lundix it SPC Bridge Control4 Network Device for Integration of Vanderbilt SPC Intrusion Detection System User Manual

SPC Bridge Control4 – User Manual
Revision 1.1

History Record

Revision	Date	Author	Comment
1.0	Nov-2017	Lumix IT	First edition
1.1	Mar-2021	Lumix IT	Generic SPC Bridge manual merged with Control4 instructions

Contents

Introduction

1.1 SPC Bridge Control4

SPC Bridge Control4 is a network device for integration of Vanderbilt SPC intrusion detection system with a Control4 system. SPC Bridge can be used with any SPC Panel that supports the Flexi protocol.

The Control4 integration allows you to use all your SPC-connected motion detectors, door/window contacts, fire detectors and alarm status for control of other devices connected to your Control4 system, e.g lights, water valves, and blinds. It has also support for arming/disarming the SPC system manually or programmatically. The integration supports Control4 security GUI version 2.

1.2 Main Features

- SPC Bridge Control4 provides SPC zone and area states/status to a Control4 system.
- Support for the area and zone commands from the Control4 system, e.g. arm/disarm, inhibit zone.
- SPC Panel Communication is based on Vanderbilt's official FlexC protocol.
- Web-based Admin GUI
- For performance reasons the SPC Bridge Control4 is recommended for maximum 128 zones and 16 areas. (Actually, the Control4 driver is designed for 512 zones and 16 areas. The actual limit depends on the use case, e.g. number of SPC events and number of motion detectors)

1.3 Hardware Specification

Processor	400MHz, 24K MIPS
Flash	16MB
RAM	64MB

Power input	9 – 12V DC
Network	2 x 10M/100M RJ45 Connectors
WiFi	802.11 b/g/n
USB	1 x USB 2.0 host connector
Type Approval	FCC Part15 Subpart B, Subpart C, CE NB, C-Tick

1.4 Terminology and Abbreviations

Term	Description
FlexC	Vanderbilt SPC Flexible Secure Communications Protocol
REST API	Representational State Transfer
API	Application Programming Interface
URL	Uniform Resource Locator
WebSocket	Two-way TCP protocol RFC 6455

2 Installation
2.1 Installation Prerequisites

- Vanderbilt SPC P with firmware >= 3.8.5
- Network router with DHCP server enabled
- The network connection between the SPC Panel, SPC Bridge and the Control4 system
- Internet access (to be able to use time synchronization via NTP)
- Vanderbilt SPC Control4 driver provided by Lundix IT
- Control4 system with firmware >= 2.10 (The driver is developed and tested under 2.10.0.542686-res)
- Control4 Composer version >= 2.10.0

2.2 Installation Steps

1. Read carefully End-User License Agreement for SPC Bridge (EULA) in last section in this document. If you do not agree to the terms of the EULA, do not install or use the SPC Bridge.
2. Connect SPC Bridge LAN port, with a regular network cable, to your network switch or router.
3. Power up the device by connecting the included power adapter to a wall socket and then to the SPC Bridge

device.

4. Wait (~2 minutes) until the SPC Bridge has fully started.

5. log in to your router and look for the IP address assigned to the SPC Bridge.

6. Open a web browser and enter the IP address of the SPC Bridge.

7. In the login window, enter Username (root) and Password (default is dragging) and you will see the main menu.

8. You can now proceed with the configuration of the Bridge in section 3 and thereafter the installation and configuration of the Control4 driver in section 0.

Configuration

SPC Bridge device is based on a standard Linux platform, OpenWrt, that is normally used for routers, therefore you will find many standard configuration options in the Web GUI. In this manual, only configuration specific for the SPC Bridge functions is described. Most of these functions are available in the main menu – SPC Bridge. For configuration of generic OpenWrt functions please see wiki.openwrt.org.

