



Activity
Connecting with intelligence

ThingPark Enterprise All-In-One

Installation, Configuration and Operation Guide for v1.1.1

Content

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- Installation and upgrade
- Configuration
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- HTTP usage (downlink)
- Backup / Restore
- Migration to TPE Full Edition
- Advanced tasks

Activity

- A Ufispac gateway:
 - UFISPACE PICO CELL Enterprise (<https://market.thingpark.com/ufispac-entepriase-pico-cell-thingpark-ready-v1-5-indoor-lorawan-gateway.html>)
 - Or UFISPACE MACRO CELL v1.5
- Characteristics
 - Processor:
 - Model name : ARMv7 Processor rev 2 (v7l)
 - Hardware : Generic AM33XX (Flattened Device Tree)
 - BogoMips: 900
 - Disk: 4GB
 - Memory : 500MB

- A GEMTEK LoRa outdoor micro gateway:
 - <https://www.gemteks.com/en/products/lora-iot/gateway#productKkRyJM>
- Characteristics
 - Processor :
 - Model name : ARMv7 Processor rev 0 (v7l), Quad-core Cortex-A9 up to 1.6GHz
 - Hardware : RK30board
 - BogoMIPS : 1631.46 x 4
 - Disk: 8GB
 - Memory : 1GB

Installation Requirements

- Installation is manual, you need to have SSH access to the Base Station box, and have the root password
- In case of problems, you might have to use an FTDI cable to directly connect on the box
- You need to have at least 500MB free disk space
- You need to have the relevant installation package for your hardware:

scheme: TAO_<manufacturer>.<BS_PROFILE>_<version>

- TAO_ufispace.UFISP_FCPICO.1_1.1.1 (Ufispaco PICO)
- TAO_ufispace.UFISP_FCMLB.1_1.1.1 (Ufispaco MACRO V1.5)
- TAO_gemtek.GMTK_ODU.1_1.1.1 (Gemtek)

use the latest
version

Installation (1/2)

- Copy the installation package on your box under /

```
scp TAO_<manufacturer>.<BS_PROFILE>_<version> mlbadmin@<box ip>:/
```

- Execute the installation package

```
ssh mlbadmin@<box ip>  
cd /  
chmod u+x ./TAO_<manufacturer>.<BS_PROFILE>_<version>  
./TAO_<manufacturer>.<BS_PROFILE>_<version>
```

Installation (2/2)

- At the end, you will get such error messages during firewall startup. They are to be ignored since the IPv6 module is not currently available in Ufispac firmware

```
am335x-evm:/# ./TAO_ufispac.UFISP_FCPICO.1.1.1.1

Self Extracting Installer

./
./rootfs-patch-tao-1.1.1-fcpico.tar.gz
....
Perhaps ip6tables or your kernel needs to be upgraded.
modprobe: FATAL: Module ip6_tables not found.
ip6tables v1.4.21: can't initialize ip6tables table `filter': Table does not exist (do you need to insmod?)
Perhaps ip6tables or your kernel needs to be upgraded.
modprobe: FATAL: Module ip6_tables not found.
ip6tables v1.4.21: can't initialize ip6tables table `filter': Table does not exist (do you need to insmod?)
Perhaps ip6tables or your kernel needs to be upgraded.
modprobe: FATAL: Module ip6_tables not found.
ip6tables v1.4.21: can't initialize ip6tables table `filter': Table does not exist (do you need to insmod?)
Perhaps ip6tables or your kernel needs to be upgraded.
Could not open socket to kernel: Address family not supported by protocol
Installation done
```

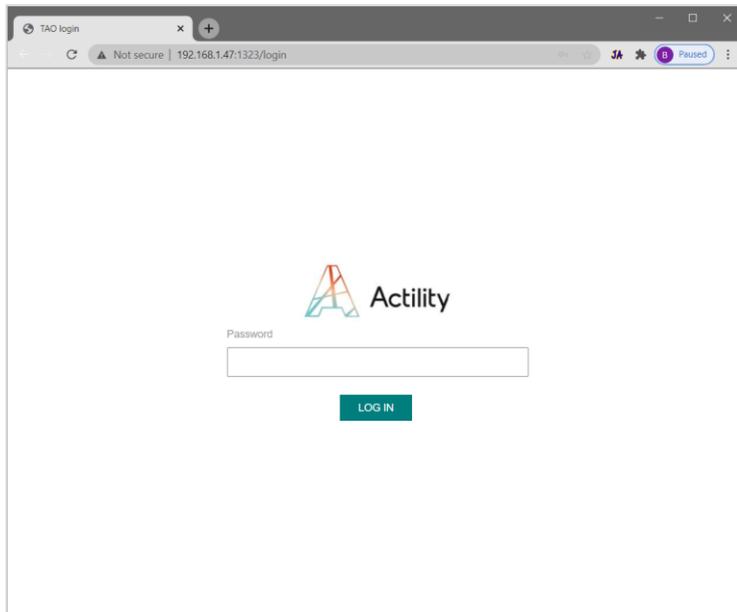
- You can now reboot the gateway

Software upgrade

- For an upgrade, you must follow the same steps as for the installation procedure, but you must reboot the box at the end of the procedure

First login to User Interface (1/3)

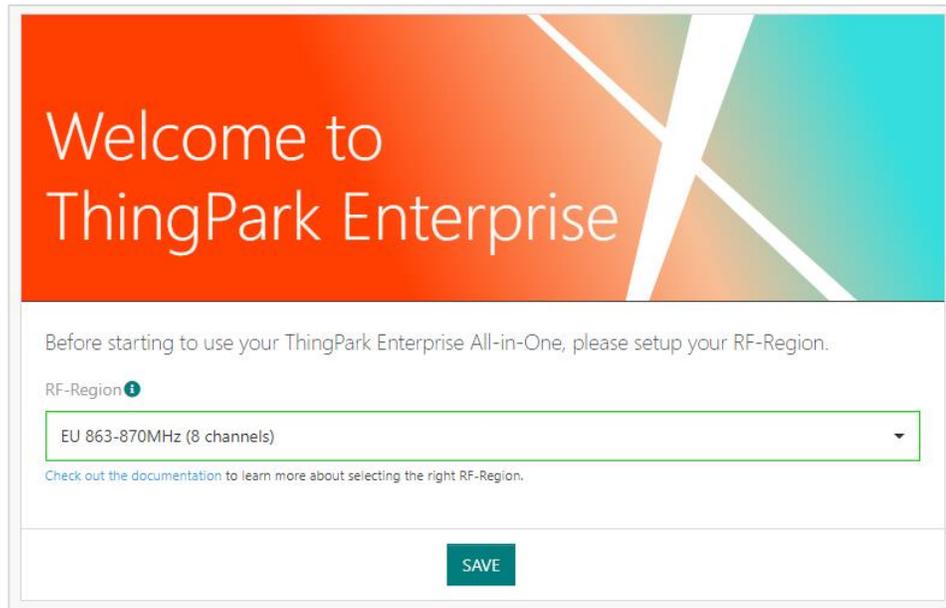
- Connect on the box at the following URL :
 - `http://<box ip>:1323`



- Enter password : default password is **tao** but it is strongly recommended to change it after the first login.

First login to User Interface (2/3)

- The first thing you must do after a fresh installation is to configure the RF Region:



Welcome to
ThingPark Enterprise

Before starting to use your ThingPark Enterprise All-in-One, please setup your RF-Region.

RF-Region ⓘ

EU 863-870MHz (8 channels) ▼

[Check out the documentation](#) to learn more about selecting the right RF-Region.

SAVE

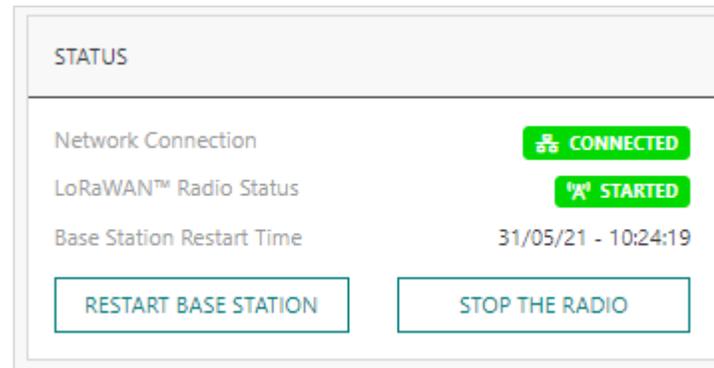
- Select your region from the list and Save



Hint: you may check-out the [online documentation](#) to learn more about selecting the right RF Region configuration for your deployment.

Login to User Interface (3/3)

- You are now redirected to the Base Station page
- Check that your base station is up and running
 - on the Base Station TAB
 - Network Connection : CONNECTED
 - LoRaWAN Radio Status : STARTED



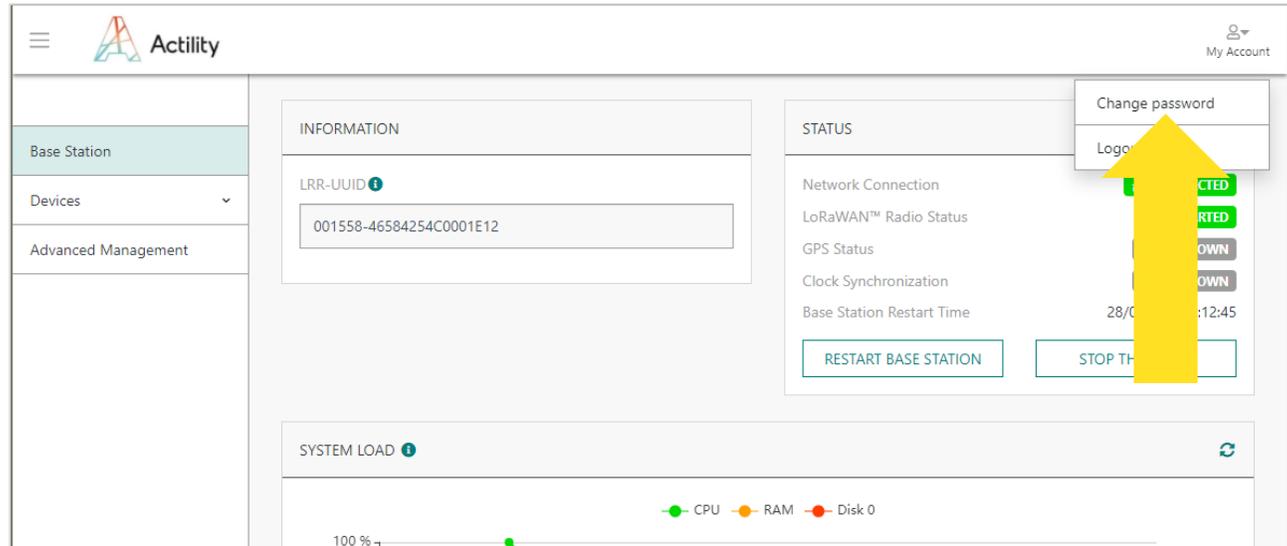
The screenshot displays a 'STATUS' panel with the following information:

Network Connection	 CONNECTED
LoRaWAN™ Radio Status	 STARTED
Base Station Restart Time	31/05/21 - 10:24:19

At the bottom of the panel, there are two buttons: 'RESTART BASE STATION' and 'STOP THE RADIO'.

Change your password (1/2)

- For security reason, it is strongly recommended to change the password
 - on the right side, click on My Account and select Change password



Change your password (2/2)

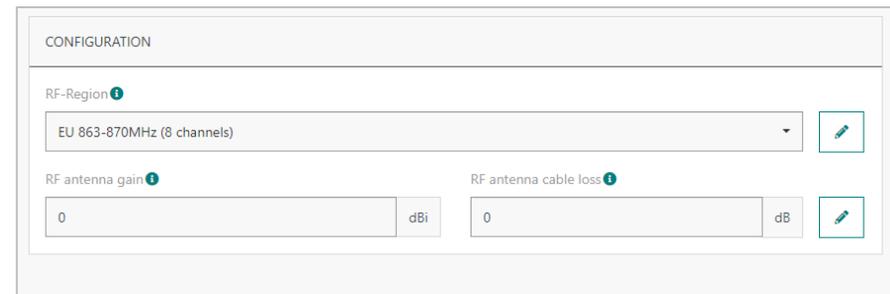
- On the old password field, enter "tao"
- Enter the new password on the
 - new password field
 - confirmation password field
- Click save when finished

The screenshot shows a 'Change Password' form with a teal header. It contains three input fields, each with a green checkmark and a toggle icon (eye) to the right. The fields are labeled 'Old password', 'New password', and 'Confirmation password'. Below the fields are two buttons: 'CANCEL' and 'SAVE'. The 'SAVE' button is highlighted in teal.

- The initial password is "tao"
- On password change, the minimum password length is 8 chars, it must be a standard linux password

Base station configuration (1/2)

- You can now configure your Base station, return to the "TPE All In One" GUI, and scroll down to the "Configuration" widget:



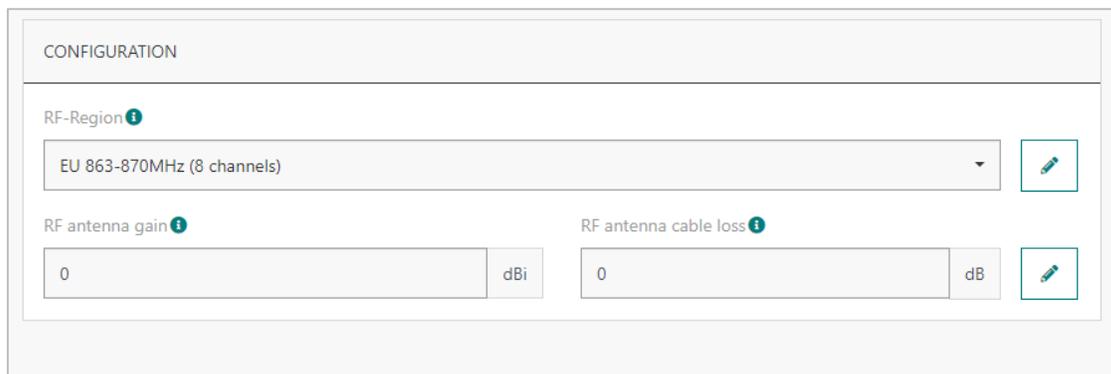
- You can change eventually change the RF-Region settings
 - click on the "PEN" icon 
 - in the dropdown, select your new region, and click on the validation icon when finished 



- Wait about 1 minute for the Base Station to reconfigure, you can receive temporary errors during that phase

Base station configuration (2/2)

- Set Antenna Gain and Cable loss as per the following table:



CONFIGURATION

RF-Region ⁱ

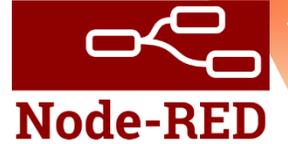
EU 863-870MHz (8 channels)

