

# RUCKUS IoT Controller SDK Programming Guide, 2.0.0.0

**Supporting vSZ – 5.2.0.0.699 release**

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# Preface

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## Contacting RUCKUS Customer Services and Support

The Customer Services and Support (CSS) organization is available to provide assistance to customers with active warranties on their RUCKUS products, and customers and partners with active support contracts.

For product support information and details on contacting the Support Team, go directly to the RUCKUS Support Portal using <https://support.ruckuswireless.com>, or go to <https://www.commscope.com/ruckus> and select **Support**.

### What Support Do I Need?

Technical issues are usually described in terms of priority (or severity). To determine if you need to call and open a case or access the self-service resources, use the following criteria:

- Priority 1 (P1)—Critical. Network or service is down and business is impacted. No known workaround. Go to the **Open a Case** section.
- Priority 2 (P2)—High. Network or service is impacted, but not down. Business impact may be high. Workaround may be available. Go to the **Open a Case** section.
- Priority 3 (P3)—Medium. Network or service is moderately impacted, but most business remains functional. Go to the **Self-Service Resources** section.
- Priority 4 (P4)—Low. Requests for information, product documentation, or product enhancements. Go to the **Self-Service Resources** section.

### Open a Case

When your entire network is down (P1), or severely impacted (P2), call the appropriate telephone number listed below to get help:

- Continental United States: 1-855-782-5871
- Canada: 1-855-782-5871
- Europe, Middle East, Africa, Central and South America, and Asia Pacific, toll-free numbers are available at <https://support.ruckuswireless.com/contact-us> and Live Chat is also available.
- Worldwide toll number for our support organization. Phone charges will apply: +1-650-265-0903

We suggest that you keep a physical note of the appropriate support number in case you have an entire network outage.

## Self-Service Resources

The RUCKUS Support Portal at <https://support.ruckuswireless.com> offers a number of tools to help you to research and resolve problems with your RUCKUS products, including:

- Technical Documentation—<https://support.ruckuswireless.com/documents>
- Community Forums—<https://forums.ruckuswireless.com/>
- Knowledge Base Articles—<https://support.ruckuswireless.com/answers>
- Software Downloads and Release Notes—[https://support.ruckuswireless.com/#products\\_grid](https://support.ruckuswireless.com/#products_grid)
- Security Bulletins—<https://support.ruckuswireless.com/security>

Using these resources will help you to resolve some issues, and will provide TAC with additional data from your troubleshooting analysis if you still require assistance through a support case or RMA. If you still require help, open and manage your case at [https://support.ruckuswireless.com/case\\_management](https://support.ruckuswireless.com/case_management).

## Document Feedback

RUCKUS is interested in improving its documentation and welcomes your comments and suggestions.

You can email your comments to RUCKUS at [#Ruckus-Docs@commscope.com](mailto:#Ruckus-Docs@commscope.com).

When contacting us, include the following information:

- Document title and release number
- Document part number (on the cover page)
- Page number (if appropriate)

For example:

- RUCKUS SmartZone Upgrade Guide, Release 5.0
- Part number: 800-71850-001 Rev A
- Page 7

## RUCKUS Product Documentation Resources

Visit the RUCKUS website to locate related documentation for your product and additional RUCKUS resources.

Release Notes and other user documentation are available at <https://support.ruckuswireless.com/documents>. You can locate the documentation by product or perform a text search. Access to Release Notes requires an active support contract and a RUCKUS Support Portal user account. Other technical documentation content is available without logging in to the RUCKUS Support Portal.

White papers, data sheets, and other product documentation are available at <https://www.commscope.com/ruckus>.

## Online Training Resources

To access a variety of online RUCKUS training modules, including free introductory courses to wireless networking essentials, site surveys, and products, visit the RUCKUS Training Portal at <https://commscopeuniversity.myabsorb.com/>. The registration is a two-step process described in this [video](#). You create a CommScope account and then register for, and request access for, CommScope University.

# Document Conventions

The following table lists the text conventions that are used throughout this guide.

TABLE 1 Text Conventions

Convention	Description	Example
monospace	Identifies command syntax examples	<code>device(config)# interface ethernet 1/1/6</code>
<b>bold</b>	User interface (UI) components such as screen or page names, keyboard keys, software buttons, and field names	On the <b>Start</b> menu, click <b>All Programs</b> .
<i>italics</i>	Publication titles	Refer to the <i>RUCKUS Small Cell Release Notes</i> for more information.

