



**TEKTELIC COMMUNICATIONS INC.**

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**CREATING YOUR FIRST NETWORK  
USING TEKTELIC NETWORK SERVER  
NETWORK SERVER RELEASE VERSION 2.0.1**

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DOCUMENT VERSION: 1.1

PRODUCT NAME: TEKTELIC NETWORK SERVER



## Revision History

Version	Date	Status	Editor	Comments
1.0	March 15, 2019	Draft	JP	Document Created
1.1	April 30, 2019	For Release	JP	Updated to include more detail on the ThingBoard Process. Updated "host" on NS Integration

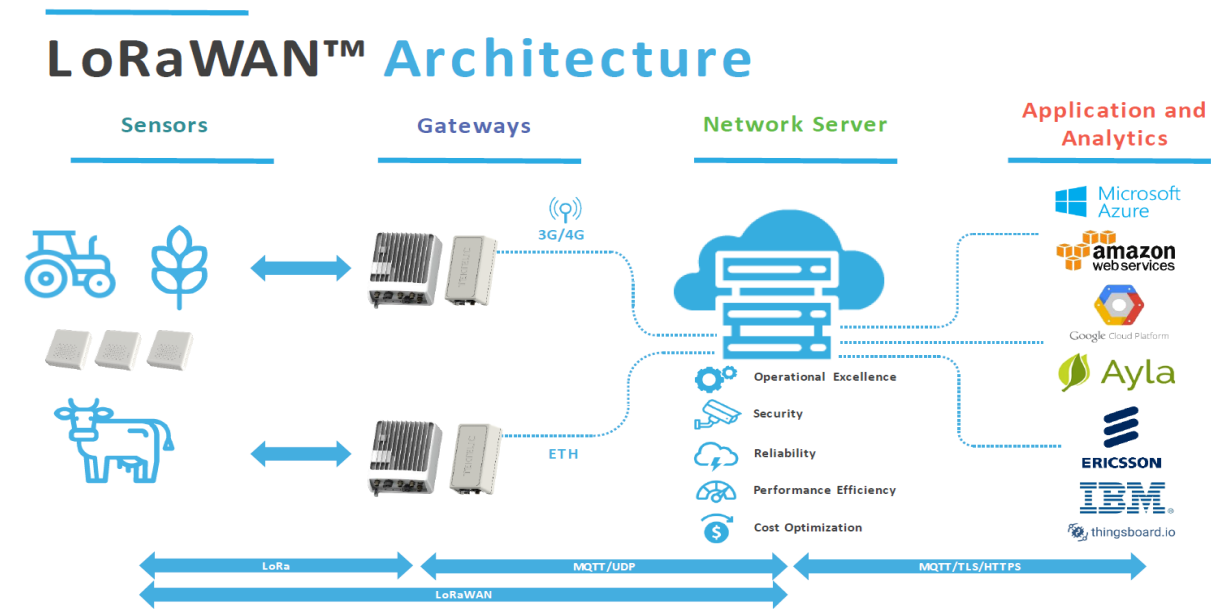


# 1 Definitions

- 1.1.1 **Application (Devices) – Grouping of devices on the network server. Not to be confused with the end use application or Application Platform.**
- 1.1.2 **Application (Platform)– end use application that interprets the data from your devices. For example, ThingsBoard**
- 1.1.3 **Data Converter – Bidirectional entity that translates the dense binary payload of the LORAWAN device to JSON payloads for messages. Used to facilitate the integration.**
- 1.1.4 **Device: Device represents a sensor or other end-device as per LoRaWAN. Supported devices are class A, B and C devices as per LoRaWAN specification.**
- 1.1.5 **Gateway - Gateway receives data from physical devices and forwards it to the network server. Gateway is always registered in the NS and belongs to only one Customer.**
- 1.1.6 **Gateway (ThingsBoard) – ThingsBoard refers to a virtual device created on the platform to handle the exchange of data between the Network Server and ThingsBoard as a gateway.**
- 1.1.7 **Integrations – the link to the end use (application platform). It is valid to have multiple integrations for the same group (application of devices)**

## 2 Introduction

The TEKTELIC network server is an integral component of LoRaWAN™ Architecture, which grants and protects access to the LoRaWAN™ network. It provides both an uplink and downlink interface between end-devices and the application layer, and facilitates secure data transport from gateways to application. The diagram below illustrates the role of the Network Server.



Every new TEKTELIC customer is provided a 3-month free trial for the network server. Access can be requested either at the time of product purchase, or by creating a ticket through our customer support portal. If you do not have access to the Tektelic support portal you can sign up at <https://support.tektelic.com/portal/home>.

Once logged into your support portal account please create a ticket and request access to the Tektelic Network server. A member of our team will create a demo account on the Network Server. When this account is created you will be sent an email with a link to login.

## Your Tektelic LoRaWAN NS account has been activated

Congratulations! Your Tektelic LoRaWAN NS account has been activated.

