



Basic / Advanced / Expert

Application note

spaceLYnk integration using BACnet

spaceLYnk integration into StruxureWare Building Operation

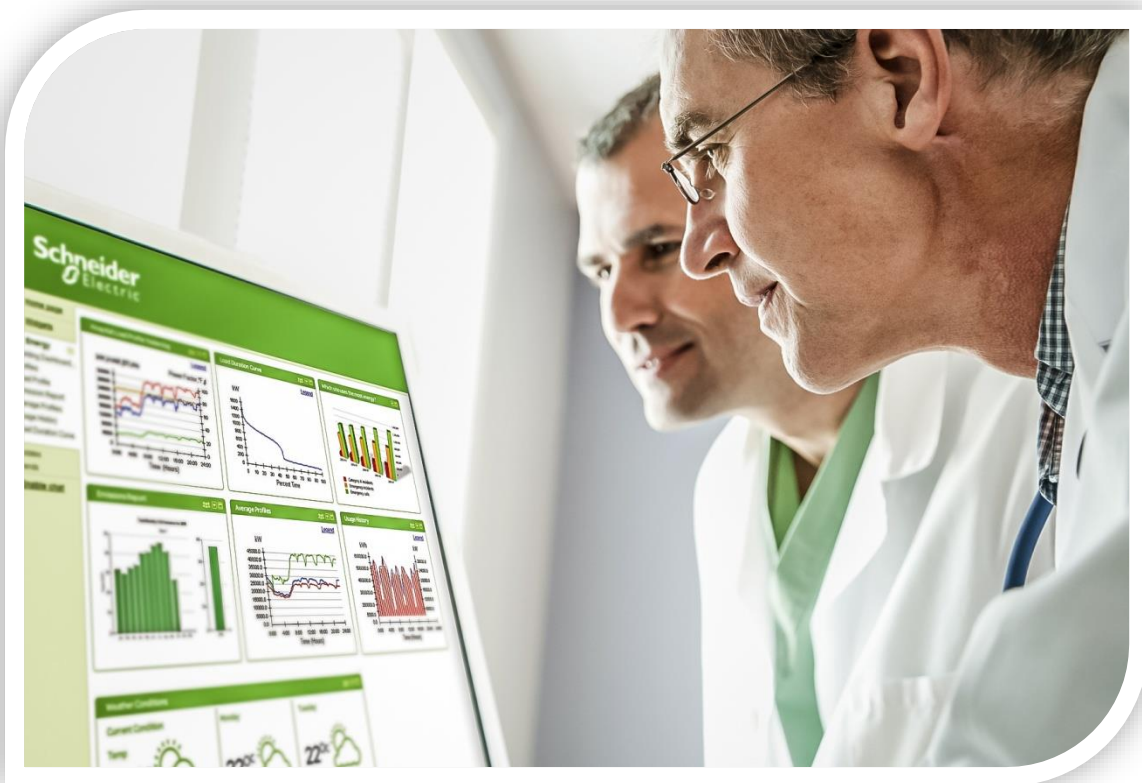


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1 Introduction

Integrating spaceLYnk with StruxureWare Building Operation Enterprise allows you to:

- Connect room and building controls
- Increase your choice of room control devices
- Use services like visualization and data monitoring
- Lower cost compared to standard gateways
- Install new spaceLYnk devices in existing spaces

Competencies

Before you start working with spaceLYnk and BACnet you should read:

- spaceLYnk User guide_EN.pdf (<http://www.schneider-electric.com>).
- StruxureWare Building Operation Workstation (SBO) (<http://buildings.schneider-electric.com>).

Note: You need to register on the site <http://buildings.schneider-electric.com>

You should be a trained electrician with experience installing building automation devices (see Safety Information)

System prerequisites

Before you begin, ensure you have the proper software. You can download the latest versions here:

Software	Version	Download
spaceLYnk	1.0 and newer	http://www.schneider-electric.com
Building Operation WorkStation	1.4 and newer	http://buildings.schneider-electric.com
Enterprise Server	Latest version	http://buildings.schneider-electric.com

Table 1: software versions of used software

1.1 BACnet

BACnet is a data communication protocol for building automation and control field networks. This protocol is supported by BACnet International (www.bacnetinternational.org) and

- American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)
- American National Standards Institute (ANSI)
- International Organization for Standardization protocol (ISO)

BACnet was designed to allow communication of building automation and control systems for application such as heating, ventilation, air - conditioning control, lighting control, access control, fire detection systems and their associated equipment. BACnet protocol provides exchange information for building automation devices, regardless of the particular building service they perform.