RF antenna gain ⁱ RF antenna cable loss ⁱ

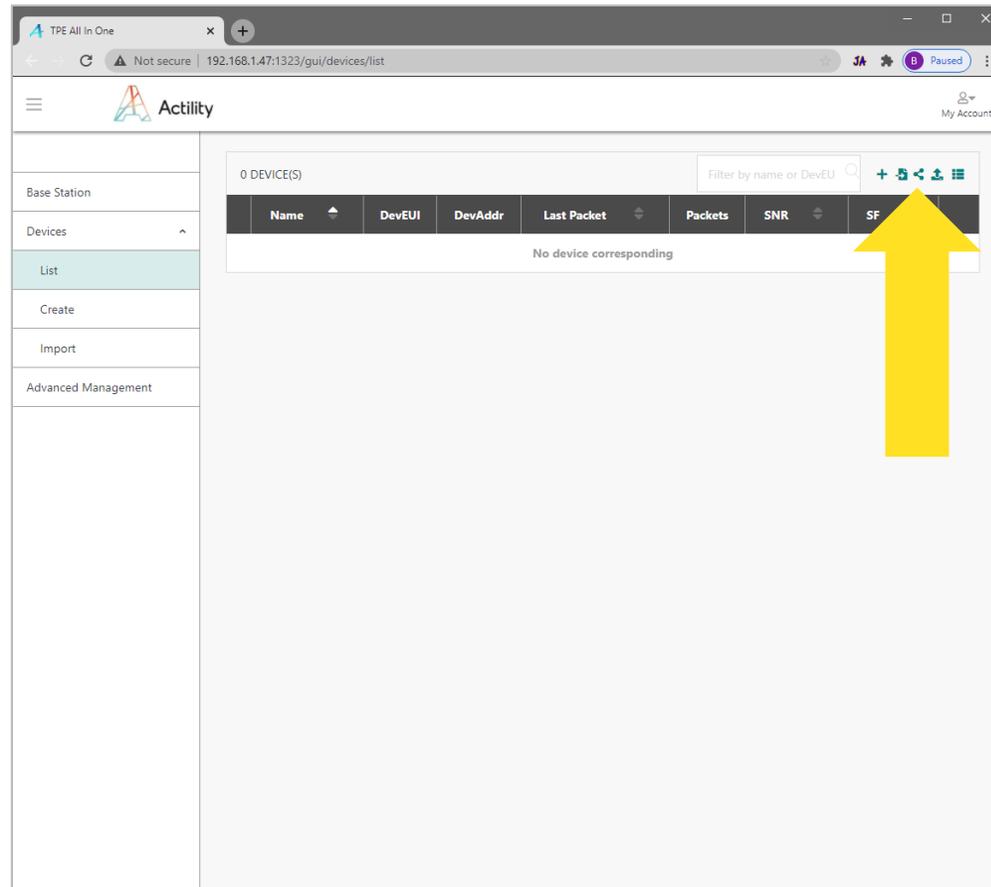
0 dBi 0 dB

	Antenna Gain	Cable loss
Ufispaco pico (external antenna)	1.5 dBi	0 dB
Ufispaco enterprise (internal antenna)	1.4 dBi	0 dB
Ufispaco macro v1.5 & Gemtek outdoor micro	Depends on antenna model	Typically ~ 0.5 dB but depends on installation

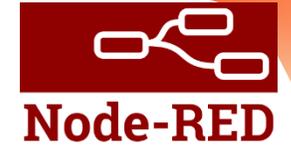
Node-RED : MQTT configuration (1/5)



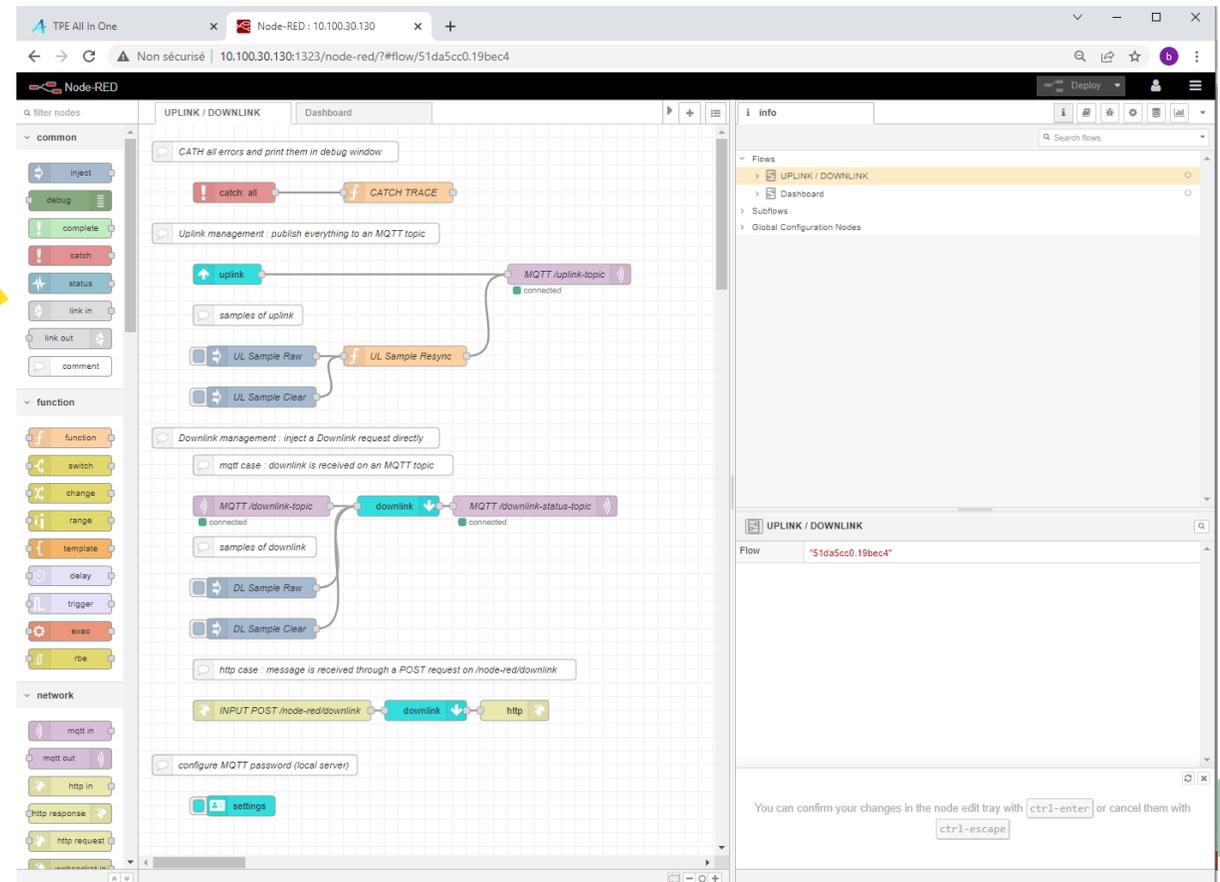
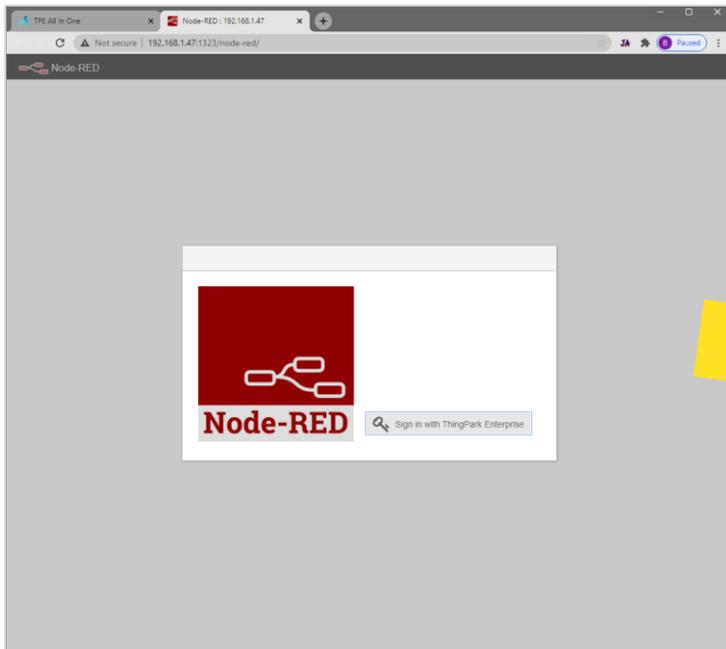
- Connect on node-red to configure the MQTT server :
 - on the Devices / List TAB, click on the node-red icon 



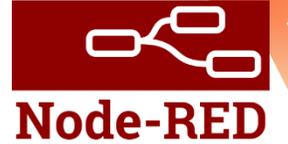
Node-RED : MQTT configuration (2/5)



- Click on node-red Sign in button, and eventually sign in again with your password



Node-RED : MQTT configuration (3/5)



- Double click the "MQTT /uplink-topic" node and configure the MQTT node



The "Edit mqtt out node" configuration dialog in Node-RED. It includes a "Delete" button, "Cancel" and "Done" buttons, and a "Properties" section with the following fields:

- Server: local-mqtt
- Topic: /uplink-topic
- QoS: 2
- Retain: false
- Name: MQTT /uplink-topic

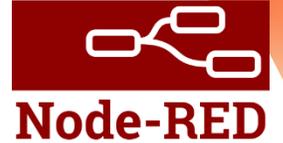
Tip: Leave topic, qos or retain blank if you want to set them via msg properties.

- You can change here the standard MQTT settings



- Topic : the topic where you will receive the uplinks
- QoS, Retain : standard MQTT attributes
- Name : the display name of the node

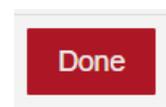
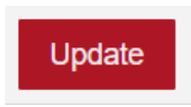
Node-RED : MQTT configuration (4/5)



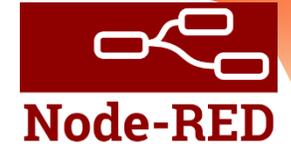
- Click on the server "pen" icon to configure the MQTT server, the default configuration is the local MQTT broker, but you can change it to an external MQTT broker

A screenshot of the "Edit mqtt out node > Edit mqtt-broker node" dialog box. It has tabs for "Connection", "Security", and "Messages". The "Connection" tab is active, showing fields for "Name" (local-mqtt), "Server" (127.0.0.1), "Port" (1883), "Protocol" (MQTT V3.1.1), "Client ID" (Leave blank for auto generated), and "Keep Alive" (60). There is a checkbox for "Use TLS" and a checked checkbox for "Use clean session". Buttons for "Delete", "Cancel", and "Update" are at the top.

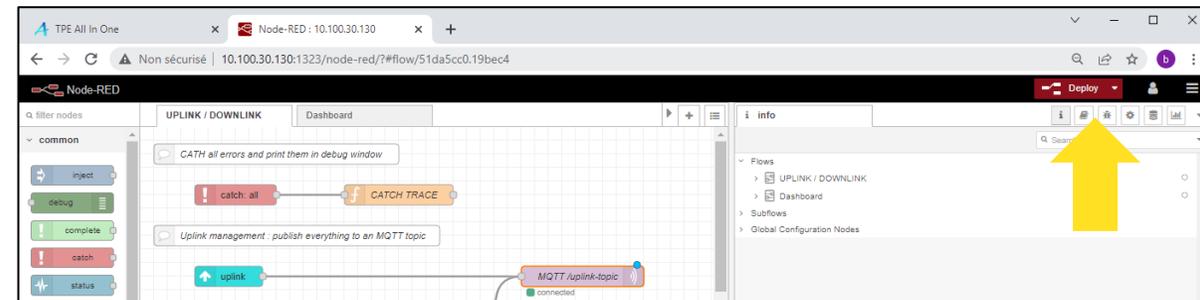
- You can change here the main server attributes
 - server address, server security, server secure connection, ...
- You must click "Update" to apply your configuration
- And click also "Done" when you also want to save the MQTT node configuration



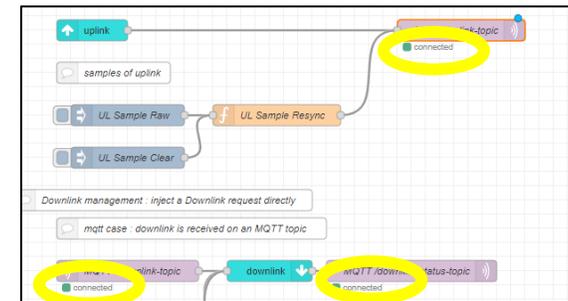
Node-RED : MQTT configuration (5/5)



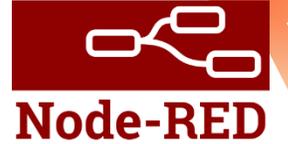
- Do the same for the "MQTT /downlink-topic" node, server configuration is global to both nodes
- After you have done all node-red reconfiguration, you must click on "Deploy" to push your new flow on the server



- After few seconds, you should see that your MQTT nodes get connected



Node-RED : BACnet / Modbus

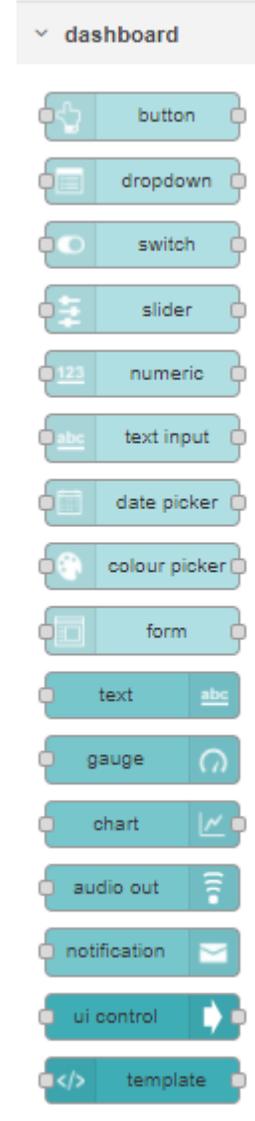
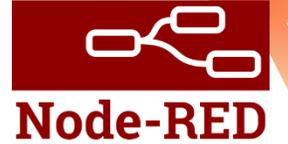
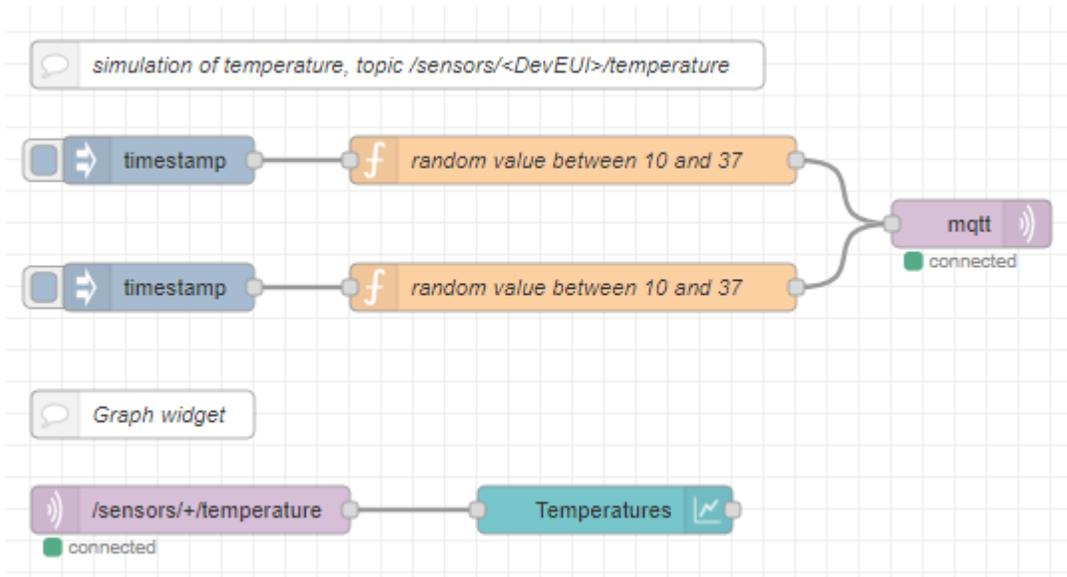


- On node-red, you may use BACnet/IP nodes in your workflows
- And you may also use MODBUS TCP/IP nodes
 - For the Modbus server node, you can only use tcp port 10502 or tcp port 11502 : they are not filtered and therefore can be accessed externally by Application Server



