

# Mega\_Bridge

IP Communications for *Mega\_Link* Telemetry & Control



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0.2	12/09/18	Changed port 9000 references for web server
0.3	15/02/19	Updated Images of web interface
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As part of our policy of continuous improvement we would welcome any suggestions for changes to the document.

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## 1 Introduction

### 1.1 Mega\_Bridge

The *Mega\_Bridge* adds flexible and fully featured internet protocol (IP) connectivity to the well-established *Mega\_Link* family of telemetry & control units which are used to pass two-way instrumentation, measurement and control data between equipment and industrial plant.

IP connection scenarios range from simple self-contained Local Area Networks (LAN), Wide Area Networks (WAN) to multiple networks anywhere across the internet for distributed geographical areas and remote locations.

The *Mega\_Bridge* functionality is easily added as an expansion upgrade to an existing *Mega\_Link* system installation, already using communications links such as 458 or 868 MHz low power radio, V23 leased line/private wire or GPRS.

*Mega\_Bridge* is an ideal solution for the replacement of BT leased line communications when used in conjunction with an ADSL modem/router.

### 1.2 Mega\_Link

The *Mega\_Link* is a Telemetry & Control communications system that can pass analogue and digital instrumentation data between industrial plant and equipment either located locally on the same site or distributed over wider geographical areas.

The I/O interfaces are compatible with a wide range of digital and analogue instruments and would typically be connected to equipment such as volt-free contacts, depth transducers, flow meters and electrical switchgear. The I/O expansion port provides additional plant interfaces via a range of expansion modules.

*Mega\_Link* can also interface via RS232/RS485 interface using Modbus, Allen Bradley or Mitsubishi Melsec protocols, to intelligent industrial equipment such as SCADA systems, PLCs, sensors or third-party telemetry systems.

*Mega\_Link* provides a high degree of system integrity by incorporating features such as battery back-up, (to maintain operation during power failures), and extensive user configurable fault monitoring.

## 2 Specifications for *Mega\_Link* with *Mega\_Bridge*

IP Connectivity:	Ethernet and USB for external Wi-Fi, 3G/4G modem
Fall-backup options:	Primary & Secondary connectivity selection
Security:	TLS v1.2 encryption with X.509 certificate authentication. Additional VPN layer option to provide AES-256 Encryption
IP address options:	Static IP, Dynamic IP
Interface combinations:	IP Connectivity plus 458/869 MHz licence exempt Low Power Radio or V23 leased line/private wire
Digital Inputs:	8 channels; two groups of 4, isolated
Digital Outputs:	8 channels; two groups of 4, volt-free contact
Analogue Inputs:	2 channels; fully isolated, 0...20 mA into 10 $\Omega$ , and 12 V for transducer excitement
Analogue Outputs:	2 channels; 0...20 mA into 500 $\Omega$ with common +12 V return,
I/O Expansion:	8 channel Digital Input, 8 channel Digital Output 4 channel Analogue Input, 4 channel Analogue Output
Power Supply:	110/240 V (with battery back-up), 12/24 V & solar panel
Display:	320 x 240 colour TFT with adjacent joystick
Fieldbus Protocols:	RS232/RS485 with Modbus RTU, Allen Bradley DF1 half-duplex, Mitsubishi Melsec FX and non-FX
Mechanical:	<b><i>Mega_Link</i></b> : Size 150w x 125h x 110d, DIN rail mounting <b><i>Mega_Bridge</i></b> : Size 32w x 95h x 110d, DIN rail mounting
Options:	Can be supplied in a range of IP65 & IP67 enclosures

## 3 System Concepts

### 3.1 Internet Protocol Enabled

The *Mega\_Bridge* brings internet connectivity to the current *Mega\_Link* family of telemetry and control equipment.

*Mega\_Link* data messages are sent over IP by either Ethernet, Wi-Fi or 3G/4G between units connected either on a common network or across distributed networks using well established internet cloud services.

