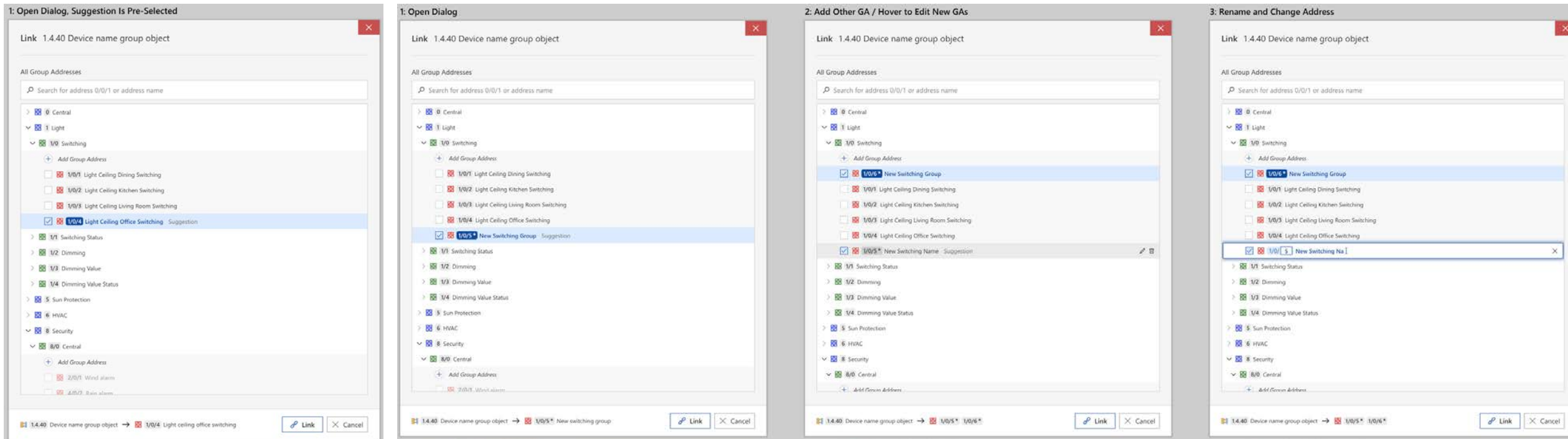
The screenshot shows the ETS6 Professional software interface. At the top, there is a green header bar with 'ETS6' and 'One Family House' tabs. Below this is a menu bar with 'Edit', 'Workplace', 'Comissioning', 'Diagnostics', 'Extras', and 'Windows'. A toolbar contains icons for 'Undo', 'Redo', 'Print', 'Workplace', 'Catalogs', and 'Diagnostics'. A blue 'Buildings' panel is open, showing a breadcrumb navigation path: 'Main House Dublin > Downstairs > TV Room'. Below the breadcrumb is a search box. A table titled 'Building Parts' is displayed, listing various components in the TV room.

Trade	Description	Room
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
Floor heating	Heating	TV room



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ETS6 Professional implements an optimized ‘Link with’ dialog to link Group Addresses faster!