3.1 IP Address
The default will SPC Bridge use DHCP to get an IP Address. To set a static IP Address, go to Network -> Interfaces and:

1. Select LAN – Edit.

2. In Interfaces – LAN, select Static address in the Protocol option menu

3. Click on Switch Protocol

4. In Common Configuration – General Setup fill in; IPv4 address, netmask, gateway and custom DNS servers.

5. In DHCP Server – General Setup; check the checkbox Ignore interface.

6. Click on Save & Apply.

7. Redirect your browser to the new IP Address.

3.2 Time Setting
To set the correct Timezone, go to System -> System and select Timezone in the section System Properties
– General Settings.
The device is as default using NTP to synchronize time. This setting is in the System -> System section Time Synchronization.
NOTE! The device has no RTC clock. During boot, the device can have an incorrect time. Some events in the system log can therefore have incorrect timestamps.
3.3 Change Administration Password
The default administrator password for accessing the device is dragging. For security reasons, it is highly recommended to change the password as soon as possible. Go to System -> Administration section Device Password to change the password. The same password is used in both Web GUI and for ssh access to the device.

3.4 SPC Communication (Flexi)
To set up the communication link between SPC Panel and SPC Bridge you have to configure the link in both SPC Panel and SPC Bridge ends.

3.4.1 SPC Panel Flexi Settings.
Use Vanderbilt SPC Web interface and define the Flexi communication following these instructions:

1. Select Full Engineer mode

2. Create a specific user for the SPC Bridge communication, e.g spcbridge. The user profile should be Manager and you need also to define a web password for the user. (Hint: To set a web password for a new user in SPC

you need to log in as the user first, using the pin code, and go to Configuration -> Change Own Pin -> Change Web Password)

3. Select Communications -> FlexC -> Event Profiles. Click on Add to add a new event profile. Give the event profile the name SPC Bridge Events and select (check) the report checkboxes for all event types. (You may consider reducing these settings later to just necessary events for the third-party application)

4. Select Communications -> FlexC -> Command Profile. Click on Add to add a new command profile. Give the command profile the name SPC Bridge Commands and select (check) the checkbox for getting the configuration of a User. Keep the defaults for all other settings. (This step is mandatory to be able to fetch and configure the SPC users in Control4 composer)

5. Select Communications -> FlexC -> FlexC ATS. Select Add Custom ATS and change the following from the default settings: – ATS Name = SPC Bridge – Event Profile = SPC Bridge Events (created in step 3) – ATS Polling Timeout = 60 seconds – Uncheck Generate FTC and Re-queue Events

6. Select Add ATP to FlexC RCT and change following from the default settings: – SPT Account Code = 999 – RCT URL or IP Address = IP Address of the SPC Bridge – ATP Category = Cat 6 [Ethernet]

7. Open Advanced ATP Settings and change the following from the default settings: – Encryption Key Mode = Fixed Encryption – Encryption key (64 hex digits) = Your own key (must match the key in the SPC Bridge)
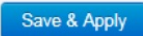
3.4.2 SPC Bridge SPC Communication Settings
In the SPC Bridge Web interface select SPC Bridge->SPC Communication and fill in the form according to:

SPC Communication

Configuration of FlexC Communication to Vanderbilt SPC Panel. It is very important that this setting corresponds with the settings in the SPC Panel.

FlexC Settings

ATP Encryption Key	encryption key
	64 hex digits (0-9, a-f, A-F)
SPC Account Code	999
RCT ID	1
RCT TCP Port	52000
SPC Username	spcbridge
SPC Password	password

Save & Apply   Save   Reset

Element	Description
ATP Encryption Key	ATP Encryption Key. 64 hex numbers (0-9, a-f, A-F). Must match the corresponding key in SPC Panel Flexi settings.
SPC Account Code	ATP Account Code. Must match the corresponding key in SPC Panel Flexi settings.
RCT ID	RCT Id. Must match the corresponding id in SPC Panel Flexi settings.
RCT TCP Port	RCT TCP Port. Must match the corresponding value in SPC Panel Flexi settings.
SPC Username and Password	Credentials for FlexC communication. User must be defined in the SPC Panel and have a corresponding web password. Valid username: max 16 characters, not including space, double quotes, backslash or tilde characters. Valid password: max 16 characters, not including space, double quotes, backslash or tilde characters. **NOTE!** Of security reason a saved password is never shown again. Just leave the field blank if you don't want to change the password.

