Purpose

This procedure describes how to connect a Tap (TapNLink, Tapioca, TapNPass or TapBus product) with Wi-Fi to a WAN network, and how to send data using MQTT protocol via a public MQTT Broker.

This example uses the **HiveMQ broker** (https://www.hivemq.com/). Using the IoTize tools to configure as we are showing here uses preset parameters that you can access using the **Tap Manager Starter Guide** (our in-app wizard for device configuration). This is a rapid and easy approach to get started with MQTT for data logging in our Tap devices. It is only intended for exploration and testing.

> *Note: This data logging functionality uses our Tap's embedded Java Virtual Machine (JVM) and java code that will be added to the Tap's configuration. When working with java code in IoTize Studio, you can fully configure the code to use any MQTT broker and to log data to any cloud platform. When you are ready to try a more advanced implementation of data logging, an MQTT java code example is provided in the examples in the IoTize Studio software installation.*

This same procedure works for any IoTize wireless device (a.k.a. Tap) that has Wi-Fi and the **Duetware firmware version 2.20 or later**.

> *Note: Firmware can be updated from your workspace in IoTize Cloud (https://iotize-cloud.web.app). **Connect** to the device via Bluetooth. **Login** to the device (admin : admin). Select A**dministration > Firmware update**.*

Requirements

To do this procedure, you will reconfigure your module to connect to a WAN and send data via MQTT using the HiveMQ broker. To do this you need:

- **A Tap** (TapNLink, Tapioca, TapNPass, TapBus) with Wi-Fi
- **An IoTize Cloud account** (https://iotize-cloud.web.app)
- **SSID and Key of the Wi-Fi network** that you will connect to
- **A target hardware system / component** and information about at least **one variable or register that you will configure to read data from**. This information can be imported into our software using either:
    - **ELF** format file if you are connecting to a microcontroller
    - **CSV** format Modbus Register Dictionary if you are connecting to a system/component with a Modbus port.

Note: Here you will find CSV template and instructions for creating your Modbus Register Dictionary. After you have completed this, you can do the procedure.

*Note: You do not need a **HiveMQ** account or login for this sample procedure.*

Hardware Connections

Connect your IoTize wireless device to (TapNLink, Tapioca, etc.) to a target hardware. Instructions are provided for:

- TapNLink in the TapNLink Primer Quick Start
- Tapioca for Modbus in the Tapioca Getting Started

Power the hardware. Make sure your TapNLink or Tapioca is powered.

Configure Tap Using Tap Manager from IoTizeCloud

- In your browser, go to https://iotize-cloud.web.app/
- Login
- Click **Connect to device** in the left menu.
- Select **Bluetooth > Scan**. Then select your Tap device and click **Pair**.

Note: If the Tap is already configured, do a factory reset.
Login *on the device (admin : admin). Select*
Administration > Factory Reset > Reset*. This will reset*
your Tap. The message "***Your Tap hasn't been***
***configured yet***" *is displayed. You can now use the Starter*
Guide.
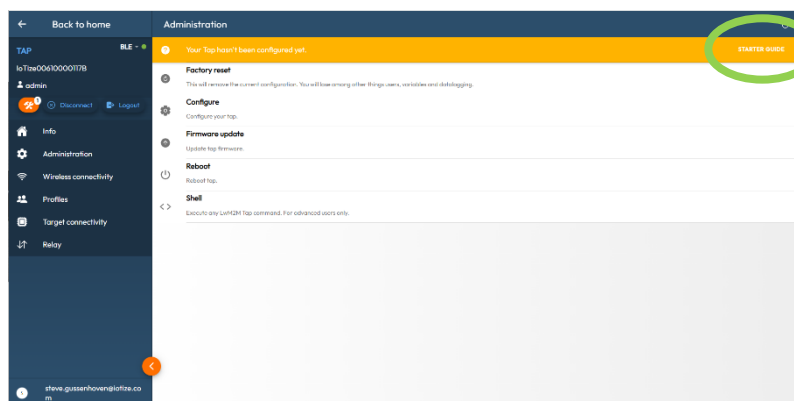
- Click on **Starter Guide**.
  This wizard will guide you through the configuration to set up the MQTT broker called HiveMQ.

