Advanced

Application note

Redundant operation mode of two spaceLYnks

Increase safety of your installation by adding secondary spaceLYnk, which overtakes the control in case of error.



Schneider Electric

Safety Information

Important Information

Read these instructions carefully before trying to install, configure, or operate this software. The following special messages may appear throughout this bulletin or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of either symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠DANGER
DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠WARNING
WARNING indicates a potentially hazardous situation which, if not avoided, can result in death or serious injury.

⚠CAUTION
CAUTION indicates a potentially hazardous situation which, if not avoided, can result in minor or moderate injury.

NOTICE
NOTICE is used to address practices not related to physical injury. The safety alert symbol shall not be used with this signal word.

Please Note

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction, installation, and operation of electrical equipment and has received safety training to recognize and avoid the hazards involved.

Safety Precautions

⚠WARNING

HAZARD OF INCORRECT INFORMATION

- Do not incorrectly configure the software, as this can lead to incorrect reports and/or data results.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.
- Consider the implications of unanticipated transmission delays or failures of communications links.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

The information provided in this documentation contains general descriptions and/or technical characteristics of the performance of the products contained herein. This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications. It is the duty of any such user or integrator to perform the appropriate and complete risk analysis, evaluation and testing of the products with respect to the relevant specific application or use thereof. Neither Schneider Electric nor any of its affiliates or subsidiaries shall be responsible or liable for misuse of the information that is contained herein. If you have any suggestions for improvements or amendments or have found errors in this publication, please notify us.

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All pertinent state, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to help ensure compliance with documented system data, only the manufacturer should perform repairs to components.

When devices are used for applications with technical safety requirements, the relevant instructions must be followed.

Failure to use Schneider Electric software or approved software with our hardware products may result in injury, harm, or improper operating results.

Failure to observe this information can result in injury or equipment damage.

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1 Introduction

This application note describes procedure how to use secondary spaceLYnk as a safety redundancy of your installation. This secondary spaceLYnk is ready to overtake all functions of the primary spaceLYnk in case of its failure. This spaceLYnk duplication can highly increase safety and reliability of your installation, what is very beneficial in safety-critical systems.

What is redundancy?

Redundancy is duplication of system component with the intention of increasing of reliability of the system. It is very often used in industry, where failure of controller can cause safety critical situation or potential damage in production line can cause enormous costs.

Benefit of redundancy

If you install spaceLYnk in environment, where any failure of system functionality is critical, you can install secondary (redundant) spaceLYnk, which highly increases the reliability of the installation.
As critical installations can be considered:

- Hospitals, fire stations – safety critical
- Industrial building – production critical (e.g. room temperature control affects the production quality).

Failure probability

If probability that spaceLYnk fails is p_1=0.01%, then two redundant spaceLYnks in the system highly decrease the probability of system failure to p=0.0001%.

Competencies

This document is intended for readers who have been trained on homeLYnk, spaceLYnk products. The integration should not be attempted by someone who is new to the installation of either product. In addition we recommend you to be familiar with the concept of KNX and Lua scripting.

System prerequisities

Software	Version	Download
spaceLYnk	2.1 and newer	http://www.schneider-electric.com

