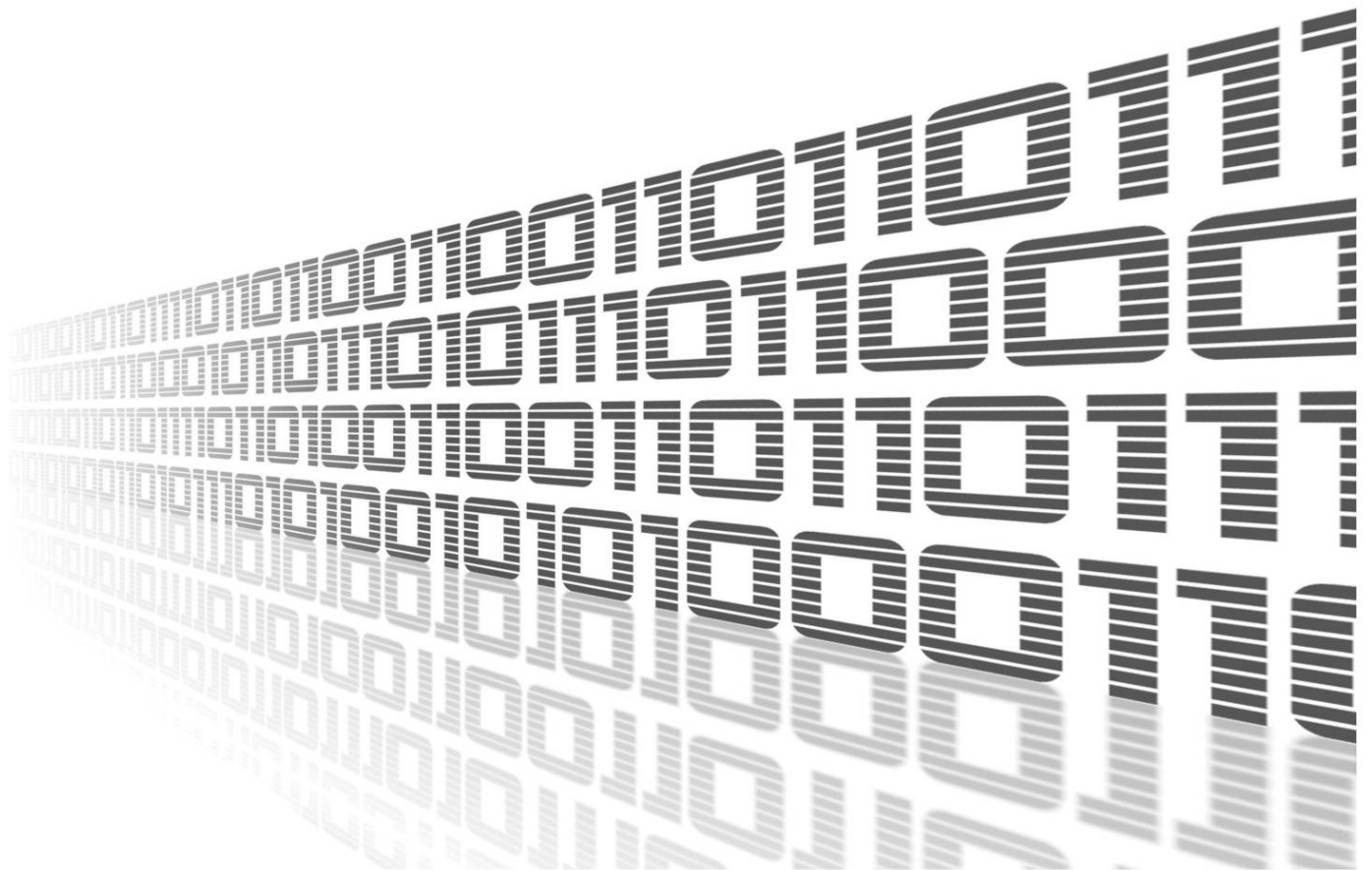


# ADVANTECH



## Azure IoT SDK Python



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# Used symbols

 *Danger* – Information regarding user safety or potential damage to the router.