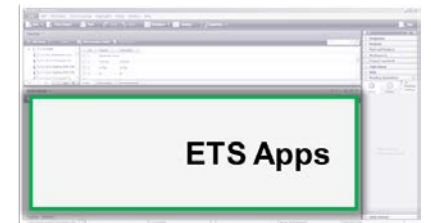


ETS6 Professional – Smart, Secure, Open

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*



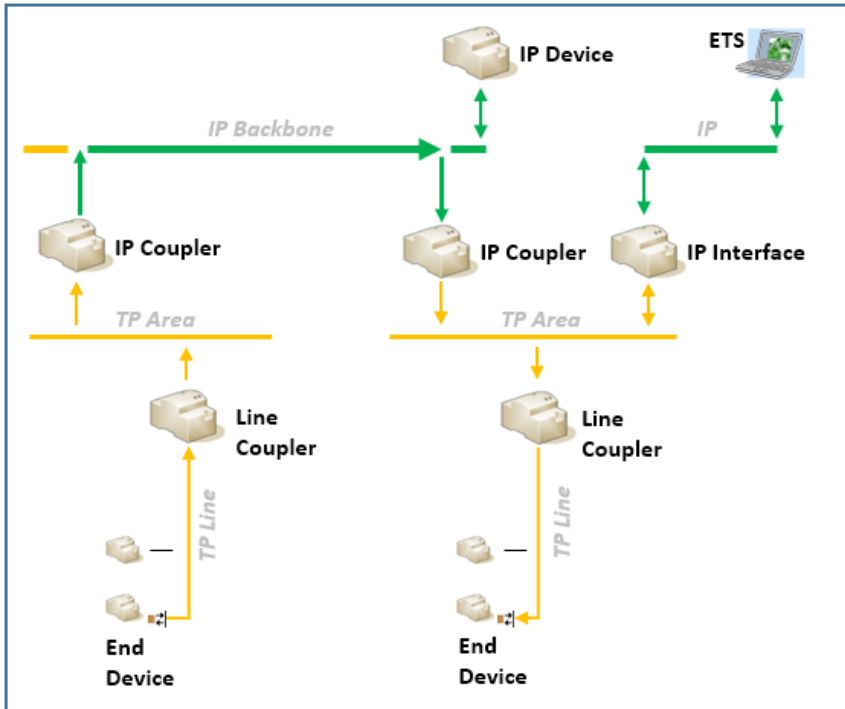
ETS6 Professional - Smart, Secure, Open

Using KNX Secure in ETS6



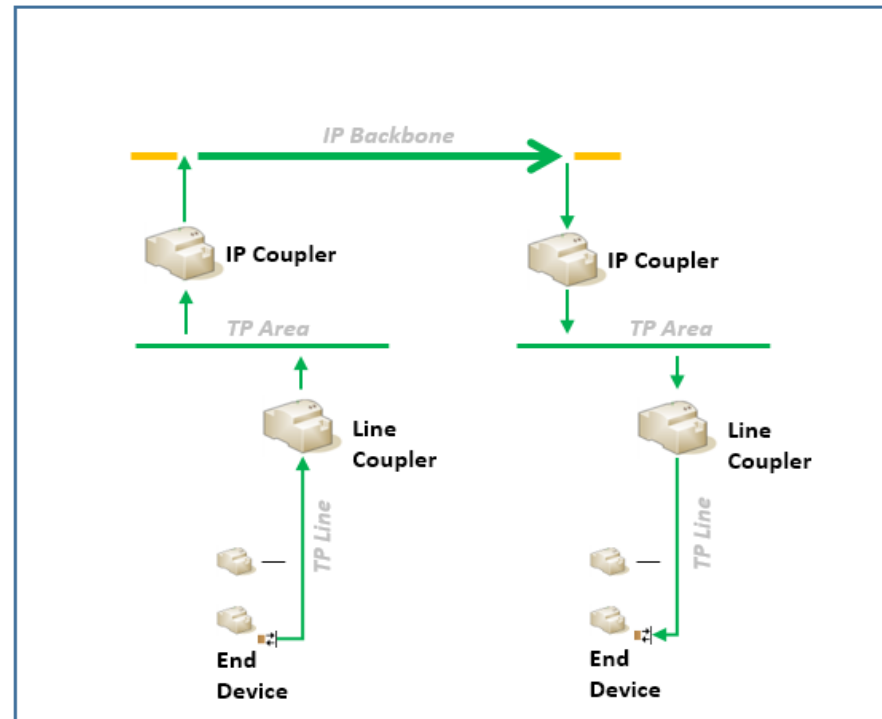
Using KNX Secure in ETS6 - Introduction - KNX Secure Overview

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.

Properties

Settings IP Comments Information

Obtain an IP address automatically
 Use a static IP address

MAC Address
Unknown

Routing Multicast Address
224.0.25.12

Management Password
zWtm@a<S
Good

Authentication Code
1zT4rx8-
Good



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.