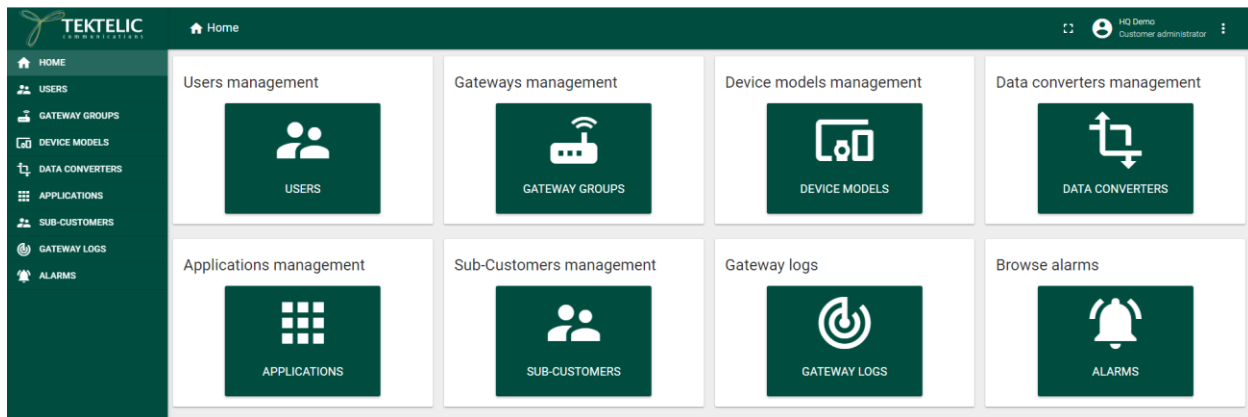
Now you can login to your Tektelic LoRaWAN NS space.

Login

— The Tektelic LoRaWAN NS

### 3 User Interface

Generally, you will be provided a Customer Administrator account. The NS home page for a Customer Administrator displays the following options: Users, Gateway Groups, Device Models, Data Converters, Applications, Sub-Customers, Gateway Logs, and Alarms. Note that these items are also displayed on the left-hand menu for easy access at any time.



**Users:** Use this function to create new user accounts for your network. You can create 4 different account types depending on the amount of access required.

- Customer Administrator – This level of access is able to:
  - 1) Manage own devices.
  - 2) Create and manage applications.
  - 3) Create and manage sub-customers.
  - 4) Assign Applications or individual devices to a Sub-customer
- Customer User – Read Only access to Customer level.
- Sub Customer Administrator- this level of access is able to:
  - 1) Manage own devices.
  - 2) Create and manage applications.
- Sub customer User – Read only access to Sub Customer level.

**Gateway Groups:** Navigate here to add/delete a gateway change setting.

**Device Models:** This is where you can edit the types of devices you want to use on your network. Supported devices are class A, B and C devices as per LoRaWAN specification.

**Data Converters:** Add, delete or modify a data converter

**Applications:** this refers to device application (grouping of devices) not to application Platform. Navigate here to create device application and add/manage devices.

**Sub-Customers:** Add, delete or modify sub customer settings.

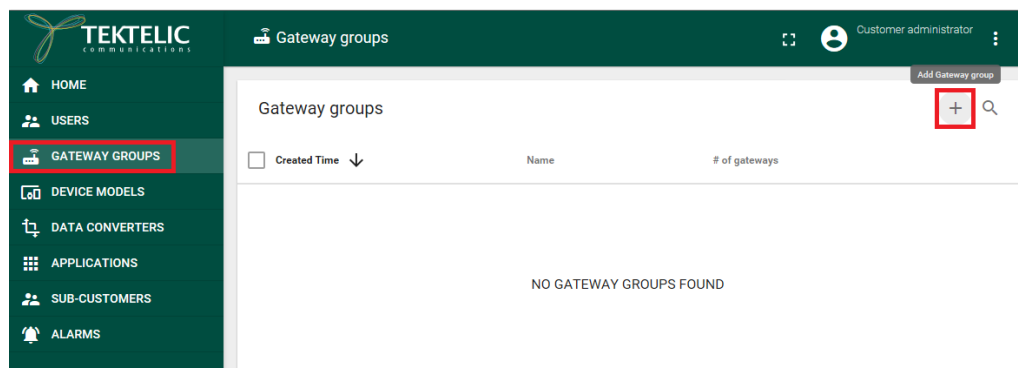
**Gateway Logs:** View gateway statistics, alarm events, RPC command/responses, configuration updates join requests and data up/down logs.