3.5 Bridge API

The Bridge API is the interface between the SPC Bridge and the Control4 system.
To configure the interface, go to SPC Bridge -> Bridge API and fill in the form. (Please note – If you use a subnet other then 192.168.0.0 you need to change the value in Access Control List. See examples below)

API Server Settings

Port	0888

API Server IP port.
Communication on this port is encrypted.

Access Control List	+192.168.0.0/24

Access Control List allows restrictions to be put on the list of IP addresses that have access to the API server. The ACL is a comma-separated list of IP subnets, where each subnet is pre-pended by either a – or a + sign. A plus sign means allow whereas a minus sign means deny. If a subnet mask is omitted, such as -1.2.3.4, this means denying only that single IP address. Subnet masks may vary from 0 to 32, inclusive.

REST/Websockets Credentials

Credentials for accessing the API REST/Websockets services. HTTP GET method is used to QUERY the SPC for information, HTTP PUT method is used for sending COMMANDS to the SPC and Websockets are used for listening on SPC EVENTS.

Username Queries	get_user
Password Queries	••••••••
Username Commands	put_user
Password Commands	••••••••
Username Events	ws_user
Password Events	••••••

Save & Apply   Save   Reset

Element	Description
API Server Settings	
Port	API Server IP port.
Access Control List	Access Control List (ACL) allows restrictions to be put on the list of IP addresses that have access to the API server. The ACL is a comma-separated list of IP subnets, where each subnet is pre-pended by either a – or a + sign. A plus sign means allow, whereas a minus sign means deny. If a subnet mask is omitted, such as -1.2.3.4, this means denying only that single IP address. Subnet masks may vary from 0 to 32, inclusive Example: **+192.168.0.0/24** (default) Allow only all IP addresses on subnet 192.168.0.0 mask 255.255.255.0 to connect. Example: **+192.168.4.0/24** Allow only all IP addresses on subnet 192.168.4.0 mask 255.255.255.0 to connect.
REST/Websockets Credentials	
Username and Password Queries	Username and password for queries to SPC Bridge. The default username is **get_user** and password **get_pwd**.
Username and Password Commands	Username and password for commands (e.g. arm/disarm) to SPC Bridge. The default username is **put_user** and the password is **put_pwd**.
Username and Password Events	Username and password for WebSockets events from SPC Bridge. The default username is **ws_user** and the password is **ws_pwd**.

NOTE! For security reasons it is highly recommended that you set your own passwords for Queries, Commands, and Events access.

3.6 SPC Test Tool
To be sure that the communication between SPC Bridge and SPC Panel is working properly you can use the tests provided in SPC Bridge->SPC Test Tool. In the option menu you can choose between query SPC areas, zones or the system log.

SPS Query API

SPS Query API Test

This pase can be used to test the query REST API based on HTIP GET requests.

GET SPC Area Status

Query

/spc/area

JSON Reply

{"status":"success","data":{"area_status":[{"area_id":"1","area_name":"Area 1","mode":"0","partseta_enable":"1","partsetb_enable":"1","partseta_name":"Partset A","partsetb_name":"Partset B","last_set_time":"1510960112","last_set_time_spc":"23083217112017","last_set_user_id":"3","last_set_user_name":"spcsmartbox","last_unset_time":"1511122435","last_unset_time_spc":"20135519112017","last_unset_user_id":"9999","last_unset_user_name":"Engineer","last_alarm":"1510751010","last_alarm_spc":"13033015112017","internal_bells":"0","external_bells":"0"},{"area_id":"2","area_name":"Area

area ID	Area Name	Mode	Last Set	Last Unset	Last Alarm
1	Area1	Unset	2017-11-1800.08.32Spcmarthbox	2017-11-1921.55 engineer	2017-11-15.14.03.30
2	Area2	Unset		2017 -11-19.38.43 pcmarthbox	

Control4

1.1 Driver Installation

4.1.1 Basic Installation

NOTE! Be sure that the SPC Bridge is configured and working properly before you install and configure the SPC driver.

Place the SPC driver file, Vanderbilt_SPC_Panel.c4z, under your local Control4 Drivers folder. Start the Control4 Composer and:

1. Search and add the Vanderbilt SPC driver to your project (Items->Search)

2.   Refresh Composer (F5) and thereafter select the item SPC Security Panel in the project tree.

3. Enter SPC Bridge IP address and check the port number (System Design -> SPC Security Panel -> Advanced Properties -> Properties). Click Set.

