



LoRaWAN Certification Pre-Test Service start-up guide



1. Package content

The package contains:

- IMST Lite Gateway
- Dipole antenna (suitable for EU 868 MHz ISM band)
- Power adapter
- USB-cable
- Ethernet cable



Figure 1 Pre-Testing HW-Package Contents



2. Gateway startup

Connect the dipole antenna to the RF ANT port (SMA-connector) and connect the gateway to a network with the Ethernet cable. Power it up with the power supply (use 2.5A output).



Figure 2 Connection at LoRa Lite GW (Top View)



Figure 3 Connection Ethernet cable



Figure 4 Connection RF antenna and power supply



3. User interface

Type loratesting.com to your browser (Chrome preferred) and you should see the following screen. Log in using credentials provided in a separate email and press the button “Sign in”. Use only one active session to loratesting.com at the same time.



Figure 5 Login Screen

After successful login, you get the following screen.

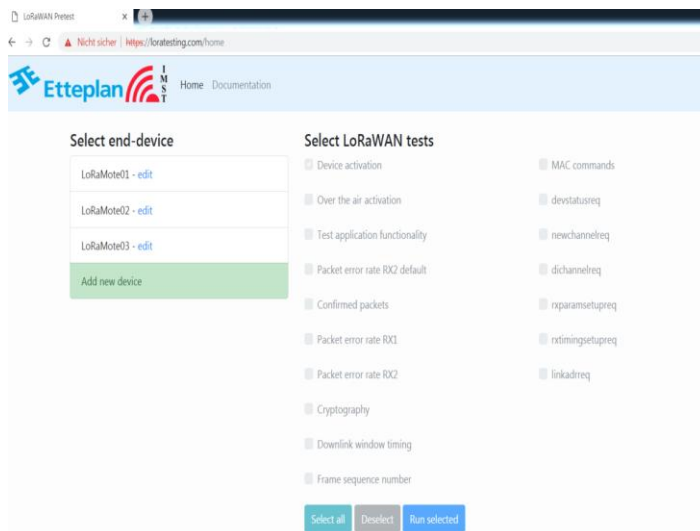


Figure 6 Successful Login



4. LoRaWAN specification version and optional feature support

Here you can select end-device and setting up test parameters. Here you can also Add new device. After clicking the button “Add new device” you get the following screen. Here you can fill in the parameters and features of your device. You can finish the changes with the button “Create/Update”

The next step is to choose which version of the LoRaWAN specification the end-device will be tested against. The activation of the end-device can be chosen to be either over the air (OTAA) or activation by personalization (ABP). If the end-device supports trigger join request –feature in LoRaWAN specification version 1.0.1 and 1.0.2, both activation methods can be selected and tested on the same run. The adaptive data rate (ADR) and (data rates) SF7BW250 and FSK50 (DR6&DR7) are optional features and can be selected depending on the end-device support. You can finish the changes with the button “Create/Update”

The screenshot shows the 'Test Parameter Set' configuration page in the Etteplan IMST web interface. The page is divided into several sections:

- Device name:** A text input field with the placeholder "Give your device a name".
- LoRaWAN version:** Radio buttons for selecting the version: 1.0.0 (selected), 1.0.1, and 1.0.2.
- Supported features:** A list of checkboxes for optional features: OTA, ABP, ADR, SF7BW250, FSK50, LINKADRREQ_BLOCK, DICHANNELREQ, and RANGE_6DB.
- Over the air activation (OTAA):** Fields for Device EUI (LSB lowercase) with value 088e336139373734, and Application key (MSB uppercase) with value 9E9D9D93CB9924A26162626C34660B5D.
- Activation by personalization (ABP):** Fields for Device address (LSB lowercase) with value 006773ae, Application key (MSB uppercase) with value 2B7E151628AED2A6ABF7158809CF4F3C, and Network key (MSB uppercase) with value 2B7E151628AED2A6ABF7158809CF4F3C.

At the bottom of the form, there are two buttons: a red "Remove" button and a blue "Create/Update" button.

Figure 7 Test Parameter Set



5. End-device parameters

The end-device parameters needed for activation and encryption should be set by using hexadecimal letters. All fields are mandatory for testing, in case only one activation method is used, replace the keys for the other one with zeros for example.