**Alarms:** Review recent or current alarms. These can include

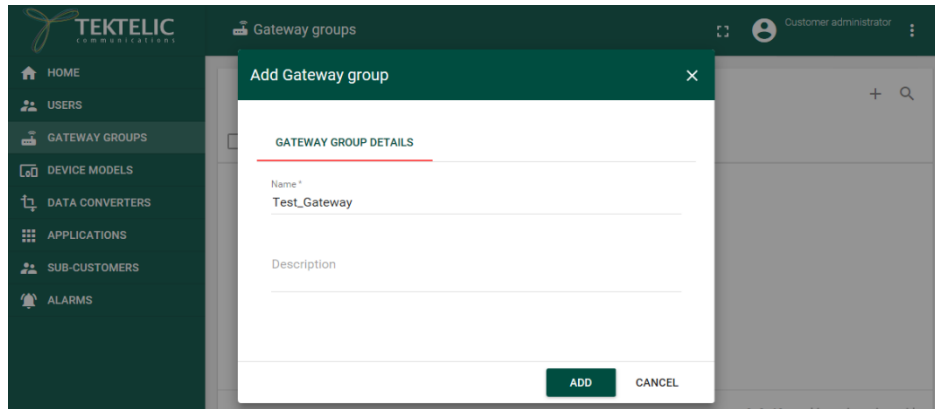
## 4 Commission Gateways

To register Gateway:

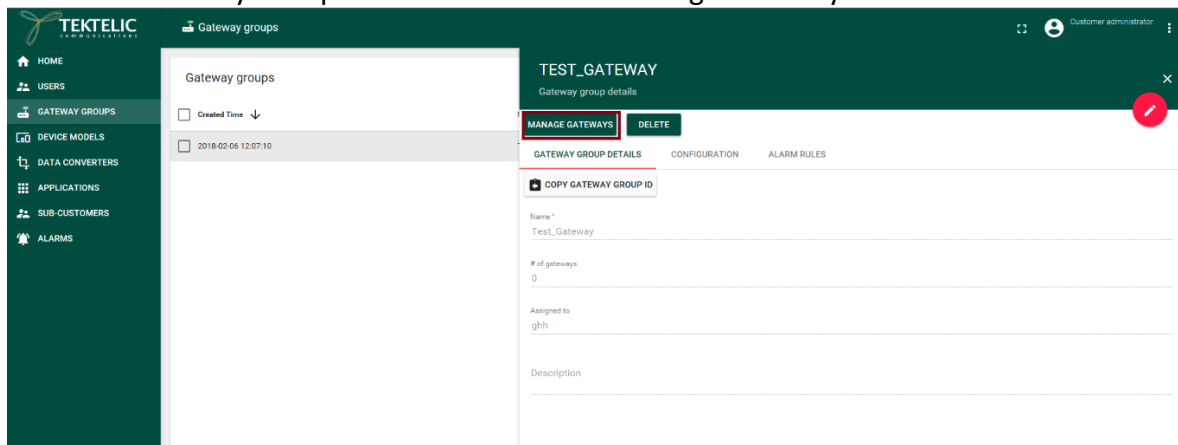
1. Login to your Tektelic Network Server
2. Navigate to the Gateway Groups screen and select a Gateway group to add Gateway.
  - If no Gateway groups exist select “+” (Add Gateway group) in the top right corner and create a new Gateway group.



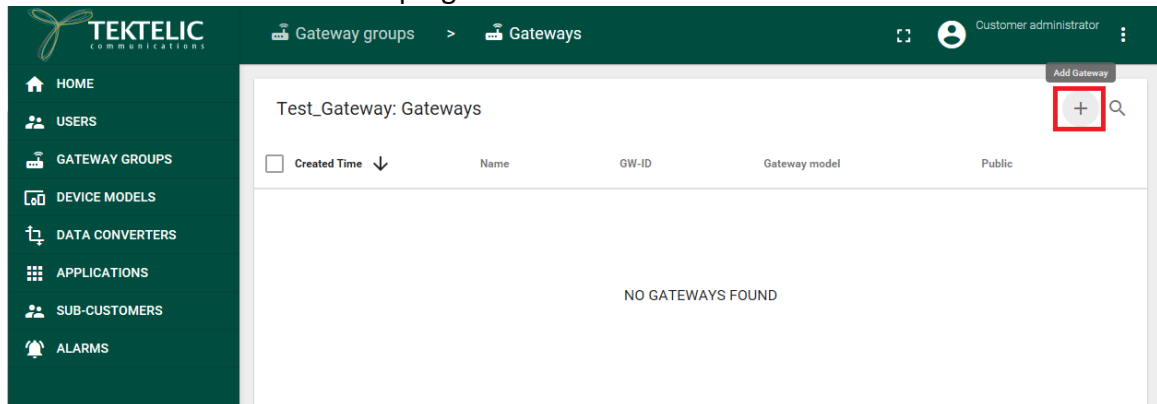
- All a new Gateway group requires is a name. description is an optional.



- From the Gateway Groups side bar select the “Manage Gateways” button.



- Select the “+” button in the top right corner.



- Enter your Gateway Name and GW-ID, select your Gateway Model from the list. Verify the information is correct and then click the add button.

