



# LoRaWAN Device Developer Kit

HXC Dev Shield

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Developer Guide

## Revision history—90002466

Revision	Date	Description
A	July 2021	Initial Digi release.

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- Firmware version
- Operating system/browser (if applicable)
- Logs (from time of reported issue)
- Trace (if possible)
- Description of issue
- Steps to reproduce

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Include the document title and part number (LoRaWAN Device Developer Kit (HXC Dev Shield) Developer Guide , 90002466 A) in the subject line of your email.

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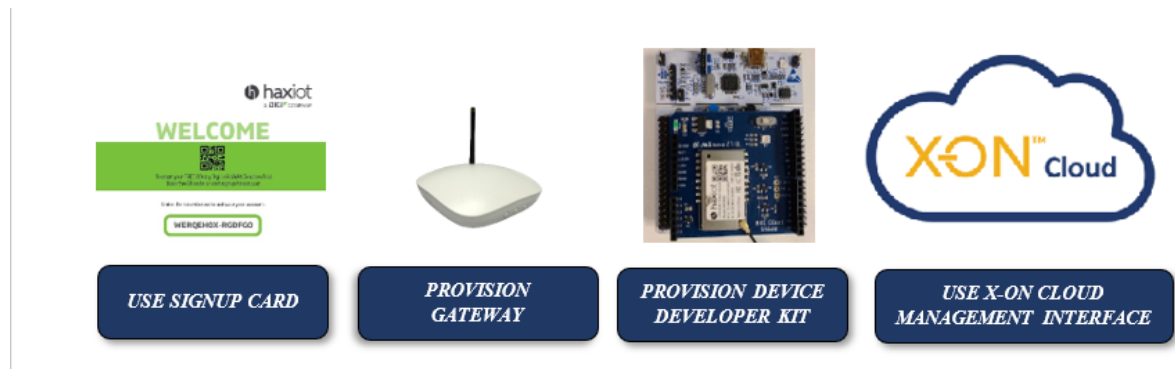
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## About the LoRaWAN Device Developer Kit

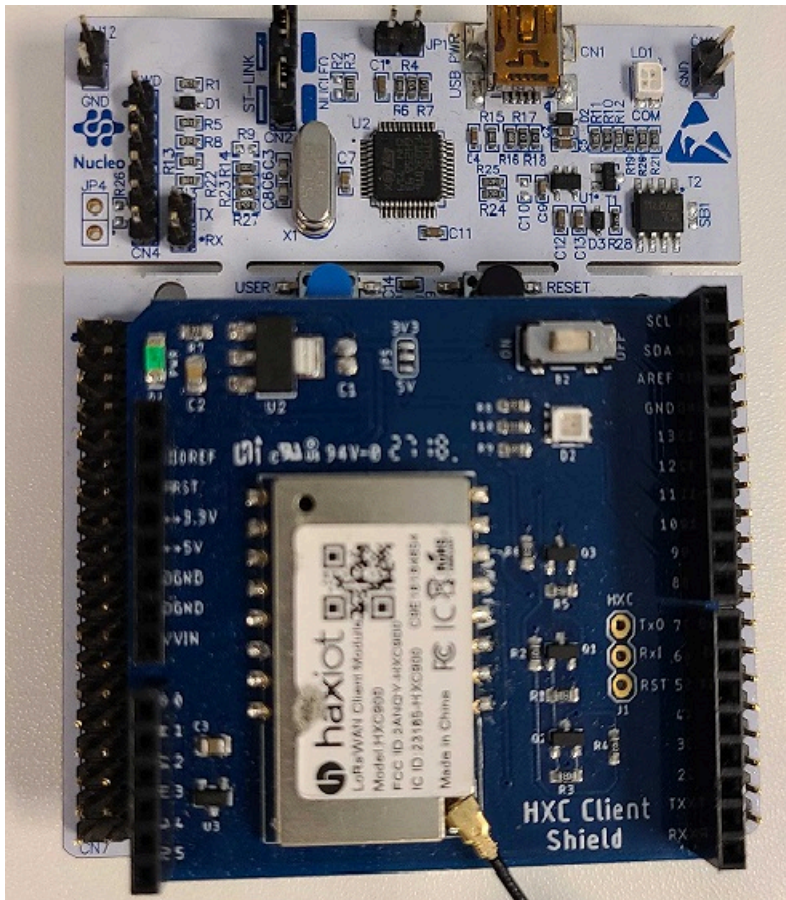
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This guide provides an over of the LoRaWAN Device Developer Kit and an introduction to the X-ON cloud IoT platform and LoRaWAN. The developer kit provides examples for sensors generated data, events trigger sends and downlink control of an actuator. The solution comes pre-configured with Haxiot Factory and Field provisioning applications for zero-touch deployment.