← Project with security / Security

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

Device (individual) Keys



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 'Security' section of the ETS6 interface. At the top, there is a breadcrumb 'Project with security / Security' and a red close button. Below this is a table with four columns: 'Device', 'Serial Number', and 'Factory Key (FDSK)'. The 'Device' column contains 'Not assigned' for all four rows. The table lists the following data:

Device	Serial Number	Factory Key (FDSK)
Not assigned	1084:21084210	84210842108421084210842108421084
Not assigned	85AD:6B5AD685	AD685AD685AD685AD685AD685AD685AD
Not assigned	8C63:18C6318C	6318C6318C6318C6318C6318C6318C63
Not assigned	0842:10842108	42108421084210842108421084210842

To the right of the table is a sidebar with three options: 'Backup Keyring' (with an upward arrow icon), 'Add Device Certificate' (with a plus icon), and 'Delete' (with a trash icon). A red 'X' button is located in the top right corner of the main content area.

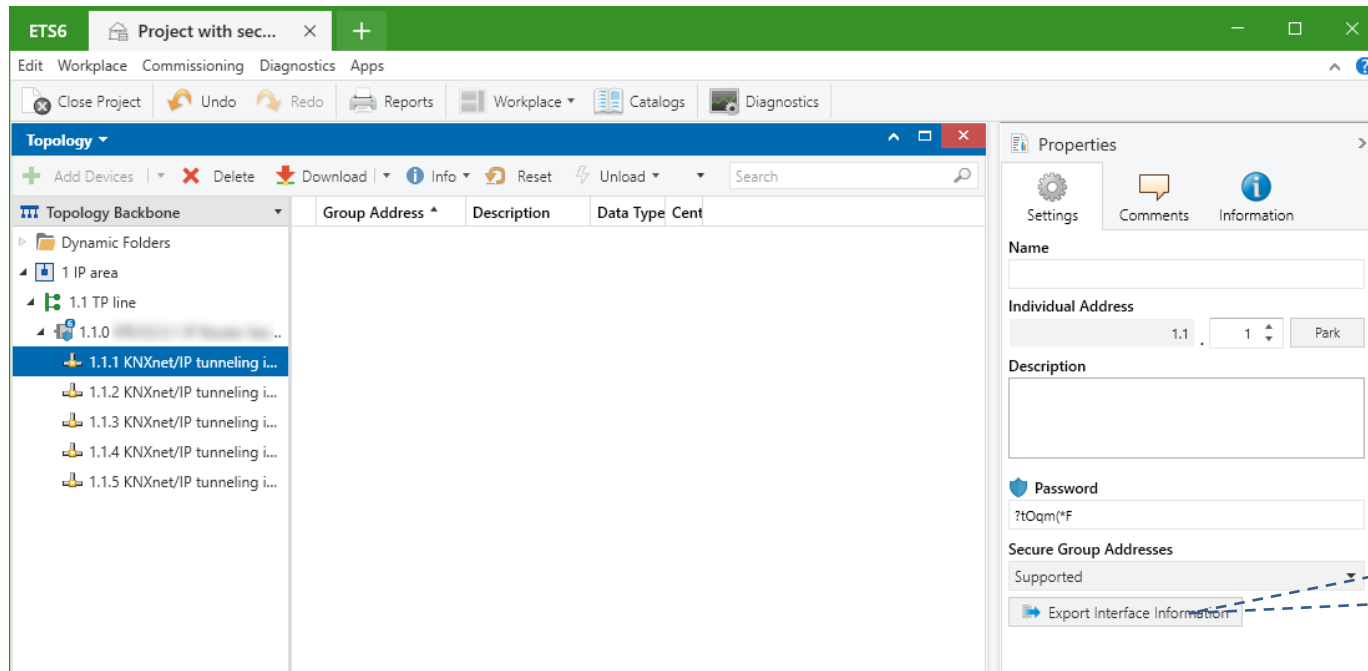
Keyring export function of entire installation (XML file)