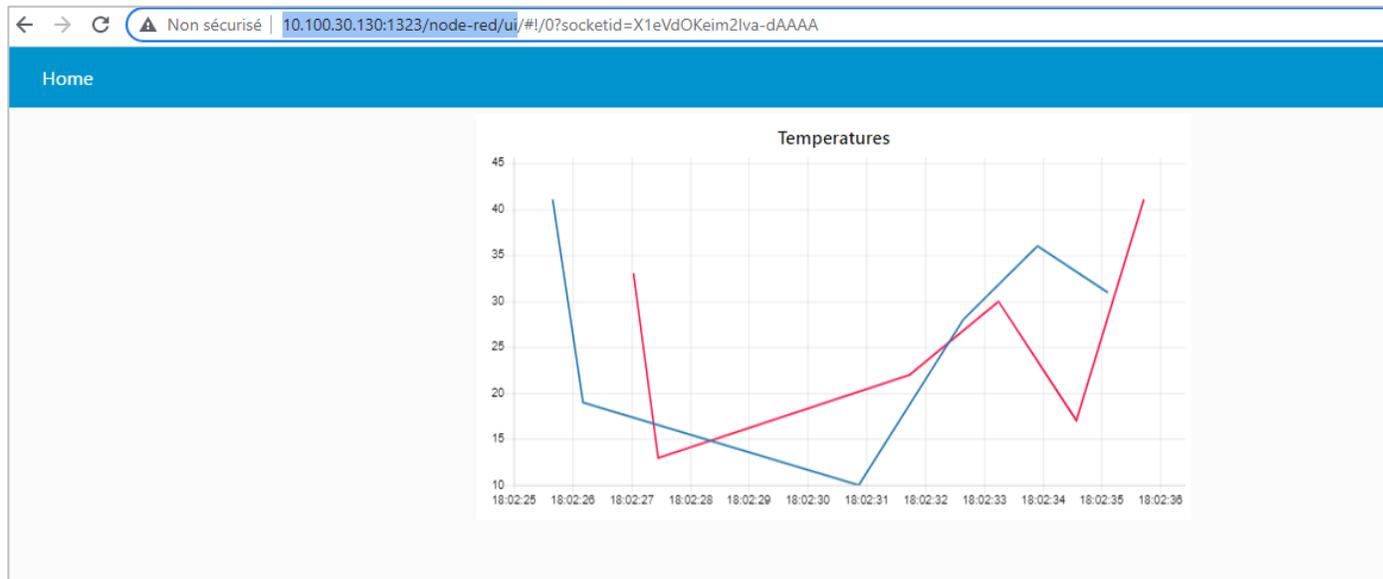
Node-RED : Dashboard (1/2)

- On node-red, you can create dashboards
- A sample is provided, and is accessible in the Dashboard panel

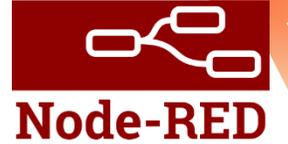


Node-RED : Dashboard (2/2)

- The GUI is available on <http://<box ip>:1323/node-red/ui>
- You can inject random values by clicking on the 'inject' nodes



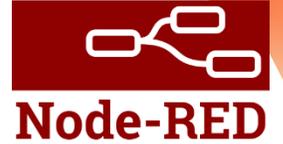
Node-RED : Usage



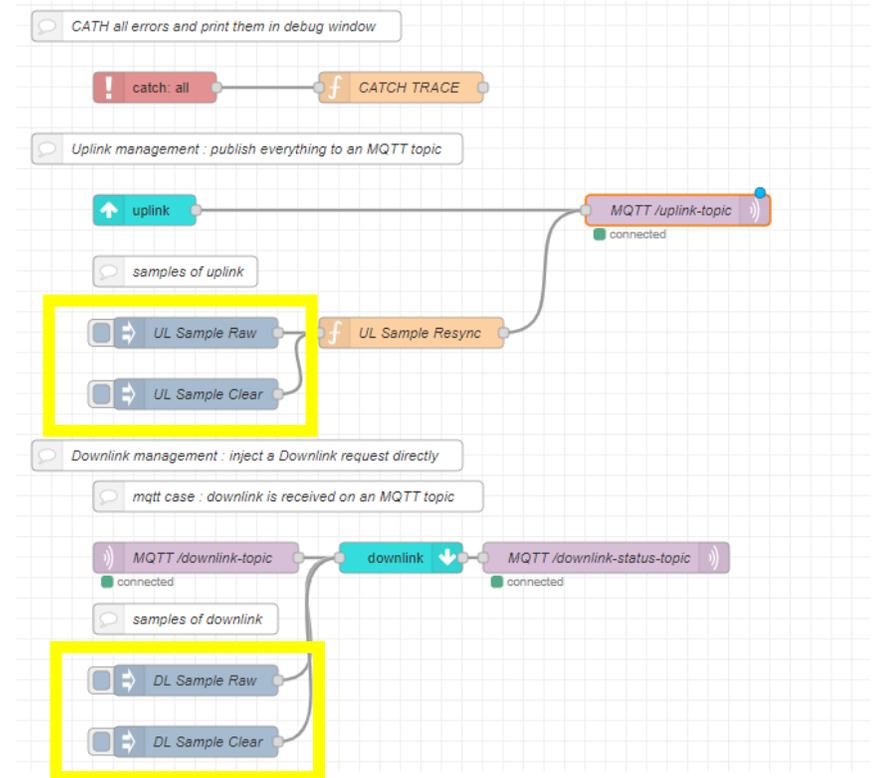
WARNING :

Use of Node-Red nodes in "server" mode (e.g. modbus server) - with regular polling from external client applications - has not been benchmarked by Actility. Server mode may have negative impacts on TPE-All-in-One performances. Such potential impact on performance remains under the entire responsibility of the TPE Partner.

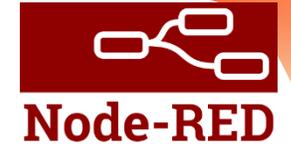
Node-RED : UL / DL Samples (1/2)



- The flow sample provides 4 injector sample nodes
- UL Sample: reception of an UPLINK (simulated)
 - **Raw:** UPLINK that was not decoded by the engine, the "payload_hex" field is a hexadecimal string.
 - **Clear:** UPLINK that was decoded by the engine, the payload_hex field is present, a DriverCfg field gives the driver configuration used to decode the message, a "payload" field is added that gives the decoded JSON document.
- DL Sample: injection of a DOWNLINK towards a device
 - **Raw:** DOWNLINK message contains only a "payload_hex" field which is a hexadecimal string.
 - **Clear:** DOWNLINK message contains a "payload" field which is a json document, and a "DriverCfg" field that gives the driver configuration for the encoding engine.



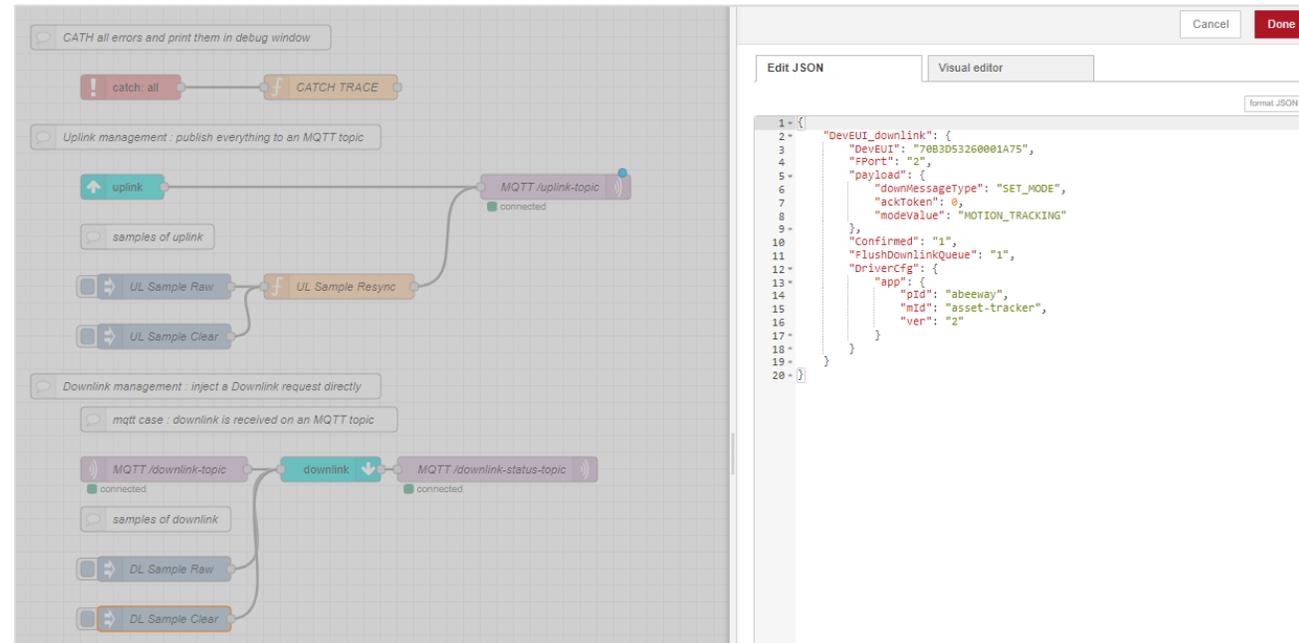
Node-RED : UL / DL Samples (2/2)



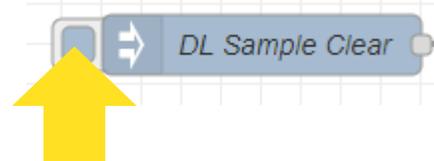
- These nodes serve as samples to better understand UPLINK and DOWNLINK message formats.
- To learn more about the message content exchanged between TPE-All-in-One and external AS (also known as LRC/AS tunnel interface), see [online documentation](#).

Note multicast & location reports are not supported by TAO.

- For testing purpose, you can change the payloads and click on the injector node button to inject a new message on the flow



Activity



Payload drivers

New in TAO v1.1

In v1.1.1, native payload drivers are available for the following manufacturers:

- Abeeway 
- Adeunis 
- Advantech 
- Cisco 
- DecentLab 
- Ellenex 
- Elsys 
- Globalsat 
- Langyang 
- Netvox 
- NKE-Watteco 
- Sensing Labs 
- Swisscom 
- Volley Boast 
- Yokogawa 
- Zenner 

Device configuration (1/2)

- You can now create your first device (OTAA example)
 - On Devices / Create TAB, click save when finished

Enter Your Device Informations*

Name* ?
 ✓

Manufacturer*
 ▼

Model*
 ▼

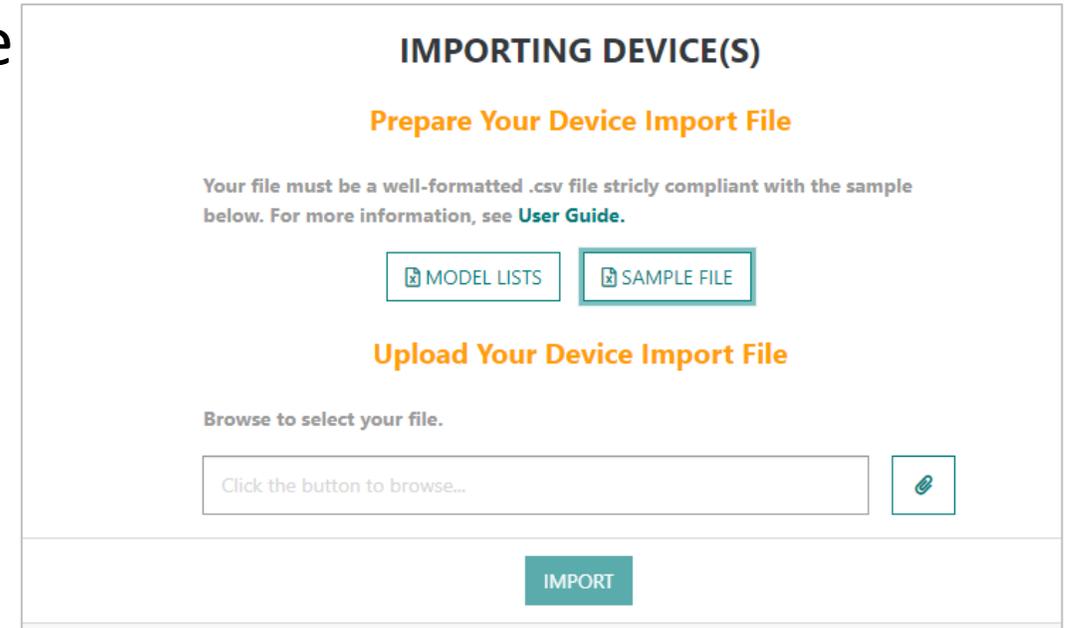
DevEUI* ?
 ✓

Activation mode* ?
 ▼

AppKey* ?
 ✓

Device configuration / mass import (1/3)

You can also use the **mass import** feature to import multiple devices in one click



The screenshot shows a web interface titled "IMPORTING DEVICE(S)". It contains the following elements:

- Section Header:** "IMPORTING DEVICE(S)" in bold black text.
- Section Header:** "Prepare Your Device Import File" in orange text.
- Text:** "Your file must be a well-formatted .csv file strictly compliant with the sample below. For more information, see [User Guide](#)." in black text.
- Buttons:** Two buttons with file icons: "MODEL LISTS" and "SAMPLE FILE".
- Section Header:** "Upload Your Device Import File" in orange text.
- Text:** "Browse to select your file." in black text.
- Form:** A text input field containing the placeholder text "Click the button to browse..." and a file upload icon (a square with a paperclip).
- Button:** A teal "IMPORT" button at the bottom center.

- Follow the "SAMPLE FILE" link to understand the csv format
- Follow the "MODEL LISTS" link to find the "Profile ID" that corresponds to your device profile

Device configuration / mass import (2/3)

- Create a csv (comma separated value) file, you should have something like this at the end (OTAA and ABP device sample) :

```
CREATE_OTAA,70B3D53260001A75,,LORA_GenericA.1.0.2a_ETSI_Rx2-SF12,,31FD21B72E9CF9F861CF27450D4160E6,,device_1
```

```
CREATE_ABP,000000000539B181,0539B180,LORA_GenericA.1.0.2c_ETSI,2B7E151628AED2A6ABF7158809CF4F3C,2B7E151628AED2A6ABF7158809CF4F3C,,device_2
```

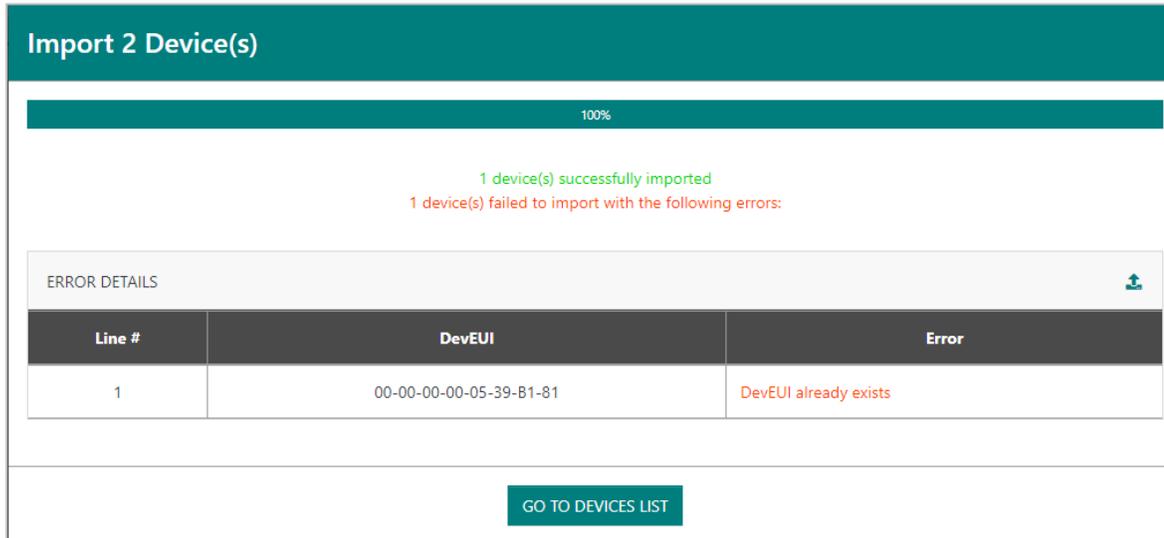
- Save the file in utf8 format when using a simple text editor
- Click on the  to open the import dialog box and select your file
- Click « Import »

Browse to select your file.