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## Kit contents



The LoRaWAN Device Developer Kit is configured as a Nucleo Board with an Arduino shield. It contains:

- 1x HXC900 LoRaWAN module
- 1x Digital switch
- 1x I2C LED
- 1x Analog Temperature sensor
- 1x 3 axis-accelerometer

The LoRaWAN Device Developer Kit is pre-provisioned on the Haxiot X-ON Cloud and contains an open-source evaluation application for ST Micro Nucleo developer kits to demonstrate:

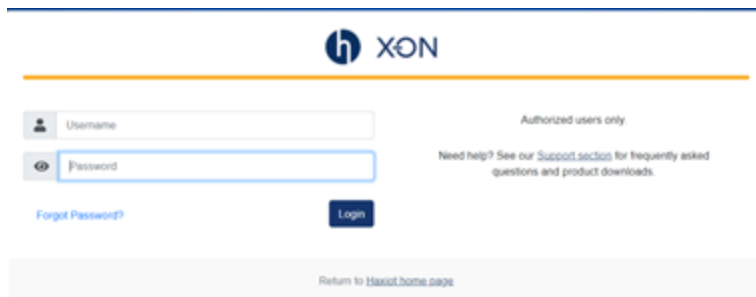
- LoRaWAN Authentication and 2-way communications
- Temperature sensor with periodic uplink reporting
- Digital switch for triggered event reporting
- Color LED for real-time device control

## System requirements

1. Haxiot X-ON Cloud account credentials username and password.
2. Mobile phone or PC with web browser and camera.
3. Internet connectivity for Gateway with Ethernet port and Ethernet cable.
4. USB 5V power adapter for powering the device.

## X-ON Cloud account

You can access the Haxiot X-ON Cloud management interface with a web browser using your account-specific username and password at <https://us1.haxiot.com>.



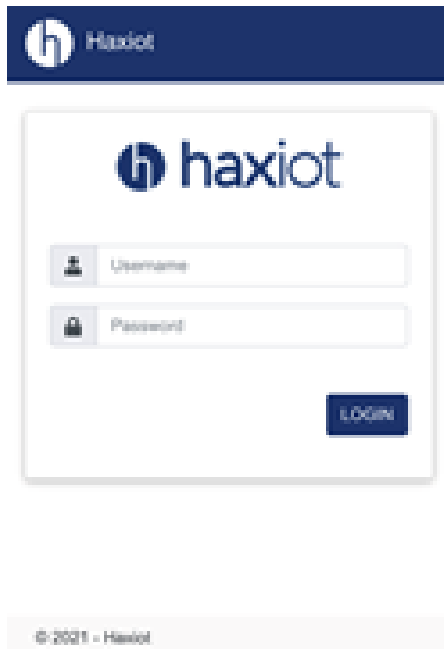
## Activation

The Gateway and Device are pre-provisioned in the Haxiot X-ON Cloud and only require activation in your X-ON cloud account using the Haxiot Cloud provisioning application at [signup.haxiot.com](https://signup.haxiot.com).

## Cloud provisioning

The Haxiot evaluation provisioning tool is a web service that works in most mobile and desktop browsers. You will need a device with internet, a camera and a web browser. Scan the code below.





<https://scan.haxiot.com>

## Gateway provisioning

1. Insert an Ethernet cable to your Gateway.
2. Make sure that you have an antenna attached to the Gateway.
3. Power on the Gateway with the 5V adapter.
4. Scan the Gateway QR code using [scan.haxiot.com](https://scan.haxiot.com). Use your X-ON credentials to log in under your account.