4.   Enter SPC Bridge credentials for Queries, Commands and Events (Only applicable if you have changed the default credentials in SPC Bridge settings) . Click Set.

5. Click Read from panel to import the SPC partitions/areas and zones. The button is located in the right upper corner in the view System Design -> SPC Security Panel -> Properties.

6. Check that displayed items in the tab partitions and zones are matching the configuration in the SPC system.

7. Refresh Navigators (Shift + F5)

8. Configure the users according to User Settings in section 4.1.2 below.

NOTE! It can take up to 1 minute before the communication with the SPC system is established.
After successful configuration, you should add and connect appropriate "virtual" sensors to each alarm zone. The sensors are found in My Drivers section Sensors. For instance, you can use Contact Switch, Motion Sensor and Smoke Detector.
NOTE! If you change the configuration of partitions or zones in the SPC system you need to use the Read from panel button to import the changes to the Control4 system.

4.1.2 User Settings

Driver Actions	Get SPC Users		
User Settings	5 - User5		
User ID – Name	5 - User5		
User Password	••••••	Set	Cancel
User Pin Code	••••••	Set	Cancel

Of security reasons, it is not allowed to import user pin codes from the SPC Panel. Therefore, you need to manually set up the users that should be granted to use the Control4 security GUI. Follow these steps to set up the users in Control4 Composer:

1.   Select Get SPC Users in the options menu Driver Actions (System Design -> SPC Security Panel -> Advanced Properties). Click Set.

2.   In options menu User Settings select the SPC User you would like to configure. Click Set.

3. Enter User Password. This must match the pin code for the user configured in the SPC system. If the user is supplied with a web password then the web password must be entered instead. Click Set to save.

4. Enter User Pin Code. This is the pin code the user should use in Control4 GUI. It is not necessary but most convenient to set the same pin code as in the SPC system. Click Set to save.

5. Repeat step 2 to 4 for each user you would like to configure.

NOTE! If you change the settings of the users in the SPC system you need to do corresponding changes in the Control4 system.

4.2 Custom Programming
There are several variables and commands which can be used in custom programming.
NOTE! Events and variables shown in Composer that are not listed here are not supported by the driver.
NOTE! To be able to use zone input states for programming you first need to connect the zone input to a "virtual"

sensor and then use the output state of the sensor instead.

4.2.1 Device Variables

ARM_LAST_USER_ID_X
SPC user id of last user that armed partition X.
ARM_LAST_USER_NAME_X
SPC user name of last user that armed partition X.
DISARM_LAST_USER_ID_X
SPC user id of last user that disarmed partition X
DISARM_LAST_USER_NAME_X
SPC user name of last user that disarmed partition X

4.2.2 Partition Variables

ALARM_STATE
Partition has alarm state, e.g has burglary or fire alarm Possible values: false, true
ARMED_TYPE
Partition armed type/mode Possible values: Away, Home A, Home B (empty if disarmed)
AWAY_STATE
True if the partition is in Away mode Possible values: false, true
DISARMED_STATE
True if the partition is in Disarmed mode Possible values: false, true
HOME_STATE
True if the partition is in Home A or Home B mode Possible values: false, true
DISPLAY_TEXT
Last navigator message Possible values: Message or SPC Event text

IS_ACTIVE
True if partition is enabled
Possible values: false, true
OPEN _ZONE_COUNT
Shows how many zones that are open in partition
Possible values: 0 – Max number of zones (512)
PARTITION_STATE
Partition state/mode Possible values:
– DISARMED_READY = Disarmed
– ARMED = Away, Home A or Home B
– ALARM = Burglary, Fire alarm or trouble
– EXIT_DELAY = Delayed arming to mode Away
– ENTRY_DELAY = Delayed entry
DELAY_TIME_REMAINING
Remaining exit delay time when arming Away. Value only available during Away arming. Otherwise, the value is 0.
Possible values: 0 – max exit delay time
DELAY_TIME_TOTAL
Total exit delay time when arming Away. Value only available during Away arming. Otherwise the value is 0.
Possible values: 0 – max exit delay time