There is unlimited operating range on devices that are connected over the internet and there are added layers of security and encryption that weren't previously available using normal low power radio methods.

### 3.2 Overview of *Mega\_Link* Operation

*Mega\_Bridge* has been designed to work in conjunction with the existing *Mega\_Link* telemetry & control equipment and requires no change of firmware or special configuration. In fact, when *Mega\_Bridge* is in operation, from the point of view of the host *Mega\_Link*, all data communications and operation is the same as if a radio, GPRS or leased line was being used.

All that is required is for a *Mega\_Bridge* Interface card to be installed in the COM1 (or COM2) interface card location.

For a point to point system, Churchill Controls will typically deliver Basestation and Outstation with a default 1 to 1 signal transfer configuration. For a point to multi-point system then we will either deliver it with a "best fit" or upon customer request, it can be supplied pre-configured with customers' requirements regarding signal routing.

Extra I/O Expansion Modules can be included.

It is convention for the Basestation to be designated station address 0 and each outstation is then allocated station address 10, 20, 30 etc.

This is to allow for inclusion of expansion modules which may automatically take up station address in between, e.g. 11, 12, 13 etc.

### 3.3 *Mega\_Link* Data Messaging

The configuration of signal routing between the basestation and outstation(s) and hence signal routing between outstations, (if required), is always determined by the basestation config file.

Communication works using a "Poll-Response" basis and messages include source and destination station address, hence the *Mega\_Bridge* at the basestation can steer or route,

the Poll message to the destination *Mega\_Bridge* at the appropriate outstation. The *Mega\_Bridge* at the outstation then communicates the response back to the basestation via its *Mega\_Bridge*.

The basestation continuously polls each outstation in turn, typically using a 10 second "round-robin" update rate.