## Notes, Cautions, and Safety Warnings

Notes, cautions, and warning statements may be used in this document. They are listed in the order of increasing severity of potential hazards.

### NOTE

A NOTE provides a tip, guidance, or advice, emphasizes important information, or provides a reference to related information.

### ATTENTION

An ATTENTION statement indicates some information that you must read before continuing with the current action or task.



### CAUTION

A CAUTION statement alerts you to situations that can be potentially hazardous to you or cause damage to hardware, firmware, software, or data.



### DANGER

A DANGER statement indicates conditions or situations that can be potentially lethal or extremely hazardous to you. Safety labels are also attached directly to products to warn of these conditions or situations.

## Command Syntax Conventions

Bold and italic text identify command syntax components. Delimiters and operators define groupings of parameters and their logical relationships.

Convention	Description
<b>bold text</b>	Identifies command names, keywords, and command options.
<i>italic text</i>	Identifies a variable.
[ ]	Syntax components displayed within square brackets are optional. Default responses to system prompts are enclosed in square brackets.
{x  y  z}	A choice of required parameters is enclosed in curly brackets separated by vertical bars. You must select one of the options.
x y	A vertical bar separates mutually exclusive elements.
< >	Nonprinting characters, for example, passwords, are enclosed in angle brackets.
...	Repeat the previous element, for example, <i>member[member...]</i> .
\	Indicates a "soft" line break in command examples. If a backslash separates two lines of a command input, enter the entire command at the prompt without the backslash.





# What's New in This Document

## Summary of New Features in RUCKUS IoT Controller SDK Programming Guide, 2.0.0.0 Rev B

Feature	Description	Location
Editorial fix for Rev B.	-	-

## Summary of New Features in RUCKUS IoT Controller SDK Programming Guide, 2.0.0.0

Feature	Description	Location
The last update to this guide was in March 2020 Rev B, no updates in the guide till date.	-	-

**TABLE 2 Summary of New Features in RUCKUS IoT Controller SDK Programming Guide, 1.8.1.1 SR**

Feature	Description	Location
The last update to this guide was in March 2020 Rev B, no updates in the guide till date.	-	-

For the current link of RUCKUS IoT Controller SDK Programming Guide, refer to <https://support.ruckuswireless.com/documents/3520>.

**TABLE 3 Summary of New Features in RUCKUS IoT Controller SDK Programming Guide, 1.8.1.0 MR**

Feature	Description	Location
The last update to this guide was in March 2020 Rev B, no updates in the guide till date.	-	-

For the current link of RUCKUS IoT Controller SDK Programming Guide, refer to <https://support.ruckuswireless.com/documents/3520>.

**TABLE 4 Summary of New Features in RUCKUS IoT Controller SDK Programming Guide, 1.0**

Feature	Description	Location
The last update to this guide was in March 2020 Rev B, no updates in the guide till date.	-	-

For the current link of RUCKUS IoT Controller SDK Programming Guide, refer to <https://support.ruckuswireless.com/documents/3520>.



# Environment where Application was Tested

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Operating System	Ubuntu Desktop 18.04 LTS
CPU	Intel core i3
RAM	8GB
Python	3.6.8
Virtualbox	6.0



# Installing Virtualbox in Ubuntu

---

1. `$ sudo add-apt-repository multiverse && sudo apt-get update`
2. `$ sudo apt install virtualbox`
3. `$ sudo virtualbox`



# Importing OVA image in Virtualbox (only once)

---

1. Open virtualbox application and click on 'File' in the menu, then select 'Import Appliance'.
2. In the popup dialog choose the path of the OVA image and click on 'Next', and keep the default settings in the next screen and click the 'Import' button.
3. Once the importing process is completed, you can see the 'VRIOT-SDK' in the left panel of virtualbox.
4. Double click on 'VRIOT-SDK' or just select it and click on 'start' in the right panel of virtualbox to start the controller.
5. Once the controller is started you will be prompted to enter  
vriot login: (default value = admin)  
Password: (default value = Qbc@1234)
6. After successful login, you will have a "Ruckus IoT Controller - Main Menu" where you can select choice 1 (Ethernet Network) to see the IP address assigned to the controller
7. Check whether the application has started or not from the menu by selecting choice 3 (System Operation)

## Configuring Gateway

1. Login to your gateway.
2. Configure your gateway to communicate with Controller's SSL enabled MQTT broker using the command  
rkscli: set iotg-mqtt-brokerip 192.168.1.12 (your controller ip)
3. Approve your Gateway so that it is allowed to communicate with Controller using the command  
rkscli: set iotg-dongle-approved 1