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



Individual keyring export for this tunnelling interface only



Using KNX Secure in ETS6

KNX Secure Types



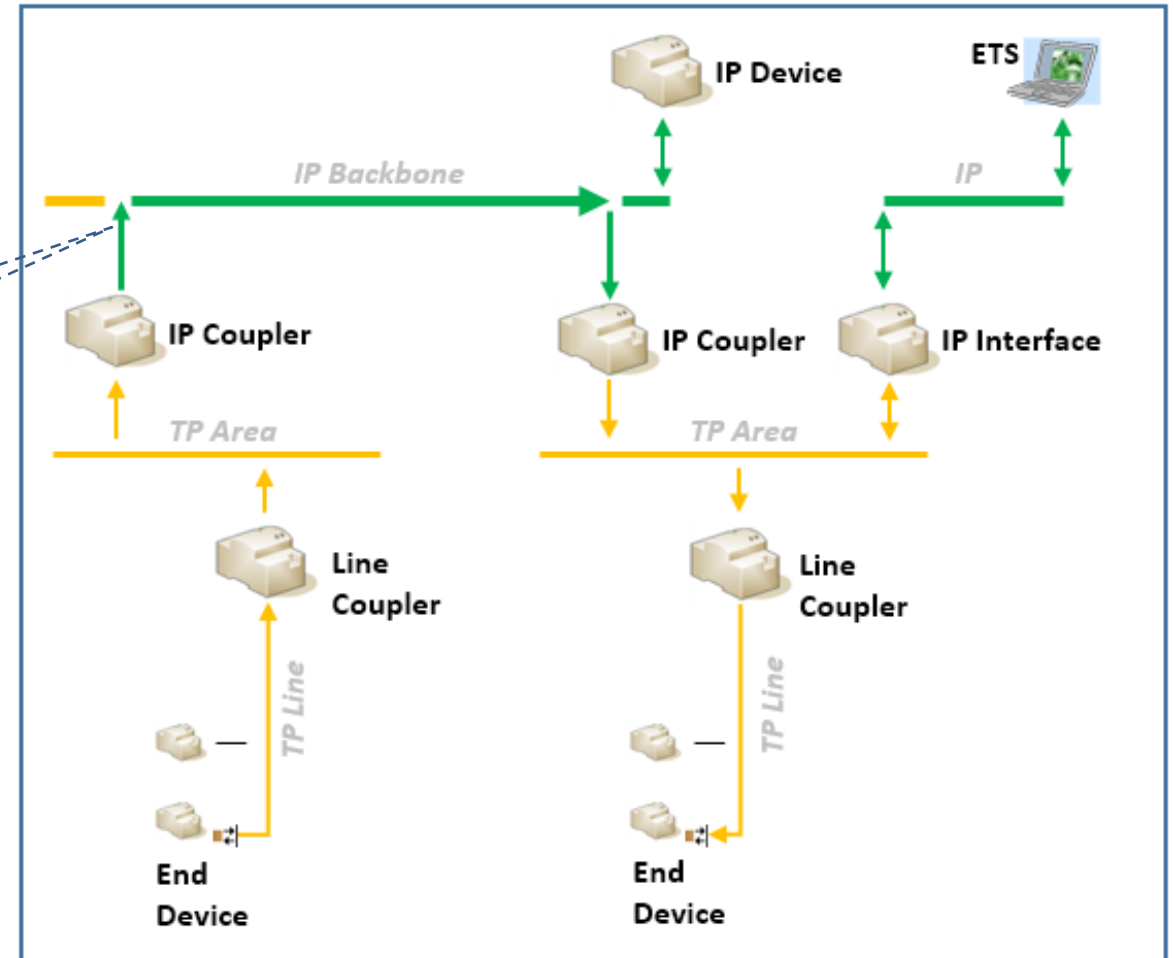
Using KNX Secure in ETS6 - KNX Secure Types

