AMPLIFIED ENGINEERING

nodeG5 Edge MQTT Gateway

Supporting

MQTT Microsoft Azure aws ubidots

Deploy edge or FOG compute with an IIoT gateway that supports python, docker & services like AWS Sitewise & TensorFlow to manage CAN Bus J1939/OBD2, OPC UA, Serial RS485 Modbus TCP/RTU, WiFi & BLE data.

EDITION / November 2024 /
FIRMWARE VERSION 2.2

DESIGNED IN AUSTRALIA.
ASSEMBLED IN SINGAPORE.

NEW FEATURES IN FIRMWARE 2.2

REAL TIME DATA MODE

The addition of a Real Time data mode allow users to handle instantaneous status updates more effectively instead of queuing & storing data in a SQL buffer.

JSON CONFIGURATION FOR IOTASSET

We have changed the configuration of the iotasset set up from a .txt file to a .json format to improve flexibility & efficiency.

TABLE OF CONTENTS

SAFETY OF USE

ALL CONDITIONS	All specialist electronic devices must be operated with due care to avoid damage or injuries and should be installed and operated by a trained personnel. DO NOT OPERATE THIS EQUIPMENT IN ENVIRONMENTS CONTAINING POTENTIALLY EXPLOSIVE GASES OR LIQUIDS, EXAMPLE, GAS STATIONS AND CHEMICAL PLANTS AND EXPLOSIVE STORES.
POWER SETUP	Inadequate current or dips in voltage may cause the device to fail to connect to data services even if the LEDs are lighted up. Supply over 30 VDC will damage the device.
SIM CARD	Never remove or insert SIM card when device has PWR switched in “ON” position. Damage caused to device or SIM in such case will not be warranted.
CONFIGURING THE ROUTER	Do not reboot/power-down the device until the writing process is acknowledged as completed.

1. 1

nodeG5
SPECIFICATIONS

CPU CORE

CPU	NXP i.MX8M Plus QuadLite, quad-core ARM Cortex-A53, 1.8GHz
NPU	AI/ML Neural Processing Unit, up to 2.3 TOPS
REAL TIME CO-PROCESSOR	ARM Cortex-M7, 800Mhz

STORAGE & MEMORY

RAM	2GB LPDDR4
Storage	32GB eMMC flash, soldered on-board

NETWORK

LAN	2x 1000Mbps Ethernet ports, RJ45
WIFI*	802.11ax WiFi
BLE*	Bluetooth 5.3 BLE
CELLULAR*	4G/LTE CAT4 cellular module, Quectel EC25-E/A (EU & US bands)
GNSS*	GPS

I/O

USB	2x USB2.0, 1x USB3.0 type-A connectors
RS485/ RS232*	Up to 2x RS485 (half-duplex)
CAN BUS*	Up to 2x CAN bus port
Digital I/O	Optional 4IN + 4OUT digital I/O
Debug	1x serial console via UART-to-USB bridge, micro-USB connector.

MANAGEMENT

NETWORK ROBUSTNESS	· Designed for maximum uptime from available network · NetMgr WWAN connect timeouts · End-to-End PING connectivity testing with reboot
NETWORKING	· Dynamic DNS
CLOUD MANAGEMENT	· Azure IoT Hub · AWS IoT Core / Sitewise Client · Ubidots Client · MQTT Client with TLS Security · On-board Real Time Clock
INTEGRATED DATA FEATURES	· Real Time Data Mode · FIFO Data Mode
REMOTE MANAGEMENT	· SSH for Remote LINUX Management

USER CUSTOM PROGRAMMING

· Run Python (2.7.15 & 3.6.5)/ LUA/ BASH scripting
· Run containers on Debian Linux

WARRANTY

· 5 year manufacturer warranty

* denotes features that may be model specific

PHYSICAL SPECIFICATIONS

DIMENSION	
- L	132mm
- W	84mm
- H	25mm
WEIGHT	550g

POWER

· 8 to 26 VDC

PERIPHERALS INCLUDED

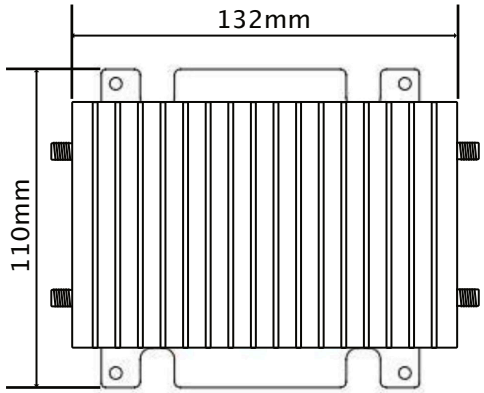
· Cellular rubber duck antenna with SMA connector
· CAT-5 LAN cable (3M)

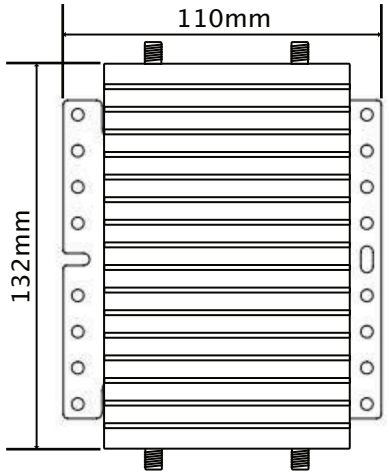
OPTIONAL ACCESSORIES

· High-gain outdoor antenna (wall mounted)
· High-gain outdoor antenna (pole mounted)
· 2x 2.4GHz / 5GHz WiFi BLE Antennas
· 2x11-pin dual-raw mating plug for industrial I/O

With the nodeG5 you have the option to install it using a mounting plate onto different surfaces.

The orientation and dimensions are as below:





1. 3
BOARD INTERFACE

SMA Antenna Connectors

USB2.0 port1

USB2.0 port2

DC Power

HDMI

Second LAN Port ETH2
(default: 10.1.1.1)

Main LAN Port ETH1
(default: 192.168.1.1)

For models with WiFi & BLE only

See Section 3.6 (page 14) for wiring diagram

Industrial I/O terminal block P8

Serial Console

SIM SLOT

WIFI/Bluetooth SMA Slot

WIFI SMA Slot

SMA Antenna Connectors

POWER ON

USB3.0

GENERIC LED1

GENERIC LED2

2. 1
SIM INSTALLATION

WHAT YOU'LL NEED

1. 4G Data Enabled micro SIM Card
2. PC/Laptop with an Ethernet port
3. SIM card network details – APN/USERNAME/PASSWORD. You would need to get this information from your operator.

INSERTING THE SIM CARD

STEP 1 of 5 - Unscrew the SIM cover and insert the micro SIM card into the slot.

STEP 2 of 5 - Screw the cover back on and connect up the power adapter and the cellular antenna

2. 2
LOGGING IN

When you have connected up the hardware to the box, the web console can be accessed at the address
192.168.1.1

For Security, after your first successful log in, you will be prompted to change your username & password.