- Enter your location information under location tab. (Note this step is optional)

6. Your Kona gateway is now registered with Network Server.

Created Time	Name	GW-ID	Gateway model	Public
2018-01-22 10:43:51	Kona_Mega_GW	647FDAFFFE0000D9	Kona Mega US	<input type="checkbox"/>

7. once gateway is registered and communicating to the network server, status will show online and last activity time will be most recent time.

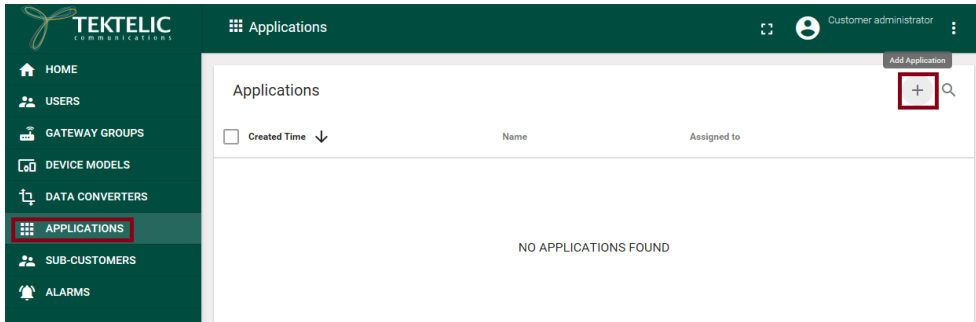
## 5 Create an Application (Group of devices)

Applications are like folders to keep your devices organized. For example, all your temperature sensors may be in the same application. You can also group the devices by the settings you

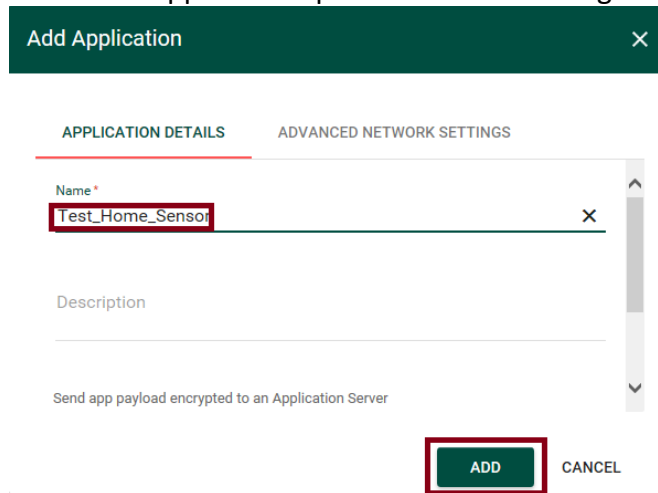


require. For example, if you may need to change the network settings on multiple devices it may be easiest to group them in one application.

1. Navigate to the Applications screen
  - Select “+” (Add Application) in the top right corner and create a new application.



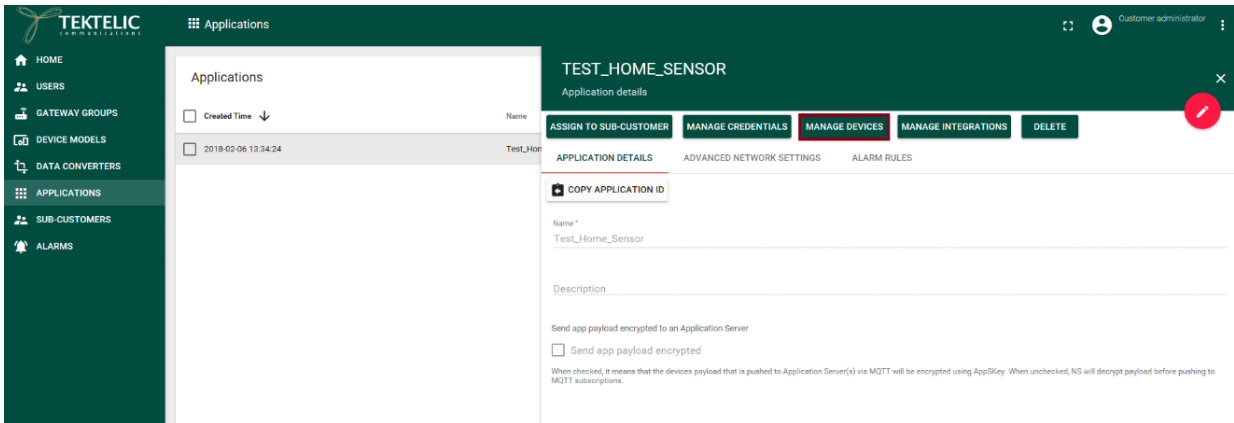
- All a new application requires is a name. Enter the name and then select “add” button. You can set application specific network settings but it is not required.