 *Attention* – Problems that can arise in specific situations.

 *Information* – Useful tips or information of special interest.

 *Example* – Example of function, command or script.

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# 1. Changelog

## 1.1 Azure IoT SDK Python Changelog

### **v2017-10-09 (2017-10-24)**

- First release.

### **v2018-02-20 (2018-02-20)**

- Upgraded SDK python to version release\_2018\_02\_20.

### **v2018-02-20 (2019-01-02)**

- Added licenses information.

### **v2018-02-20 (2020-10-01)**

- Updated CSS and HTML code to match firmware 6.2.0+.
- Linked statically with OpenSSL 1.0.2u.
- Linked statically with libcurl 7.72.0.
- Linked statically with zlib 1.2.11.

### **v2018-02-20 (2020-11-12)**

- Upgraded python3 to 3.7.9.

### **v1.0.0 (2021-06-0)**

- Fixed version string.

## 2. Router App Description

### 2.1 Azure IoT

Azure IoT is Microsoft's end-to-end IoT platform. Microsoft offers products like Azure IoT Hub to easily and securely connect your IoT devices to Microsoft Azure.

### 2.2 SDK for Python

It is possible to connect the devices to Azure IoT using open source device SDKs offered by Microsoft. These SDKs support multiple operating systems, and multiple programming languages, including Python. One of them – *Azure IoT Hub Device SDK for Python* – was implemented as a standalone Router App for *Advantech* routers called *Azure IoT SDK Python*.

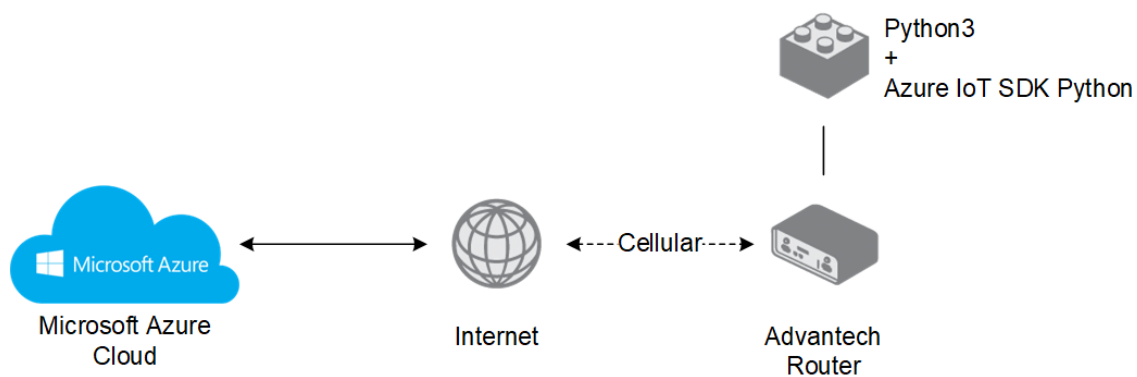


Figure 1: Router with *Python3* and *Azure IoT SDK Python* installed to connect Azure Cloud



Please note that there are two versions of this router app available, *Azure IoT SDK Python* and *Azure IoT SDK Python3 API Version 2*. The original version is still available due to the compatibility reasons and still can be used for existing implementation. *Azure IoT SDK Python version 2* was completely reworked to Python. The original version and version 2 are not compatible.

For more information, including features of the device SDK, see:

<https://github.com/Azure/azure-iot-sdk-python/tree/master/device>

Note that only "device SDK" part of the Python SDK was implemented.



More complex README file for Python SDK is available here:

<https://github.com/Azure/azure-iot-sdk-python>

SDK for deprecated version 1 is still available here:

<https://github.com/Azure/azure-iot-sdk-python/tree/v1-deprecated>



The *Azure IoT SDK Python* router app is not installed on *Advantech* routers by default. It can be downloaded from [icr.advantech.cz/user-modules](http://icr.advantech.cz/user-modules). There is dependency for *Azure IoT SDK Python* router app to be installed in the router – follow the instructions in Chapter 2.3. See the *Configuration Manual*, chapter *Customization* → *Router Apps*, for the description of how to upload a router app to the router.