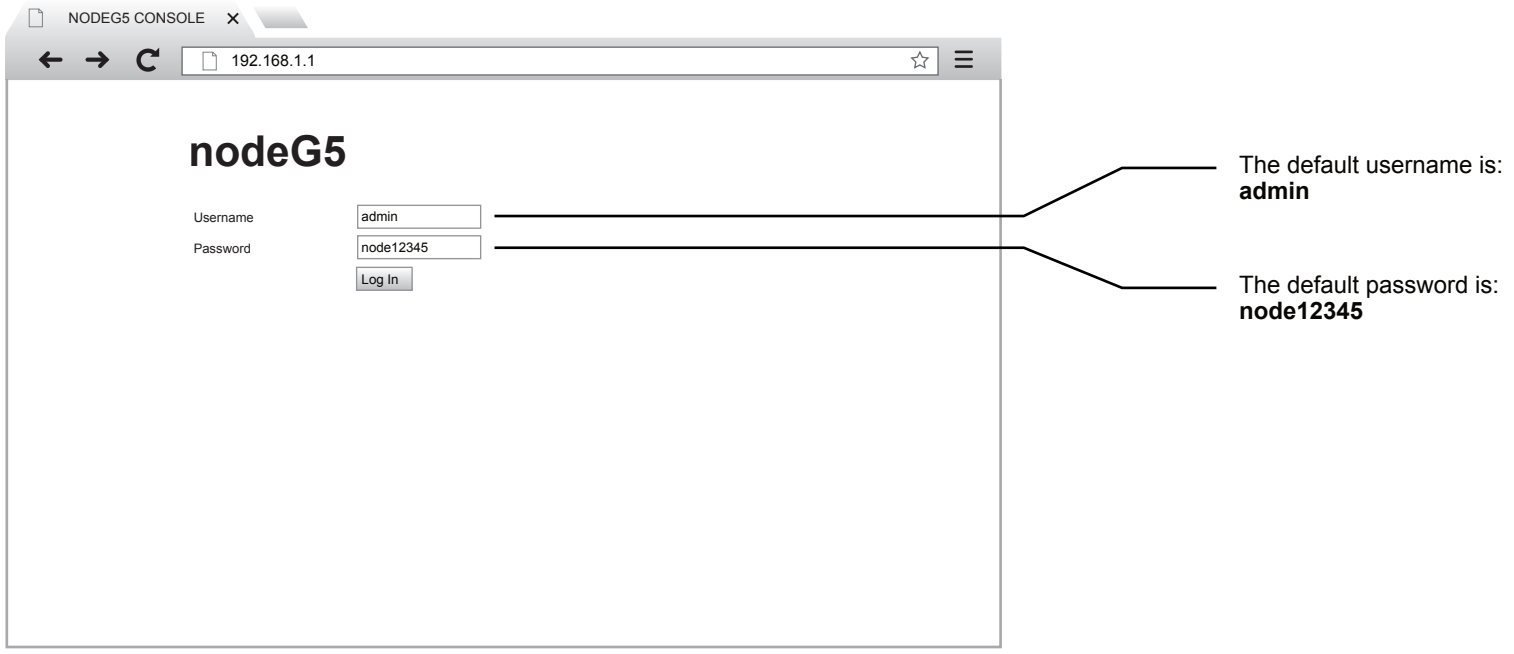
Note: If you are using a SSH console:

The login username is:
root

The default password remains as:
node12345

STEP 3 of 5 - Plug in the Ethernet cable from ETH1 to your pc and power up the nodeG5.
STEP 4 of 5 - Launch your browser and enter address as 192.168.1.1

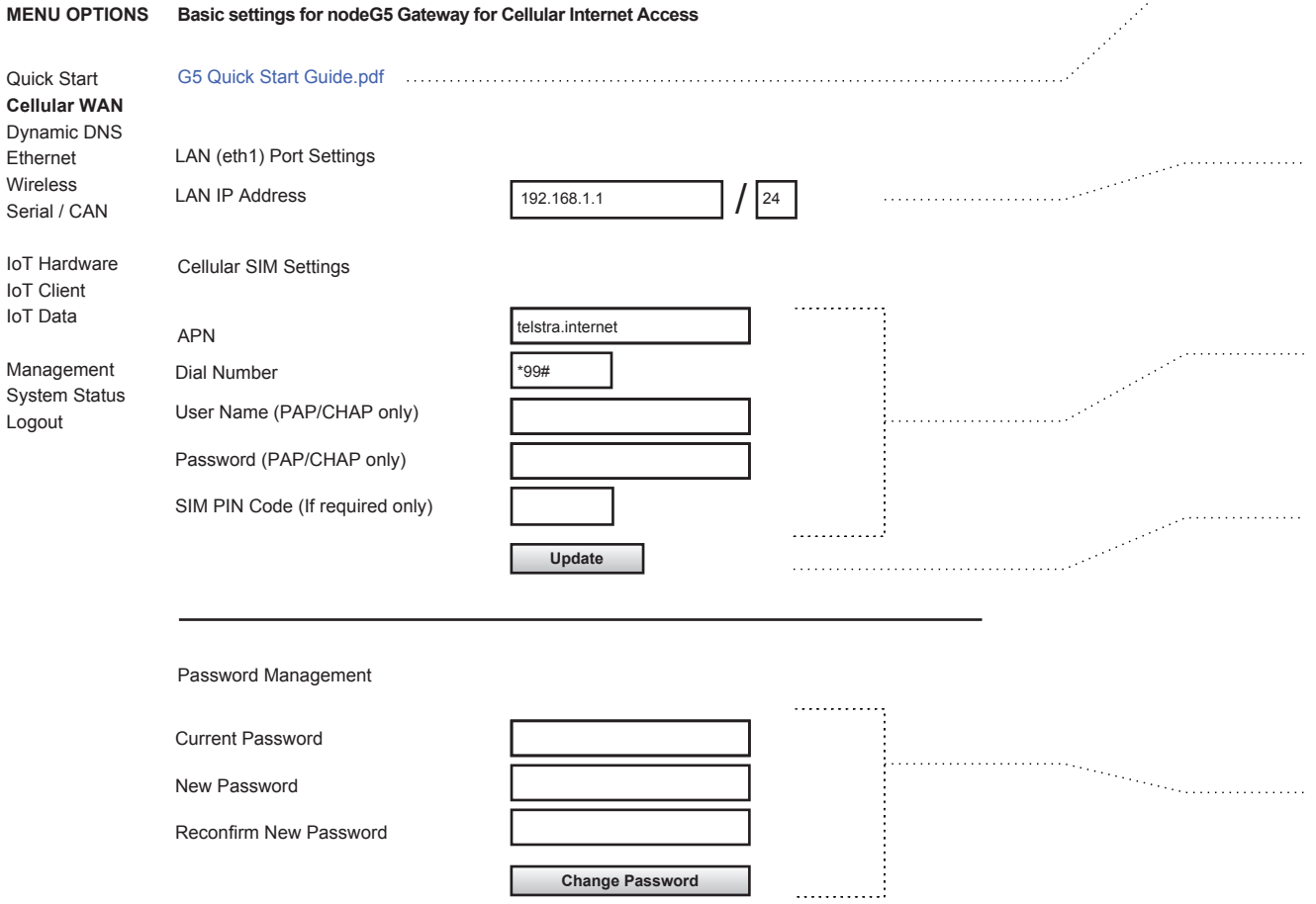
STEP 5 of 5 - Log in.



nodeG5

3. 1 QUICK START

The Quick Start tab brings together all the settings you need to establish an immediate cellular connection in one page.



You can find resource PDF links in our web config to help guide you through the different setups.

Key in the IP Address for your nodeG5 gateway here.

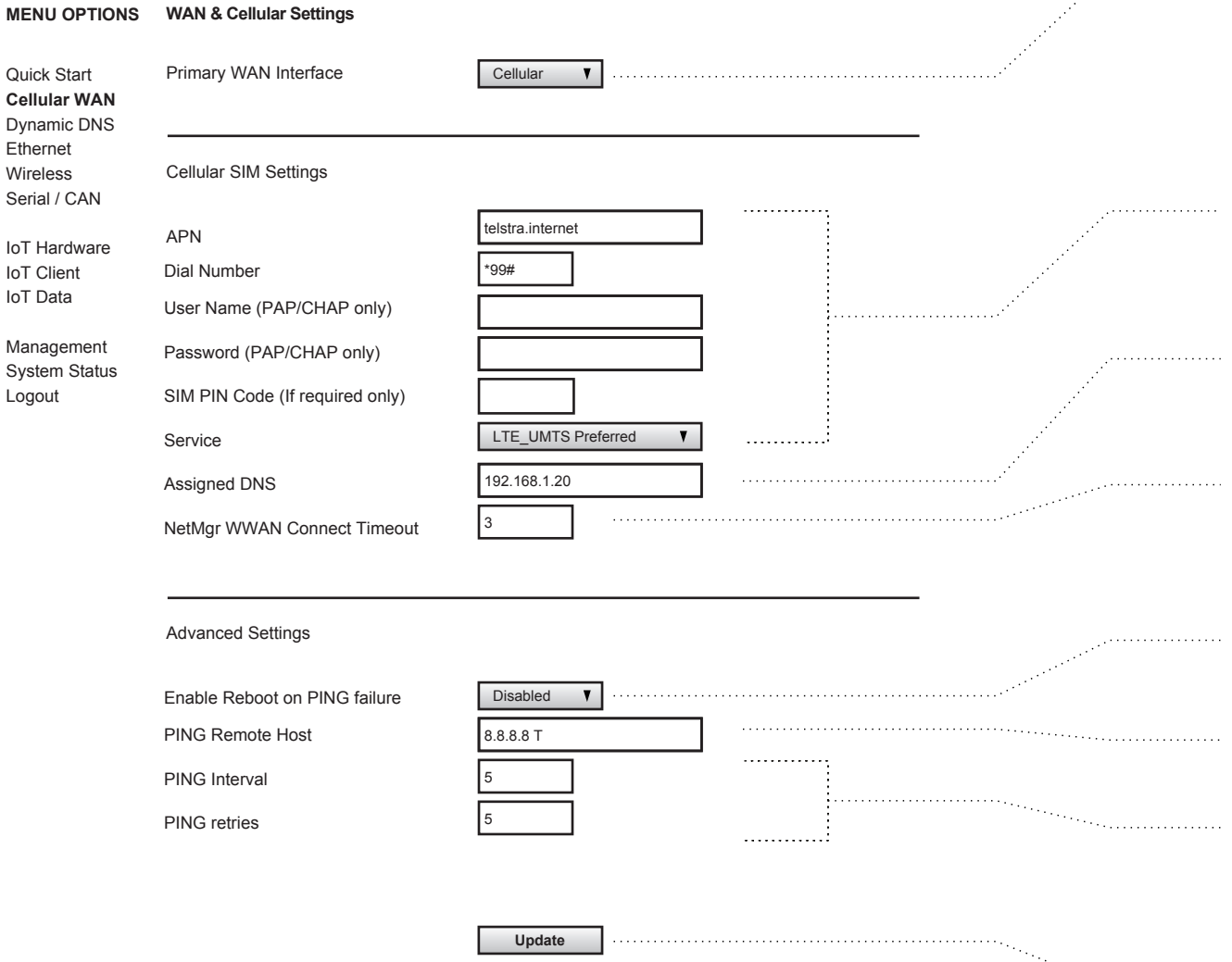
To connect the nodeG5 to a cellular network the following information is required. You will be able to get them from your internet service provider.