A screenshot of the 'Add Application' dialog box. The dialog has two tabs: 'APPLICATION DETAILS' (selected) and 'ADVANCED NETWORK SETTINGS'. Under 'APPLICATION DETAILS', there is a 'Name\*' field with the text 'Test\_Home\_Sensor' entered and highlighted with a red box. Below it is a 'Description' field. At the bottom right, there are two buttons: 'ADD' (highlighted with a red box) and 'CANCEL'. The dialog also has a close button (X) in the top right corner.

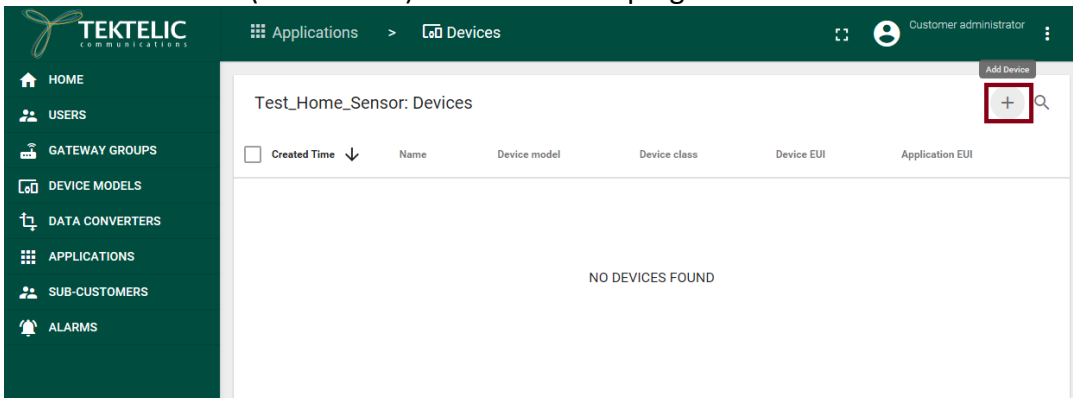
## 6 Add your Devices

In order to commission a device, you will need the DEVEUI (Device EUI), APPEUI (Application EUI), APPKEY (Application Key) and in some cases, the Network Key. These commissioning values can be obtained from the device manufacturer. If you have a TEKTELIC device, you should have received a sheet with these values in the box with your device. Soft copies of these values can also be sent upon request via the support portal.

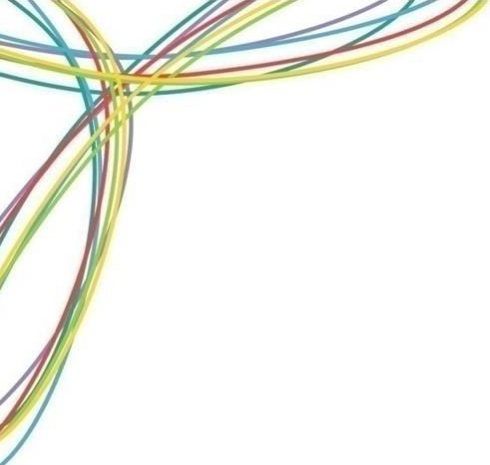
1. Select Applications from the list, followed by manage devices Manage Devices.



2. Select the “+” (Add Device) button in the top right corner.



3. Enter a name, Select the type of device model and enter the correct commissioning information for your sensor. Verify the information is correct and then click the add button. If you do not see your device model you can add it by selecting “device models” from the left-hand menu.



### Add Device ✕

DEVICE DETAILS    ADVANCED NETWORK SETTINGS    ACTIVATION

Name\*  
Tektelic-Home-Sensor

Device model\*  
Home Sensor

Device EUI\*  
647FDA00000011F 16 / 16

Application EUI\*  
647FDA80000011F 16 / 16

Application Key\*  
8642C8D963567067E22CD24651E1CA79 32 / 32

Use application settings  
 Use application settings

**ADD**    CANCEL

- Advanced network settings can be applied but are not required. However, if you are using a gateway such as the Kona Micro or Kona Macro in North America region that uses less than 64 channels, we would recommend changing the default channel mask under Advanced Network Settings to correspond with the number of channels your gateway uses.

4. Once your sensor is registered and communicating to the network server, status will show online and last activity time will be most recent time. Note that the default timeout setting is 1 hour. If no activity is detected within this time the sensor will show offline. It will come back online the next time data is sent.

The screenshot shows the Tektelic web interface. On the left is a navigation menu with options: HOME, USERS, GATEWAY GROUPS, DEVICE MODELS, DATA CONVERTERS, APPLICATIONS, SUB-CUSTOMERS, and ALARMS. The main area is titled 'Applications > Devices'. A table lists devices under 'Test\_Home\_Sensor: Devices' with columns for 'Created Time' and 'Name'. One device is listed: '2018-01-22 10:47:29' and 'Tektelic-Home-Sensor'. A modal window titled 'TEKTELIC-HOME-SENSOR' is open, showing 'Device details'. It has a 'DELETE' button and tabs for 'DEVICE DETAILS', 'ADVANCED NETWORK SETTINGS', 'ACTIVATION', and 'REAL-TIME PACKETS'. A 'COPY DEVICE ID' button is also present. The 'Status' is 'Online' and the 'Last activity time' is '2018-02-06 14:48:59'. Below this, the 'Name' and 'Device model' are shown as 'Tektelic-Home-Sensor' and 'Home Sensor' respectively.