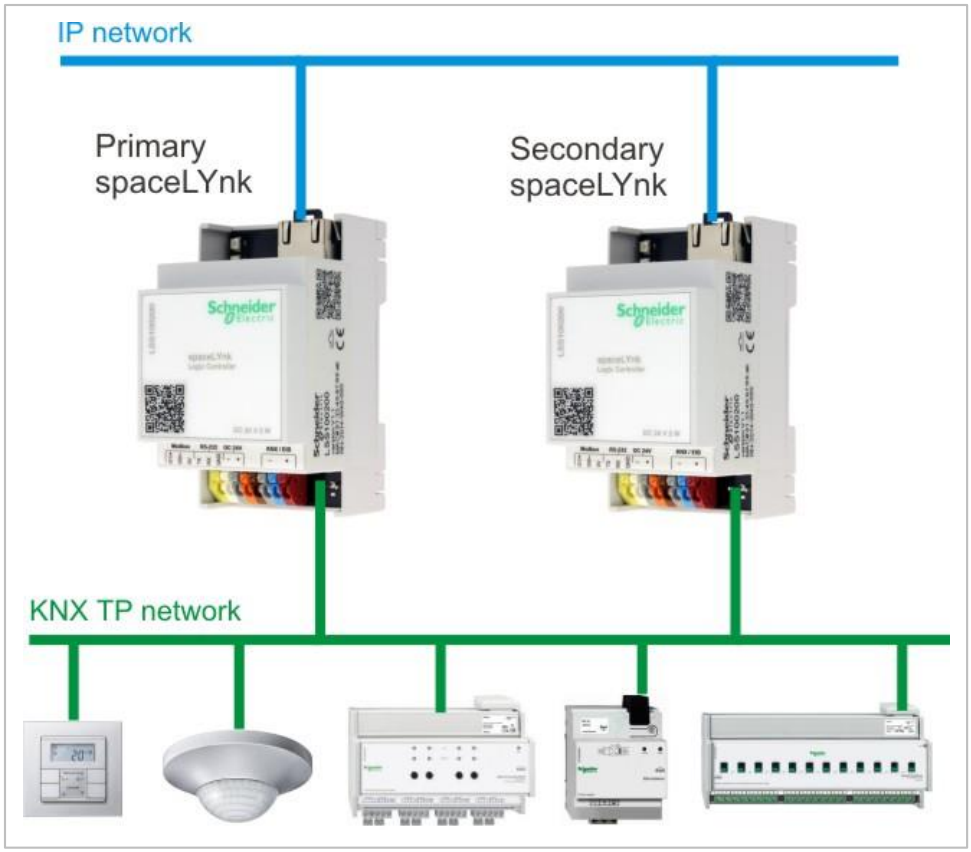
Table 1: software versions of used software

2 Design

In the Picture 1 you can see example of redundant interconnection of two spaceLYnks. Both spaceLYnks are connected to the same line of KNX network and contains the same project information (KNX objects, scripts, schedulers, ...).

It the case when primary spaceLYnk works without error, it sends KNX write command to specific KNX group address and scripts in secondary spaceLYnk will be disabled. When secondary spaceLYnk recognises that primary spaceLYnk is not sending its checking telegrams, it considers that primary spaceLYnk fails. When primary spaceLYnk fails, secondary spaceLYnk enables all its scripts and overtakes the functionality of primary spaceLYnk.

When primary spaceLYnk returns to be active again (it sends checking telegram to specific KNX group address), secondary spaceLYnk will disable all its scripts and primary spaceLYnk will continue to control the system.



Picture 1: Scheme of redundancy connection of two spaceLYnks

3 Configuration of redundancy

3.1 IP address settings

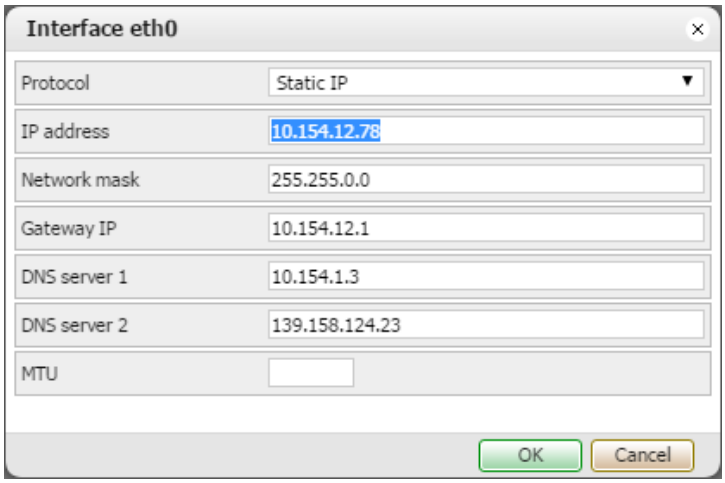
Primary and secondary spaceLYnks must have different IP address setting.

In order to change the IP address of your spaceLYnk, please follow the steps below.

Step 1 Click *Configurator >> Utilities>> System >> Network >> Interfaces*.

Step 2 Click on the selected interface from the list.

Step 3 Change the IP address of spaceLYnk.



Step 4 Click **OK**.

Step 5 Click red button **Apply changes**.