Click on UPDATE to save your settings.

For security, please ensure you change to a new password.

nodeG5

3. 2
WAN &
CELLULAR
SETTINGS



Select your primary WAN interface from the options given. (Note that Wi-Fi is model dependent & you will need to complete the rest of your the settings in 'Wireless' tab.)

To connect the nodeG5 to a cellular network the following information is required. You will be able to get them from your internet service provider.

If you will like to override your network assigned DNS, you can input your own address here. Otherwise leave it blank.

Set the amount of minutes before the system does a reboot (0 = never)

To ensure reliable connectivity you can choose to PING an external IP address.

Add in a test IP address (i.e. Google at 8.8.8.8 T)

Input the PING interval & number of retries made before the system reboots.

When you have completed your settings on this page, click 'Update' to save them.

nodeG5

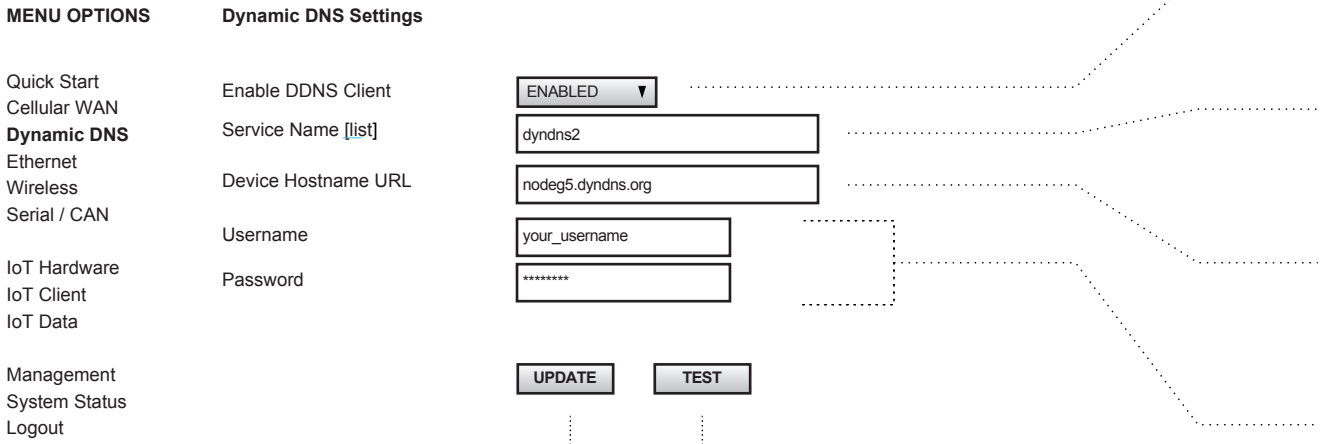
3. 3
DYNAMIC DNS

The Dynamic DNS feature helps to keep a standard domain name pointed to the nodeG5 even if it is assigned IP changes during a reboot/reconnection.

WHAT YOU'LL NEED

1. A data sim card with a public IP [You can check this with your operator.]

2. An account with a dynamic DNS service provider like dyndns2, easydns or changeip



Enable of Disable the DYNDNS service.

Enter in the DYNDNS service you have registered with.

Enter in the FQDN (fully qualified domain name) of your host at DDNS provider.

Key in your DYNDNS Service Username & Password.

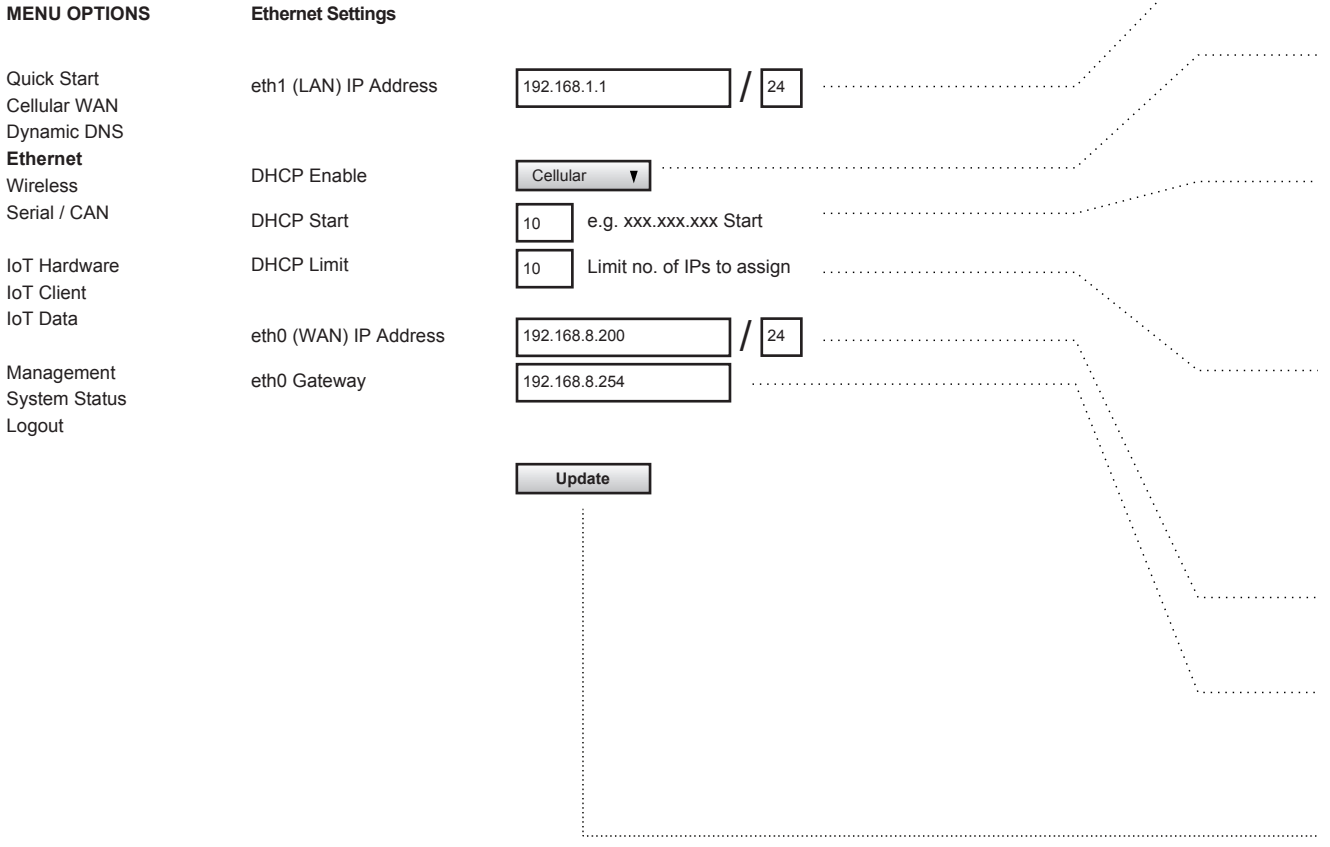
Click 'Update' to save your settings. The nodeG5 will connect to your account and point the domain after you reboot.