Device configuration / mass import (3/3)

- When everything is done, and you have no error, you can directly return to the device list and start working with your devices.
- In case of errors, you get a page that summarizes these errors, ordered by line number.



Import 2 Device(s)

100%

1 device(s) successfully imported
1 device(s) failed to import with the following errors:

ERROR DETAILS 

Line #	DevEUI	Error
1	00-00-00-00-05-39-B1-81	DevEUI already exists

GO TO DEVICES LIST

- You can now correct the file, and re-import the corrected devices.

MQTT usage : Uplink

- On the MQTT server, you can subscribe to the "/uplink-topic" topic, and verify that you get your packets:
- Example on the local MQTT broker :

```
mosquitto_sub -t /uplink-topic -h <box ip> -u tao -P tao
```

```
{"DevEUI_uplink":{"Time":"2022-03-01T16:02:56.438+00:00","DevEUI":"20635F0106000324","FPort":17,"FCntUp":14,"ADRbit":1,"MType":2,"FCntDn":2,"payload_hex":"09a0708e0000","mic_hex":"82d06336","Lrcid":"0000000F","LrrRSSI":-93,"LrrSNR":8.75,"LrrESP":-93.543648,"SpFact":7,"SubBand":"G2","Channel":"LC5","DevLrrCnt":1,"Lrrid":"FFFFFFFF","Late":0,"LrrLAT":0,"LrrLON":0,"Lrrs":{"Lrr":[{"Lrrid":"FFFFFFFF","Chain":0,"LrrRSSI":-93,"LrrSNR":8.75,"LrrESP":-93.543648}]},"CustomerID":"tao","ModelCfg":"0","DriverCfg":{"mod":{"pId":"abeeway","mId":"micro-tracker","ver":"3"},"app":{"pId":"abeeway","mId":"asset-tracker","ver":"2"}},"InstantPER":0,"MeanPER":0,"DevAddr":"03AD689F","TxPower":16,"NbTrans":1,"Frequency":867.3,"DynamicClass":"A"},"payload":{"messageType":"SHUTDOWN","trackingMode":"OFF","batteryVoltage":3.41,"ackToken":0,"periodicPosition":false,"temperatureMeasure":27.8,"sosFlag":0,"appState":0,"dynamicMotionState":"STATIC","onDemand":false,"shutdownCause":"USER_ACTION","payload":"09a0708e0000","deviceConfiguration":{"mode":"OFF"}}}
```

...

MQTT usage : Downlink and Downlink status

- You can either send downlink raw encoded packets using the "downlink-topic" topic (using **payload_hex**)

```
mosquitto_pub -h <box ip> -u tao -P tao -t "/downlink-topic" -m  
'{"DevEUI_downlink":{"DevEUI":"20635F0106000324","FPort":"2","payload_hex": "0102"}}'
```

- and subscribe to the "downlink-status-topic" topic to retrieve the status

```
mosquitto_sub -t /downlink-status-topic -h <box ip> -u tao -P tao  
{"response":"queued","payload":{"DevEUI_downlink":{"DevEUI":"20635F0106000324","FPort":"2","payload_hex":"0102"}}}
```

MQTT usage : Downlink and Downlink status

- Or you can also send decoded downlink packets using the "downlink-topic" topic (using **payload**) and rely on TPE-All-in-One encoding functions:

```
mosquitto_pub -h <box ip> -u tao -P tao -t "/downlink-topic" -m  
'{"DevEUI_downlink":{"DevEUI":"20635F0106000324","FPort":"2","payload":{"downMessageType":"REQUEST_CONFIG","ackToken":1},"Confirmed":"1","FlushDownlinkQueue":"1","DriverCfg":{"app":{"pId":"abeeway","mId":"asset-tracker","ver":"2"}}}}'
```

- and subscribe to the "downlink-status-topic" topic to retrieve the status

```
mosquitto_sub -t /downlink-status-topic -h <box ip> -u tao -P tao  
{"response":"queued","payload":{"DevEUI_downlink":{"DevEUI":"20635F0106000324","FPort":"2","payload":{"downMessageType":"REQUEST_CONFIG","ackToken":1},"Confirmed":"1","FlushDownlinkQueue":"1","DriverCfg":{"app":{"pId":"abeeway","mId":"asset-tracker","ver":"2"}}}}}}
```

HTTP usage : Downlink and Downlink status

- You may either send downlink raw encoded packets using the "HTTP INPUT POST" node (using `payload_hex`):

```
curl -X POST -d '{"DevEUI_downlink":{"DevEUI":"20635F0106000324","FPort":"2","payload_hex": "0102"}}' -H 'Content-Type: application/json' http://<box ip>:1323/node-red/downlink  
  
{"response":"queued","payload":{"DevEUI_downlink":{"DevEUI":"20635F0106000324","FPort":"2","payload_hex":"0102"}}}
```

- Or you may send decoded downlink packets (using `payload`) and rely on TPE-All-in-One encoding functions:

```
curl -X POST -d '{"DevEUI_downlink":{"DevEUI":"20635F0106000324","FPort":"2","payload":{"downMessageType":"REQUEST_CONFIG","ackToken":1},"Confirmed":"1","FlushDownlinkQueue":"1","DriverCfg":{"app":{"pId":"abeeway","mId":"asset-tracker","ver":"2"}}}}' -H 'Content-Type: application/json' http://<box ip>:1323/node-red/downlink  
  
{"response":"queued","payload":{"DevEUI_downlink":{"DevEUI":"20635F0106000324","FPort":"2","payload":{"downMessageType":"REQUEST_CONFIG","ackToken":1},"Confirmed":"1","FlushDownlinkQueue":"1","DriverCfg":{"app":{"pId":"abeeway","mId":"asset-tracker","ver":"2"}}}}}
```

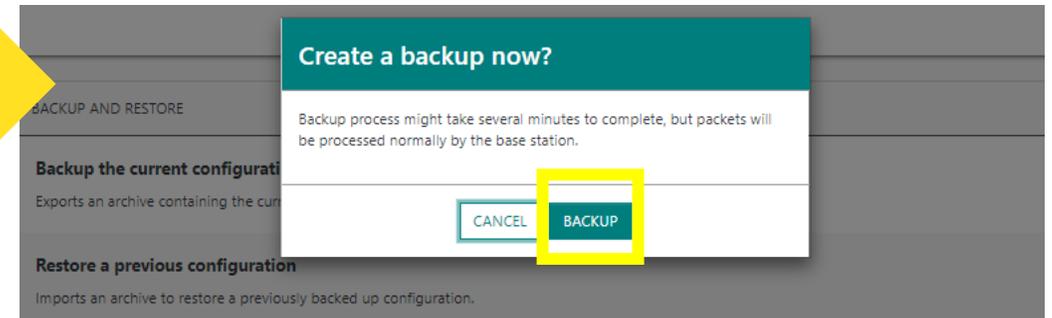
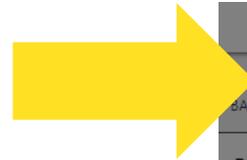
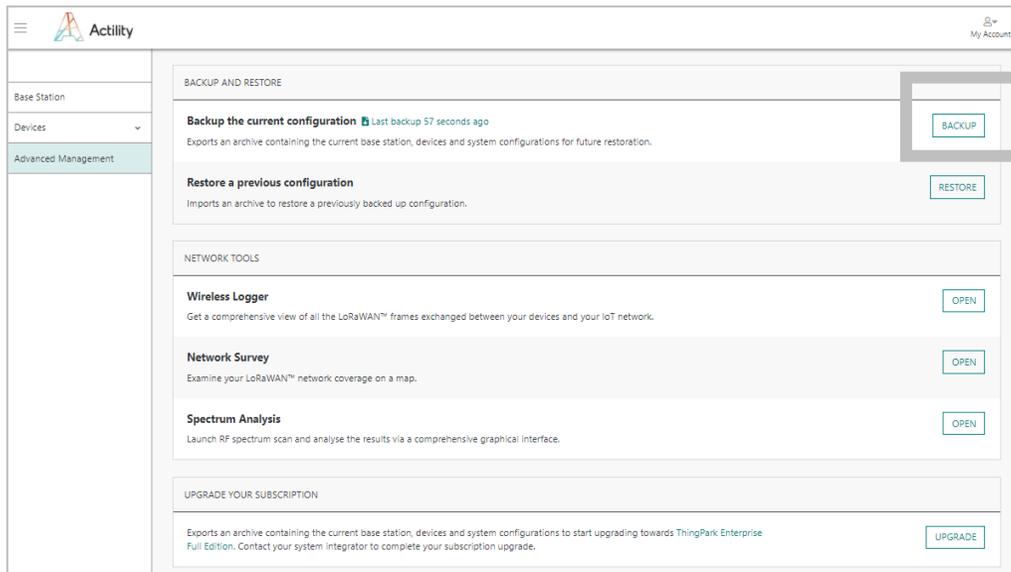
System Backup (1/4)

- It is necessary to regularly create a backup archive of your gateway:
 - Before / after node-red flow changes
 - After new device creations
 - Before / after LRR modifications (via Suplog)
 - Before / after system upgrades (upgrade version > 1.0.0), to support potential rollback situations

→ This will ensure that you will be able to restore the gateway if something went wrong.

System Backup (2/4)

- To create a backup file :
 - Go to "Advanced Management"
 - Click on the "Backup" button, then click "Backup" again on the popup



- The backup file is automatically downloaded on your browser

System Backup (3/4)

- After the backup is executed with success, a persistent link is generated :
 - it indicates the age of the last backup
 - it allows you to download the file later-on, but it is highly recommended to save the backup file in an alternative storage location

BACKUP AND RESTORE

Backup the current configuration [Last backup 9 minutes ago](#) BACKUP

Exports an archive containing the current base station, devices and system configurations for future restoration.

Restore a previous configuration RESTORE

Imports an archive to restore a previously backed up configuration.

System Backup (4/4)

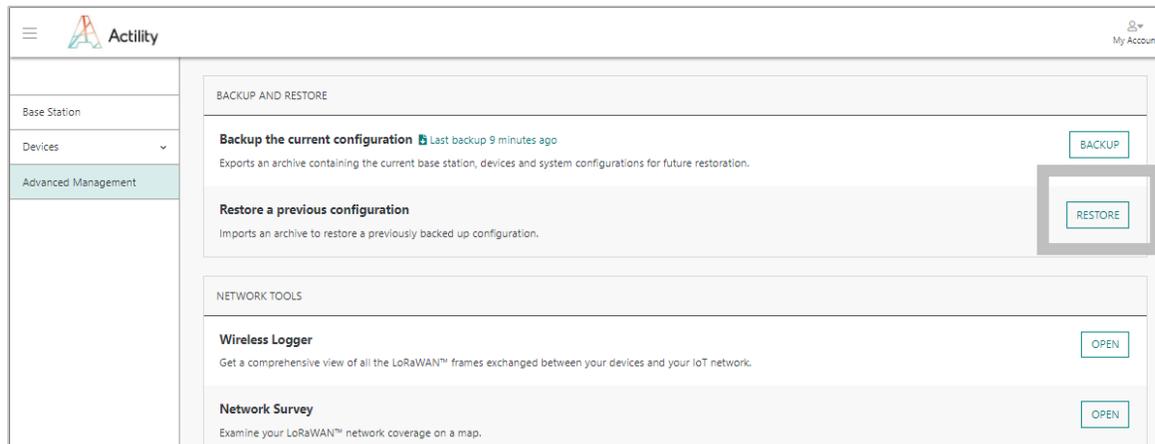
- The backup file consists of :
 - LRC database (FDB_lora)
 - Node-Red data folder (flows, credentials)
 - TPE-All-in-One (TAO) data folder (secret key)
 - A complete LRR backup (specific LRR procedure), including the network configuration changes provided through Suplog
 - TAO release version file
- **Note** passwords are not included in the archive.

System Restore (1/3)

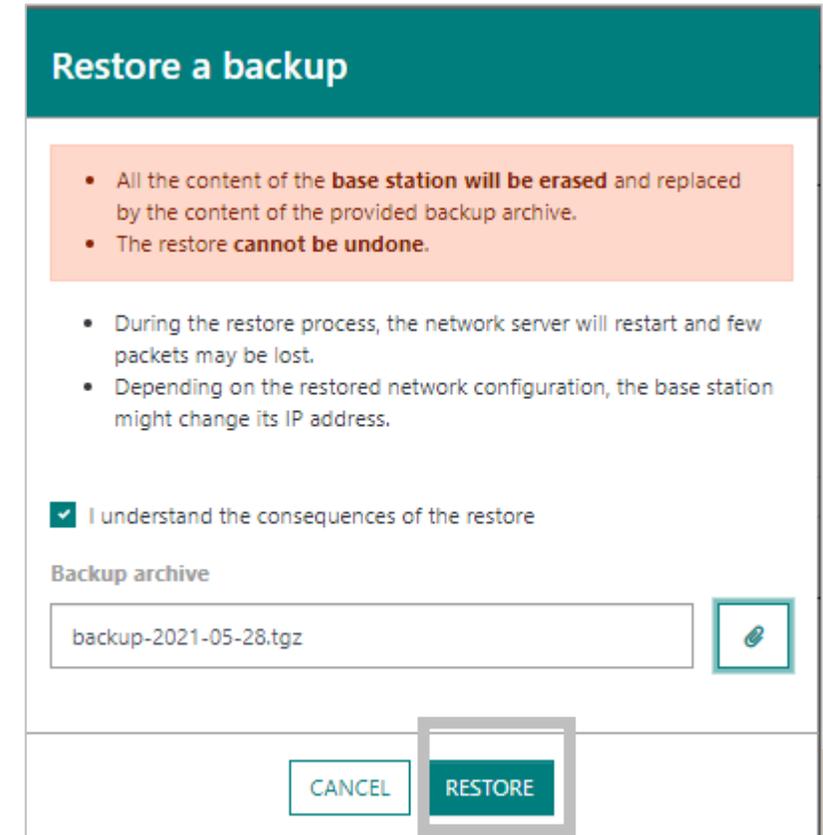
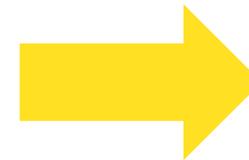
- Restore can only be executed on the same TAO version and the same hardware model (full restoration of LRR requires the same hardware model).
- It allows you for example to rebuild a gateway after a hardware failure
 1. install the same TAO version on an identical hardware model
 2. restore the archive content on that gateway
- Be careful, as the network configuration is restored, you might lose your gateway, it is then recommended to make sure that the gateway is correctly configured (identically as the backup).
- A full restore takes around 3mn.