# Create virtual environment for development (only once)

---

1. Install python3 and pip3

```
$ sudo apt-get -y update
$ sudo apt-get -y upgrade
$ sudo apt-get -y install python3-pip python3-venv
```
2. Open new terminal, create virtualenv

```
$ python3 -m venv py3
```
3. Create entry in .bashrc in ubuntu

```
$ echo "alias py3=' . ~/py3/bin/activate' " >> ~/.bashrc
```
4. Reload bash

```
$ source ~/.bashrc
```
5. Activate virtualenv and install rpyc package

```
$ py3
$ pip install rpyc==4.1.2
```



# Starting application testing for dev environment (everytime)

Follow the procedure to perform application testing for Dev environment

1. Get the sdkservice\_wrapper and sample application in the same directory.
2. Open new terminal and activate virtualenv  
`$ py3`
3. Run the command `cd` to change the path to our sample application directory.
4. Edit the `sample_app.py` and change the value of 'server' variable to store controller\_IP\_Address.
5. Run the following command to test the sample application  
`$ python3 sample_app.py`

**If you are creating your own application follow the below instructions.**

6. Import the SDKService class from `sdkservice_wrapper` into your application.
7. Create an instance of SDKService class with two arguments (server=controller\_IP\_Address, port=18812)  
`sdk = SDKService('controller_IP_Address', '18812')`
8. Using this 'sdk' instance you can invoke the following methods with the arguments mentioned.  
=> Arguments inside [ ] are optional

S.No	Method Signature	Description
1	<code>sdk.get_adapter ([ gateway_id ] )</code>	Use this method to get available radios for the given gateway_mac. If gateway_id is not provided you will get available radios of all the gateways configured with controller IP.
2	<code>sdk.scan (gateway_id, network_mac, scan_callback, gap_name[, uuid, scan_interval, scan_window, scan_dur] )</code>	Use this method to start scan with the given gateway and network mac, and you need to define a scan_callback to get the results
3	<code>sdk.connect (gateway_id, network_mac, dev_addr, addr_type, pass_key, auto_connect, connect_callback)</code>	Use this method to connect with given device, and you need to define a connect_callback to get the connection status
4	<code>sdk.discover_services(gateway_id, network_mac, dev_addr, conn_handle, service_callback)</code>	Use this method to discover the services of given device, and you need to define a service_callback to get the service results containing service and characteristic details.
5	<code>sdk.read_characteristic(gateway_id, network_mac, dev_addr, conn_handle, char_uuid, char_handle)</code>	Use this method to get the value of characteristic specified.
6	<code>sdk.write_characteristic(gateway_id, network_mac, dev_addr, conn_handle, char_uuid, char_handle, value, value_len, ack_flag)</code>	Use this method to set/write the value of characteristic specified.
7	<code>sdk.set_char_notif_or_indication(gateway_id, network_mac, dev_addr, conn_handle, char_uuid, char_handle, notif_flag, notif_callback)</code>	Use this method to set/reset notification/indication of characteristic specified if it supports notification/indication.
8	<code>sdk.disconnect(gateway_id, network_mac, dev_addr, conn_handle)</code>	Use this method to disconnect the given device with gateway.



# Best Practices and Troubleshooting

---

1. If you execute the sample application, provide the gateway\_id and receive a message **No gateways configured**, it might be because your gateway is not running a BLE mode. Ensure the following commands are configured on the AP to establish communication between the Ruckus IoT Controller and AP.

Disable IoT process

```
rkscli: set iotg-enable 0
```

If Gateway has i100 dongle, configure BLE mode on p2

```
rkscli: set iotg-usb-dongle-mode p2 1
```

If Gateway doesn't have i100 dongle, configure BLE mode on p1

```
rkscli: set iotg-usb-dongle-mode p1 1
```

Enable IoT process

```
rkscli: set iotg-enable 1
```

2. There is a possibility that a device was added, and post which the sample (or your custom) application was closed, or the vendor application crashed because of faulty code. In this case, if the device was already added to the AP, it will not show up in the scan result. To start afresh with this device, execute the following command

```
$ python3 delete_device.py
```

This will clear the existing Device and AP association and with a fresh scan the device will show up in the scan result.



# Return Values of Methods

---

The return values of methods are below.