5. Type or edit the name for your Gateway.
6. Select **Provision**.

## Device provisioning

1. Power the device using the USB cable included.
2. Scan the Device QR code using [scan.haxiot.com](https://scan.haxiot.com). Make sure you login under the same account that you added the Gateway to.
3. Type or edit the name for your Device.
4. Select the newly created **Application** or any other existing **Application** from the drop-down list.
5. Select **Provision**.

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**Note** Several devices can be provisioned under one Application.

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Your LoRaWAN coverage and device are now fully operational. The device and the gateway are now managed through the Haxiot X-ON Cloud application.

## Evaluation embedded application

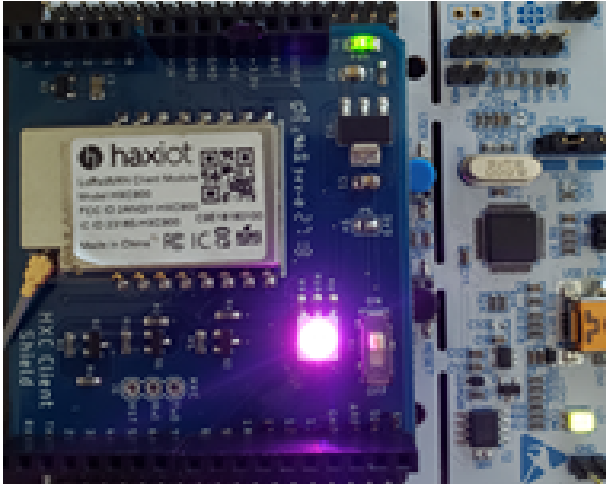
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Digi provides an evaluation embedded application that runs on the Nucleo to get started with LoRaWAN. The LoRaWAN Device Developer Kitt provides four functions as a starting point for developers:

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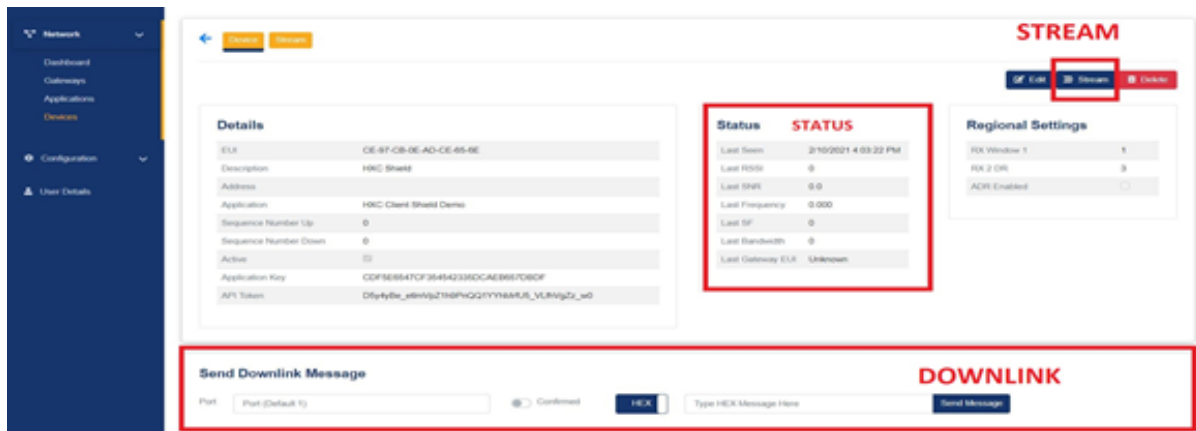
## LoRaWAN two-way communications

The device is pre-provisioned as a low-latency LoRaWAN Class C device with two-way communications. The device displays a Purple LED when it successfully authenticates after the power is switched on within range of an activated gateway.



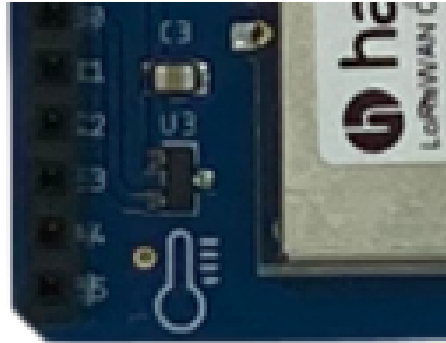
The Haxiot X-ON Cloud application allows you to confirm authentication, uplink messages and send downlink messages.

