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# SPC Bridge User Manual

Revision 1.0

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## History Record

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## Contents

<b>1</b>	<b>INTRODUCTION.....</b>	<b>4</b>
1.1	SPC Bridge.....	4
1.2	Features .....	4
1.3	Hardware Specification.....	4
1.4	Terminology and Abbreviations .....	4
<b>2</b>	<b>INSTALLATION.....</b>	<b>6</b>
2.1	Installation Prerequisites.....	6
2.2	Installation Steps .....	6
<b>3</b>	<b>CONFIGURATION.....</b>	<b>7</b>
3.1	IP Address .....	7
3.2	Time Setting .....	7
3.3	Change Administration Password.....	7
3.4	SPC Communication (FlexC) .....	7
3.4.1	SPC Panel FlexC Settings .....	7
3.4.2	SPC Bridge SPC Communication Settings.....	8
3.5	Bridge API .....	9
3.6	SPC Test Tool.....	10
<b>4</b>	<b>ADVANCED USERS.....</b>	<b>11</b>
4.1	Backup of Configuration Settings .....	11
4.2	Upgrading software .....	11
4.3	SSH Access .....	11
<b>5</b>	<b>LICENSE AGREEMENTS .....</b>	<b>12</b>
5.1	End-User License Agreement for SPC Bridge (EULA) .....	12
5.2	Open Source Software .....	13
5.3	Open Source Hardware.....	13

# 1 Introduction

## 1.1 SPC Bridge



SPC Bridge is a network hub for bridging Vanderbilt SPC intrusion detection system to third-party systems. The bridge converts Vanderbilt IP protocol FlexC to a REST/Websockets API that is easy to use for integration with other platforms and products. SPC Bridge can be used with any SPC panel that supports the FlexC protocol.

## 1.2 Features

- SPC Panel Communication using FlexC
- REST and Websockets API for easy integration with third-party products.
- Web based Admin GUI

## 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

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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 panel with firmware  $\geq$  3.6 (3.6 was the first version with support for FlexC)
- Network router with DHCP server enabled
- Network connection between the SPC SmartBox and the SPC panel
- Internet access (to be able to use time synchronization via NTP)

### 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. Login 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 **dragino**) and you will see the main menu.
8. You can now proceed with the configuration.

## 3 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](http://wiki.openwrt.org).

### 3.1 IP Address

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 correct Timezone, go to **System** -> **System** and select **Timezone** in section **System Properties – General Settings**.

The device is as default using NTP to synchronize time. This setting is in **System** -> **System** section **Time Synchronization**.

**NOTE!** The device has no RTC clock. During boot the device can have incorrect time. Some events in the system log can therefore have incorrect timestamps.

### 3.3 Change Administration Password

The default administration password for accessing the device is **dragino**. Of 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 (FlexC)

To setup 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 FlexC Settings.

Use **Vanderbilt SPC Web interface** and define the FlexC communication following this instructions:

1. Select Full Engineer mode
2. Create a specific user for the SPC Bridge communication, e.g **spcbridge**. User profile should be Manager and you need also to define a web password for the user.
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 -> FlexC ATS**. Select **Add Custom ATS** and change 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
5. 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]
6. Open **Advanced ATP Settings** and change 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 settings corresponds with the settings in the SPC Panel.

##### FlexC Settings

ATP Encryption Key	<input type="text" value="encryption key"/>	
	64 hex digits (0-9, a-f, A-F)	
SPC Account Code	<input type="text" value="999"/>	
RCT ID	<input type="text" value="1"/>	
RCT TCP Port	<input type="text" value="52000"/>	
SPC Username	<input type="text" value="spcbridge"/>	
SPC Password	<input type="text" value="password"/>	

Element	Description
ATP Encryption Key	ATP Encryption Key. 64 hex numbers (0-9, a-f, A-F). Must match corresponding key in SPC Panel FlexC settings.



SPC Account Code	ATP Account Code. Must match corresponding key in SPC Panel FlexC settings.
RCT ID	RCT Id. Must match corresponding id in SPC Panel FlexC settings.
RCT TCP Port	RCT TCP Port. Must match corresponding value in SPC Panel FlexC settings.
SPC Username and Password	Credentials for FlexC communication. User must be defined in the SPC Panel and have a corresponding web password.

## 3.5 Bridge API

The SPC Bridge provides a generic web service interface to the SPC panel. The main feature of this interface is to simplify SPC integration with third party applications and products such as Home and Building Automation Systems, Smartphone App's and Web applications. The API is using HTTPS and REST principles (RESTful) for queries and commands to the SPC panel and WebSockets for reporting events from the SPC panel. HTTPS GET methods are used for queries and HTTPS PUT methods for commands. The communication is always encrypted (HTTPS)

To configure the interface, go to **SPC Bridge -> Bridge API** and fill in the form.

### API Server Settings

Port

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

Access Control List

Access Control List (ACL) allows restrictions to be put on the list of IP addresses which 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, where a minus sign means deny. If a subnet mask is omitted, such as -1.2.3.4, this means to deny 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

Password Queries

Username Commands

Password Commands

Username Events

Password Events

Element	Description
<b>API Server Settings</b>	
Port	API Server IP port.
Access Control List	Access Control List (ACL) allows restrictions to be put on the list of IP addresses which 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, where a minus sign

	means deny. If a subnet mask is omitted, such as -1.2.3.4, this means to deny only that single IP address. Subnet masks may vary from 0 to 32, inclusive
<b>REST/Websockets Credentials</b>	
Username and Password Queries	Username and password for queries to SPC Bridge. 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. Default username is put_user and password put_pwd.
Username and Password Events	Username and password for websockets events from SPC Bridge. Default username is ws_user and password ws_pwd.

**NOTE!** For security reasons it is highly recommended that you set 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.

SPC Query API

#### SPC Query API Test

This page can be used to test the Query REST API based on HTTP 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 2"
      }
    ]
  }
}
```

**Example Formatted Reply**

Area ID	Area Name	Mode	Last Set	Last Unset	Last Alarm
1	Area 1	Unset	2017-11-18 00:08:32 [spcsmartbox]	2017-11-19 21:13:55 [Engineer]	2017-11-15 14:03:30
2	Area 2	Unset	-	2017-11-19 18:38:43 [spcsmartbox]	-

## 4 Advanced users

### 4.1 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.

### 4.2 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 **dragino-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.

### 4.3 SSH Access

The device has as default ssh access enabled. Login using username **root** and same password as in the Web GUI (default **dragino**). The settings for the SSH access can be changed in the **System -> Administration**, section **SSH Access**.

## 5 License Agreements

### 5.1 End-User License Agreement for SPC Bridge (EULA)

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## 5.2 Open Source Software

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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## 5.3 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.

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