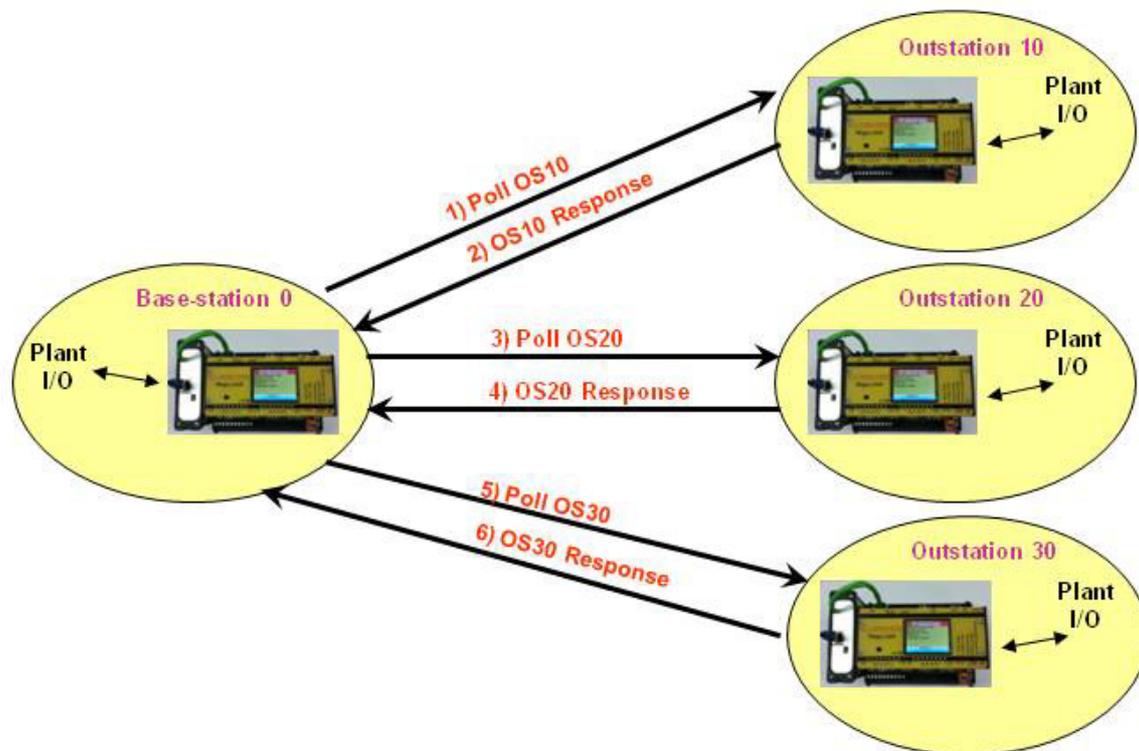


Figure 1: Poll-Response Operation

## 4 Mega\_Bridge System Network Scenario Examples

### 4.1 Network Modes Explained

The *Mega\_Bridge* is very flexible and fully configurable to operate in many network operating scenarios and communication modes; the two most distinct communication modes are either Local or Remote scenarios.

- **Local Mode** utilises conventional IP address defined network communications
- **Remote Mode** utilises a MQTT Broker hosted in the Cloud to set up and perform communications

The two Communications modes of Local or Remote can be further broken down into the following general modes:

1. **Local** - offline mode
2. **Local** - online mode
3. **Remote** - cloud mode (via Churchill Controls administered MQTT broker with VPN option)
4. **Remote** - cloud mode (via Customer arranged MQTT broker and customer administered security)

#### Notes:

"Offline" is where the network is closed off from the general internet.

"Online" assumes that the network has open internet connectivity available.

Cloud modes are by definition online.

### 4.2 Local Mode Scenarios

#### 4.2.1 Local – Offline mode

Example 1a: Basestation and Outstation Ethernet cables plugged into a wall socket which is cabled to a network switch on the same common LAN. There is no outside connection to internet.

#### Notes:

- 1) The Basestation must be configured with a fixed IP address and sub-net address which will typically be allocated by the network owner.
- 2) The Outstation(s) may either be also configured with a fixed IP address and sub-net address which will typically be allocated by the network owner or they can be configured to be left to be automatically issued with a dynamic IP address from the network's DHCP server.

# Local Area Network (LAN)

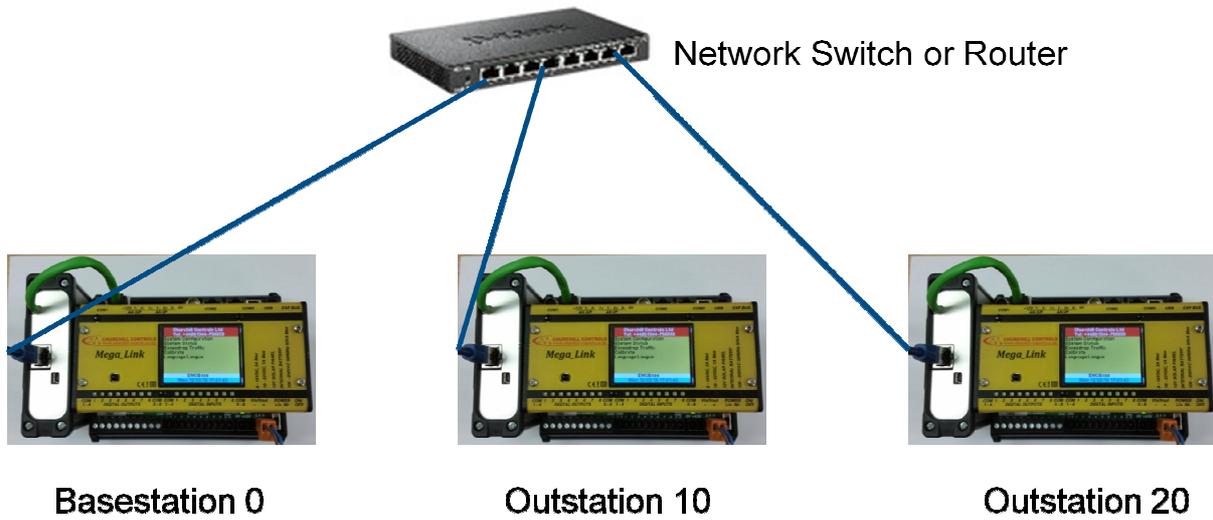


Figure 2: Example 1a, Local Mode, LAN Visualisation

Example 1b: As 1a where some or all stations are connected via Wi-Fi to same LAN network.