Login to <https://us1.haxiot.com> and select **Network > Devices** > [Your Application from the drop down] to see a page like the one below.



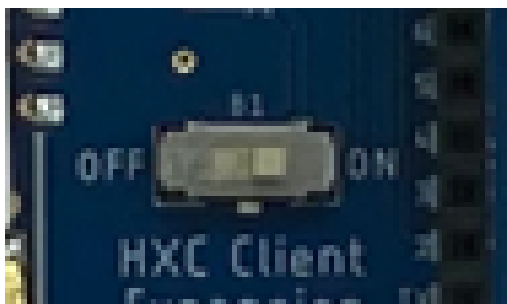
## Temperature sensor

The temperature sensor generates analog temperature data every 15 seconds. The temperature analog value is LSB bytes 2 and 3 of each message. The temperature sensor is shown with a thermometer icon on the shield.



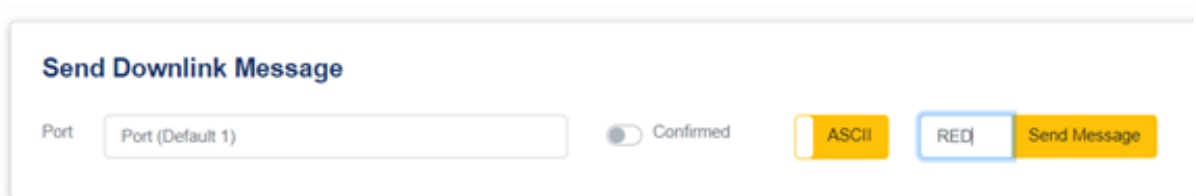
## Digital switch

toggling the digital switch triggers an automatic uplink from the device when activated. The digital switch is the last byte of the payload and will toggle between 0 and 1. The digital switch is the **OFF/ON** toggle shown below.

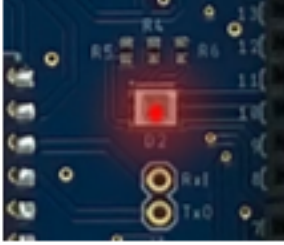


## LED lighting control

The HXC Dev Shield has a micro-processor managed color LED. The built-in application allows you to control the device wirelessly and change to predefined colors. The color commands are RED, BLUE or GREEN and can be sent from the Haxiot X-ON Cloud to the device. Use the **Send Downlink Message** web form in the X-ON web interface as shown below.



**Note** Ensure that you change HEX to ASCII for the payload type.




The LED light should change to the desired color.

## Stream packet viewer

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The X-ON Stream web interface provides a real-time packet capture to view and analyze packets. More advanced stream integrations are available with a commercial solution. The evaluation application on the client combines temperature, digital I/O and LED status in a single message. Click the blue **Stream** button to view traffic in real-time.

 **Stream - Device: F2-7D-59-A3-41-9D-C5-52**

Gateway EUI	Local Time	Frequency (MHz)	Bandwidth	RSSI	SNR	Seq #	Port	Data
0000000000000000	2021/02/11 17:08:25 PM	902.7	125	-23	7.8	160	2	7F5E20FF01
0000000000000000	2021/02/11 17:08:10 PM	902.3	125	-21	13	159	2	7F5E200001
0000000000000000	2021/02/11 17:08:55 PM	902.5	125	-29	9	158	2	7F5E200001
0000000000000000	2021/02/11 17:08:40 PM	902.1	125	-19	11.8	157	2	7F5E20FF01
0000000000000000	2021/02/11 17:08:25 PM	902.3	125	-27	10	156	2	7F5E20FF01

## Open-source STM32 Nucleo board firmware

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**CAUTION!** This is only for advanced developers.

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The evaluation application is freely available from ARM mBed and can be downloaded and modified. The firmware can be modified as per custom requirements and can be compiled on the ARM mBed platform. Successful code compilation will generate a binary file (.bin format) which can be flashed on the STM32 Nucleo board.

See [https://os.mbed.com/users/kashish\\_mbed/code/HXCClientShield/](https://os.mbed.com/users/kashish_mbed/code/HXCClientShield/).