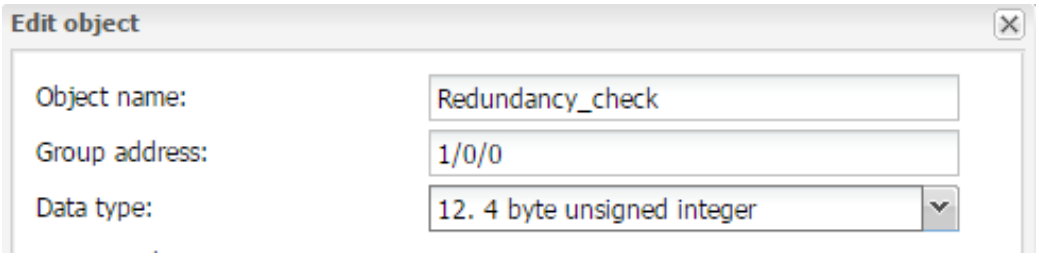
Step 6 spaceLYnk will be restarted now. IP address settings will be applied after restart.

Step 7

3.2 Primary spaceLYnk

Step 1 Create application for your primary spaceLYnk.

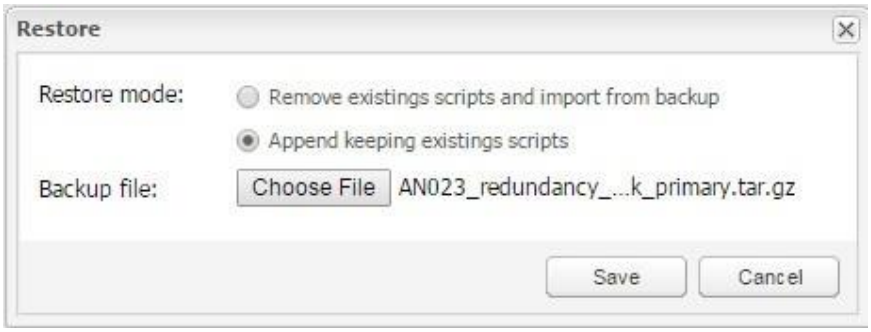
Step 2 Add new object in *Configurator >> Objects >>* ***Add new object***.



Step 3 Backup spaceLYnk project in *Configurator >> Utilities >>* ***Backup.***

Step 4 Navigate to *Configurator >> Scripting >> Tools >>* ***Restore scripts***.

Step 5 Restore script saved in file *AN023_redundancy_check_primary.tar.gz*



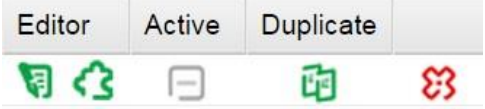
3.3 Secondary spaceLYnk

Step 1 Restore backup from primary spaceLYnk created in Chap 3.1., Step 3.
Restore button is placed in *Configurator >> Utilities >>* ***Restore.***

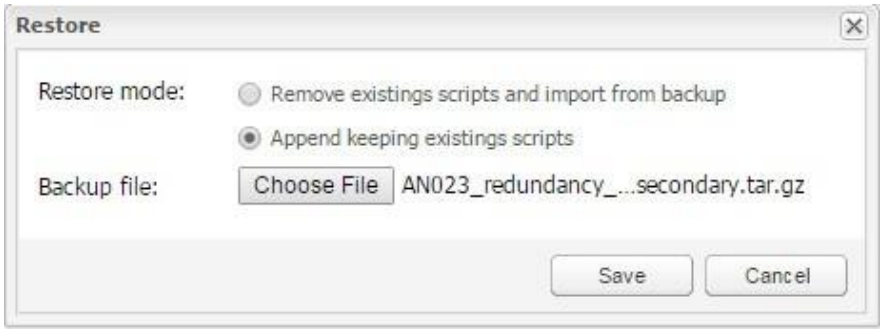
Step 2 Navigate to *Configurator >> Scripting >> Tools >>* ***Restore scripts***.
Disable all the Event-based, Resident and Scheduled scripts. You can do it clicking on the green “play” icon in the script list.



Step 3 When the script is disabled the green “play” icon turns to grey square icon.



Step 4 Restore script saved in file *AN023_redundancy_check_secondary.tar.gz*



Step 5 Navigate to *Configurator >> Scripting >> Resident.*

Step 6 Click the editor icon next to the script *AN023_redundancy_check_secondary.*



Step 7 Edit the script *AN023_redundancy_check_secondary* by adding commands for enabling/disabling of all scripts from primary spaceLYnk.