Example 1c: As above with all stations connected to a company WAN across different sites.

# Wide Area Network (WAN)

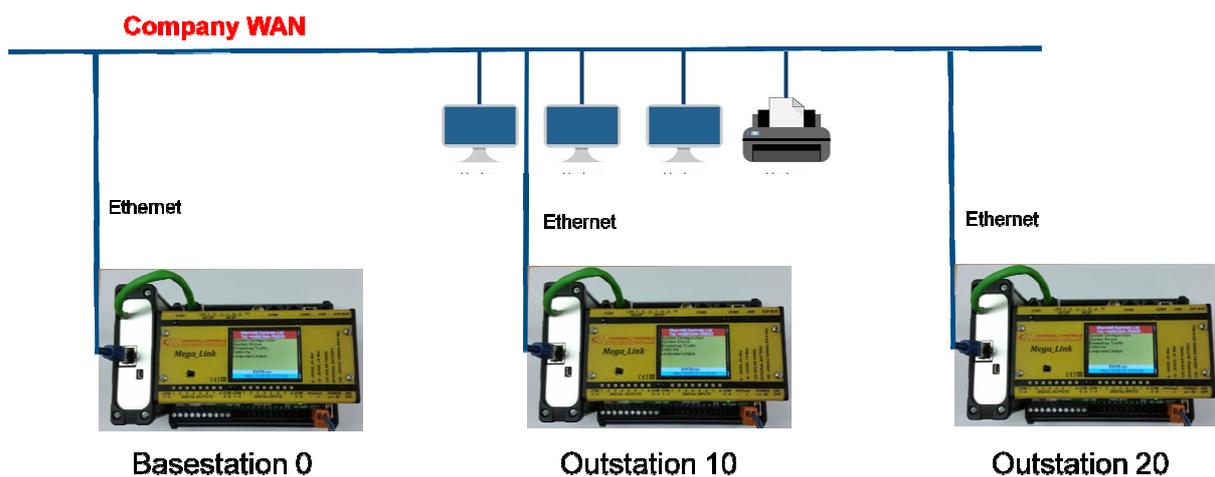


Figure 3: Example 1c, Local Mode, WAN visualisation

#### 4.2.2 Local –Online mode

Example 2a: Each station's Ethernet cable plugs into an associated 3rd party ADSL modem/router. The ADSL modems are configured by the customer or 3rd party communications provider to communicate with each other to operate like a dedicated LAN (typically using a VPN tunnel).

Notes:

- 1) The Basestation must be configured with a fixed IP address and sub-net address which will typically be allocated by the network owner.
- 2) The Outstation(s) must also be configured with a fixed IP address and sub-net address which will typically be allocated by the network owner.
- 3) The Ethernet communications with the local ADSL Modem/Router will appear to the Mega\_Bridge just like a normal LAN.