System Restore (2/3)

- To restore a backup :
 - Go to "Advanced Management"
 - Click on the Restore button
 - On the popup
 - Click on "I understand the consequences of the restore"
 - Click on the  and pickup your backup file



- Click "Restore"



System Restore (3/3)

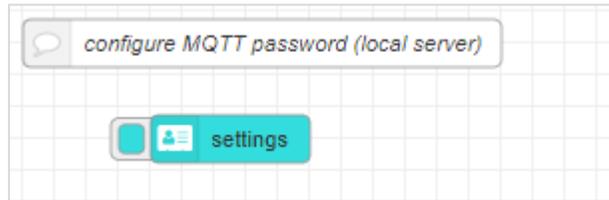
- During restoration, a waiting screen is displayed, and the GUI is locked:



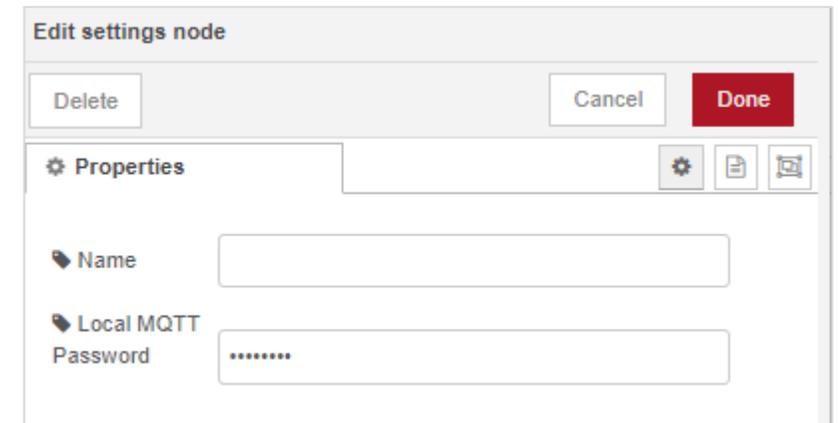
- Any attempt to navigate is blocked, all new login will be redirected to this same page.
- After restoration, all required services are restarted and the user can navigate again.

Internal MQTT broker password

- The internal MQTT broker is accessible through the user 'tao', the default password is 'tao', you can change it using the 'settings' node



- Double click the node to open the configuration panel, only the Local MQTT Password is configurable for now.
- Change the field and click Done.
- You must then Deploy the configuration to apply the changes.
- You also have to reconfigure your 'MQTT in' and 'MQTT out' nodes to use the new password



Migration to TPE Full Edition (1/6)

- **Preliminary step:** You must first contact your system integrator to purchase a ThingPark Enterprise Full Edition subscription.
- This migration is supported as of ThingPark Enterprise v7.2.
- Prerequisites:
 - A new Gateway configured on the target ThingPark Enterprise platform. This prerequisite is needed to avoid packet loss during the migration procedure (see “Migration steps” for more details).
 - Access to the target ThingPark Enterprise GUI.
 - A manual migration of your node-red flow to the ThingPark Enterprise node-red (if any, only relevant for TPE-OCP), otherwise you need to manually configure your Connection details towards external Applications in the GUI of your target ThingPark Enterprise platform.
 - A migration key, generated through the GUI of your target ThingPark Enterprise platform.
- Migration steps:
 - Export from TAO
 - TAO radio will automatically be stopped to prevent any change of the session context for devices being exported.
 - All device states are frozen and all device contexts are exported to a csv file.
 - During this phase, all uplink packets will not be processed by TAO, since TAO radio has been stopped.

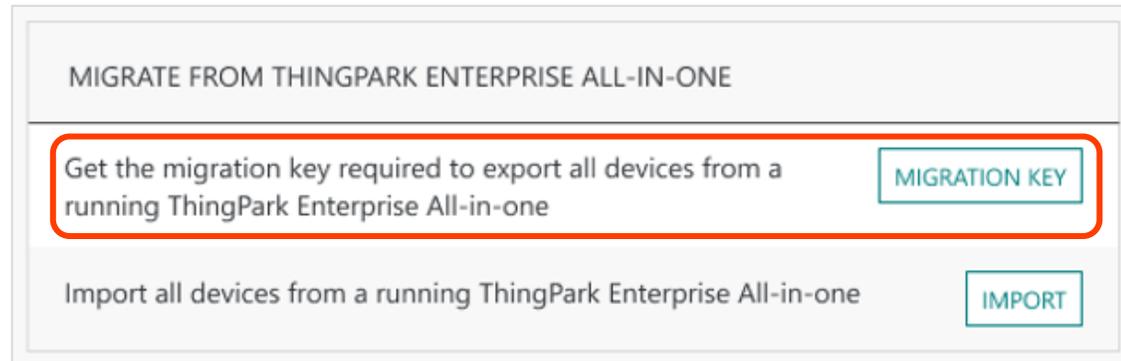
Migration to TPE Full Edition (2/6)

- Migration steps (cont.):
 - Export from TAO (cont.)
 - To avoid losing uplink packets during the export process, you should bring another gateway to temporarily serve TAO devices during the migration.
 - This gateway shall buffer UL packets until the import step is completed, then send the buffered frames to the target TPE platform when devices are successfully imported.
 - Therefore, the gateway shall NOT be configured to communicate with the target TPE platform as long as the device import step is not successfully completed. For instance, you may manually disable the network interfaces to force the gateway to buffer UL frames until devices are successfully imported to TPE platform.
 - Import to TPE full-edition
 - Device contexts are recreated on ThingPark Enterprise
 - Once import is successfully completed, the new gateway shall be configured to communicate with the target TPE platform (e.g., by restoring the network interface backhaul if it was manually cut during the export step).
 - The new gateway shall purge the buffered UL packets towards the target TPE platform, then those frames will be processed by the TPE network server and sent to external Application Servers with a “Late” flag.
 - Depending on your strategy, several options are possible:
 - Either recycle the TAO gateway as a conventional LRR-only base station: in this case, you need to reflash your gateway with a TPE BS image, as described in the [TPE user guide](#).
 - Or continue to serve your devices through the new gateway (used during the migration) and reuse your TAO gateway in another deployment location.

Migration to TPE Full Edition (3/6)

1. Step #1: On ThingPark Enterprise GUI (target platform):

- From the left panel, go to “Operating Management”
- In “Migrate from ThingPark Enterprise All-in-One” widget, get the “Migration Key” file. Save it to upload it to TAO in Step #2

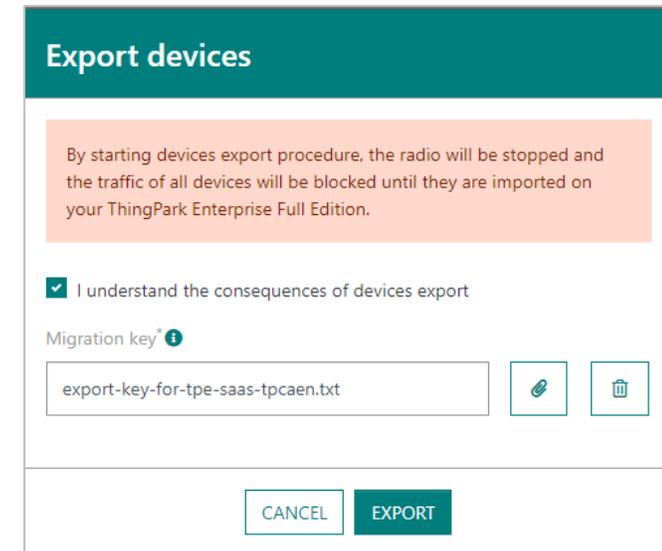
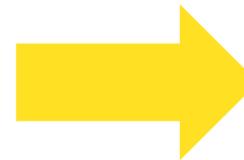
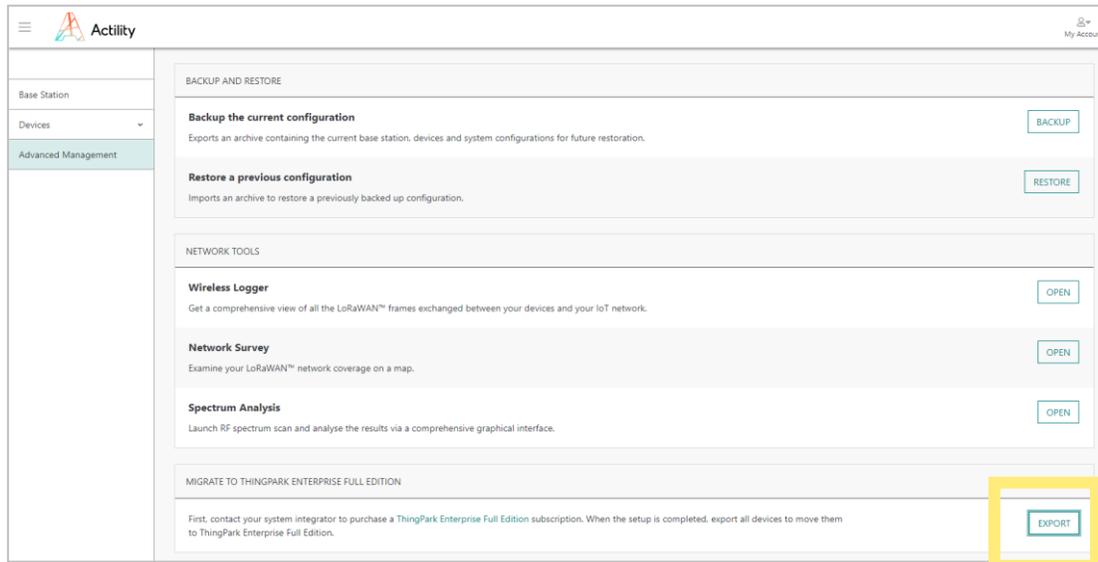


Migration to TPE Full Edition

(4/6)

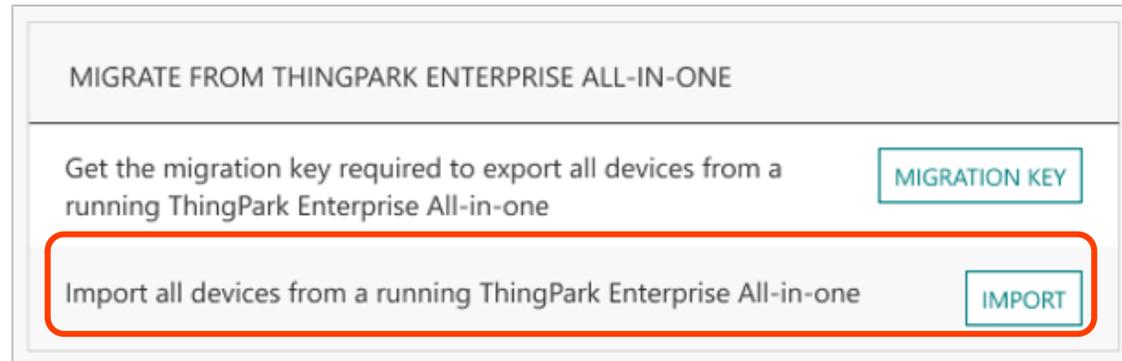
2. Step #2: On TAO side

- Go to "Advanced Management"
- Click on the Export button
- On the popup
 - Click on "I understand the consequences of the devices export"
 - Click on the  and select your migration license file.



Migration to TPE Full Edition (5/6)

- 3. Step #3:** On TPE side, import your "export-YYYY-MM-DD.taodevices" file to ThingPark Enterprise GUI, through the "Operating Management" tab:



Note During this step, you will be requested to associate your imported devices with one or several Connections towards external Application Servers. So, those Connections must be setup prior to the import process.

At the end of the migration operation, all the devices should seamlessly work on the ThingPark Enterprise platform.

Migration to TPE Full Edition (6/6)

In case you want to recycle your TAO gateway as a conventional LRR-only Gateway:

1. you must remove all TAO components from your Gateway, you have to connect on it (using ssh) and execute the TAO cleanup script:

```
chmod u+x /home/actility/tao-system/scripts/tao-remove.sh  
/home/actility/tao-system/scripts/tao-remove.sh
```

2. You can now install an official LRR package on that gateway, you need to reflash your gateway with a TPE BS image, as described in the [TPE user guide](#)

Migration to TPE Full Edition : Rollback

If something went wrong during the migration, you have the possibility to rollback you migration.

Full rollback : All your devices will remain in TAO

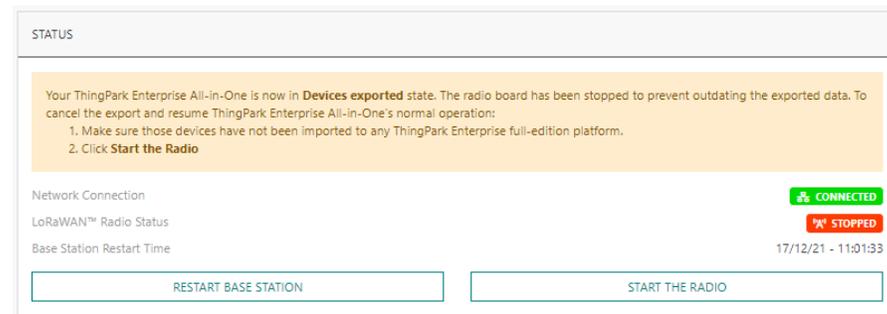
step#1 : all migrated devices must be deleted on the TPE Full Edition.

step#2 : on the TAO Base Station panel, click on "START THE RADIO".

Partial rollback : all migrated devices will stay in TPE Full Edition, but the ones that were not migrated will stay on TAO.

step#1 : all migrated devices must be deleted on TAO.

step#2 : on the TAO Base Station panel, click on "START THE RADIO".



Advanced tasks : Services

- TAO is composed of a standard LRR with its standard services, most important one is :
 - `/etc/init.d/lrr`
- 4 new services are added
 - `/etc/init.d/lrc {start | stop | status | restart}`
 - LRC server
 - `/etc/init.d/tao {start | stop | status | restart}`
 - tao server, written in GO, serving the angular GUI
 - `/etc/init.d/node-red {start | stop | status | restart}`
 - node-red server
 - `/etc/init.d/mqtt {start | stop | status | restart}`
 - mqtt broker

Advanced tasks - WARNING

- **Important**

- It is not allowed to modify any configuration files located under /home/activity/usr/etc... (except for temporary tests)
- All these modifications will be lost after an upgrade

Advanced tasks : Access to logs (1/3)

- All logs are stored in a tmpfs in-memory space
 - log storage root path :
 - ufi space : /var/volatile/log
 - gemtek : /dev/shm/log
 - for each service, a dedicated folder is created
 - < log storage root path > /_LRCLOG
 - < log storage root path > /_LRRLOG
 - < log storage root path > /_NODEREDLOG
 - < log storage root path > /_TAOLOG
- This is achieved through links (ufi space example)

```
am335x-evm:/# ls -l /home/activity/var/log/
lrwxrwxrwx 1 root root 25 Jan 5 11:36 lrc -> /var/volatile/log/_LRCLOG
lrwxrwxrwx 1 root root 25 Jan 5 11:36 lrr -> /var/volatile/log/_LRRLOG
lrwxrwxrwx 1 root root 29 Jan 5 11:36 node-red -> /var/volatile/log/_NODEREDLOG
lrwxrwxrwx 1 root root 25 Jan 5 11:36 tao -> /var/volatile/log/_TAOLOG
```

Advanced tasks : Access to logs (2/3)

- tmpfs space
 - ufiSPACE PICO/MACRO : 100 MB
 - gemtek : 500 MB
- Log levels are kept very low, and not provided for mqtt
 - LRR (/home/activity/usr/etc/lrr/lrr.ini) :
 - level=1, debug=1, size=10000000 (10MB)
 - LRC (/home/activity/usr/etc/lrc/lrc.ini) :
 - level=1, debug=1, size=10000000 (10 MB)
 - TAO (/home/activity/usr/etc/tao/configs/tao_server_config.yaml) :
 - level: WARN, maxSize=10 #megabytes
 - node-red : (/home/activity/usr/etc/node-red/settings.js) :
 - level : 'error', size=10000000 (10 MB)
 - mqtt: (/home/activity/usr/etc/mqtt/mosquitto.conf) :
 - log_dest none to log_dest file /var/log/mosquitto.log