The Enterprise Server manages data from BACnet protocol. This includes:

- centralized logging
- display
- application version of a StruxureWare Building
- data management.

The Enterprise Server also serves as a single point of administration through your WorkStation or your WebStation for StruxureWare Building Operation.

When you configure spaceLYnk with the BACnet protocol

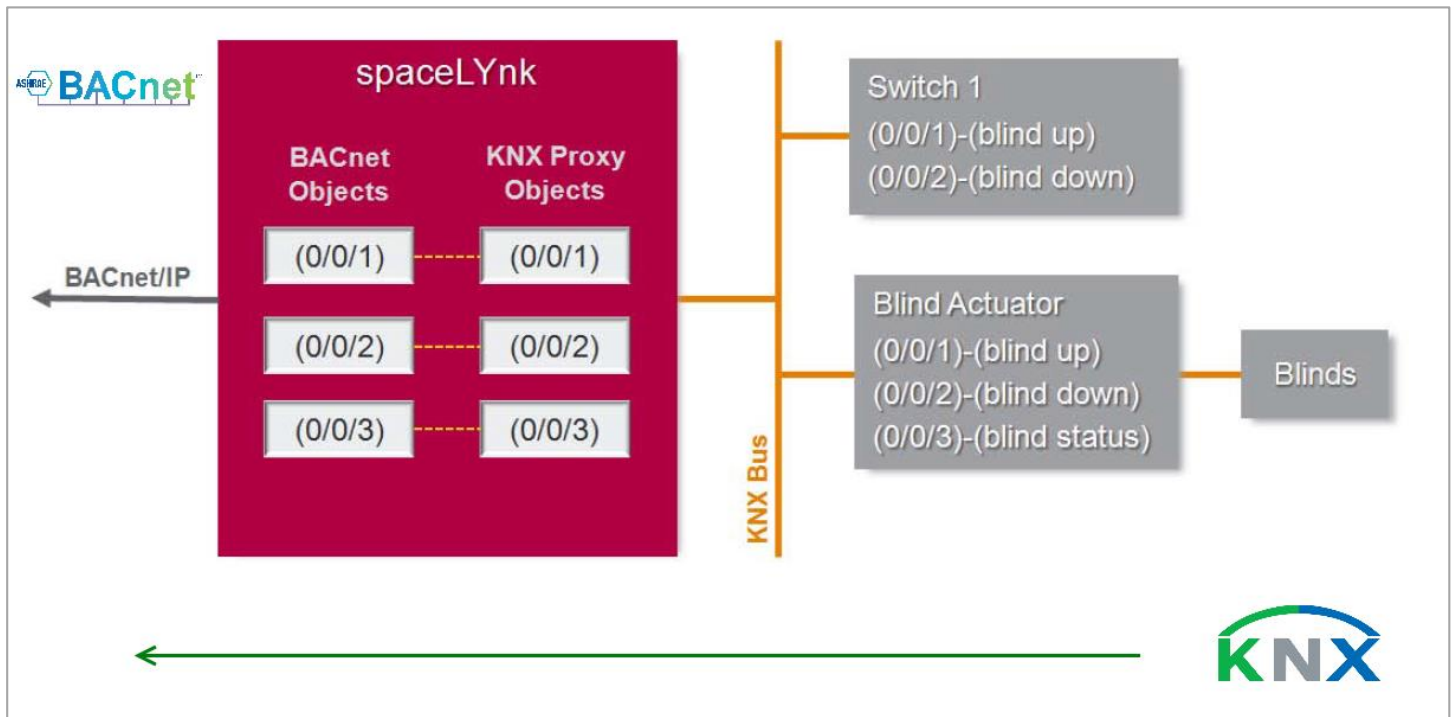
- The spaceLYnk device acts as a BACnet server.
- StruxureWare Building Operation Enterprise Server acts as the client.

This configuration allows you to combine the benefits of both systems (KNX and BACnet), on both the room and building automation levels.

1.2 KNX objects and BACnet

spaceLYnk is based on using KNX objects which can be optionally exposed to BACnet as a BACnet objects via BACnet / IP network.

spaceLYnk controller creates proxy objects which interacts with BACnet and other supported networks as Modbus. Proxy objects behave the same as KNX group addresses.