## get\_adapter( )

### Return Value

On success:

```
{
  "<gateway_id>": {
    "network_macs": [
      "<network_mac>"
    ]
  }
}
```

On Failure:

```
{"message": "description of failure"}
```

## scan( )

**Return Value:** The following are returned to specified scan\_callback

On scan result:

```
{
  "<dev1_addr>": {
    "gateway_id": "<gateway_id>",
    "network_mac": "<network_mac>",
    "packet_dump": "<packet_dump>",
    "packet_type": <packet_type>,
    "dev_addr": "<dev1_addr>",
    "addr_type": <addr_type>,
    "rssi": <rssi>,
    "result": <result>
  },
  "<dev2_addr>": {
    "gateway_id": "<gateway_id>",
    "network_mac": "<network_mac>",
    "packet_dump": "<packet_dump>",
    "packet_type": <packet_type>,
    "dev_addr": "<dev2_addr>",
    "addr_type": <addr_type>,
    "rssi": <rssi>,
    "result": <result>
  }
}
```

Other cases:

```
{"message": "description of failure or scan completed or scan result empty"}
```

## Return Values of Methods

connect()

# connect()

**Return Value:** The following are returned to specified connect\_callback

On Connection:

```
{  
  "gateway_id": "<gateway_id>",  
  "network_mac": "<network_mac>",  
  "dev_addr": "<dev_addr>",  
  "conn_handle": <conn_handle>,  
  "result": <result>  
}
```

On Failure:

```
{"message": "description of connection failure"}
```

On Disconnection:

```
{"message": "device is disconnected"}
```

# discover\_services( )

**Return value:** The following are returned to specified service\_callback



On service result:

```
{
  "<service1_uuid>": {
    "gateway_id": "<gateway_id>",
    "network_mac": "<network_mac>",
    "service_details": {
      "conn_handle": <conn_handle>,
      "dev_addr": "<dev_addr>",
      "result": <result>,
      "service_handle": <service1_handle>,
      "service_uuid": "<service1_uuid>",
      "characteristics": [
        {
          "char_handle": <char1_handle>,
          "properties": <properties>,
          "char_uuid": "<char1_uuid>"
        },
        {
          "char_handle": <char2_handle>,
          "properties": <properties>,
          "char_uuid": "<char2_uuid>"
        }
      ]
    }
  },
  "<service1_uuid>": {
    "gateway_id": "<gateway_id>",
    "network_mac": "<network_mac>",
    "service_details": {
      "conn_handle": <conn_handle>,
      "dev_addr": "<dev_addr>",
      "result": <result>,
      "service_handle": <service1_handle>,
      "service_uuid": "<service1_uuid>",
      "characteristics": [
        {
          "char_handle": <char1_handle>,
          "properties": <properties>,
          "char_uuid": "<char1_uuid>"
        },
        {
          "char_handle": <char2_handle>,
          "properties": <properties>,
          "char_uuid": "<char2_uuid>"
        }
      ]
    }
  }
}
```

Other cases:{"message": "description of failure"}

## read\_characteristic( )

**Return value:**

On Success:

```
{
  "gateway_id": "<gateway_id>",
  "network_mac": "<network_mac>",
  "cmd_args": {
    "conn_handle": "<conn_handle>",
    "dev_addr": "<dev_addr>",
    "result": <result>,
    "char_handle": <char_handle>,
    "att_opcode": <att_opcode>,
    "value": "<value>"
  }
}
```

On Failure:

```
{"message": "description of failure"}
```

## Return Values of Methods

write\_characteristic()

# write\_characteristic( )

### Return value:

On Success:

```
{
  "gateway_id": "<gateway_id>",
  "network_mac": "<network_mac>",
  "cmd_args": {
    "conn_handle": "<conn_handle>",
    "dev_addr": "<dev_addr>",
    "char_handle": <char_handle>,
    "result": <result>,
    "ack_flag": <ack_flag>
  }
}
```

On Failure:

```
{"message": "description of failure"}
```

# set\_char\_notif\_or\_indication( )

**Return value:** The following are returned to specified notif\_callback

On notified data:

```
{
  "gateway_id": "<gateway_id>",
  "network_mac": "<network_mac>",
  "cmd_args": {
    "conn_handle": "<conn_handle>",
    "dev_addr": "<dev_addr>",
    "result": <result>,
    "char_handle": <char_handle>,
    "att_opcode": <att_opcode>,
    "value": "<value>"
  }
}
```

On Failure:

```
{"message": "description of connection failure"}
```



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