In the above example, you will be able to access your nodeG5 using the domain name "nodeG5.dyndns.org" on any regular browser.

Our new TEST feature allows you to quickly & easily verify that your dynamic domain assignment is working.

nodeG5

3. 4 ETHERNET SETTINGS



Set up the IP Address of your LAN port.

Enable the nodeG5 to automatically assign IP addresses to your connected LAN devices.

This would be the starting address for connected devices. For the example here, the first connected device will be assigned the address of 192.168.1.10

This will limit the number of connected devices. For this example the last connected device will be assigned 192.168.1.20

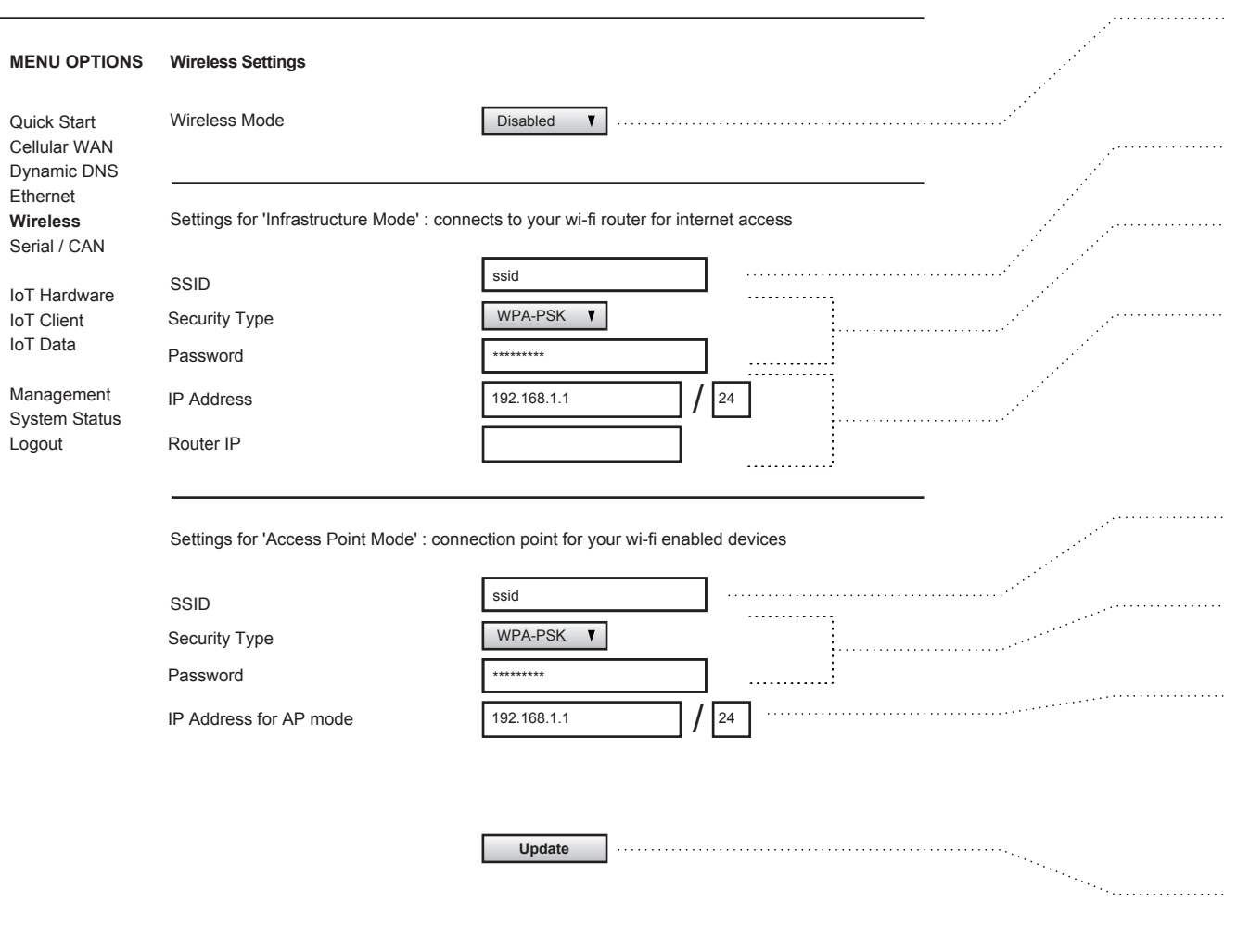
Sets up the IP Address of your WAN port.

Sets up the IP Address of the nodeG5 gateway.

Once you have completed your settings click to save.

nodeG5

3. 5
WIRELESS
SETTINGS



Select to enable (Note that Wi-Fi is model dependent.)

Key in the SSID of your wi-fi router.

Input the security settings to connect to your router.

Key in the IP address for your nodeG5, or leave this blank to let it be assigned via DHCP.

Create a SSID for your nodeG5 access point.

Input the security settings to authenticate a connection with devices.

Key in the IP address for your nodeG5 as access point.

When you have completed your settings on this page, click 'Update' to save them.

3. 6 SERIAL & CAN SETTINGS

The industrial I/O signals are routed to terminal block P8. Pin-out is determined by the I/O modules configuration below:

Serial (RTU) Port A	· PIN 1 (RS485_POS) · PIN 3 (RS495_NEG) · PIN 5 (ISO_GND_1)
Serial (RTU) Port B	· PIN 7 (RS485_POS) · PIN 6 (RS495_NEG) · PIN 8 (ISO_GND_2)
CAN Port C	· PIN 12 (CAN_H) · PIN 14 (CAN_L) · PIN 21 (ISO_GND_3)
CAN Port E	· PIN 4 (CAN_H) · PIN 2 (CAN_L) · PIN 5 (ISO_GND_1)

Note: for RS485 2-wire, half-duplex cables are required.

Connector Type:

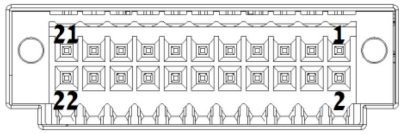
22-pin dual-row plug with spring connections