Picture 1: Exposing objects to BACnet

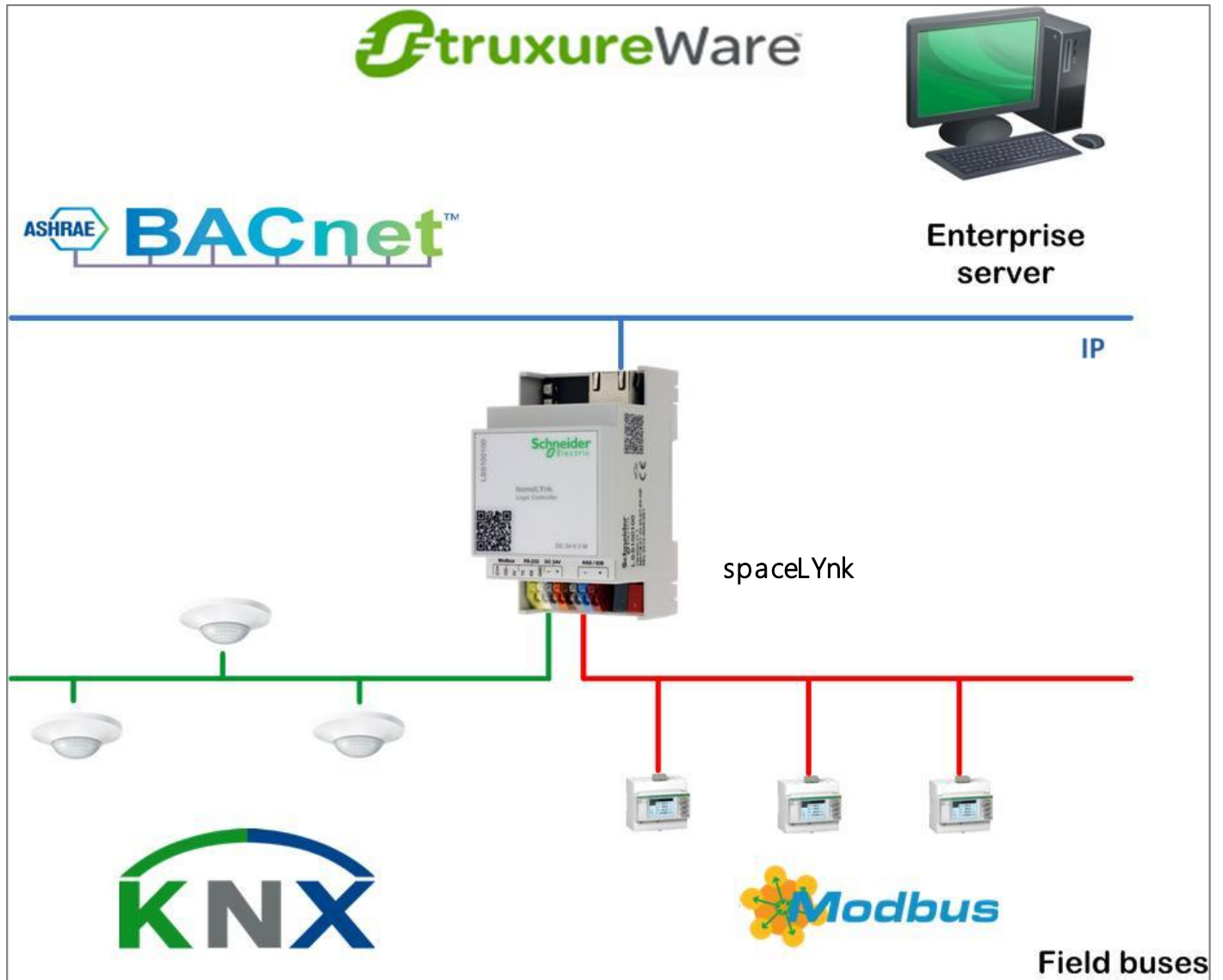
spaceLYnk executes an internal *WRITE* operation to the *Present_Value* of the BACnet object according change value of the proxy object.

Value of the proxy object occurs when:

- spaceLYnk program or scheduler changes the value
- value is updated from network
- value is changed from spaceLYnk's user interface
- WriteProperty request is made by a BACnet client (SBO)

Note: KNX system can have multiple controls for a particular actuator. For example, a dimming actuator can be controlled by two pushbuttons. Each pushbutton has unique group address and own proxy object and, if exposed, its own BACnet object. When one of pushbuttons is pressed then only its proxy object is updated and the second one is not updated in BACnet client. In this scenario keep attention to correct using binding between KNX objects and proxy objects in SBO.

2 Design



Picture 2: Architecture of spaceLYnk integration into a StruxureWare Building Operation Enterprise

3 Configuration

For integration of spaceLYnk using BACnet into a Enterprise server is necessary to follow next steps.

- 1) Configure spaceLYnk
- 2) Import objects
- 3) Export Objects
- 4) Configure BACnet

3.1 Configure spaceLYnk to enable BACnet feature

Configure spaceLYnk to set up data sharing between spaceLYnk and a supervising system, BACnet server.