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





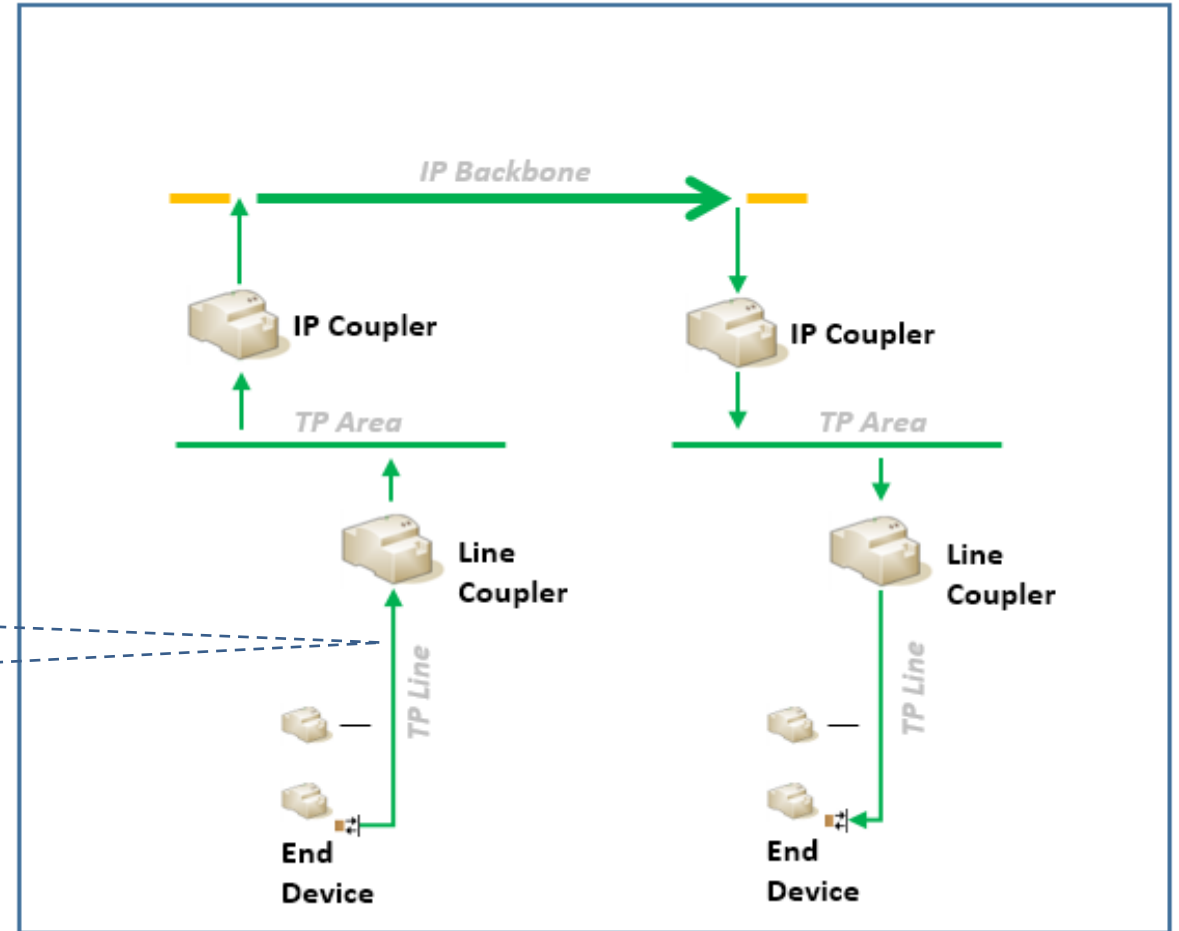
Using KNX Secure in ETS6 - KNX Secure Types

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



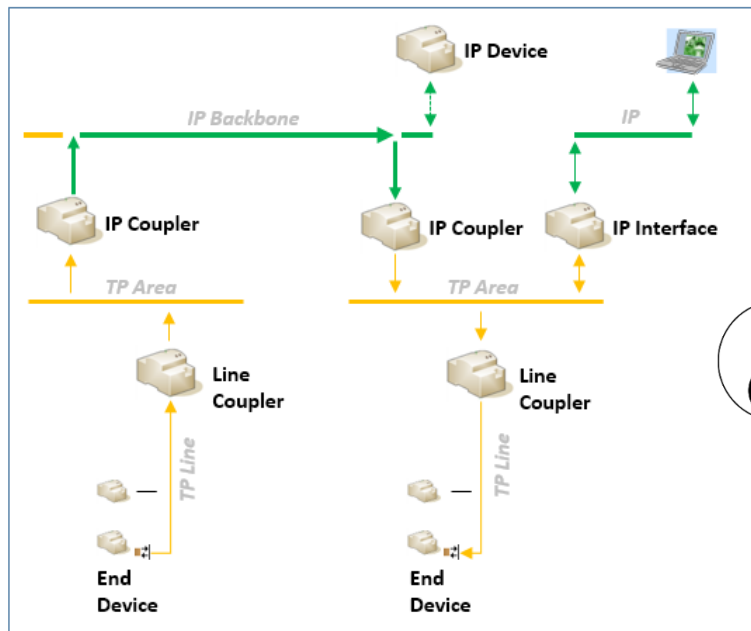
Using KNX Secure in ETS6 - KNX Secure Types