Locking: screw flange

Pitch: 2.54mm

Wire cross-section: AWG20-AWG30

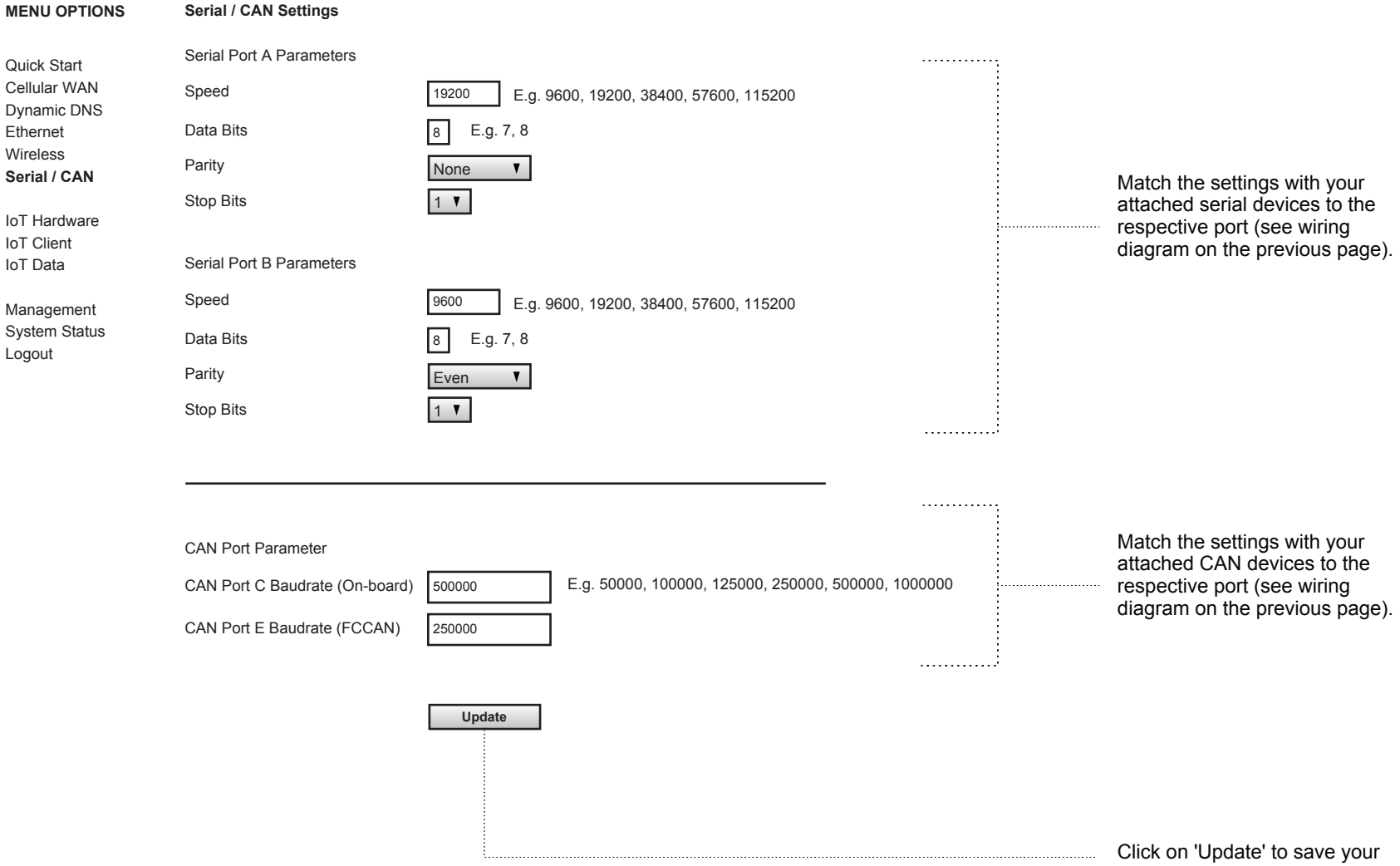
INDUSTRIAL I/O



I/O module	Pin	Signal Name	Isolation Power Domain
A	1	RS232_TXD / RS485_POS	1
-	2	CAN_L	1
A	3	RS232_RXD / RS485_NEG	1
-	4	CAN_H	1
A	5	ISO_GND_1	1
B	6	RS232_RXD / RS485_NEG	2
B	7	RS232_TXD / RS485_POS	2
B	8	ISO_GND_2	2
D	9	IN0	3
D	10	IN1	3
D	11	IN2	3
C	12	RS232_TXD / RS485_POS / CAN H	3
D	13	IN3	3
C	14	RS232_RXD / RS485_NEG / CAN_L	3
D	15	OUT0	3
D	16	OUT1	3
D	17	OUT3	3
D	18	OUT2	3
D	19	24V_IN	3
D	20	24V_IN	3
C/D	21	ISO_GND_3	3
C/D	22	ISO_GND_3	3

nodeG5

3. 6
SERIAL & CAN
SETTINGS



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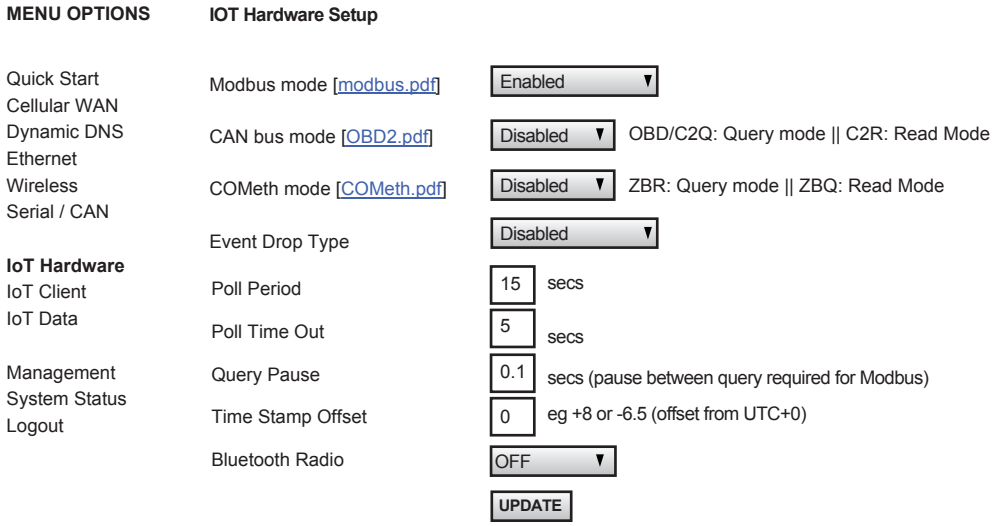
3. 7
IOT HARDWARE



Click to enable Modbus mode

Choose 'Query mode' to send request packet & read response values. Choose 'Read mode' when slaves auto report their status/values. J1939 users will also need to choose that CAN bus option here.

ComETH BOT supports query and reading of on-board digital input.

Select the time interval of reading data events of the iotasset listing. If you wish, have a different polling period for different assets, refer to our web FAQ to set your iotasset.txt configuration.

The timeout specifies the time period to accept responses after each network request. Ensure adequate spacing that takes into account network traffic and latency.

If you require a pause between separate poll queries, set it here.

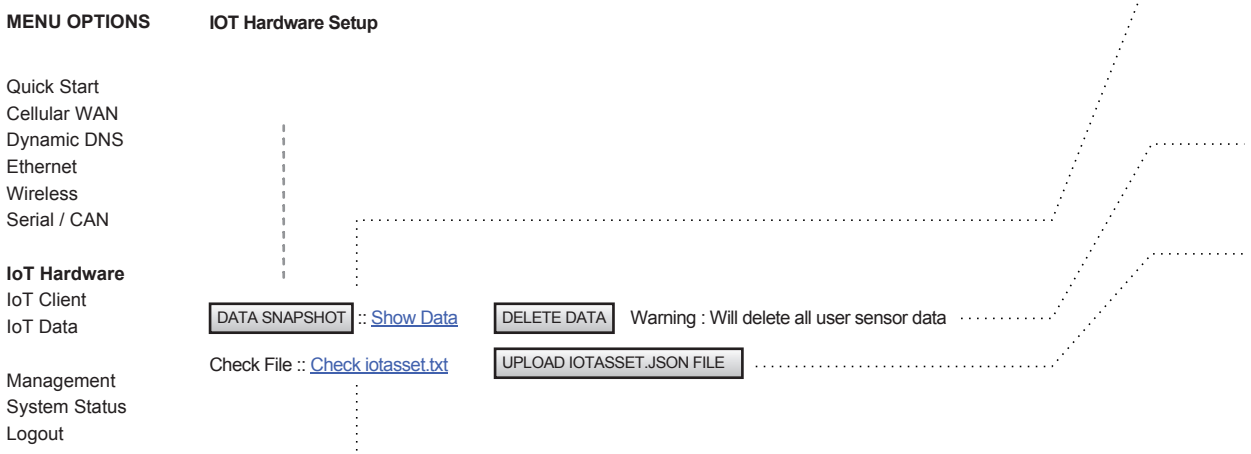
Set your local timezone for event timestamp.

Enable the Bluetooth option here. Note that this feature is model dependant.

Update and reboot the nodeG5

nodeG5

3. 7
IOT HARDWARE



Show a snapshot of the current data

DELETE ALL JSON DATA

Ensure that the gateway HTTPS console must be accessible before proceeding with these steps.

1. Click on the 'UPDATE IOTASSET.JSON FILE' button.

2. In the new window, click on 'CHOOSE FILE' & select the updated file from your local folder.

3. Click 'UPLOAD FILE'

4. Close the page & log in again for security purposes.

If the update failed, check that the connection to the gateway is stable. Or else please contact support@amplified.com.au

Click to see the current configurations file in a new web page.