## ADSL COMMUNICATIONS CONNECTION

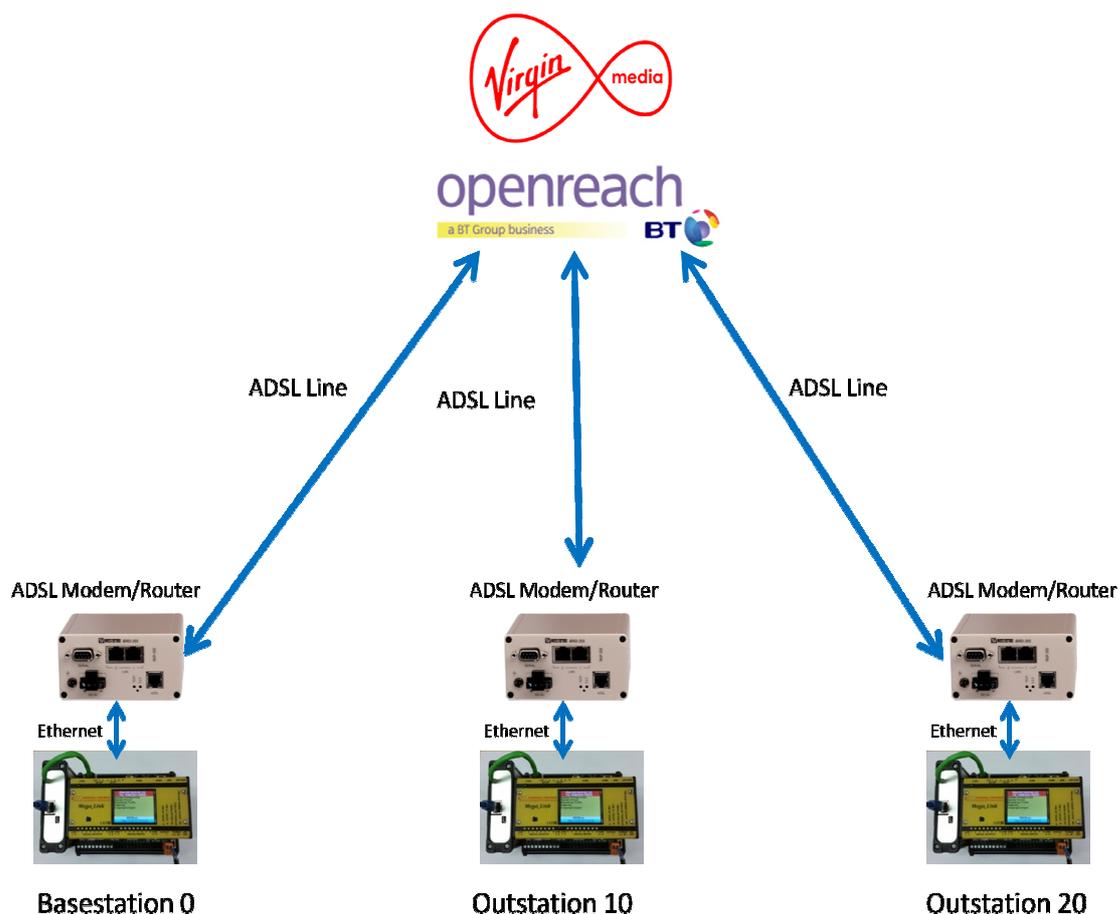


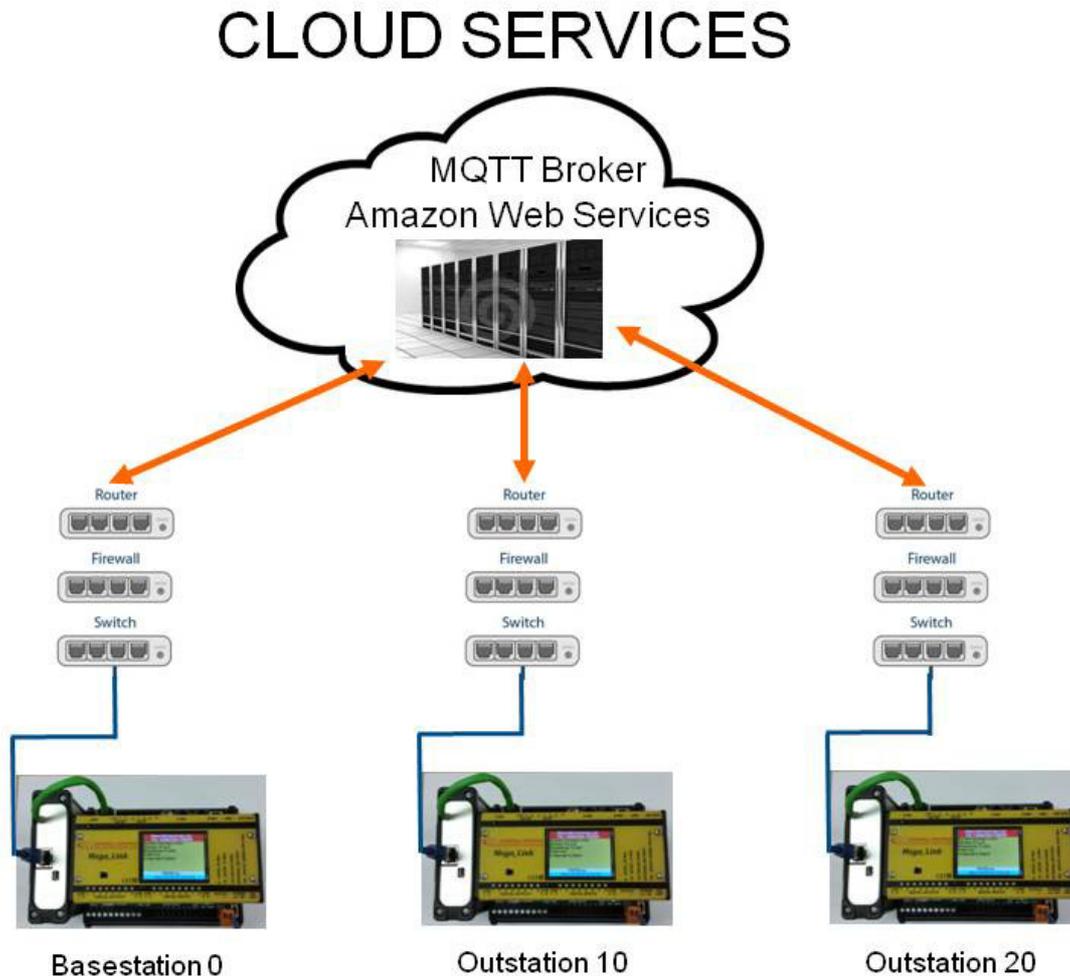
Figure 4: Example 2A, Local Mode, 3rd Party Communications Link Via ADSL

**This scenario makes the ideal solution for BT leased line replacement.**

## 4.3 Remote Mode Scenarios

### 4.3.1 Remote – Cloud mode (via AWS MQTT broker with VPN option)

Example 3a: Basestation and outstation Ethernet cables plugged into an internet connection



*Figure 5: Example 3a, Remote Mode, Cloud Services Visualisation via Ethernet*

Notes:

- 1) All stations must be plugged into open internet access.
- 2) In remote mode each station must be configured with certificates, customer company name and a unique system name for communications via an MQTT server. The MQTT server can be provided by Amazon Web Services and administered by Churchill Controls.