The screenshot shows the Etteplan web interface for configuring a LoRaWAN device. The header includes the Etteplan logo and the IMST logo, with navigation links for Home and Documentation. The main content area is divided into two columns. The left column contains: a text input field for 'Device name' with the value 'LoRaMote03'; a section for 'LoRaWAN version' with radio buttons for 1.0.0, 1.0.1, and 1.0.2; a section for 'Supported features' with checkboxes for OTA (checked), ABP (unchecked), ADR (checked), SF7BW250 (checked), FSK50 (checked), LINKADRREQ BLOCK (checked), DICHANNELREQ (checked), and RANGE_6DB (checked); and two buttons: 'Remove' (red) and 'Create/Update' (blue). The right column contains: a section for 'Over the air activation (OTAA)'; a text input field for 'Device EUI (LSB lowercase)' with the value '196e357531343233'; and a text input field for 'Application key (MSB uppercase)' with the value '99989E9BDF9FC4B36667616420603B4C'.

Figure 8 Device Parameter



6. Test selection

The next phase is to select which test cases will be performed for the end-device. The test case for device_ activation must always be selected due to the certification test mode is activated there. The full certification test can be done by choosing and end –device (in this case LoRaMote03) ticking all boxes and by clicking “Run selected” button.

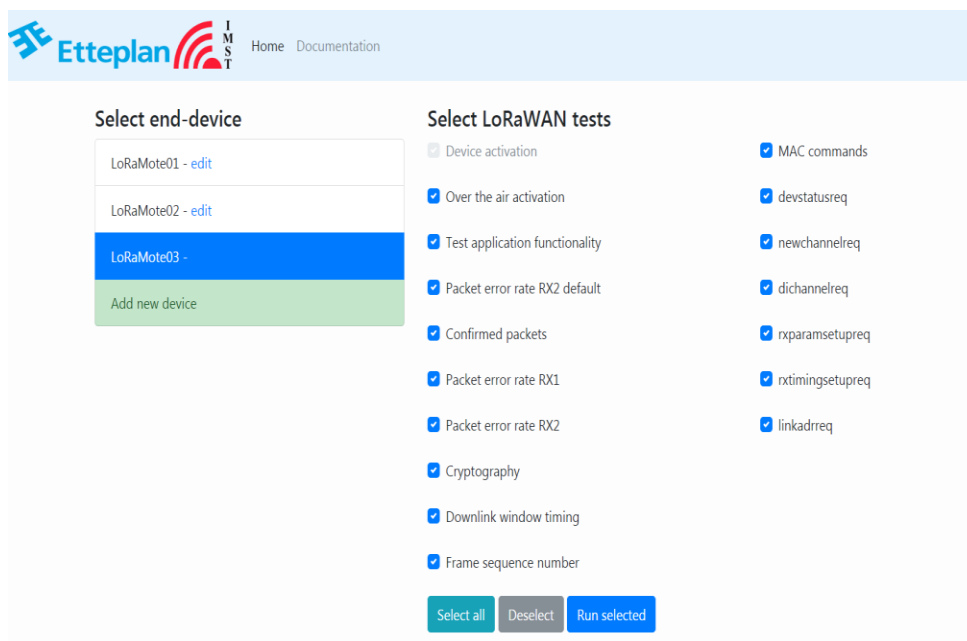


Figure 9 Test Case Selection



7. Test execution

At the beginning the screen is empty. Please click the button “Start test” for beginning with testing.



Figure 10 Test execution

The output of the test system is now showing on the screen and the test execution can be monitored in real time. At first the test server waits the gateway communication, which usually takes less than 30 seconds. Depending on the type of activation, either “Trying to activate node with personalization” or “Trying to activate node by over the air” is showing -> power up the device. The test can be stopped at any time by pressing stop tests.

```
Run LoRaWAN protocol certifications tests
=====
Device Activation & Test Application Functionality & Over The Air Activation...
=====
Device Activation & Test Application Functionality & Over The Air Activation...
=====
-> Connecting to gateway
Enter test mode
-> Trying to activate node by over the air
-> Received uplink: port=2, payload=00277f0c47009d000000000000ffff, fopts=
-> Node over-the-air activated, addr=aabbccdd
-> Unconfirmed downlink has been sent: port=224, payload=01010101, fopts=
-> Received uplink: port=224, payload=0000, fopts=
| PASS |
```

Figure 11 Test Execution

8. Test results

After the test has finished a zip-archive containing the log files (html) can be downloaded by pressing Download results.