Step 1: Configure spaceLYnk

- 1) Configure IP address, date and time, user access etc. according to the User guide
 - User Guide is located at <http://www.schneider-electric.com>

Step 2: Import objects

- 1) Click **Utilities**
- 2) Click **Import ESF file**

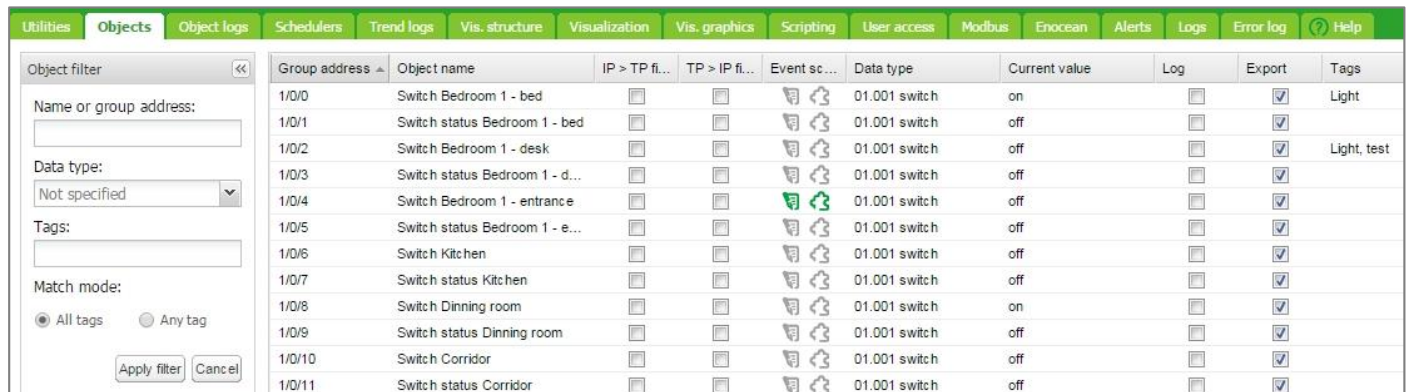


Picture 3 : Import ESF file

- 3) Navigate to your import file (*.esf) on your hard drive and click **open**
 - System builds KNX objects list, which contains all data (group addresses, name, data type, etc.).

Step 3: Exporting objects

- 1) Click **Objects** tab
- 2) Click **Export** checkbox on desired objects



Group address	Object name	IP > TP fl...	TP > IP fl...	Event sc...	Data type	Current value	Log	Export	Tags
1/0/0	Switch Bedroom 1 - bed	<input type="checkbox"/>	<input type="checkbox"/>		01.001 switch	on	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Light
1/0/1	Switch status Bedroom 1 - bed	<input type="checkbox"/>	<input type="checkbox"/>		01.001 switch	off	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
1/0/2	Switch Bedroom 1 - desk	<input type="checkbox"/>	<input type="checkbox"/>		01.001 switch	off	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Light, test
1/0/3	Switch status Bedroom 1 - d...	<input type="checkbox"/>	<input type="checkbox"/>		01.001 switch	off	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
1/0/4	Switch Bedroom 1 - entrance	<input type="checkbox"/>	<input type="checkbox"/>		01.001 switch	off	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
1/0/5	Switch status Bedroom 1 - e...	<input type="checkbox"/>	<input type="checkbox"/>		01.001 switch	off	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
1/0/6	Switch Kitchen	<input type="checkbox"/>	<input type="checkbox"/>		01.001 switch	off	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
1/0/7	Switch status Kitchen	<input type="checkbox"/>	<input type="checkbox"/>		01.001 switch	off	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
1/0/8	Switch Dining room	<input type="checkbox"/>	<input type="checkbox"/>		01.001 switch	on	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
1/0/9	Switch status Dining room	<input type="checkbox"/>	<input type="checkbox"/>		01.001 switch	off	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
1/0/10	Switch Corridor	<input type="checkbox"/>	<input type="checkbox"/>		01.001 switch	off	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
1/0/11	Switch status Corridor	<input type="checkbox"/>	<input type="checkbox"/>		01.001 switch	off	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Picture 4: Objects export using Objects tab