KNX Secure, Combined

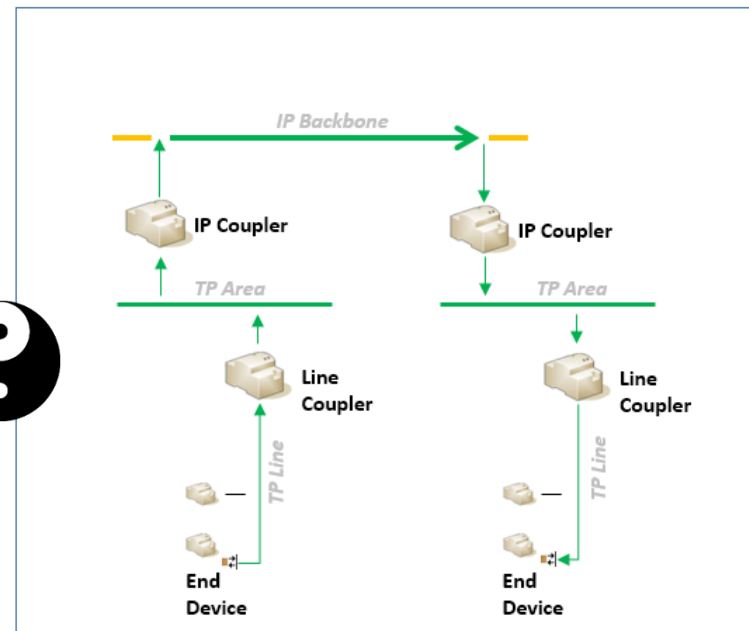
KNX IP Secure and KNX Data Secure can be combined in an ETS project/installation.

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

KNX IP Secure



KNX Data Secure



- Plain communication
- Secured communication





Using KNX Secure in ETS6

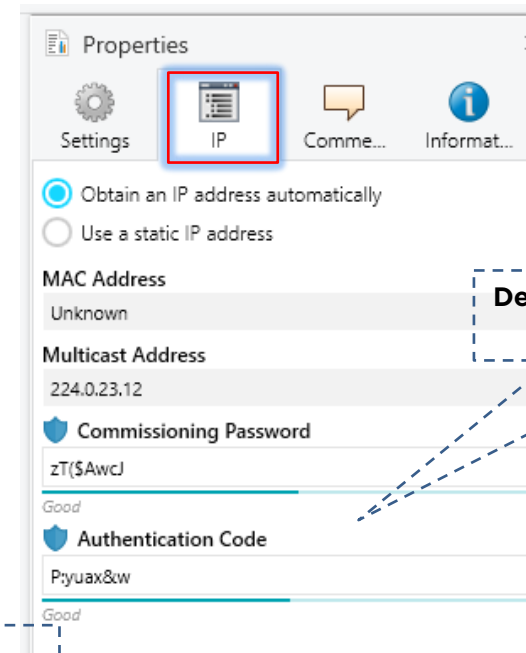
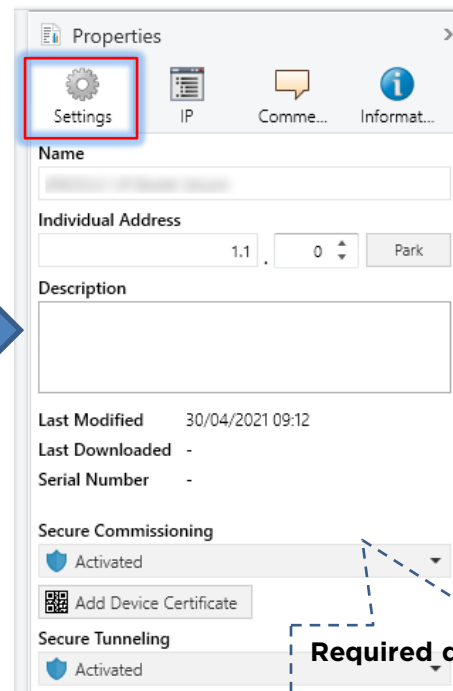
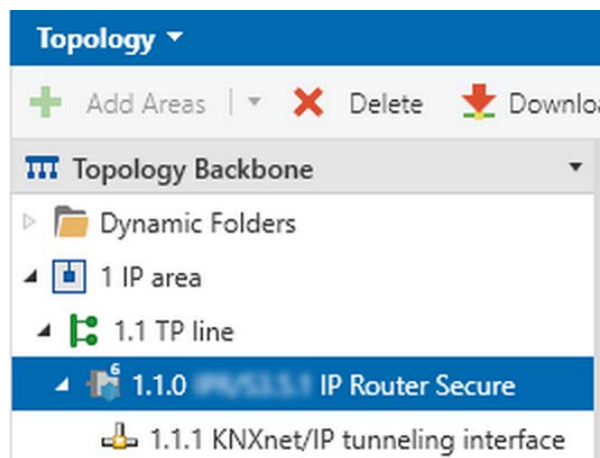
KNX Secure in ETS6