Advanced tasks : Access to logs (3/3)

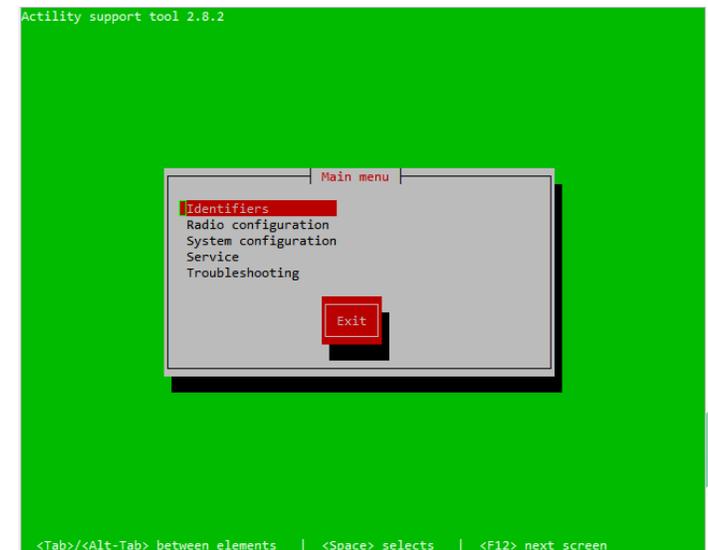
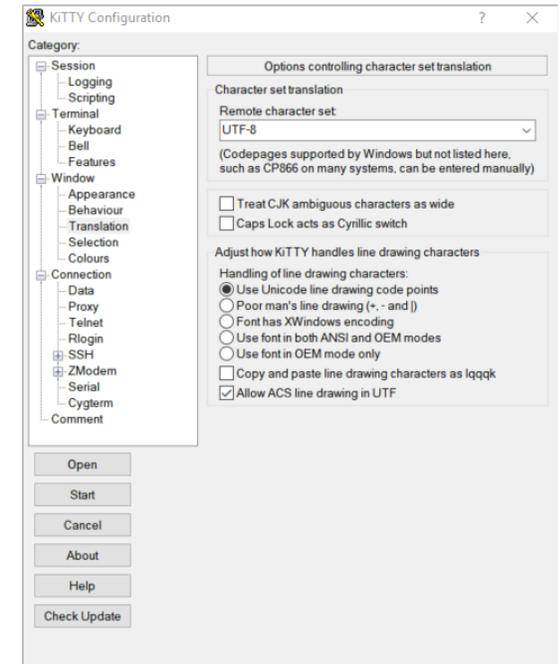
- Log level modification
 - For Irr, tao, node-red, mqtt you must connect on the base station, and modify the configuration files and then, restart the corresponding service
 - For Irc, you can do the same or dynamically through a telnet admin session (telnet 0 2009)
 - For node-red,
 - level: "trace",
 - add section: uplinkDownlink: { log: (s)=>{(module.exports.logging.customLogger.handler())({timestamp: s.slice(0,s.indexOf(" ")), msg:s.slice(s.indexOf(" ")+1)}} } },
 - For MQTT : log_dest to log_dest file /var/log/mosquitto.log, and set log_type
- All logs (not for the MQTT broker) are stored in memory, they are copied on disk every day in /home/activity/traces

Advanced tasks – Suplog (1/2)

- Preliminary : for putty users, you must configure "Allow ACS line drawing in UTF" to get nice rendering
- Connect on suplog using ssh (password is the one you use to connect on tao)

```
ssh support@$BOX_IP
```

- To navigate inside the tool :
 - <tab>, <arrow right> : move to action buttons, then return to the initial position, navigate inside forms
 - <arrow up> / <arrow down> : change position in menus, navigate inside forms
 - <enter> : select a menu item, validate an action
 - <space> : activate/deactivate a choice inside forms

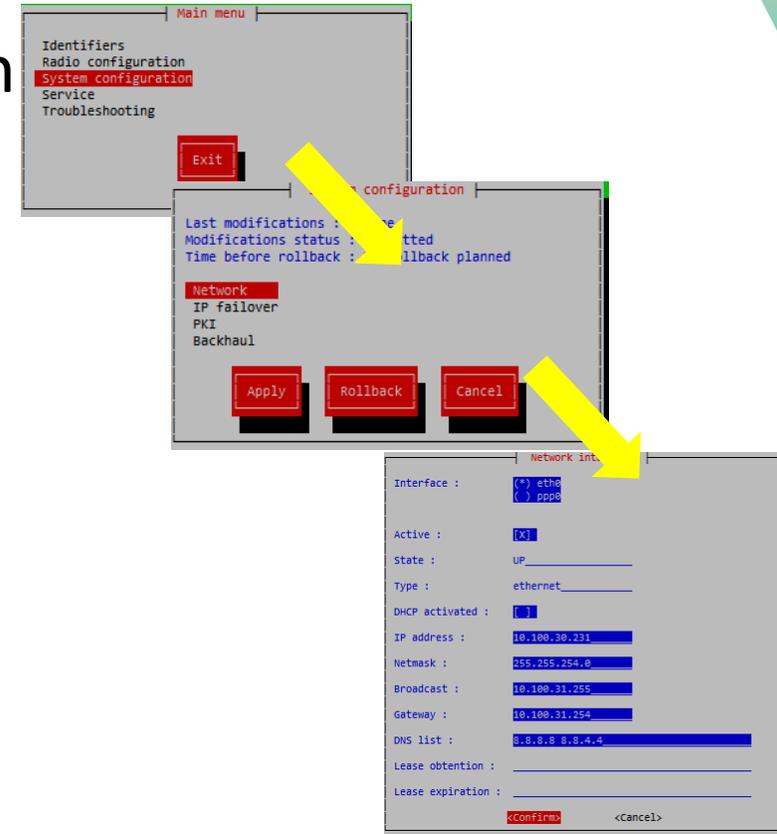


Advanced tasks – Suplog (2/2)

- Warning : some menu configurations are not supported or irrelevant in TPE All In One context :
 - Identifiers
 - Radio configuration
 - System configuration / PKI
 - System configuration / Backhaul
 - Service
 - Troubleshooting

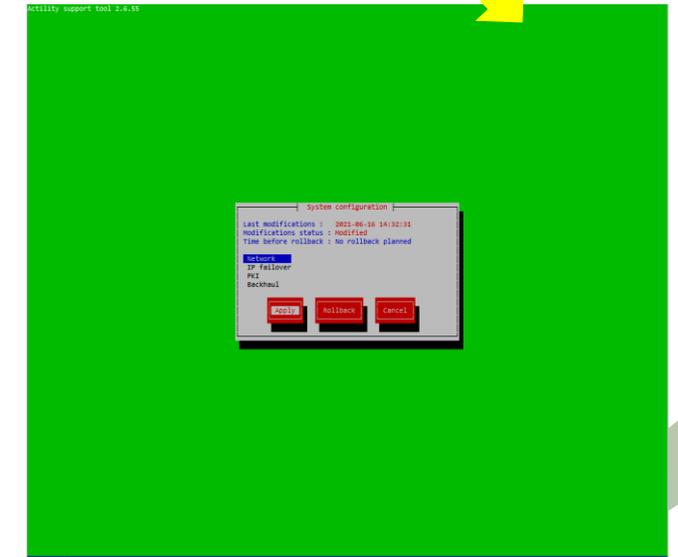
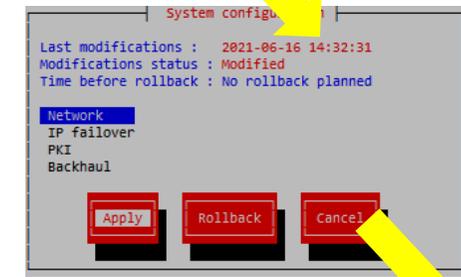
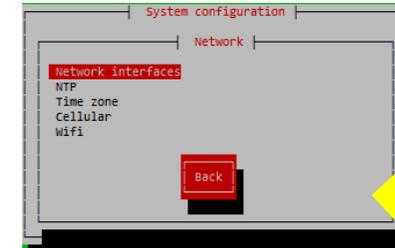
Suplog DHCP -> Static IP (1/3)

- The gateway is originally configured for ethernet with DHCP, follow these steps to configure a fix IP address
 - select System configuration, press <enter>
 - select Network, press <enter>
 - select Network interfaces, press <enter>
 - you can then configure your interface settings, use <tab> to navigate through the fields
 - Active, should have an [X]
 - DHCP activated, should be deactivated : []
 - IP address, Netmask, Broadcast, Gateway, DNS list must be configured
 - Move to the Confirm button, Press <Enter>



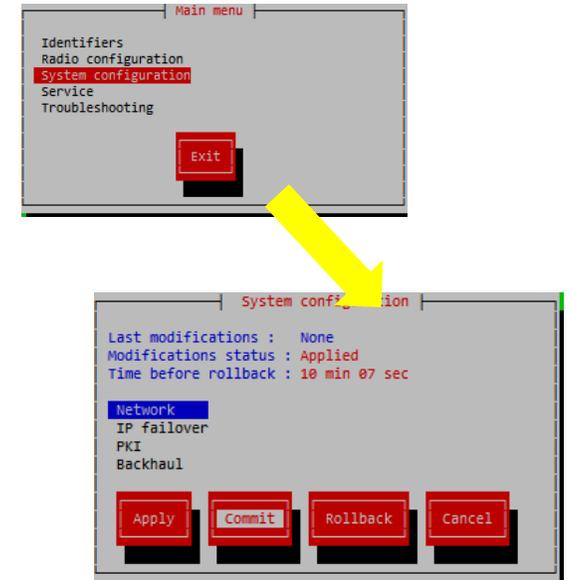
Suplog DHCP -> Static IP (2/3)

- select Back button, press <enter>
- select Apply, press <enter>
- you are now invited to wait, the gateway is now reconfiguring everything, but as you have changed the ip address, your console is no more on the right location



Suplog DHCP -> Static IP (3/3)

- After the configuration is applied, you must wait around **1 minute** before connecting to the new IP address (you will not be able to commit the configuration before this delay), you also have 15 minutes to commit your changes, if you don't commit, the configuration will be automatically rolled back
 - connect a new suplog session to the new IP address
 - select System configuration, press <enter>
 - select the Commit button, press <enter>

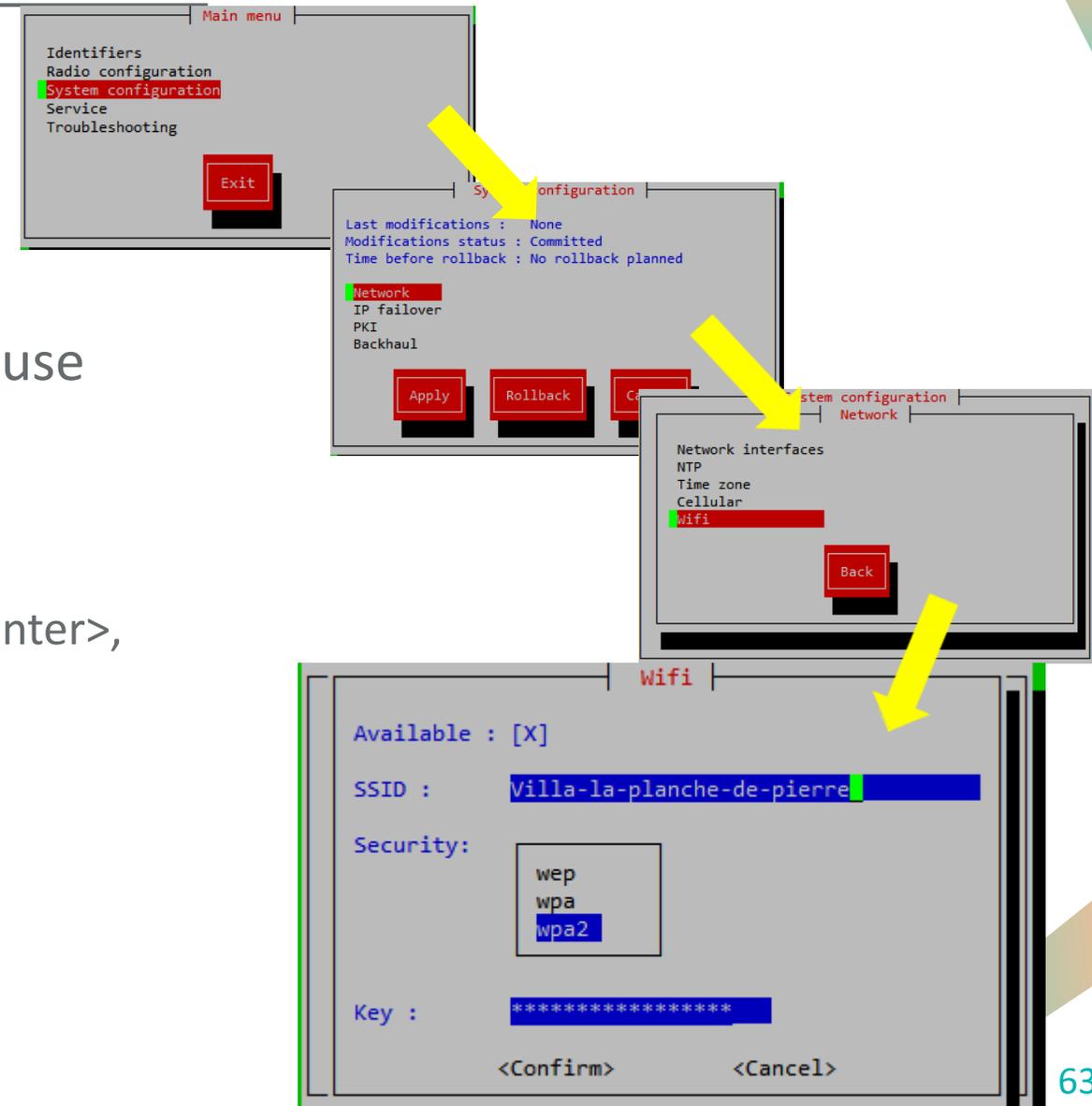


Suplog Eth -> WiFi mode [PICO] (1/6)

- The gateway is originally configured for ethernet with DHCP, follow these steps to configure the WiFi mode instead of ethernet
- Five steps are required
 - Configure your WiFi credentials
 - Deactivate eth0
 - Activate wlan0
 - Apply the configuration
 - Commit the configuration