IMPORTANT ::

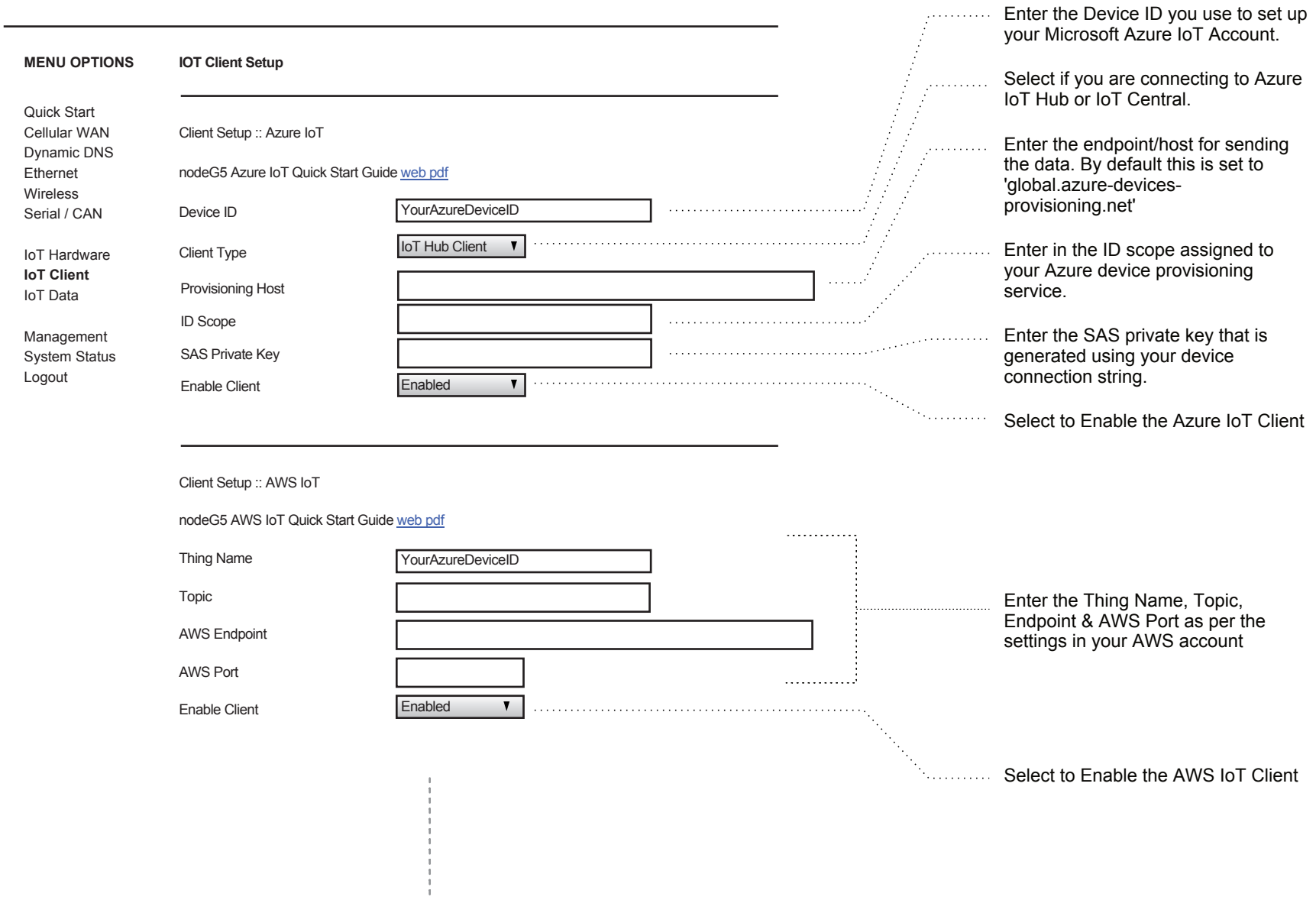
Please upload the following settings via the **Management tab**.

- **iotasset.json** with hardware device settings (e.g Modbus addresses)

- **connstr.txt** with Azure settings (e.g. Azure IoT device id token)

3. 8
IOT CLIENT

nodeG5



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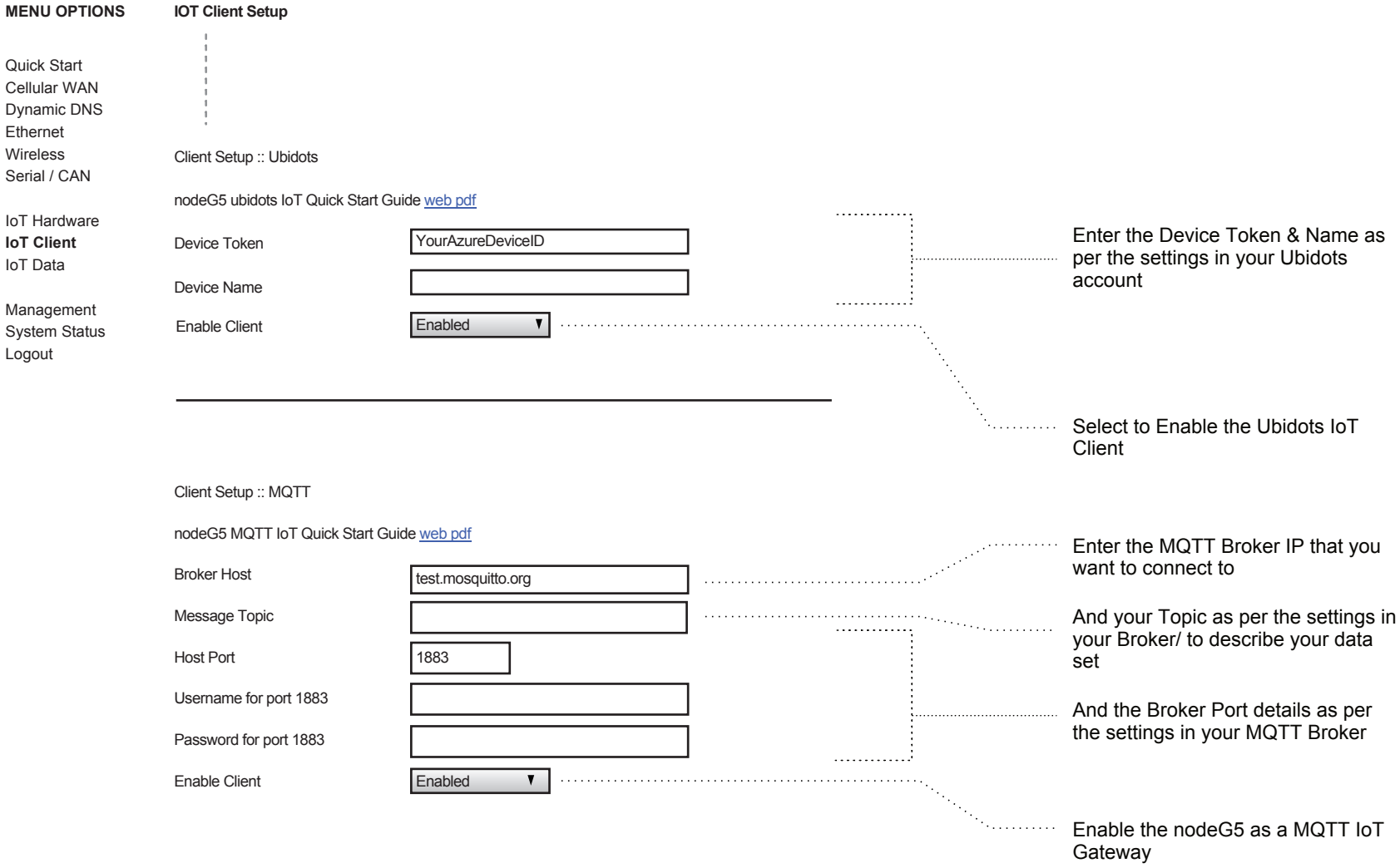
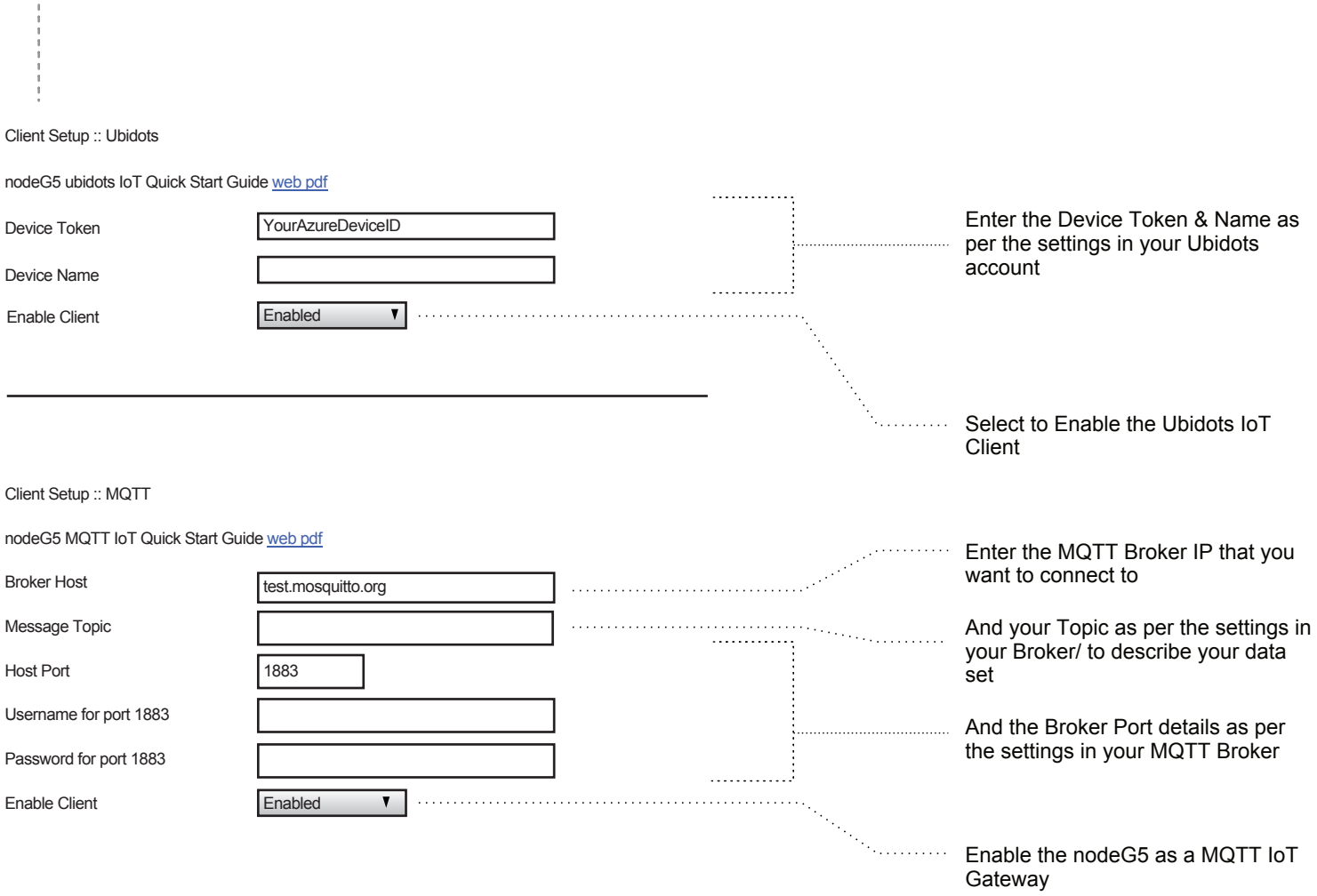
3. 8
IOT CLIENT