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)



Device management passwords

Required device security level

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

Accessible Group Address over 1.1.1

Password for interface with 1.1.1

Define whether the software using this tunnelling interface supports Secure Group Addresses

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 screenshot shows the 'Group Addresses' table in ETS6. The table has columns for 'Se.' (Security), 'Address', and 'Name'. The first row is highlighted with a red box, showing a security level of 0/0/1 for the address 0/0/1. The table also shows a tree view on the left with '0/0 New middle group' selected.

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



The screenshot shows the 'Properties' dialog box for a group address. The 'Settings' icon is highlighted with a red box. The 'Security' dropdown menu is set to 'Automatic'.

Properties

Settings Comments Information

Name
New middle group

Address
0

Description

Security
Automatic

Required device security level



Using KNX Secure in ETS6

KNX Secure Proxy in ETS6



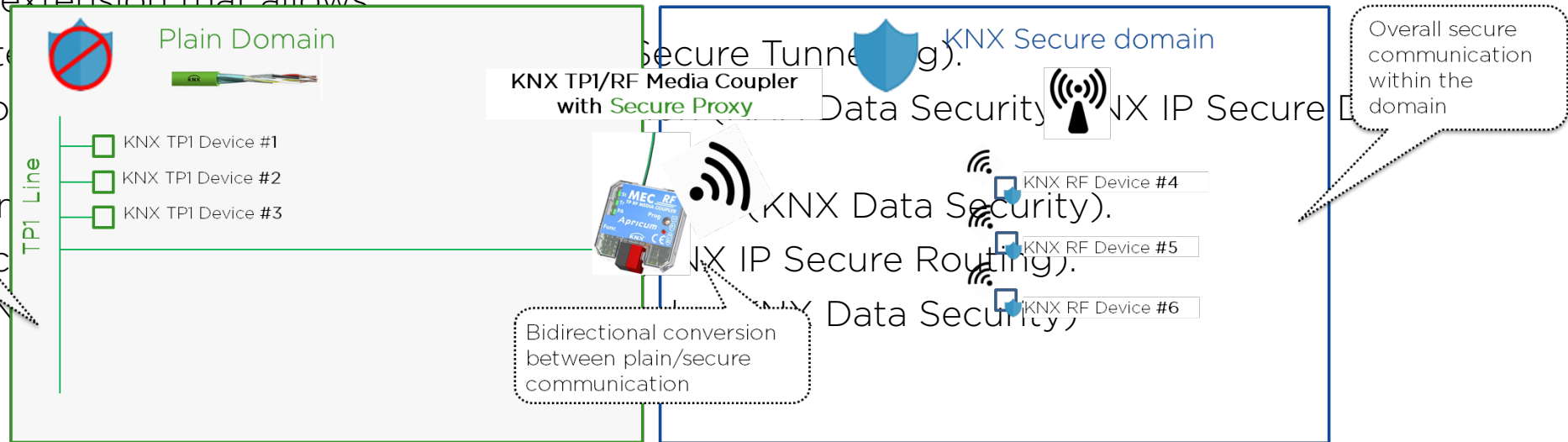
Using KNX Secure in ETS6 - KNX Secure Facts