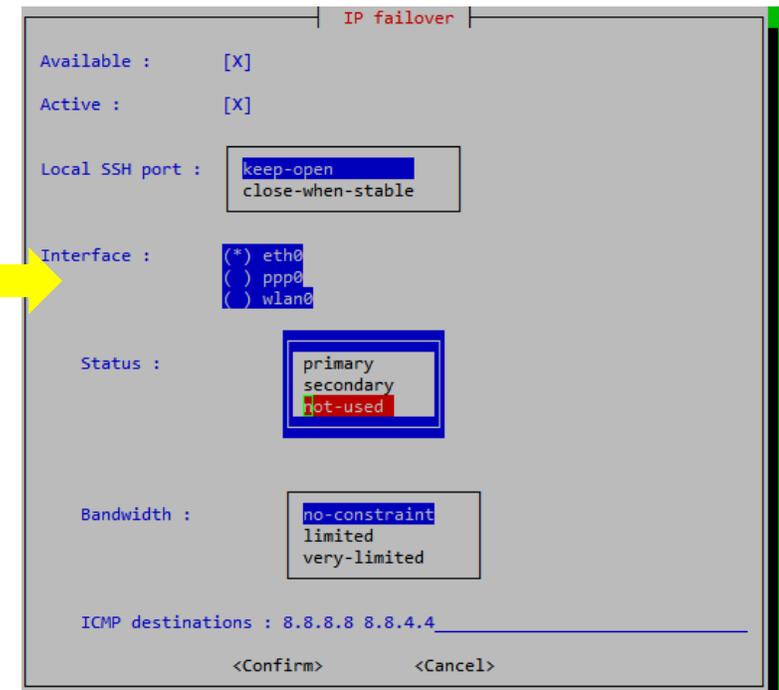
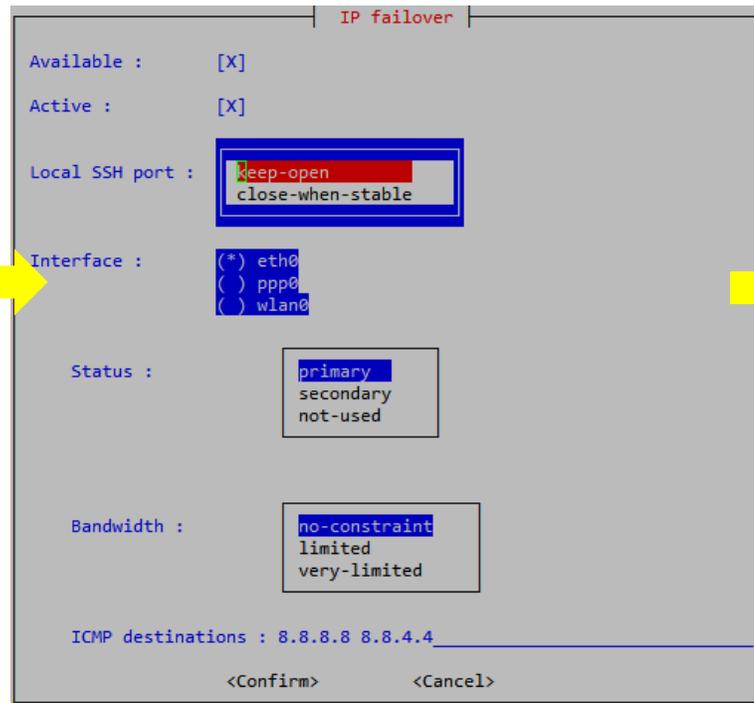
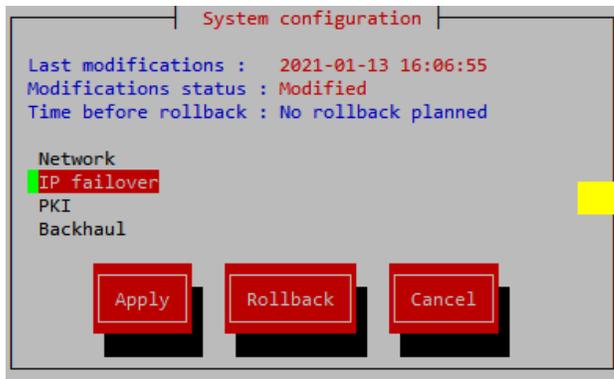
Suplog Eth -> WiFi mode [PICO] (2/6)

- Step 1/5 : enter your WiFi credentials
 - select System configuration, press <enter>
 - select Network, press <enter>
 - select WiFi, press <enter>
 - you can then configure your WiFi settings, use <tab> to navigate through the fields
 - Available, should have an [X]
 - SSID, enter your SSID
 - Security, enter your security algorithm, press <enter>, when finished to validate your choice
 - Key, enter your security key, press <enter>,
 - Confirm, press <enter>
 - Select Back button to return to the System configuration



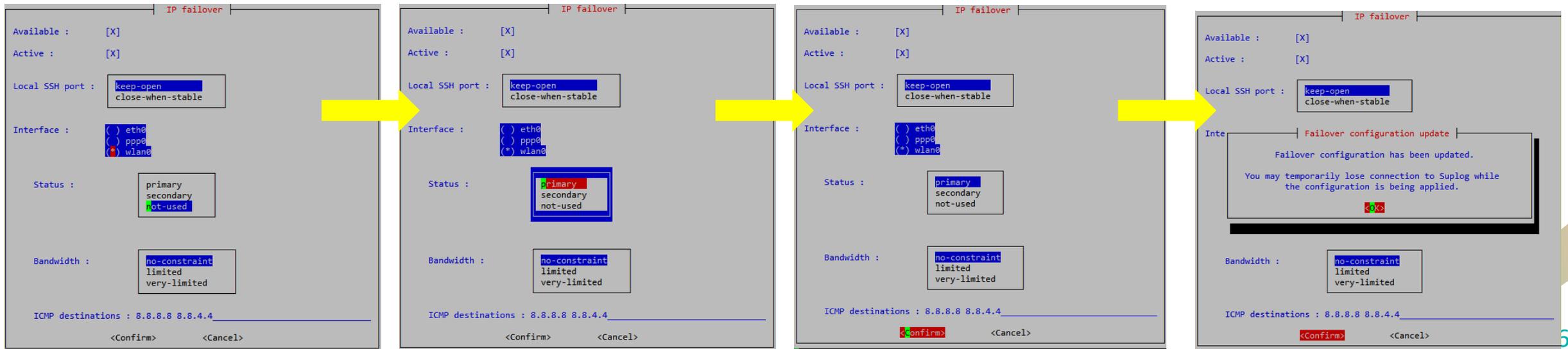
Suplog Eth -> WiFi mode [PICO] (3/6)

- Step 2/5 : deactivate eth0
 - select IP failover, press <enter>
 - Interface should be (*) eth0
 - move to Status, select not-used and press <enter>
 - stay on this form for the next step !



Suplog Eth -> WiFi mode [PICO] (4/6)

- Step 3/5 : activate wlan0
 - move to Interface, and select wlan0 (<space>)
 - Interface should be (*) wlan0
 - move to Status, select primary and press <enter>
 - move to Confirm, press <enter>
 - on the OK button, press <enter>
 - you are now back to the System configuration menu



Suplog Eth -> WiFi mode [PICO] (5/6)

- Step 4/5 : apply your configuration
 - move to Apply, and press <enter>
 - press <enter> on the Confirm button
 - Please wait, you will now loose your network connection, you need to find the WIFI address
 - After the configuration is applied, you have 15 minutes to commit your changes, if you don't commit, the configuration will be automatically rolled back

```
System configuration
Last modifications : 2021-01-13 16:19:43
Modifications status : Modified
Time before rollback : No rollback planned

Network
IP failover
PKI
Backhaul

Apply Rollback Cancel
```

```
System configuration
Last modifications : 2021-01-13 16:19:43
lrr must be restarted
Please confirm or cancel...

Confirm Cancel
```

```
System configuration
Last modifications : 2021-01-13 16:19:43
Modifications status : Modified
Time before rollback : No rollback planned

Network
IP failover
PKI
Backhaul

Apply Rollback Cancel
```

```
Arago 2015.05 am335x-evm /dev/tty00
am335x-evm login: mlbadmIn
Password:
am335x-evm:~# ifconfig
eth0      Link encap:Ethernet  HWaddr 38:08:3C:26:9E:E8
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:67683 errors:0 dropped:0 overruns:0 frame:0
          TX packets:33998 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:85547210 (81.5 MiB)  TX bytes:8521581 (8.1 MiB)
          Interrupt:56

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:5128 errors:0 dropped:0 overruns:0 frame:0
          TX packets:5128 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:3345515 (3.1 MiB)  TX bytes:3345515 (3.1 MiB)

wlan0    Link encap:Ethernet  HWaddr A8:10:87:14:93:A2
          inet addr:192.168.1.23  Bcast:192.168.1.255  Mask:255.255.255.0
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:118 errors:0 dropped:0 overruns:0 frame:0
          TX packets:149 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:14568 (14.2 KiB)  TX bytes:16592 (16.2 KiB)

am335x-evm:~#
```

Activity

Suplog Eth -> WiFi mode [PICO] (6/6)

- Step 5/5 : commit your configuration
 - See "[Suplog - Commit configuration](#)"

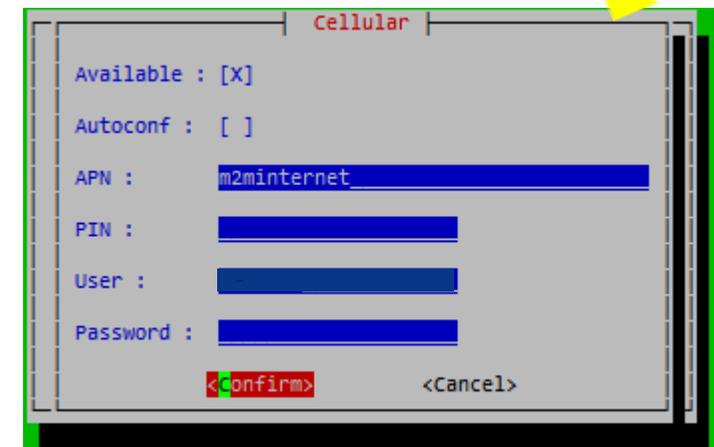
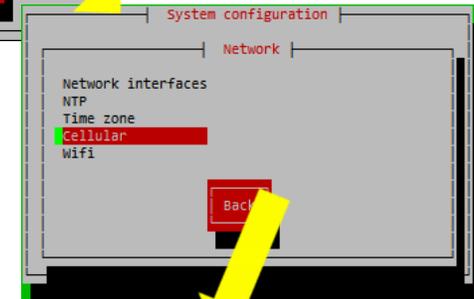
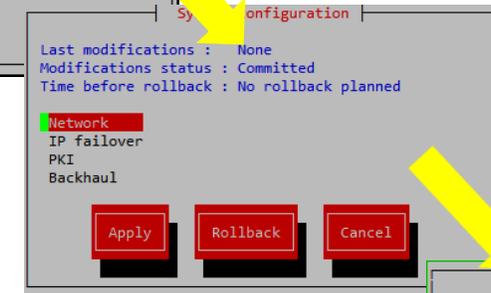
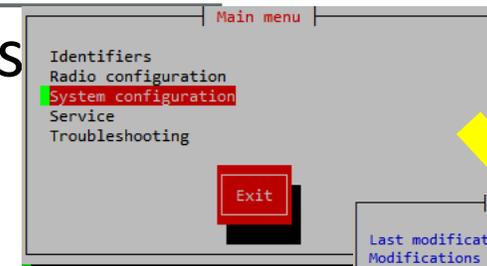
Suplog Eth -> Cellular mode (1/6)

- The gateway is originally configured for ethernet with DHCP, follow these steps to configure the Cellular mode instead of ethernet
- Five steps are required
 - Configure your Cellular credentials
 - Change eth0 to secondary (or not-used)
 - Activate ppp0
 - Apply the configuration
 - Commit the configuration

Suplog Eth -> Cellular mode (2/6)

- Step 1/5 : enter your Cellular credentials

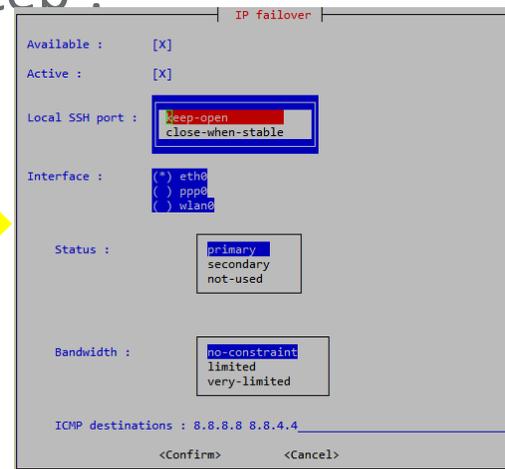
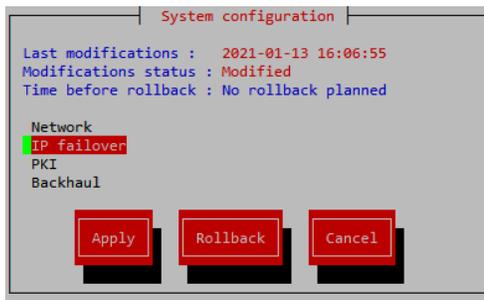
- select System configuration, press <enter>
- select Network, press <enter>
- select Cellular, press <enter>
- you can then configure your Cellular settings, use <tab> to navigate through the fields
 - Available, should have an [X]
 - Autoconf, leave empty
 - APN, enter your APN, press <enter>
 - PIN, enter your PIN if any, press <enter>,
 - User, enter your user if any, press <enter>
 - Password, enter your password if any, press <enter>
 - Press Confirm
- Select Back button to return to the System configuration



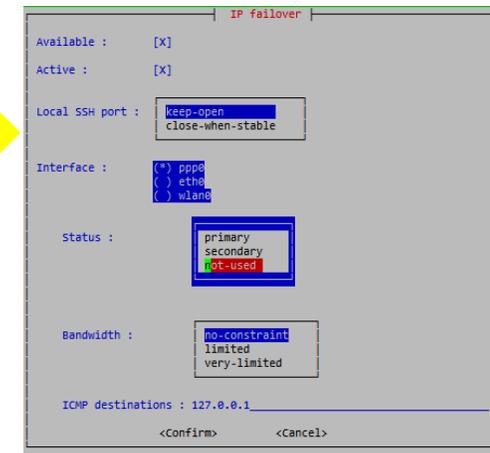
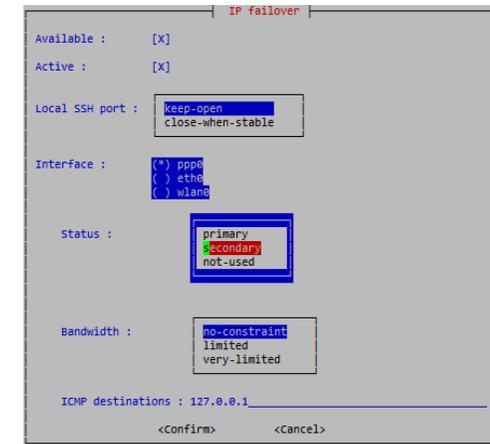
Suplog Eth -> Cellular mode (3/6)

- Step 2/5 : you should change eth0 to status: secondary, in order to still get access on your local LAN and connect TAO. If you deactivate it, you will not be able to connect back on TAO if you don't get public IP from your cellular connection

- select IP failover, press <enter>
- Interface should be (*) eth0
- move to Status, select secondary or not-used
- and press <enter>
- stay on this form for the next step !