3. 9 IOT DATA

The industrial I/O signals are routed to terminal block P8. Pin-out is determined by the I/O modules configuration below:



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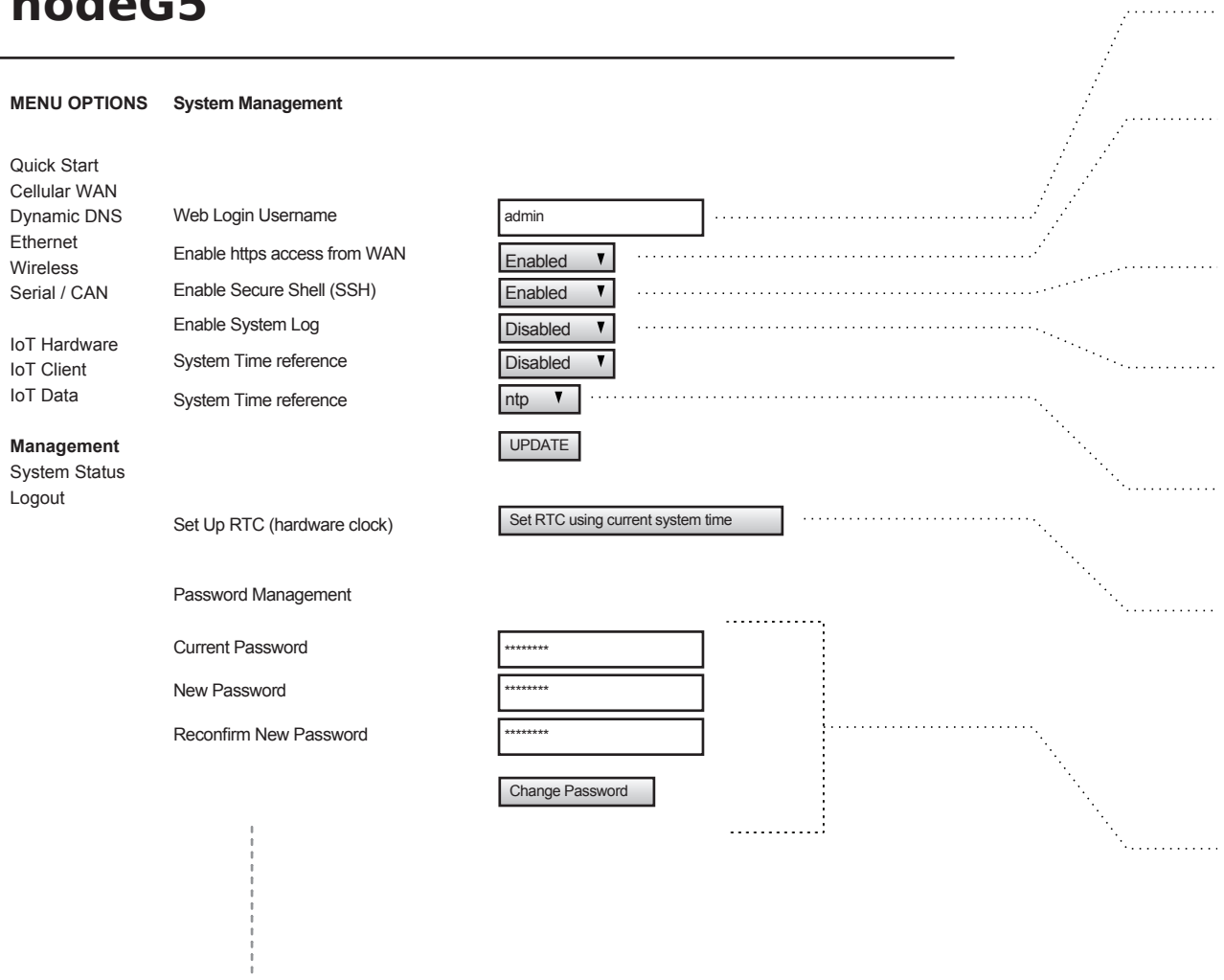
3. 10 MANAGEMENT

Note that from the internet, the nodeG5 can only be accessed via HTTPS (secure) to ensure all data between user and nodeG5 web configuration page is encrypted.

We give our clients the choice to install their own signed certificate (e.g. Verisign or Digicert) via SSH to nodeG5 console. Since there is no packaged signed SSL certificate in each nodeG5, a complaint of error might be issued from the browser. Note that this does not affect the secure encryption of data to configure the nodeG5 via HTTPS.



This login name is only used for web. If you are using SSH, always log in as 'root'.

Click to enable remote https access via WAN port 443. Note that non secure https access via WAN is not allowed.

Disabled by default. If enabled it will provide root access using the default login details on page

If enabled you can download/ view the log page from the 'System status page.

Choose a system time source reference as ntp (online time service) or rtc (on-board battery back hardware clock).

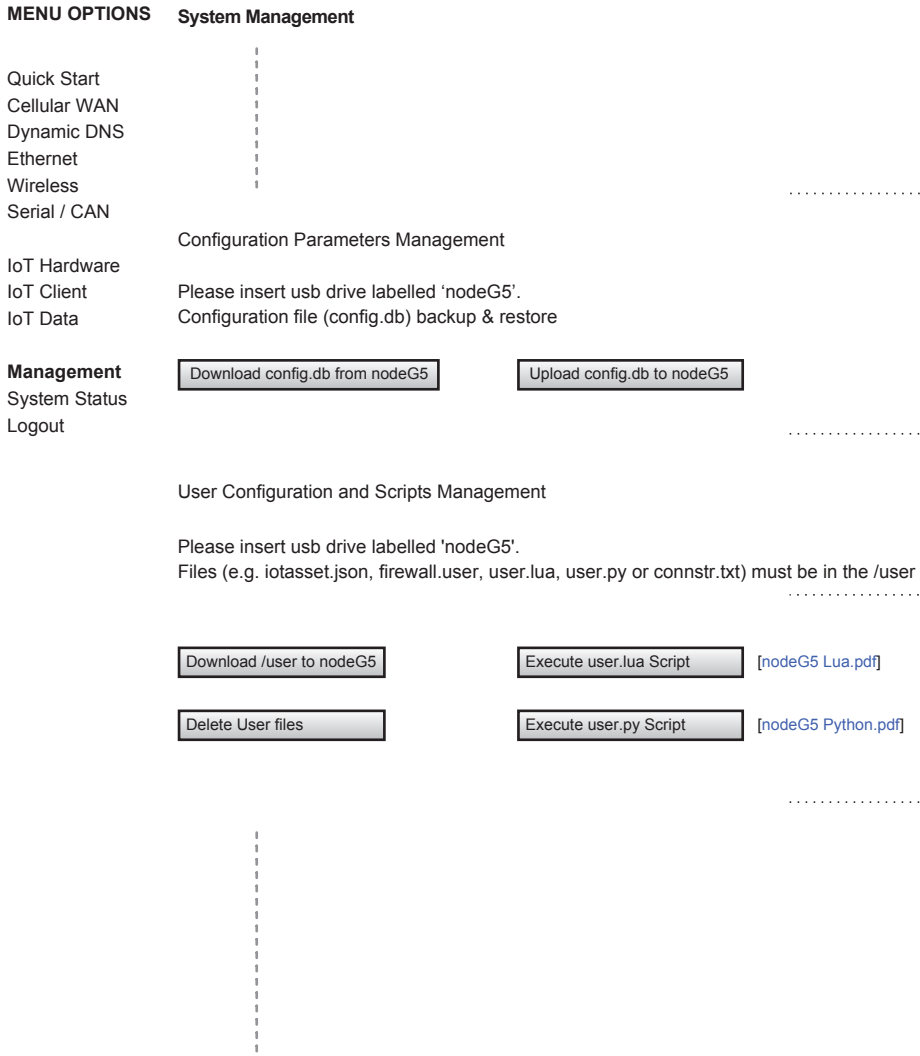
Click to update hardware clock using the current time system