### 2.3 Azure IoT SDK Python Dependency



It is necessary to install the *Python3* router app along with the *Azure IoT SDK Python* router app. *Python3* is required for *Azure IoT SDK Python* to work – it is the separated module and it can be used as a standalone *Python3* for other purposes.

User Modules			
Azure IoT SDK Python	2017-10-09 (2017-10-24)		Delete
Python3	3.5.4 (2017-08-08)		Delete
New Module	Vybrat soubor	Soubor nevybrán	Add or Update

Figure 2: Python3 and Azure IoT SDK Python router apps installed

### 3. Available Python Modules

Installing *Python3* and *Azure IoT SDK Python* offers a set of standard and common Python modules, including these:

- os
- sys
- logging
- time
- datetime
- multiprocessing
- threading
- json
- uuid
- sqlite3
- textutils
- importlib
- shell
- compression
- subprocess
- tblib
- uuid

The full list of available Python modules can be obtained by typing the following command in the router's command line interface (available via SSH):



```
python3
```

The prompt will go to Python mode starting with ">>>". Go to Python help mode by typing:



```
help()
```

Now you are in the Python help mode starting with "help>" and you can type the following command for the full list of installed Python modules:



```
modules
```

See the example of output in the next Figure:



```

help> modules

Please wait a moment while I gather a list of all available modules...

CDROM          _weakrefset    heapq           shelve
DLFCN          abc            hmac            shlex
IN             aifc           html            shutil
TYPES          antigravity     http            signal
__future__     argparse       imaplib         site
__ast__        array          imgchr          smtpd
__bisect__     ast            imp             smtpdlib
__bootlocale__ asyncio        importlib       sndhdr
__codecs__     asynchat       inspect         socket
__codecs_cn__  asyncore       io              socketserver
__codecs_hk__  atexit         ipaddress       spwd
__codecs_iso2022 audioop         itertools       sqlite3
__codecs_jp__  base64         json            sre_compile
__codecs_kr__  bdb            keyword         sre_constants
__codecs_tw__  binascii       linecache       sre_parse
__collections__ binhex          locale          ssl
__collections_abc__ bisect          logging         stat
__compat_pickle__ builtins        lzma             statistics
__compression__ bz2            macpath          string
__crypt__       cProfile       macurl2path      stringprep
__csv__         calendar       mailbox          struct
__ctypes__      cgi            mailcap          subprocess
__ctypes_test__ cgitb          marshal          sunau
__datetime__    chunk          math             symbol
__decimal__     cmath          mimetypes        symtable
__dummy_thread__ cmd            mmap             sys
__elementtree__ code           modulefinder     sysconfig
__functools__   codecs         multiprocessing   syslog
__hashlib__     cPickle        natrc            tabnanny

```

Figure 3: Example of listed available modules

### 3.1 Azure installation



Detailed information along with examples can be found here: <https://github.com/Azure/azure-iot-sdk-python>

1. Install Python3 with PIP into the router
2. Install python requirements – *Setuptools*, *azure-iot-device* (via routers CLI)

```

pip3 install setuptools
pip3 install azure-iot-device

```

3. Create a link for routers certificate:

```
ln -s /etc/ssl/certs/ca-certificates.crt /usr/ssl/cert.pem
```

(this will be permanently created) or include this line in your every Python script under `async def main()`:

```

os.environ["SSL_CERT_FILE"] = "/etc/ssl/certs/ca-certificates.crt"

async def main():
    os.environ["SSL_CERT_FILE"] = "/etc/ssl/certs/ca-certificates.crt"

```

4. Create a Azure IoT Enviroment (Azure account, Azure IoT Hub, Device provisioning centre)
5. Create device in Azure IoT Hub and copy his Primary connection String into the clipboard