Example 3b: As 3a via Wi-Fi router to internet

Example 3c: As 3a via 3G/4G data SIM card to internet

**3G/4G Mobile Network  
Operator based system**

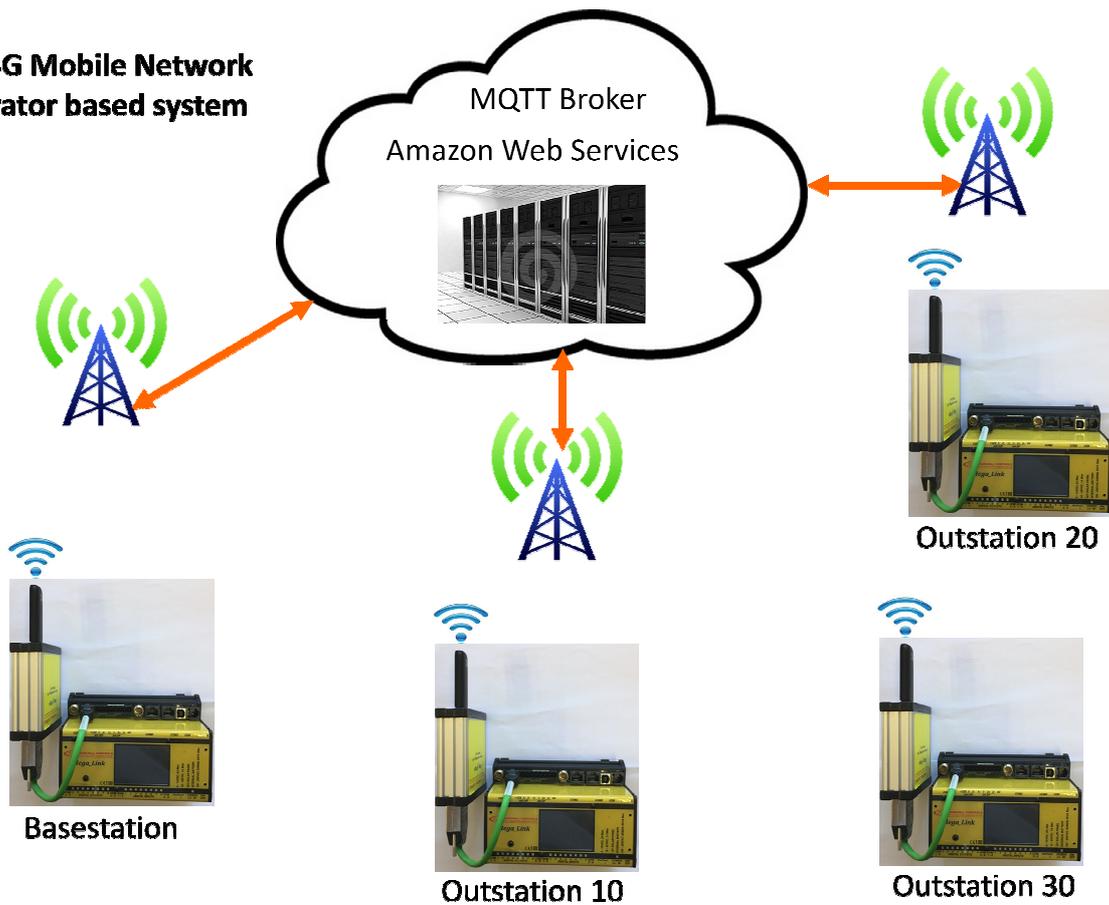


Figure 6: Example 3c, Remote Modem, Cloud Services Visualisation via 3G/4G Dongle

Notes:

- 1) As Example 3a.
- 2) Each 3G or 4G dongle must be provisioned with a standard data only SIM card, (there is no requirement for fixed IP).