For security, please do not use default password for your deployed unit.

Passwords are never stored directly but as a hash string to increase device security.

nodeG5

3. 10
MANAGEMENT



To allow 'cloning' of parameter settings to multiple nodeG5 in deployment we utilise USB flash drives.

1. Format a USB thumb-drive (e.g. NODE32) and label it 'nodeG5'
2. After the nodeG5 is powered up insert the thumb-drive into an available USB port.
3. Click 'Download config.db from nodeG5', wait 5 seconds & remove thumb-drive
4. Insert the thumb-drive into new nodeG5 and click 'Upload config.db to nodeG5', wait 5 seconds and remove thumb-drive
5. Check in new nodeG5 that parameters from other nodeG5 has been copied over

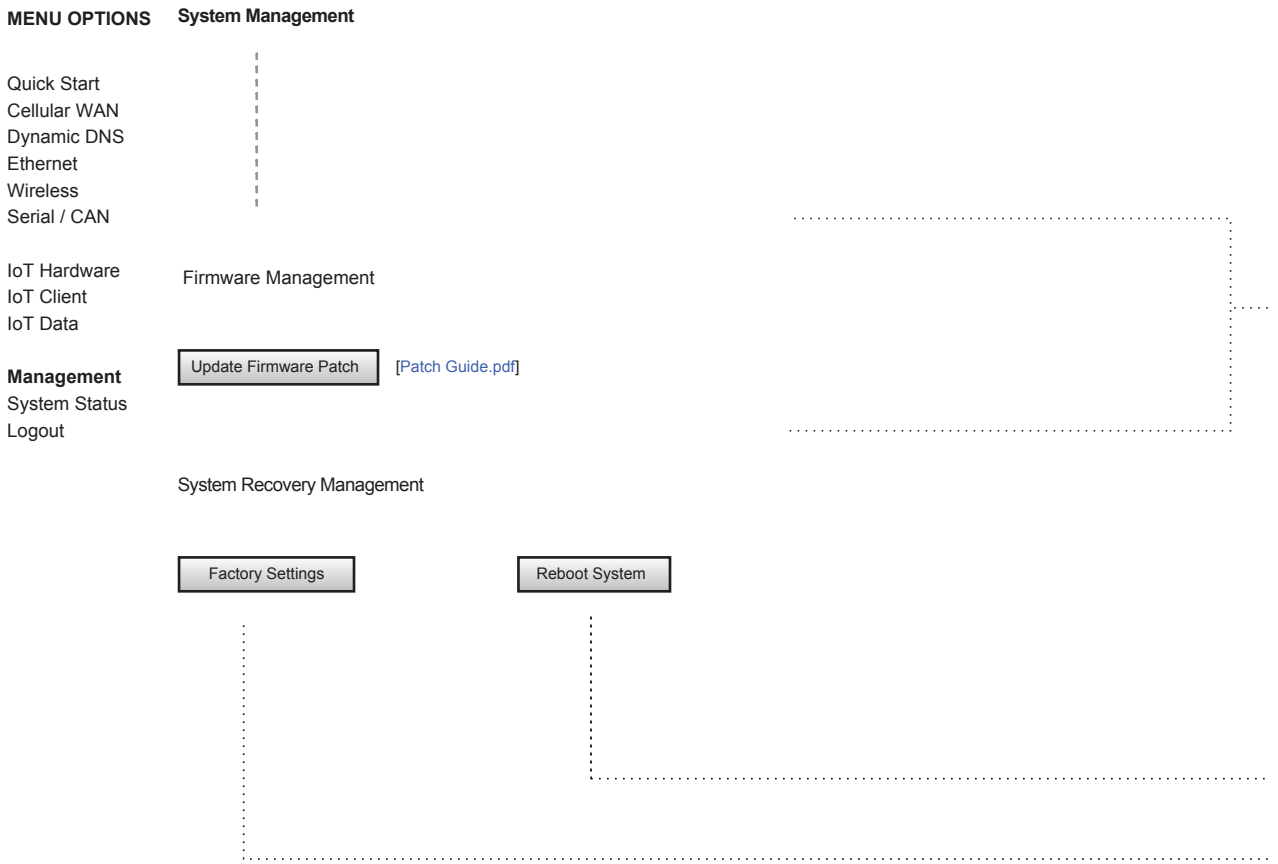
To input your own LUA or Python program:

1. Write your LUA or Python program and name it as 'user.lua' or 'user.py'
2. Save the program in /user folder in your thumb-drive (drive labelled 'nodeG5')
3. Insert the thumb-drive into your nodeG5
4. Click 'Download /user to nodeG5', wait 5 seconds and remove the thumb-drive
5. You can click 'Execute Program' to test your program

Your program will automatically be executed after complete boot-up of the nodeG5.

nodeG5

3. 10
MANAGEMENT



Ensure that the gateway HTTPS console must be accessible before proceeding with this steps.

1. Click on the 'UPDATE FIRMWARE' button.
2. In the new window, click on 'CHOOSE FILE' and select from your local folder the specific firmware update .zip file. (Please check with support@amplified.com.au for any assistance).
3. Click 'UPLOAD FIRMWARE PATCH'. If the firmware has been successful you will get the following message:

"RESULT: The firmware update has been applied"

4. After closing the page, you will need to log in again for security purposes.

If the update failed, check that the connection to the gateway is stable. Or else please contact support@amplified.com.au

Click ‘Reboot’ to soft reset the nodeG5 device.

Click ‘Factory Settings’ to revert all parameters to factory default.

nodeG5

3. 11 SYSTEM STATUS

MENU OPTIONS

Quick Start
Cellular WAN
Dynamic DNS
Ethernet
Wireless
Serial / CAN

IoT Hardware
IoT Client
IoT Data

Management
System Status
Logout

System Status

Main

Firmware Version	5.15.32+gb917e043c529
System Date & Time	Thur Aug 10 02:41:16 UTC 2023
Upload and CPU Load (1,5,15m)	02:41:16 up 16 min, 1 user, load average: 0.25, 0.22, 0.13
Temperature	39 * C

Cellular WAN

Modem firmware	EC25EUGAR06A07M4G
IMEI	864303052713149
USIM IMSI	502181121133668
USIM ICCID	8960181171211336711
Modem State	connected
Interface	wwan0
SIM APN	telstra.internet
IP address	21.173.254.22
Operator Name	U Mobile
Roam Status:	home
Service Mode:	lte
Signal Strength:	63%
Cellular Data (since bootup)	RX packets 30 bytes 3286 (3.2 KIB) TX packets 42 bytes 3994 (3.9 KIB)

System Log : System Log File

Diagnostics : Run Diagnostics | Diagnostics Output File

Diagnostics : Ping Test

Run a system diagnostic test

Run a Ping test to check your connection

CONTACT US

TECHNICAL SUPPORT: SUPPORT@AMPLIFIED.COM.AU

SALES: SALES@AMPLIFIED.COM.AU

WEBSITE AMPLIFIED.COM.AU

ADDRESS Amplified Engineering Pty Ltd
Unit 3, 2A Brodie Hall Drive
Bentley WA 6102, Australia
ABN 44127163035

AMPLIFIED ENGINEERING