4.2.3 Partition Events

- Alarm
- Alarm Clear
- Disarmed
- Armed
- Partition State Changed
- Arm Status Changed

4.2.4 Partition Commands
Arm
Set arm mode of the SPC partition to Away (Fullset), Home A (Parts A) or Home B (Parts B)
Disarm
Disarm the SPC partition.
Clear All Alerts
Clear all alerts for all partitions on the SPC system.
Silence All Bells
Silence all bells for all partitions on the SPC system.
Inhibit/Deinhibit Zone
Inhibit/Deinhibit Zone commands are not supported for programmatically control. The commands are only supported for manually control from the navigator GUI.

Troubleshooting

5.1 Troubleshooting communication between SPC Panel and SPC Bridge
To troubleshoot the communication between the SPC Panel and the SPC Bridge it easiest to use the test tool in the SPC bridge. Please see section 3.6.
NOTE! No events are reported from the SPC Panel to the SPC Bridge/Control4 system if someone is logged in in Full Engineer mode.
5.2 Error logging in Control4 Composer
If you set Log level to 1 – error and Log mode to Log in the driver settings, you will be able to se a lot of information in the Lua window, that can be used for troubleshooting.
Example:
WS wss://192.168.0.107:8088/ws/spc?username=xxxx&password=xxxx disconnected while running
Wait 60000 ms for the Bridge to be ready before we setup the websocket communication.
Closing NetBinding 6119 8088
Starting Web Socket… Creating net connection to
wss://192.168.0.107:8088/ws/spc?username=xxxx&password=xxxx
WS wss://192.168.0.107:8088/ws/spc?username=xxxx&password=xxxx connected
In Control4 Director Log you can also find some helpful messages, for example when the communication with the SPC Bridge is lost:
2020-12-03 10:02:18.969 +0100 ea1-000FFF1D7749 [3577] ERROR: [Room 1–>SPC Panel(4988)] Vanderbilt SPC: 2020.12.03 10:02:18 – OFFLINE

Advanced users

6.1 Backup of Configuration Settings
In System -> Backup / Flash Firmware, section Backup /Restore, you can save a backup copy of your settings on your PC and later use it to restore the settings.
6.2 Upgrading software
In System -> Backup / Flash Firmware, section Flash new firmware image, you can upgrade the device firmware to a new version. The firmware file should have the name dragging-SPC-bridge-vX.X.X-squashfs-sysupgrade.bin. For minor upgrades, you can keep your current settings by selecting Keep settings. For major upgrades, it is preferable to not keep the settings because they can be incompatible with the new firmware.
6.3 SSH Access
The device has as default ssh access enabled. Login using username root and same password as in the Web GUI (default dragging). The settings for the SSH access can be changed in the System -> Administration, section SSH Access.

License Agreements

7.1 End-User License Agreement for SPC Bridge (EULA)

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The SPC Bridge software is based on OpenWrt, a Linux distribution that bundles lots of third-party software, under many different licenses. Source code for OpenWrt is available on **http://dev.openwrt.org**.

The most frequently used licenses are:

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7.3 Open Source Hardware

The SPC Bridge hardware is based on the open-source hardware Dragino, **http://www.dragino.com**.

The Dragino hardware design is released under the Creative Commons License, **https://creativecommons.org/licenses**/. The modular Dragino design enables rapid development cycles for commercial products.

END OF DOCUMENT

Documents / Resources

SPC Bridge Control4 - User Manual	**lundix it SPC Bridge Control4 Network Device for Integration of Vanderbilt SPC Intrusion Detection System** [pdf] User Manual SPC Bridge Control4, Network Device for Integration of Vanderbilt SPC Intrusion Detection System, SPC Bridge Control4 Network Device for Integration of Vanderbilt SPC Intrusion Detection System

References

- 🌐 **OpenWrt**
- 🌐 **Old OpenWrt Wiki [Old OpenWrt Wiki]**
- ✏ **Apache License, Version 2.0**
- 🔄 **Dragino :: Open Source WiFi, Linux Appliance**

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