



Sensor Application Conformance Test Bench: Frequently Asked Questions

Semtech

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What is the required hardware for the Conformance Test Bench?

We suggest that you purchase Raspberry Pi¹ and the ADC board from a distributor². You can find the reference design for the current sensing board, for the US, EU, and Asia regions, at <https://github.com/Lora-net/CTB/tree/master/Hardware/V2>.

The following table is a list of the Conformance Test Bench hardware components.

| Component | Description | Part Number | Key Specifications |
|--------------------------------|--|--|---|
| LoRa [®] concentrator | Pico GW Reference Design | EU - SX1308P868GW US - SX1308P915GW | SX1308, 8 channel |
| Host | Raspberry Pi 3 Model B+ | N/A | 1.4 GHz quad-core CPU, Wi-Fi, BLE, Ethernet |
| ADC (ADS1256) | RASPBERRY PI HIGH-PRECISION AD/D | 114990831 | 8 channels, 24-bit resolution |
| Current sensing board | Semtech-designed board. (See https://github.com/Lora-net/CTB/tree/master/Hardware/V2 for the reference design) | N/A (Reference design) | 3 gain levels, ranging from 1 uA to >200 mA |

Which gateways can I use for Conformance Test Bench?

You need to include a gateway in your deployment. You can use any LoRaWAN[®]-based gateway that supports the Semtech UDP packet forwarder. For more information, see the [Gateway Packet Forwarder](#) documentation.

The gateway can be a USB-connected Pico gateway collocated with the test bench host, or any gateway connected to the host with a valid Ethernet connection.

How do I download the software for Conformance Test Bench?

To download the open-source software, visit <https://github.com/Lora-net/CTB>.

¹ We used and tested Raspberry Pi 3 Model B+. This Test Bench has not been tested using Raspberry Pi 4.

²To purchase hardware, visit:

- <https://www.digikey.com/product-detail/en/raspberry-pi/RASPBERRY-PI-3-MODEL-B/1690-1025-ND/8571724>
- <https://www.digikey.com/products/en/development-boards-kits-programmers/evaluation-boards-expansion-boards-daughter-cards/797?k=ads1256>
- <https://www.mouser.com/ProductDetail/Seeed-Studio/114990584?qs=sGAEpiMZZMuG6%2FXKM6MUaTgGSBiEss%2FvTYhppelpMAY%3D>,
<https://www.mouser.com/ProductDetail/Seeed-Studio/114990831?qs=sGAEpiMZZMvCVB2zOvcJCcglimtwphlgOAmxAZmPDhIRkYhyqce0g%3D%3D>

[For information on installing and setting up the software, see the Set Up the Software section of the Sensor Application Conformance Test Bench User Guide.](#)

What network server can I use for the Conformance Test Bench?

While we tested using The Things Network (TTN)³, the Conformance Test Bench is designed to work with all network servers that support the Semtech packet forwarder.

How should I configure the network server for the Conformance Test Bench?

On the network server, provision the gateway. To provision your gateway, to work with The Things Network, follow the instructions here:

<https://www.thethingsnetwork.org/docs/gateways/registration.html>.

Next, provision the device under test (DUT). To provision your device to work with The Things Network, follow the instructions here: <https://www.thethingsnetwork.org/docs/devices/registration.html>.

Note: Make sure that you are using the same Gateway ID, DevEUI and AppKey data in both the Test Bench configuration files and on the network server

Where are the configurations stored?

Two configuration files are available. Both are required.

The Pico gateway configuration JSON is available at:

```
/home/pi/loranet/picoGW_packet_forwarder/loranet_pkt_fwd/global_conf.json.
```

Note: The location of the required files for an external gateway is beyond the scope of this document.

The test bench configuration file is available at:

```
/home/pi/lorawan-conformance-testbench/config.json.
```

For more information, see the Configure Local Files section of the [Sensor Application Conformance Test Bench User Guide](#).

³<https://www.thethingsnetwork.org/>

How do I validate that the gateway is receiving packets and forwarding them to the Conformance Test Bench host?

First, make sure that a LoRa-based device is transmitting within the coverage area of the gateway. It can be a device trying to join the network near the gateway which is being used in the test bench. Next, visit the URL where the IP is the test bench host IP. For example, visit <http://IP/packet/last/100/log>. A detailed log of the last 100 packets sent to and from the test bench (both uplinks and downlinks) will appear.

- If packets are being received, the gateway is working properly and the communication between the gateway and the test bench host is good.
- If no packets appear, the gateway is not working correctly, or the communication status is not valid.

How do I debug my gateway?

External Gateway

- Make sure that the gateway is running in the [Semtech UDP packet-forwarder](#) mode. For information on how the packet forwarder works, see the [Lora Network Packet Forwarder](#) project documentation in GitHub.
- Make sure that the network server address on the gateway is the test bench IP address.
- Make sure that the network server ports in the gateway are the same as the **packet_forwarder** port in the configuration file, as described in the User Guide.

Internal Gateway

- SSH into the test bench host and check the packet forwarder configurations in the following file:

```
/home/pi/lora-net/picoGW_packet_forwarder/lora_pkt_fwd/global_conf.json
```

- Double-check the **server_address**, **serv_port_up** and **serv_port_down** fields.

Note: Here, the server address is the test bench host address, which should be **localhost**. The **serv_port_up** and **serv_port_down** ports are the packet forwarder ports in test bench configurations.

- Check the configuration at

```
/home/pi/lorawan-conformance-testbench/config.json
```

- Make sure that the **use_internal_gateway** field is set to 1, and the **packet_forwarder** port matches the configured port number in the pico gateway **global_config.json** file.
- Try to run the packet forwarder directly:
 1. Stop the test bench in the test bench host SSH console by entering **sudo systemctl**.
 2. Run the packet forwarder by entering this commands in the SSH console:

```
cd /home/pi/lora-net/picoGW_packet_forwarder/lora_pkt_fwd/  
./lora_pkt_fwd
```

3. The packet forwarder output or error message should appear on the screen, as applicable.

Can I view and save the log from the Conformance Test Bench?

Yes. To view the log from the test bench:

1. From the test bench SSH, stop the test bench by entering:

```
sudo systemctl stop test bench
```

2. Move to the test bench root folder by entering

```
cd pi/lorawan-conformance-test bench
```

3. Run the test bench on the screen (rather than in the background, as happens by default). To do this enter:

```
sudo python3 start.py
```

The following information should appear:

- Current sensing sub-system log, for example: "Power meter: 700 points saved."
- Packet flow to or from the proxy, for example: "6 controller -> proxy," "4 NS -> proxy," or "0 Packetforwarder -> proxy."
- Decoded packet information in JSON (all physical and MAC layer information should appear).

- Web interface information should appear if any I/O operations are using the HTTP-based API.

To save the log from the test bench, run the command with output direct to a log file:

```
sudo python3 start.py > log.txt
```



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