Selected KNX objects will send values to BACnet

- 3) Click **System**

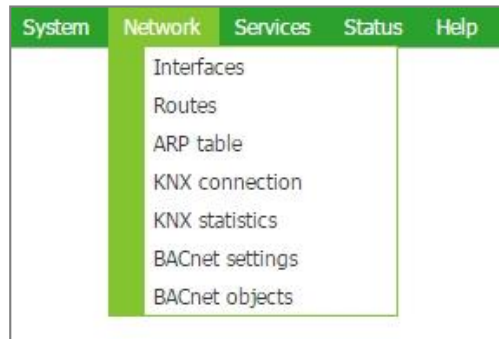


Picture 5: System

- System opens a new page

Step 4: Configuring BACnet

- 4) Click **Network** and select **BACnet settings**



Picture 6: BACnet settings

- System opens the BACnet settings window

- 5) Click **Server enabled** checkbox and click **OK**

A screenshot of the 'BACnet settings' dialog box. It features a 'Server enabled' checkbox which is checked. Below this are several input fields: 'Device ID' (127004), 'Password' (mybacpwd), 'Object priority' (16), 'Port' (47808), 'BBMD IP', 'BBMD port', and 'BBMD lease time (seconds)'. At the bottom right are 'OK' and 'Cancel' buttons.

Picture 7: BACnet settings

Property	Description
Server enable	Enable / Disable BACnet server
Device ID	BACnet device ID which must be unique on BACnet network. Range (0 – 4194302)
Password	BACnet password
Object priority	Define to which priority array spaceLYnk will write to.
Port	BACnet port, default 47808

Table 2: BACnet properties

Shared data are shown on *Network -> BACnet object*

BACnet objects			
Name: spaceLynk_127004			
Device ID: 127004			
Object priority: 16			
Port: 47808			
Download CSV			
Type	Instance	Name	Current value
5 (BV)	2048	Switch Bedroom 1 - bed (1.0.0)	true
5 (BV)	2049	Switch status Bedroom 1 - bed	false
5 (BV)	2050	Switch Bedroom 1 - desk (1.0.2)	false
5 (BV)	2051	Switch status Bedroom 1 - desk	false
5 (BV)	2052	Switch Bedroom 1 - entrance	false
5 (BV)	2053	Switch status Bedroom 1 -	false
5 (BV)	2054	Switch Kitchen (1.0.6)	false
5 (BV)	2055	Switch status Kitchen (1.0.7)	false
5 (BV)	2056	Switch Dinning room (1.0.8)	true
5 (BV)	2057	Switch status Dinning room (1.0.9)	false
5 (BV)	2058	Switch Corridor (1.0.10)	false
5 (BV)	2059	Switch status Corridor (1.0.11)	false

Picture 8: BACnet objects

Property	Description
Device name	Device name is combined from hostname and device ID
Download CSV	Download BACnet objects in CSV file

Table 3: BACnet objects properties

Note: We recommends using object priority 16 in StruxureWare Building Operation. Downloaded file name and format is depending of the browser, not spaceLynk itself.

3.2 Building Operation WorkStation configuration

Schneider Electric StruxureWare (SBO) is a BACnet certified Building Management System capable of discovering values exported from spaceLYnk (SL). Exported data can be used for information, control, or visualization. Communication between SBO and SL is bi-directional.

Enterprise server acts as a BACnet client.

To configure the Building Operation WorkStation follow these five steps:

- 1) Log into SBO
- 2) Add BACnet interface into Automation Server
- 3) Configure IP network
- 4) Discover devices and upload BACnet objects
- 5) Set required priority to reveal actual exported values