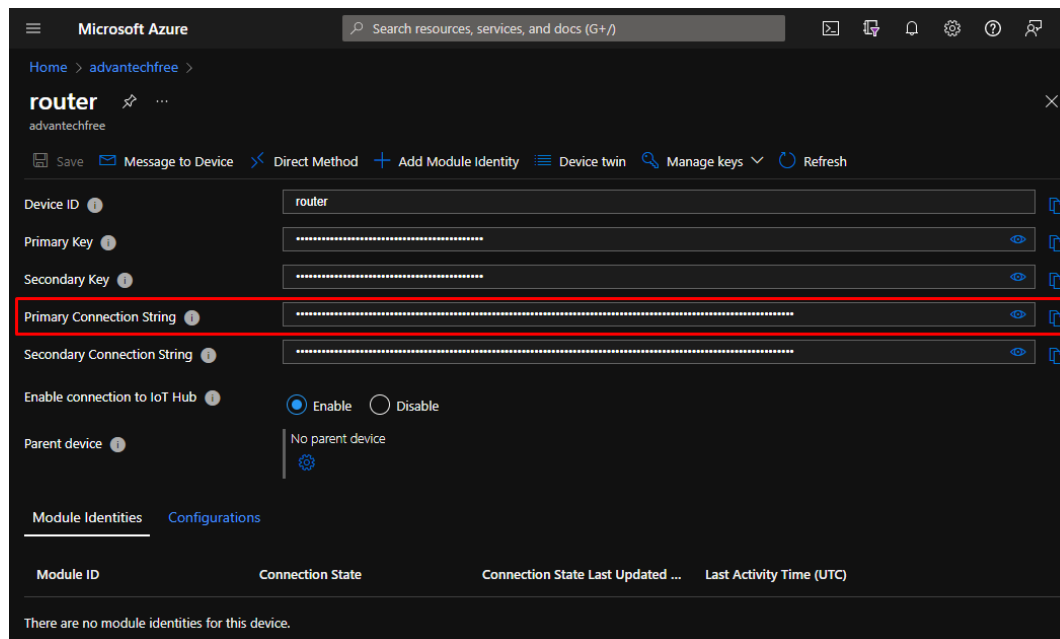


Figure 4: Primary connection string

6. Set a variable to Python environment about the device in Azure to the router CLI:

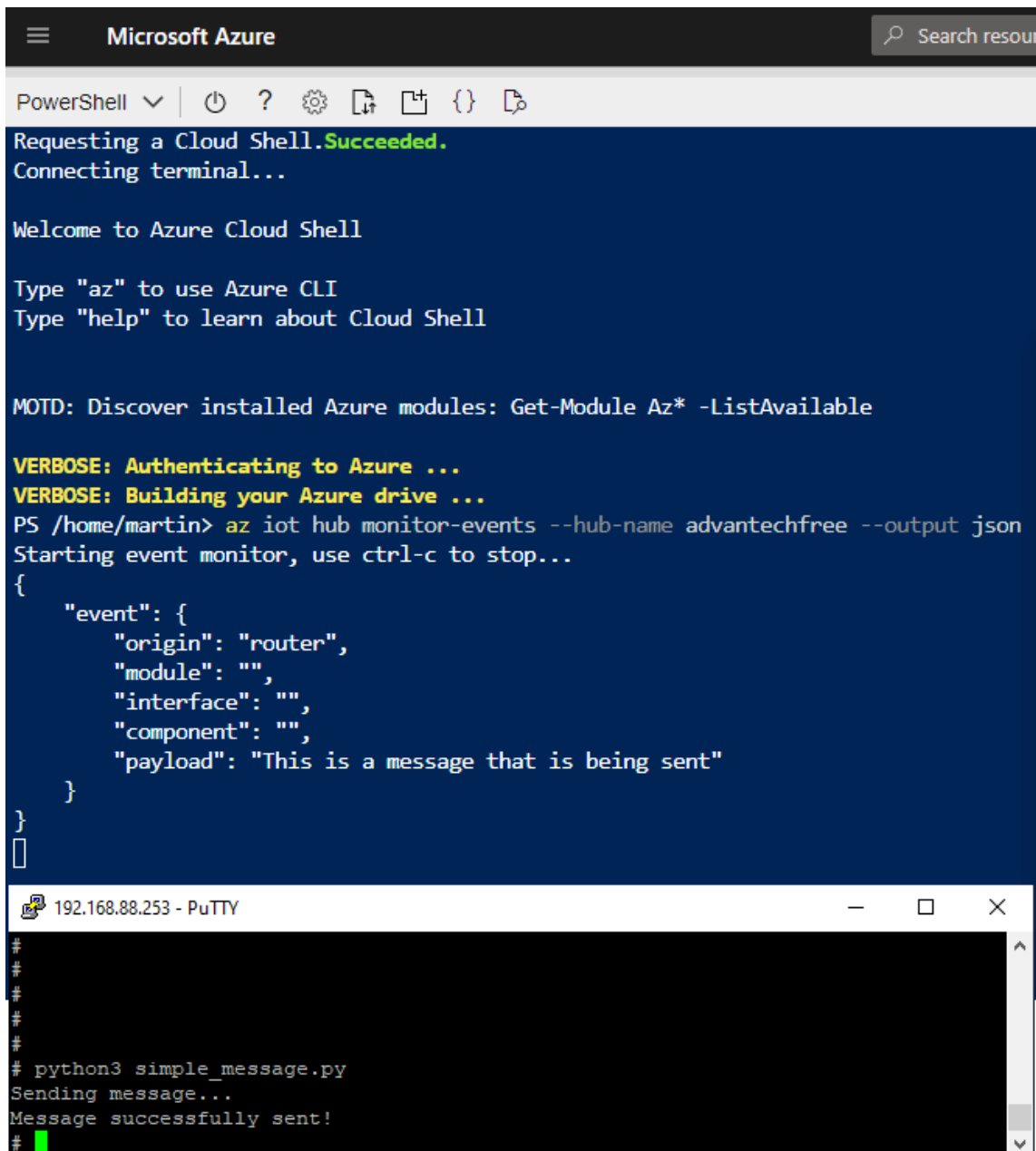
```
export IOTHUB_DEVICE_CONNECTION_STRING="PASTE_THE_CONNECTION_STRING_HERE"
# export IOTHUB_DEVICE_CONNECTION_STRING="HostName=advantechfree.azure-devices.net;DeviceId=router;SharedAccessKey=r42+GvZr8LUnGuCvlgYCBPQ5nq8JJ4Ef4eR9RhtRnPM="
```

7. Start the Azure IoT Python script:

```
# python3 simple_message.py
Sending message...
Message successfully sent!
#
```

Figure 5: Starting the script

8. You can see the information about communication in Azure Shell:



```
Microsoft Azure
Search resource

PowerShell
Requesting a Cloud Shell.Succeeded.
Connecting terminal...

Welcome to Azure Cloud Shell

Type "az" to use Azure CLI
Type "help" to learn about Cloud Shell

MOTD: Discover installed Azure modules: Get-Module Az* -ListAvailable

VERBOSE: Authenticating to Azure ...
VERBOSE: Building your Azure drive ...
PS /home/martin> az iot hub monitor-events --hub-name advantechfree --output json
Starting event monitor, use ctrl-c to stop...
{
  "event": {
    "origin": "router",
    "module": "",
    "interface": "",
    "component": "",
    "payload": "This is a message that is being sent"
  }
}

192.168.88.253 - PuTTY
#
#
#
#
#
# python3 simple_message.py
Sending message...
Message successfully sent!
#
```

Figure 6: Communication in Azure shell

## 4. Related Documents

You can obtain product-related documents on *Engineering Portal* at [icr.advantech.cz](http://icr.advantech.cz) address.

To get your router's *Quick Start Guide*, *User Manual*, *Configuration Manual*, or *Firmware* go to the [Router Models](#) page, find the required model, and switch to the *Manuals* or *Firmware* tab, respectively.

The *Router Apps* installation packages and manuals are available on the [Router Apps](#) page.

For the *Development Documents*, go to the [DevZone](#) page.