- Confirm the **Tap serial number > Next**
- Select the correct **Tap model > Next**
- Confirm the **workspace association > Next**
- Give the device a **Name** and **Device Type > Next**

*Note: Device Type is used later in the HiveMQ Topics.*
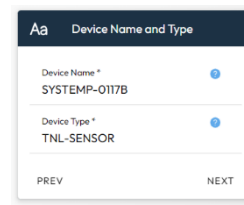
- Enter the **SSID and Key for the Wi-Fi network** the Tap will connect to **> Next**
- Select **Custom > Next**
- Click on **Select predefined MQTT broker** then select **HiveMQ > OK > Next**
- Verify that LwM2M over MQTT **Enabled is checked > Next**
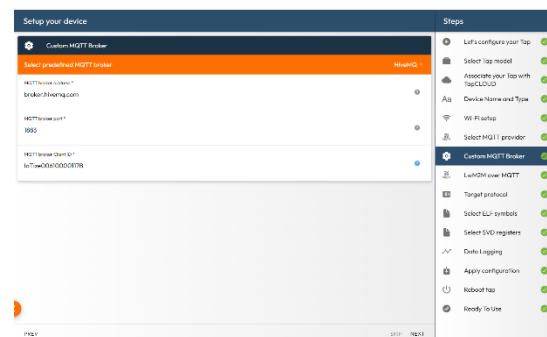
Note: For information, in the different HiveMQ Topics, the brackets will be completed with the device type and the full Tap Serial Number.

- Select the **Target Protocol** (**SWD** or **MODBUS**) depending on the hardware connection that you are using.
- Click **Select File**, to import your ELF (SWD connection) or your CSV format library of Modbus registers from your PC or phone.
- Click to **select the variables or registers** that you want to read data from **> Next**
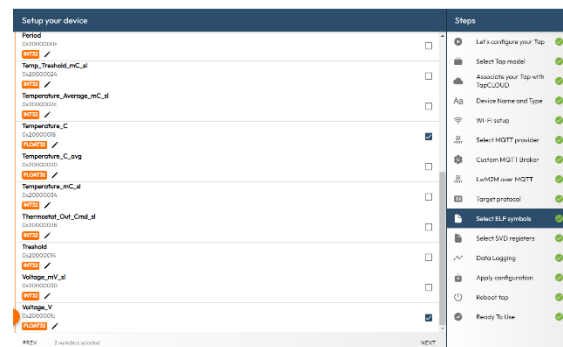
Note: for SWD you are invited to import an SVD file for registers. <u>You can do this or skip</u>. Just be sure you have at least one variable or register that the Tap will read data from.

- Click on **Enable Data Logging** for the variables / registers that you want to log data for. Set the data logging interval **> Next**
- Click on **Apply**

The configuration is sent to the Tap.

- Click on **Restart**, to reboot your Tap using the new configuration.
- Click **Let's Get Started**

The display changes to the Monitoring view. You can see the values that are being read for your selected variables/registers using the local connection (Bluetooth).
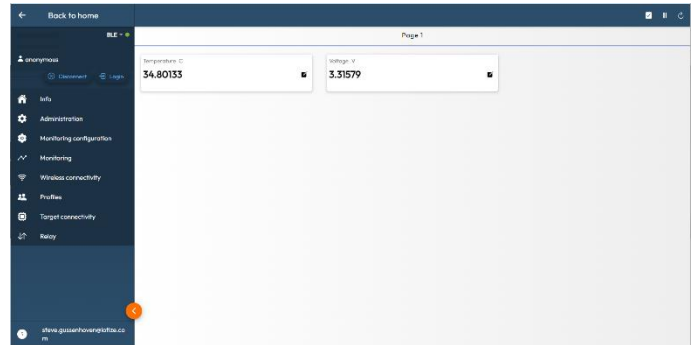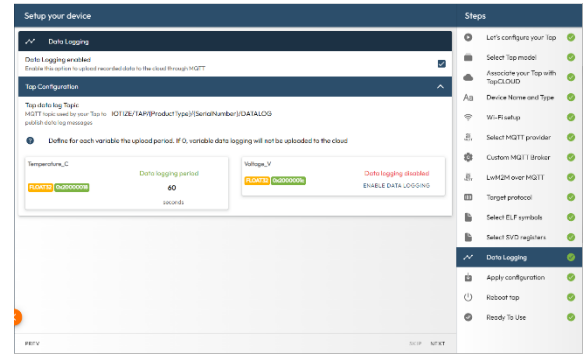
To connect using the MQTT:

- Click on **Back to home > Quit**
- On the **Tap Connection** page, select **MQTT**
- Click on Select predefined MQTT broker **> HiveMQ > OK**