Example: If your primary spaceLYnk contains script named *Light_control*, you have edit *AN023_redundancy_check_secondary* script as below.

Resident: AN023_redundancy_check_secondary

```
1  -- current value of Redundancy_check object
2  curr = grp.getvalue('1/0/0')
3  -- previous object value or current if not set
4  prev = prev or curr
5
6  -- master timeout
7  if curr == prev then
8    -- first error
9    if not timeout then
10     alert('master offline')
11     --*****************************************************************
12     -- enable scripts here using command script.enable('scriptname')
13     script.enable('Light_control')
14
15     --*****************************************************************
16
17     timeout = true
18   end
19 -- master ok, recovered from error
20 elseif timeout then
21   alert('master online')
22   --*****************************************************************
23   -- disable scripts here using command script.disable('scriptname')
24   script.disable('Light_control')
25
26
27   --*****************************************************************
28
29
30   timeout = false
31 end
32
33 -- save previous object value
34 prev = curr
```

Step 8 Click **Save and Close.**

Step 9 You can test the functionality of redundancy now. Disconnect primary spaceLYnk from KNX network and see if secondary spaceLYnk overtakes the control. Once you connect primary spaceLYnk back to KNX network, secondary spaceLYnk disable its scripts and primary spaceLYnk is in charge.

3.4 KNX Communication settings

If you need your spaceLYnk to act as KNX line coupler, where backbone line is IP network, secondary spaceLYnk cannot fulfil this functionality. There can be only one spaceLYnk on KNX TP line, which has KNX IP features turned on.

NOTE: If two spaceLYnks on one KNX TP line have KNX features turned on, it causes multiplication of KNX telegrams. It may cause overloading of spaceLYnk CPU.

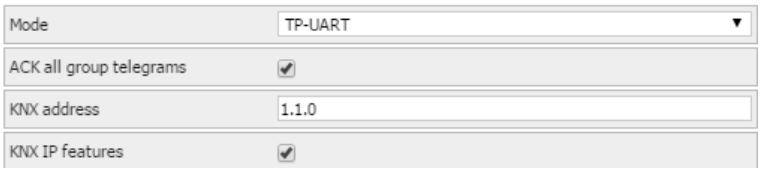
In order to avoid KNX telegram multiplication described above, please follow the settings below,

3.4.1 Primary spaceLYnk – KNX connection settings

Step 1 Click *Configurator >> Utilities>> System >> Network >> KNX connection*.

Step 2 Set **KNX address** according to your KNX TP line with the 0 at the end (e.g. 1.1.0)

Step 3 Select the option **KNX IP features**.

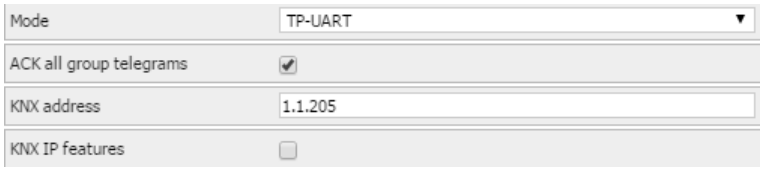


3.4.2 Secondary spaceLYnk – KNX connection settings

Step 1 Click *Configurator >> Utilities>> System >> Network >> KNX connection*.

Step 2 Set **KNX address** according to your KNX TP, but different from the primary spaceLYnk. Secondary spaceLYnk does not act as line coupler, so it does not have KNX address with 0 on the end (e.g. 1.1.205).

Step 3 Do not select the option **KNX IP features**.



NOTE: If primary spaceLYnk fails and secondary spaceLYnk overtakes the control, the line coupler functionality will be interrupted. Secondary spaceLYnk controls only the functions related to the particular KNX TP line!

4 Conclusion

How to set two spaceLYnks in redundant mode has been described in chapters above. This useful safety and reliability feature can be achieved by following steps in Chapter 3.

Pay special attention to Chapter 3.2, Step7. You have to set correctly enabling/disabling commands for all scripts from primary spaceLYnk. You can also use the script *AN023_redundancy_check_secondary* script for other more advanced function, which will be executed when the primary spaceLYnk turns on/off. You can e.g. send KNX telegram to specific group address, which will indicate the spaceLYnk in action.

5 Appendix

5.1 Reference

Document title	Reference
spaceLYnk User Guide	www.schneider-electric.com

Table 2: reference

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