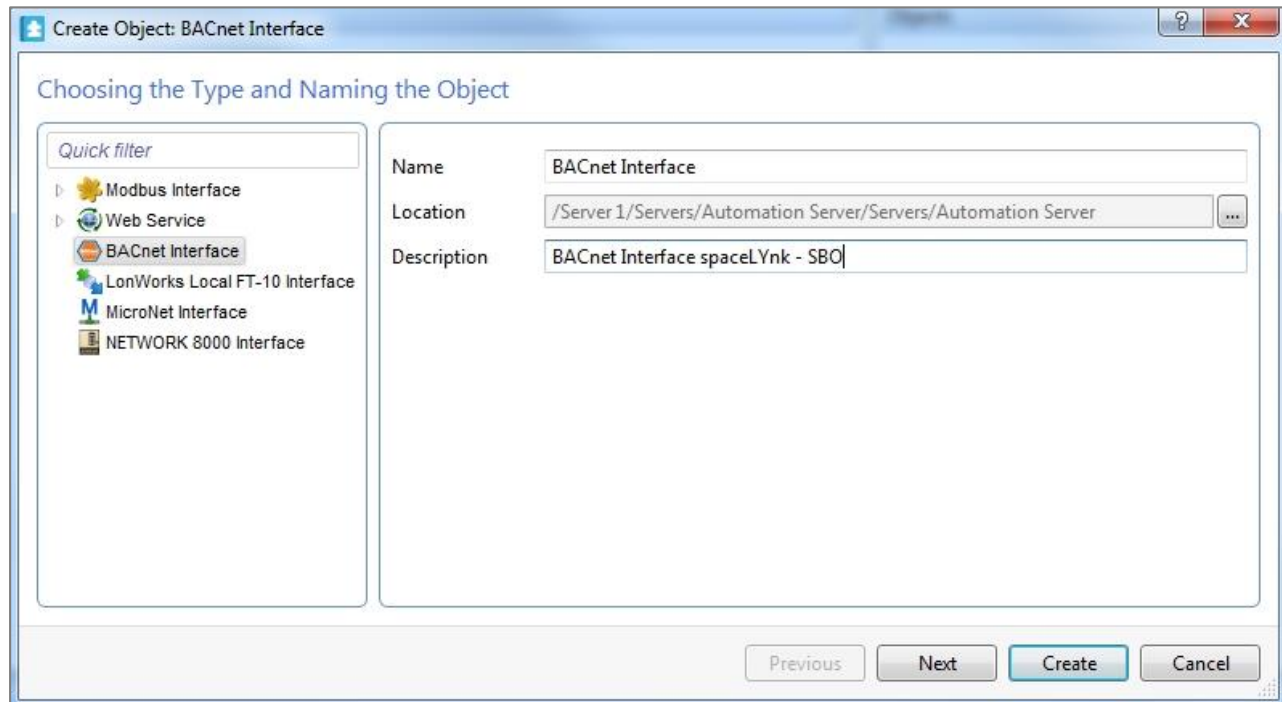
*Note: Server name in this application note is **Automation Server**. In case of change this name following steps you have to reflect this change.*

Step 1: Log into SBO

- 1) Open your SBO program and enter your user name and password.
 - Main page of SBO program opens.

Step 2: Add BACnet interface into Automation Server

- 1) Right click **Automation server**
- 2) Click **New**
- 3) Click **Interface**
- 4) Click **BACnet interface**
- 5) Type your BACnet interface **Name**. You can leave preset name "BACnet interface"
- 6) Type your **Location**. You can leave the default location
- 7) Click **Create**
 - Your BACnet interface is now available in system menu.



Picture 9: add BACnet Interface into Automation Server

Note: If BACnet interface must be added to additional servers

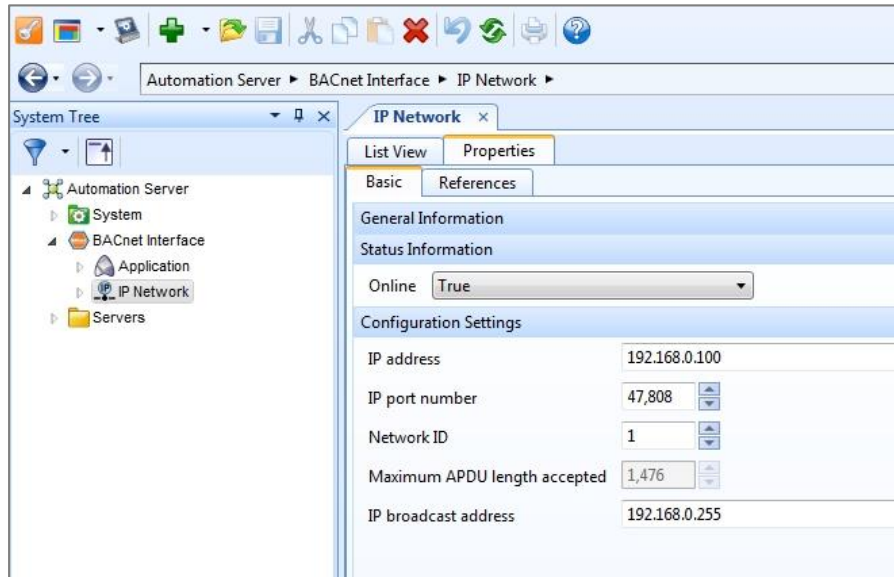
- 1) Create your new server
- 2) Change **Location** for BACnet Interface object
- 3) Select your new location

Step 3: Configuring your SBO IP network

Configuring SBO IP network allows you to establish connection between spaceLYnk and SBO to use Device discovery function to discover spaceLYnk device on the network.

Important : To use Device Discovery, you must set the IP settings of SBO to the same IP range as spaceLYnk.

- 1) Go to **Automation server**
- 2) Expand **BACnet Interface**
- 3) Click **IP Network**
- 4) Type your IP configuration



Picture 10: BACnet Interface configuration

IP address of your SBO is now set.

Note: In case of network collision change the value of the SBO IP port number.