*Note: **Delete the username and password.** These may be filled in by the login form autocompletion. HiveMQ does not require a login and password if you have not set it up to use one.*
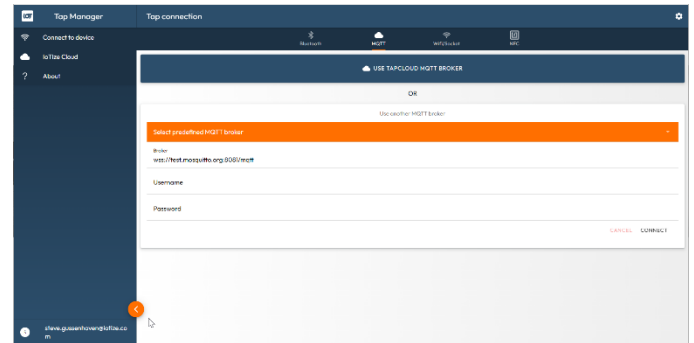
- Click on **Connect**.
- **MQTT Status topic** default should be **IOTIZE/#**. If this is not the case, click **Unsubscribe**. Type in the correct topic **IOTIZE/#**. Then click **Subscribe**.
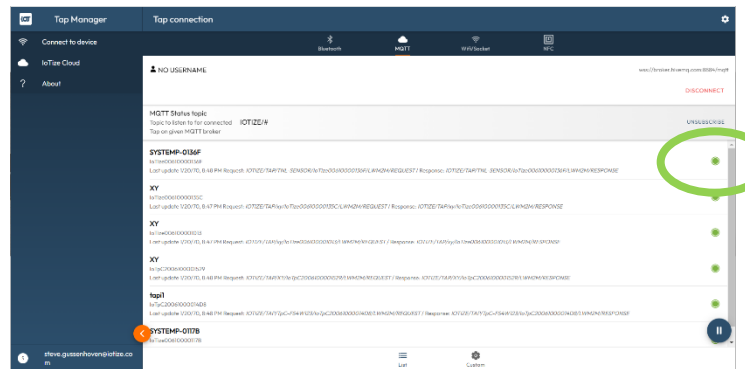
When you subscribe to this topic, you will see all of the IoTize Taps which use it. Click on the Tap that you want to connect to. This loads the Dashboard where you can see the live data.

Test Connections and View Data Logs

To view the data log sent via the MQTT broker, you will need to set up a cloud or an app to receive the data log messages.

First, **create at topic wildcard for your device(s)** such as:

IOTIZE/TAP/{Your Device Type}/{Your Device Serial Number}/#

Or...

IOTIZE/TAP/{Your Device Type}/#

For example, mine looks like this: IOTIZE/TAP/TNL-SENSOR/IoTize00610000136F/#
If you use IOTIZE/#, you will see all of the data logging messages from our park of Taps.
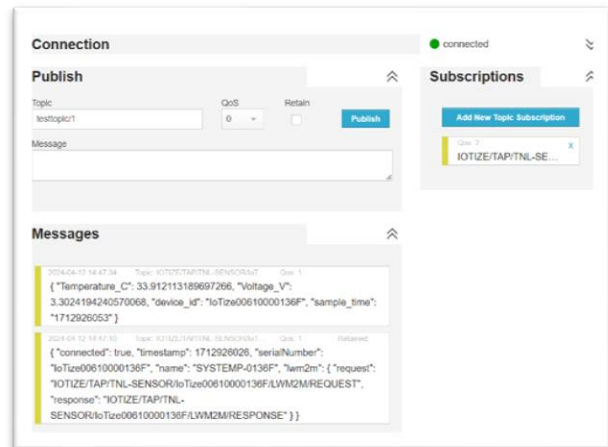
Then, you can try one of these applications to immediate results:

HiveMQ web socket client

https://www.hivemq.com/demos/websocket-client/

- Go to the link above
- Click on Connect
- Click on **Add New Topic Subscription**, enter **your topic wildcard > Subscribe**

You will see messages appear, including data logging messages.

myMQTT app

Android: https://play.google.com/store/apps/details?id=at.tripwire.mqtt.client&hl=en&gl=US
iOS: https://apps.apple.com/us/app/mymqtt/id1634425878

- Install the app
- Enter the host broker.hivemq.com
- Enter the port 1883
- Don't enter anything in Credentials
- Select Connect
- Select Subscribe
- Enter your topic wildcard > Subscribe
- Select Dashboard

The MQTT messages exchanged with your Tap are visible.

Troubleshooting Note

If there are no data logging messages, it maybe because:

- **The Tap's internal time parameter is invalid.** This happens often with reconfiguration of a Tap. To correct this, cut the power supply to the Tap device and power it back on. If this does not work check the following also:
- **The Tap has no Wi-Fi connection.** Make sure the network is available and that the Tap's Wi-Fi is enabled in its configuration.
- **The MQTT is not enabled.** Check that the MQTT relay is enabled in the Tap's configuration.