ETS6 Professional supports KNX Secure Proxy

which is a coupler extension that allows

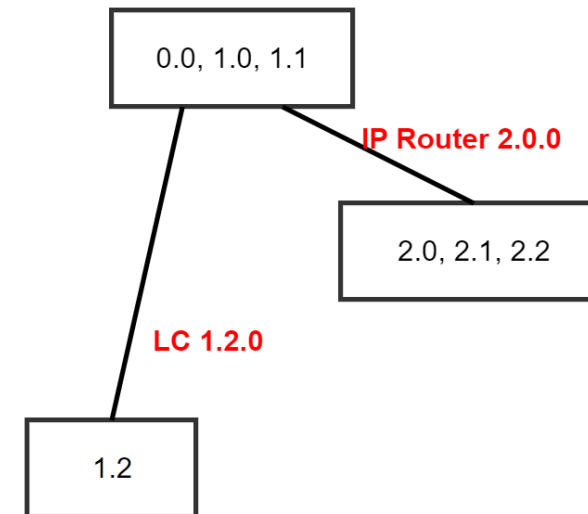
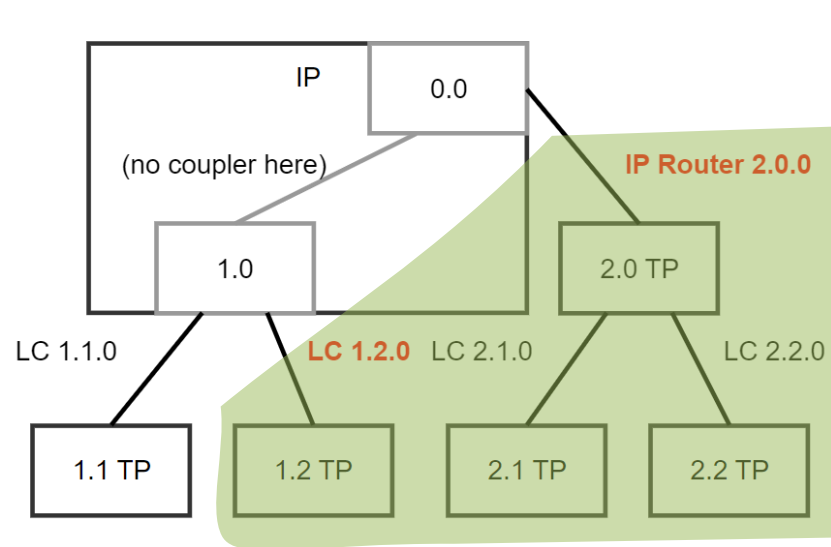
- Plain communication between #1 ↔ #2
- Possible secure communication between #3 ↔ #4

3. Securing the KNX IP Secure Routing.
4. Securing the KNX Data Security.
5. Securing the KNX IP Secure Routing.



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			
+ Add Group Addresses X Delete Download Info Reset Unload Print			
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			

Group Addresses | <no interface selected> | 1.1 TP line

Group Addresses		
+ Add Group Addresses X Delete Download Info Reset Unload Print		
Group Addresses	Se	Object ^
Dynamic Folders	🔒	1: Channel C1 - Switch object
0 New main group	🔒	36: Channel 1: Switching - Output
0/0 New middle group		
0/0/1 Switching		
0/0/2 Status		
0/0/3 Central Switch		

Device

1.1.1 SU 1 RF

1.3.1 Remo KNX RF

Thank you!

Vassilios Lourdas

KNX Tools Team Leader

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For general questions:
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Smart home and building solutions.
Global. Secure. Connected.