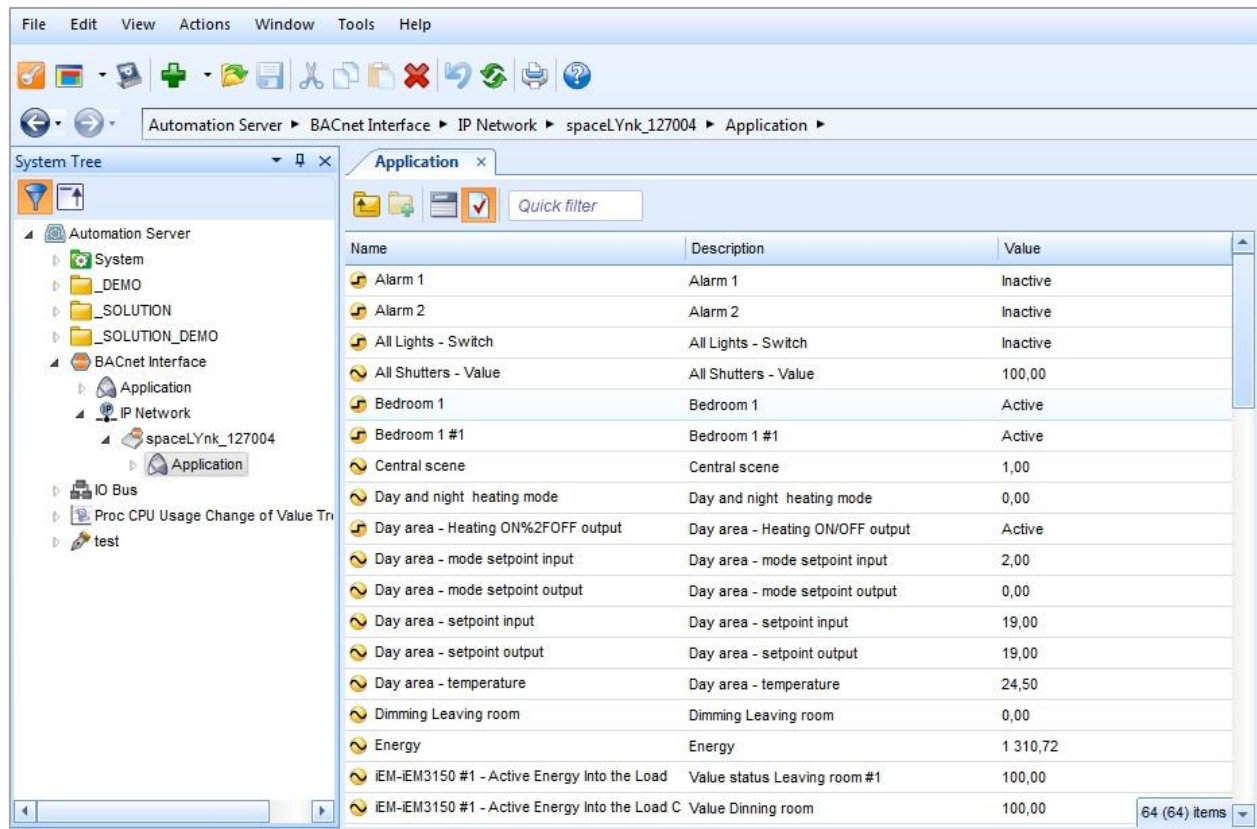
Step 4: Discovering devices and uploading BACnet objects

- 1) Click **Automation Server**
- 2) Click **Device Discovery** and select **BACnet devices** from pull down menu
 - List of all discovered devices displays
- 3) Drag and drop your **spaceLYnk** to **BACnet Interface**
 - IP network is displayed in System Tree
 - A pop up message informs you, that objects have to be uploaded to the database in SBO
- 4) Right click your **spaceLYnk** and then select **Upload**

Objects from your spaceLYnk are now synchronized with your SBO application.

Step 5: Setting required priority to reveal live exported values

- 1) Click your **spaceLYnk** in System Tree
- 2) Expand spaceLYnk to show the **Application** folder
- 3) Click **Application** folder
 - Sub window with list of spaceLYnk objects appears
- 4) Right click on Description to see a list of possible BACnet properties to be displayed such as priority, data type, etc.
- 5) Select the check box of properties of your BACnet object to display them



Picture 11: Uploaded BACnet objects with values

Application tab collects all exported values from spaceLYnk to BACnet. Values of BACnet objects are dynamically changed according to their current values. Live update of your spaceLYnk proves successfully established connection between SL and SBO. You can manually change values of your data to test the connection.

3.3 Building Operation WorkStation performance

spaceLynk can distribute up to 500 Objects to BACnet. Due this fact it is necessary to secure suitable response times.