- To See uplink and downlink packets select the Tektelic-Home-Sensor then select the Real-Time Packets tab.

The screenshot displays the Tektelic web interface. On the left is a dark green sidebar with navigation icons and labels: HOME, USERS, GATEWAY GROUPS, DEVICE MODELS, DATA CONVERTERS, APPLICATIONS, SUB-CUSTOMERS, and ALARMS. The main area is titled 'PV Test Application: Devices' and shows a list of devices, with 'Tektelic-Home-Sensor' selected. To the right, the 'TEKTELIC-HOME-SENSOR' details page is open, with the 'REAL-TIME PACKETS' tab highlighted in a red box. Below the tabs is a table of real-time packets. The table has columns: Timestamp, Gateway, RSSI, Frequency, CH, CR, SNR, SF, BW, Message Type, Payload, FCntUp, and FCntDown. The data rows show various packet types such as Downlink, Uplink, and Join Request/Response with their respective timestamps and payloads.

## 7 Create data converter

A Data Converter is needed to transmit data to your application platform. This is done by selecting data converter from the left-hand menu (or home screen) then pressing the + button in the upper right-hand corner. There are a default data converter such as Tektelic Home Sensor, and Tektelic industrial Sensor that you do not have to create. You also have the option to create your own custom converter by manually entering a Decoder and Encoder.

An example of a custom converter to print the raw payload is as follows.

Decoder:

```
// Do not decode anything, just put it into AS as is
arr = [];
for (var i = 0; i < bytes.length; ++i){
    arr.push(bytes[i]);
}
//return { "bytes": JSON.stringify(arr), "port": port, "payload length": bytes.length};
return { "bytes": toHexString(arr), "port": port, "payload length": bytes.length};

function toHexString(arr) {
    var s = '0x';
    arr.forEach(function(byte) {
        s += ('0' + (byte & 0xFF).toString(16)).slice(-2);
    });
    return s;
}
```

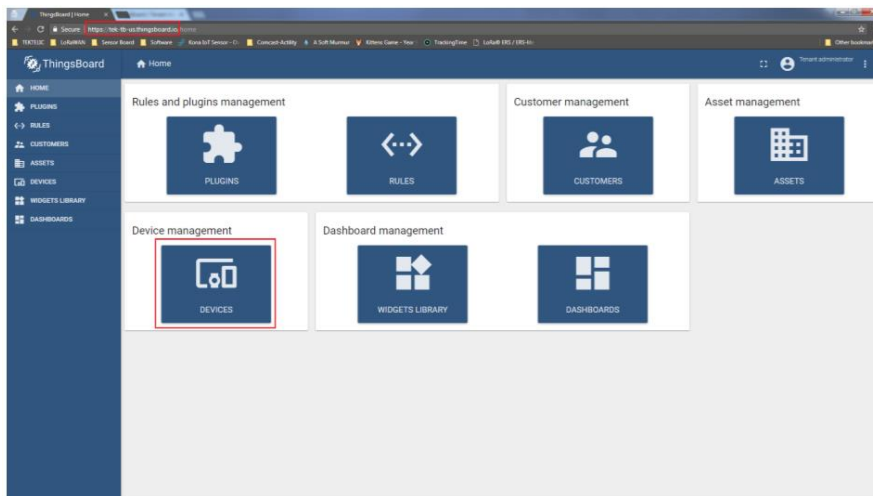
## 8 Create integration – Application Platform

The integration is unique depending on the end application you are using. In this example we will use ThingsBoard Application Server. Please contact Tektelic via the support portal if you are interested in a demo account with Thingsboard.

The Tektelic Network server also supports integrations with Azure and HTTP. If you have any questions about compatibility of a particular application platform please contact us. If you are unsure on how use or set up a particular application platform, please contact the developer of that platform directly.

### 8.1 Setting up an integration with ThingsBoard

Create the ThingsBoard gateway by first selecting devices from the ThingsBoard home screen, then by selecting Add Device. The ThingsBoard Gateway is a special device that handles the exchange of data between the NS and the Application. See screenshots below.



Add Device

Name\*  
TekNS-Integration

Device type\*  
TB-Integration

Is gateway

Description

ADD CANCEL

2. Copy the access token from your newly created device. To do this click on your device and then select copy access token.