Device: LoRaMoteU3, version:

```
-> Unconfirmed downlink has been sent: port=224, payload=044405, fopts=  
  
-> Received uplink: port=224, payload=044506, fopts=  
Test that DUT ignores frame if MAC commands in payload and options... | PASS |  
End node does not support the LoRaWAN version 1.0.1.  
-----  
Device Activation & Test Application Functionality & Over The Air ... | PASS |  
1 critical test, 1 passed, 0 failed  
1 test total, 1 passed, 0 failed  
=====
```

Start test Stop Clear Download results

Figure 12 Test Results


 results (11).zip

Figure 4 Test Results zip.file

After extraction there are following files:

- debug.log
- log.html
- output.xml
- report.html



The log.html contains all necessary information of the test execution and individual test cases can be monitored packet by packet.

Test Statistics

Total Statistics	Total	Pass	Fail	Elapsed	Pass / Fail
Critical Tests	9	9	0	00:03:03	██████████
All Tests	9	9	0	00:03:03	██████████
Statistics by Tag	Total	Pass	Fail	Elapsed	Pass / Fail
unsupported_version 1.0.1	5	5	0	00:00:00	██████████
Statistics by Suite	Total	Pass	Fail	Elapsed	Pass / Fail
Device Activation & Test Application Functionality & Over The Air Activation & Devstatusreq Mac Command & Mac Commands	9	9	0	00:03:29	██████████
Device Activation & Test Application Functionality & Over The Air Activation & Devstatusreq Mac Command & Mac Commands . Device Activation	1	1	0	00:02:49	██████████
Device Activation & Test Application Functionality & Over The Air Activation & Devstatusreq Mac Command & Mac Commands . Test Application Functionality	2	2	0	00:00:20	██████████
Device Activation & Test Application Functionality & Over The Air Activation & Devstatusreq Mac Command & Mac Commands . Over The Air Activation	4	4	0	00:00:05	██████████
Device Activation & Test Application Functionality & Over The Air Activation & Devstatusreq Mac Command & Mac Commands . Devstatusreq Mac Command	1	1	0	00:00:10	██████████
Device Activation & Test Application Functionality & Over The Air Activation & Devstatusreq Mac Command & Mac Commands . Mac Commands	1	1	0	00:00:05	██████████

Test Execution Log

```

- [SUITE] Device Activation & Test Application Functionality & Over The Air Activation & Devstatusreq Mac Command & Mac Commands
  Full Name: Device Activation & Test Application Functionality & Over The Air Activation & Devstatusreq Mac Command & Mac Commands
  LoRaWAN Version: conf_version
  Test Location: Development
  Test Software Version: 1.0.2
  Start / End / Elapsed: 20181010 17:14:38.058 / 20181010 17:18:07.409 / 00:03:29.351
  Status: 9 critical test, 9 passed, 0 failed
           9 test total, 9 passed, 0 failed

+ [SUITE] Device Activation
+ [SUITE] Test Application Functionality
+ [SUITE] Over The Air Activation
+ [SUITE] Devstatusreq Mac Command
+ [SUITE] Mac Commands
  
```

Figure 13 HTML Log-File



9. Troubleshooting

IP address is not showing on the screen of the gateway

- Check the power supply and the Ethernet connection
- If the screen is totally blank, the SD-card might be corrupted -> contact IMST, see mail address below.

The output of the test system is not showing on the screen after starting the tests

- Press stop tests, restart your browser and try to log in again

Error "Address already in use" or "Test is already running"

- The test is running on another browser or window -> close all browsers, wait 1-5 minutes and restart the test.

Error "No pull data received from the gateway"

- The gateway does not communicate with the test server -> make sure that the firewall allows outbound traffic on port 22 (SSH)

OTA-activation of the end-device fails

- Check the logs for "Join request from DevEUI: 1122334455667788" -> check that 1122334455667788 matches the DevEUI in the end-device parameters (might be reversed depending on the implementation)
- Check the AppKey

ABP-activation of the end-device fails

- Check the logs for "Uplink packet from an unknown node:11223344" -> check that 11223344 matches the ABP node address in the end-device parameters
- Check the ABP Application/Network Keys

Do not hesitate to contact contact@loratest.de for more specific instructions or troubleshooting.