Response times

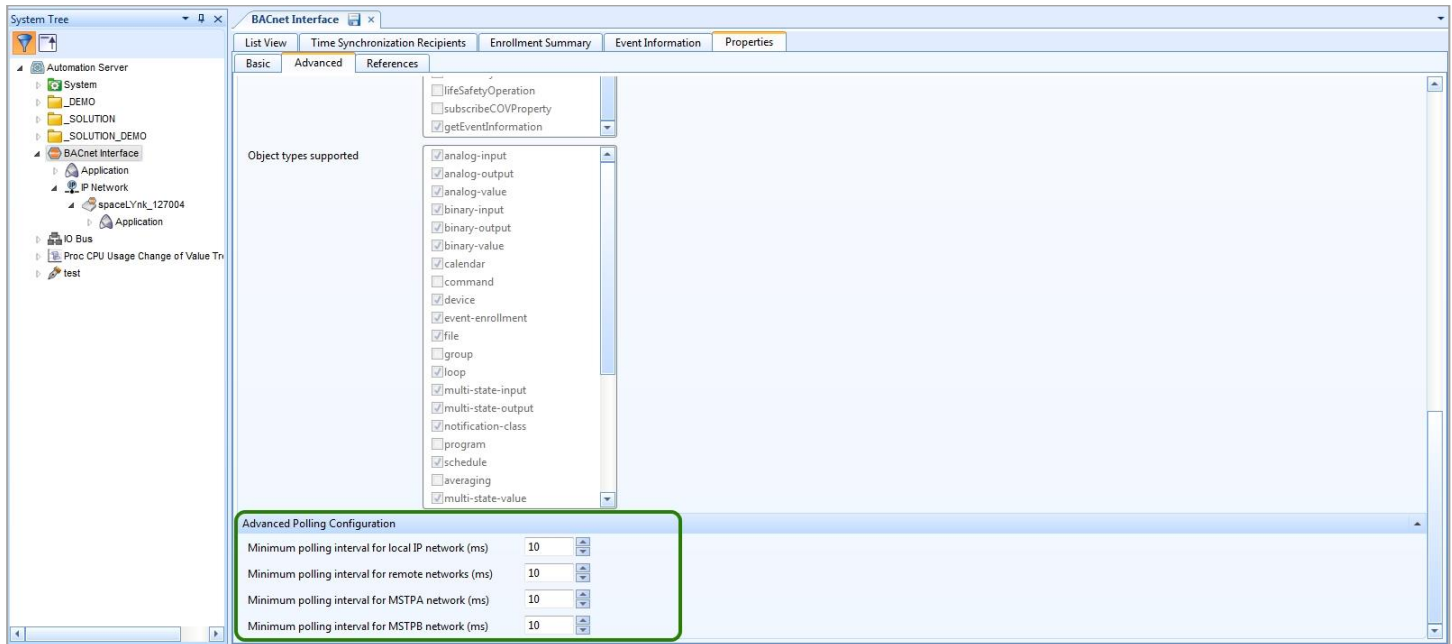
spaceLynk supports single *ReadProperty* request as well as *ReadPropertyMultiple* request. When single *ReadProperty* request increases respond time of subsequent requests *ReadPropertyMultiple* pool multiple values in a single request and make request done in a shorter time.

spaceLynk supports *COV*(Change of Value) subscriptions too. When a *COV subscription* is established between a BACnet client and server (spaceLynk) then server immediately notifies the client in case of value change.

spaceLynk supports 32 *COV subscriptions*. Building Operation automatically will use *COV* for the first 32 objects and will use pooling, via *ReadProperty* or *ReadPropertyMultiple*, for the remainder of the objects.

To achieve faster response times set minimum pooling interval.

In Building Operation go to *BACnet Interface* -> *Properties* -> *Advanced*



Picture 12: Minimum pooling interval settings

4 Conclusion

Procedures contained in this application note describe integration of spaceLYnk into a Enterprise server using BACnet. spaceLYnk functionality described in this application note brings benefits to system integrator to create robust automation system complying with international standards as well as optimization of performance between BACnet server and client.

5 Appendix

5.1 Glossary

The following table describes the acronyms and defines the specific terms used in this document.

Abbreviation	Description
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
ANSI	American National Standards Institute
BACnet	A data Communication Protocol for Building Automation and Control Networks
ISO	International Organization for Standardization protocol.
SBO	StruxureWare Building Operation

Table 4: specific terms

Schneider Electric Industries SAS

Head Office

35, rue Joseph Monier

92506 Rueil-Malmaison Cedex

FRANCE

www.schneider-electric.com