ThingsBoard | Devices

TEKNS-INTEGRATION

Device details

DETAILS ATTRIBUTES LATEST TELEMETRY ALARMS EVENTS RELATIONS

MAKE DEVICE PUBLIC ASSIGN TO CUSTOMER MANAGE CREDENTIALS DELETE DEVICE

COPY DEVICE ID  COPY ACCESS TOKEN

Name\*  
TekNS-Integration

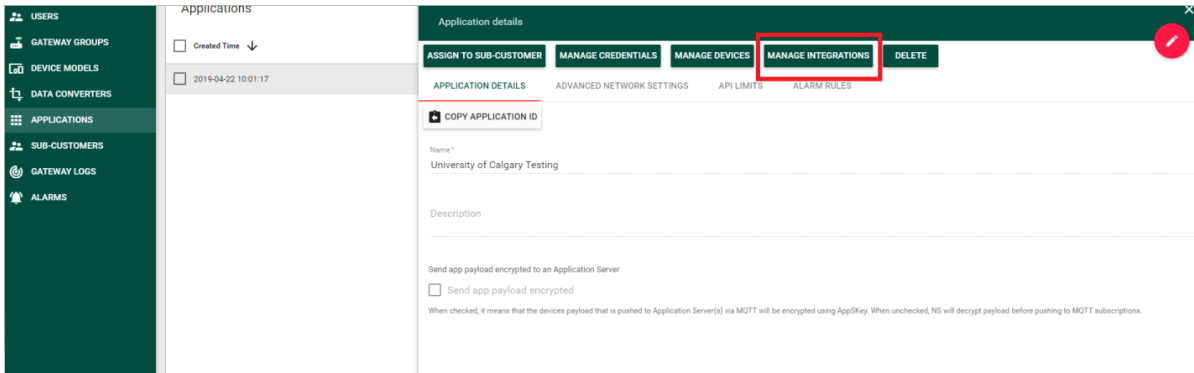
Device type\*  
TB-Integration

Is gateway

Description

Example:  
Pr1g5liqVGC2yBlawmt

3. Return to the NS and select your application (group of devices) and then select “manage integrations”.

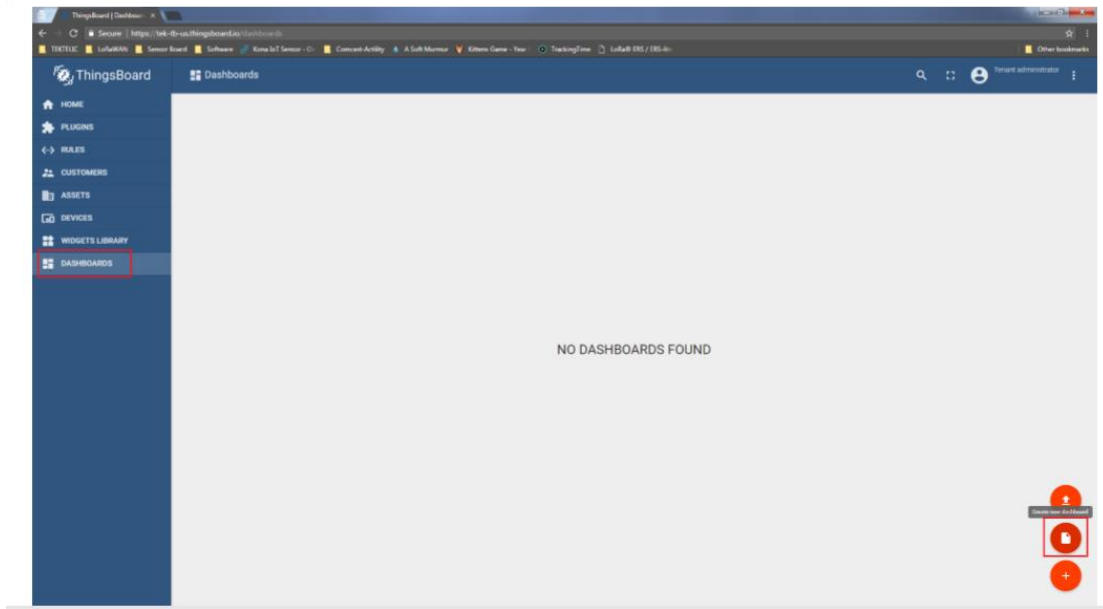


4. Select the “+” sign in the top right-hand corner to add an integration. The NS Integration Configuration is:

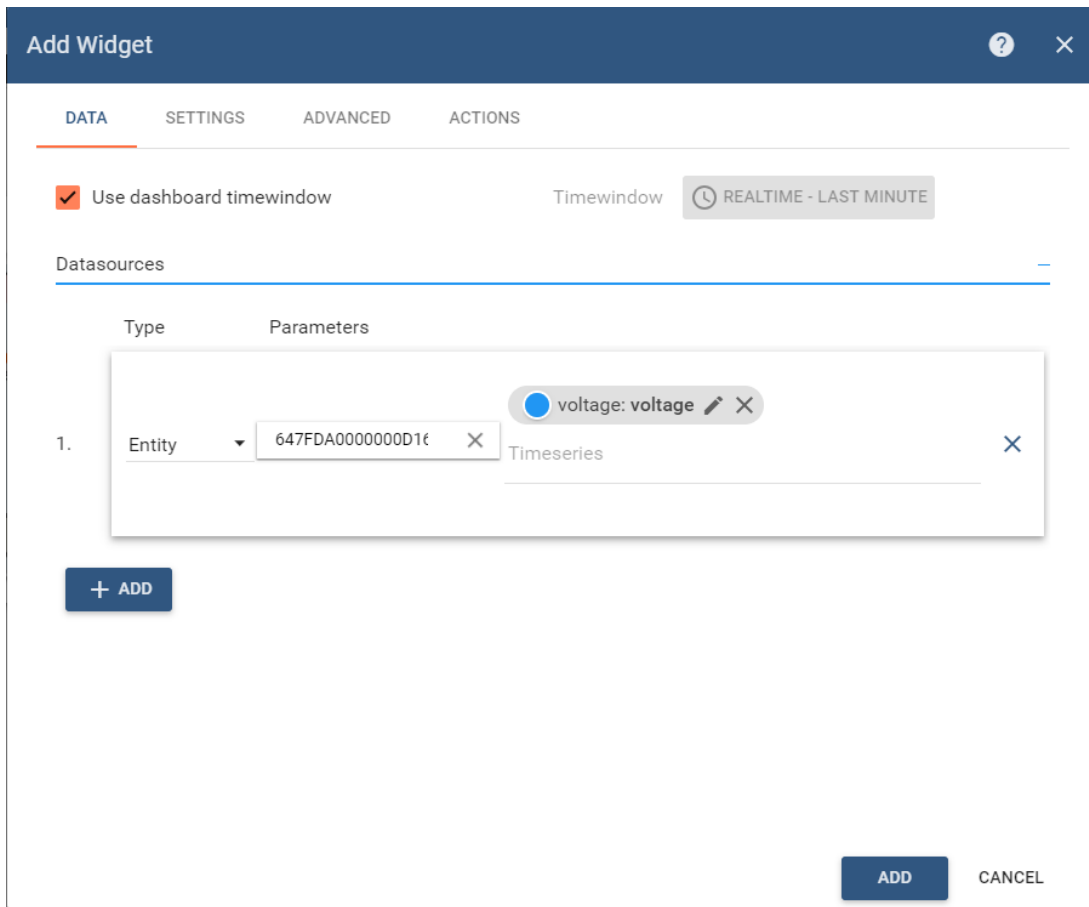
- Type: ThingsBoard
- Data Converter: the specific converter you wish to use. For example, Tektelic Home Sensor
- Host: either [tek-tb-us.ThingsBoard.io](https://tek-tb-us.ThingsBoard.io) (North American server) or [tek-tb-eu.ThingsBoard.io](https://tek-tb-eu.ThingsBoard.io) (EU Server)
- Port: 9883
- Copy your access token into the Token Field of your integration.

6. Return to ThingsBoard and you should now see your device(s). Devices displayed as their DevEUI. You should see other devices labeled as “Gateway” which are the LoRaWan Gateways that saw your device.

7. The next step is to create a dashboard to visualize your data. Select Dashboards from the left-hand menu, followed by Create New Dashboard in the bottom left hand corner. This will bring you to the widgets screen