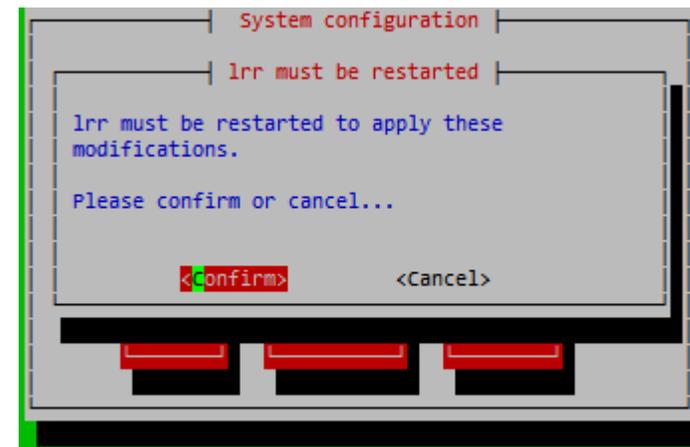
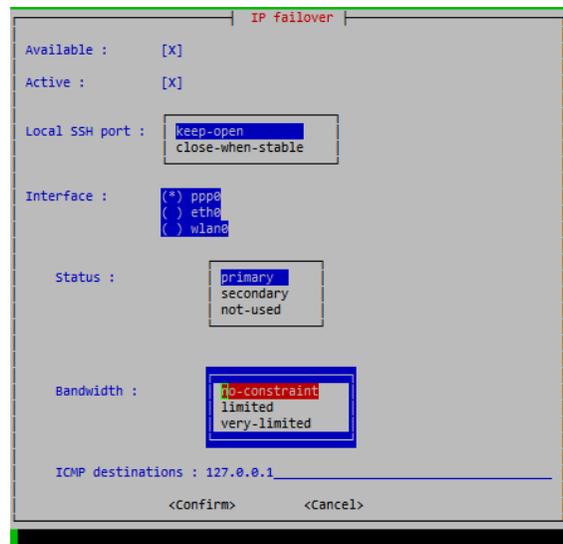
or



Suplog Eth -> Cellular mode

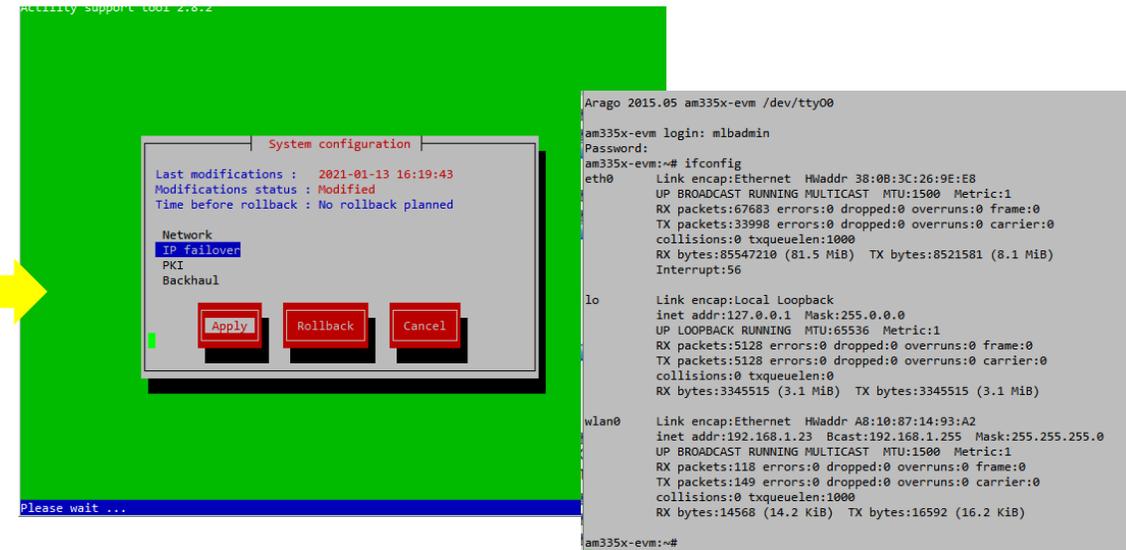
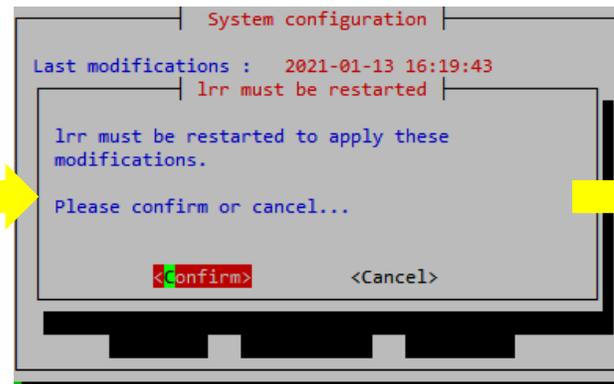
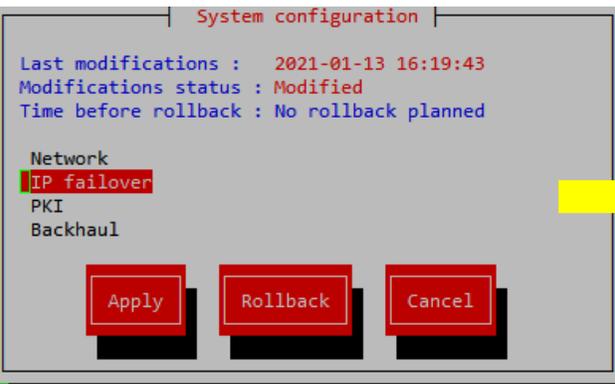
(4/6)

- Step 3/5 : activate ppp0
 - move to Interface, and select ppp0(<space>)
 - Interface should be (*) ppp0
 - move to Status, select primary and press <enter>
 - move to Confirm, press <enter>
 - on the OK button, press <enter>
 - you are now back to the System configuration menu



Suplog Eth -> Cellular mode (5/6)

- Step 4/5 : apply your configuration
 - move to Apply, and press <enter>
 - press <enter> on the Confirm button
 - Please wait, you will now lose your network connection, you need to connect back to the gateway through ethernet (secondary interface) to commit your changes.
 - After the configuration is applied, you have 15 minutes to commit your changes, if you don't commit, the configuration will be automatically rolled back



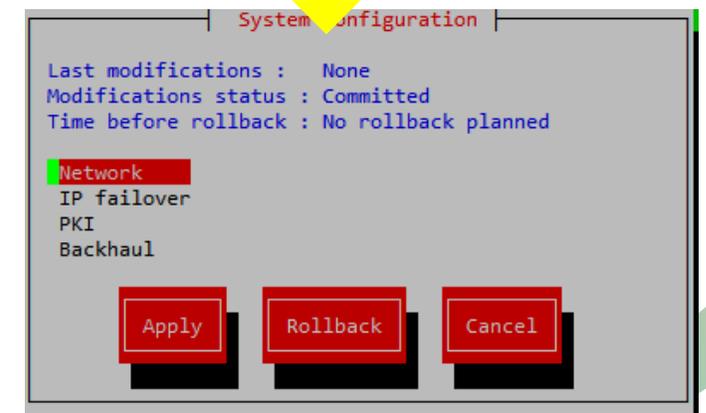
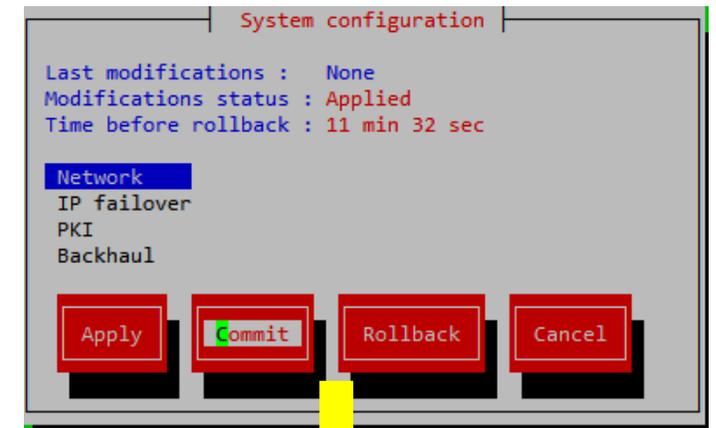
Suplog Eth -> Cellular mode

(6/6)

- Step 5/5 : commit your configuration
 - See "[Suplog - Commit configuration](#)"

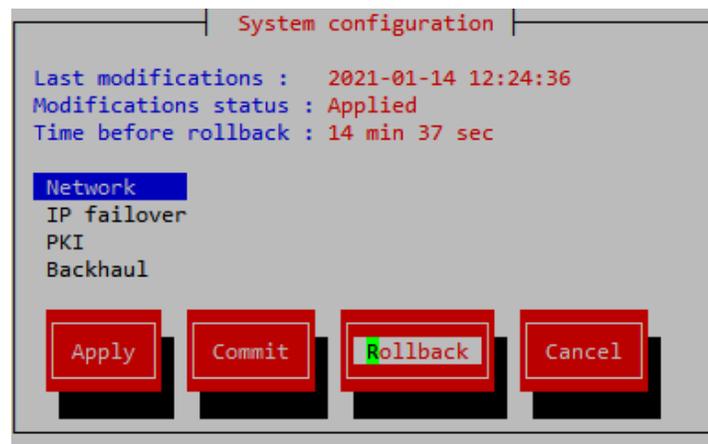
Suplog - Commit configuration

- Every time you apply a new configuration, ThingPark All In One will keep this configuration for 15 minutes, and will automatically roll back if you don't commit your changes
- you have to commit the configuration to keep it permanently
 - you must return to the System configuration menu
 - Modification Status should be : Applied
 - Time before rollback is also displayed
 - You now have to select Commit and press <enter>
 - The screen will change to reflect the new Modification Status : Committed



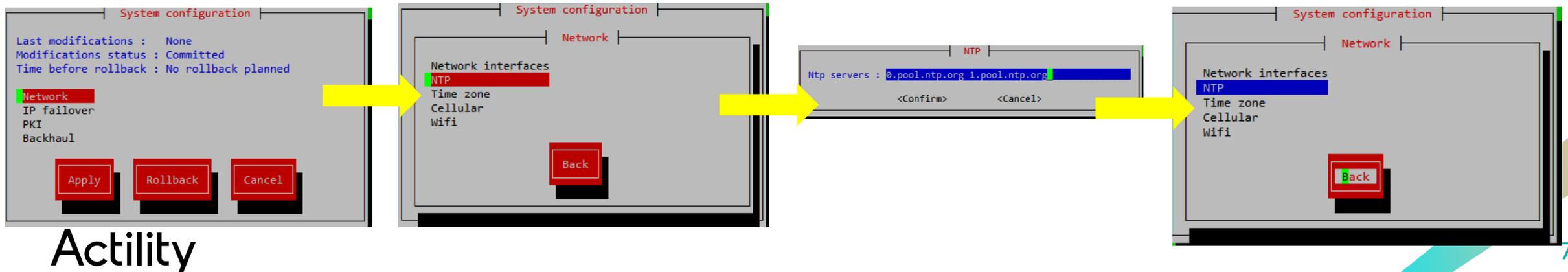
Suplog - Restore configuration

- If you want to restore your previous configuration manually rather than waiting for the automatic rollback
 - select System configuration, press <enter>
 - Modification Status should be : Applied
 - Time before rollback is displayed
 - Select Rollback and press <enter>
- Note : Once a configuration is committed, it cannot be rolled back



Suplog - Change NTP Servers

- If you want to change your NTP servers
 - Select System configuration, press <enter>
 - Select Network and press <enter>
 - Select NTP and press <enter>
 - Change the NTP servers list
 - Move to Confirm, press <enter>
 - Move to Back, press <enter>
 - Move to Apply, press <enter>
 - After reconfiguration, commit your configuration, see [Suplog - Commit configuration](#)



Advanced tasks - Direct access to Node-Red flow

- In case you encounter issues with Node-Red configuration, making Node-Red UI unreachable (e.g. infinite loop that consume all node CPU) and you have no backup file
 - You may directly connect on the box using the node-red user (password is the one you use to connect on tao)
 - `ssh node-red@$BOX_IP`
 - Enter the node-red-data folder
 - `cd /home/actility/node-red-data/`
 - You can edit flows.json and correct the file
 - You can now kill -9 the node-red process, it will be automatically restarted, take care to only kill the "node-red" process

```
am335x-evm:~$ ps | grep node-red
```

```
3768 root      1464 S      {S99node-red} /bin/sh /etc/rc5.d/S99node-red _respawnService
```

```
3822 node-red   2600 S      su -c /opt/node/bin/node /home/actility/node-red/node_modules/node-red/red.js --settings /home/actility/usr/etc/node-red/settings.js node-red
```

```
3838 node-red  131m S      node-red
```

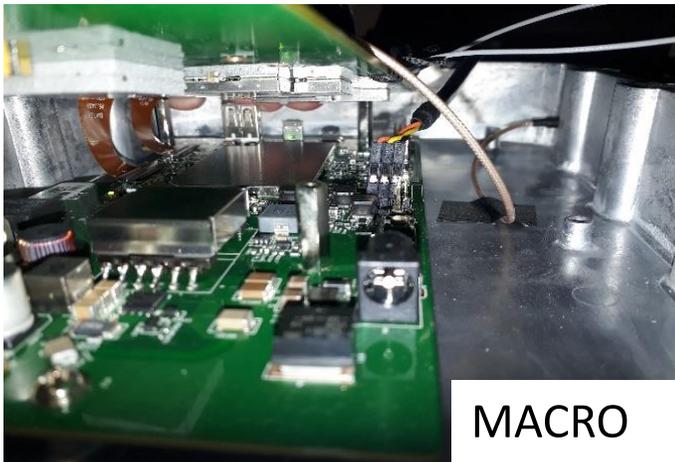


Advanced tasks - Open ports

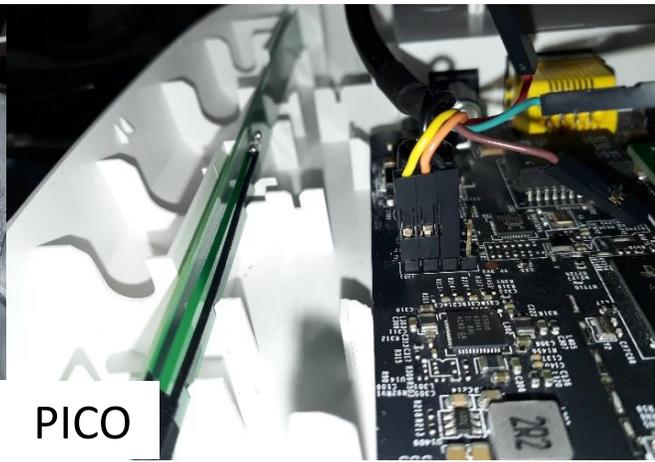
- Following ports are open
 - tcp port 22 (ssh)
 - tcp port 10502/11502 (reserved for an eventual MODBUS Server, or other usages)
 - tcp port 1883 (MQTT)
 - tcp port 1323 (TAO)

Advanced tasks – Access via serial port

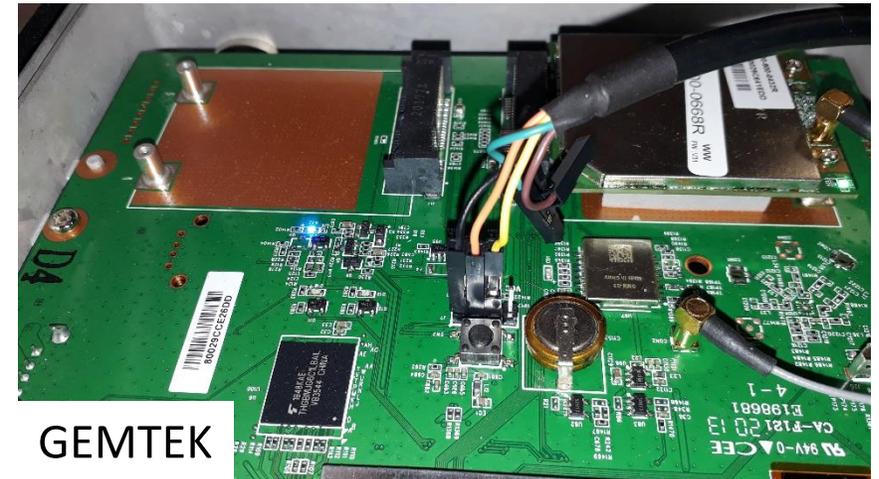
- You may connect to the serial port using an FTDI cable
 - black : GND
 - yellow : TX
 - orange : RX
- Speed (baud): 115200, Data bits: 8, Stop bits: 1, Parity: None, Flow control: XON/XOFF



MACRO



PICO



GEMTEK

THANK YOU



Activity