8. From the data tab on the add widget menu, you select your entity (sensor) and then your timeseries (what you are measuring). The settings and advanced tabs can be used to customise various aspects of your widget.





NOTE: Widgets can also be created from the latest telemetry screen under devices. Simply select a payload you want to display as a widget, and select Show on widget from the from the top menu.

The screenshot displays the ThingsBoard interface. On the left is a navigation sidebar with options like HOME, PLUGINS, RULES, DATA CONVERTERS, INTEGRATIONS, CUSTOMER GROUPS, ASSET GROUPS, DEVICE GROUPS, WIDGETS LIBRARY, DASHBOARDS, SYSTEM SETTINGS, and AUDIT LOGS. The main area is split into two panels. The left panel, titled 'All: Devices', shows a list of devices with columns for 'Created time' and 'Name'. The right panel, titled 'PIR SENSOR', shows 'Device details' with tabs for DETAILS, ATTRIBUTES, LATEST TELEMETRY (selected), ALARMS, EVENTS, RELATIONS, and AUDIT LOGS. Below the tabs, it indicates '1 telemetry unit selected' and has a 'SHOW ON WIDGET' button. A table of telemetry data is shown below:

<input type="checkbox"/>	Last update time	Key ↑	Value
<input checked="" type="checkbox"/>	2019-04-25 12:20:17	humidity	46.0
<input type="checkbox"/>	2019-04-25 12:44:36	motionDetected	false
<input type="checkbox"/>	2019-04-25 12:44:36	nsFCount	117
<input type="checkbox"/>	2019-04-25 12:44:36	nsFPort	10
<input type="checkbox"/>	2019-04-25 12:44:36	nsGateway	647fdafffe07e21

For a more detailed description of ThingsBoard – please refer to the full user guide at <https://ThingsBoard.io/docs/getting-started-guides/helloworld/>