Example 3d: As 3a via ADSL Broadband Modem/Router to internet

## ADSL BROADBAND CONNECTION

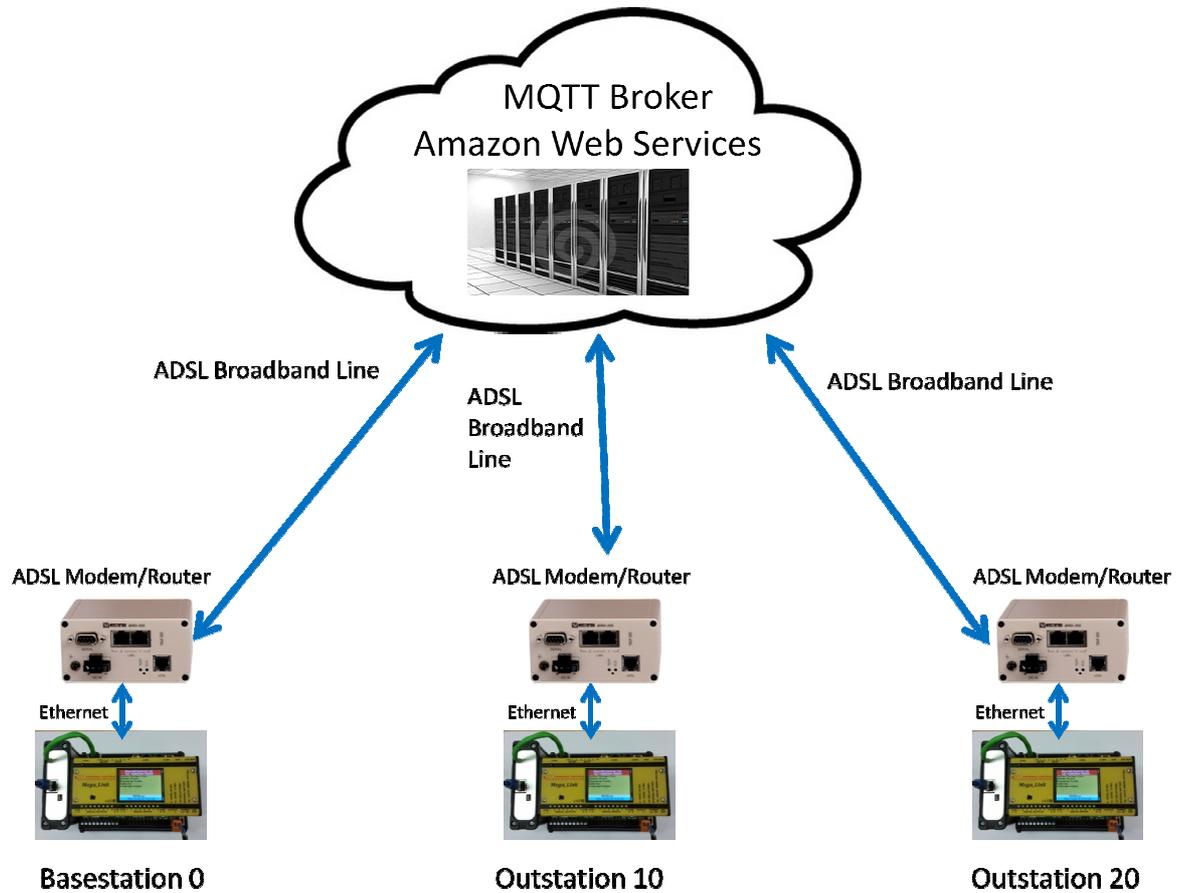


Figure 7: Example 3d, Remote Modem, Cloud Services Visualisation via ADSL Broadband

Notes:

- 1) As Example 3a.
- 2) Each 3rd party ADSL Broadband Modem/Router provides open access to the internet.

### 4.3.2 Remote – Cloud mode (via Customer arranged MQTT broker and customer administered security)

As above.

## 5 *Mega\_Bridge* Network Connection Options

### 5.1 Ethernet

There is an industry standard physical Ethernet port on the *Mega\_Bridge* with an RJ45 connector and use of a screened CAT5 cable (or better) is recommended.

For typical local mode operation, the basestation sub-system must be configured with fixed Static IP address and sub-net address, typically to be provided by the network owner. Optionally, to help minimise the possibility of IP address clashes with those already in use, the outstation(s) can be operated with dynamic IP address and can automatically initialise an IP address if the connected router has DHCP enabled, otherwise follow instructions in later sections to set a Static IP address. The basestation must always use a Static IP address.

### 5.2 Wi-Fi

Wi-Fi is added via an external dongle and configured within the “Network Settings” section of the web application, LEDs in the dongle will reflect connection status.

A green LED means connection has been made, no LED means no connection. If signal strength and operating range is an issue, there are compatible dongles with connection for external antennae that we can advise on.

### 5.3 3G/4G

3G and 4G mobile network interfaces are available in the form of external modem USB dongles that can be added to the *Mega\_Bridge* via the USB interface port.

Prior to use, the recommended 3G or 4G modem may need to be configured in a computer browser to select the right APN/User profiles. After initial configuration the modem will always connect and reconnect automatically, the modems are completely network unlocked.

Standard data SIM cards may be used. (NB: These do not need to be any specific type of SIM, and do not need to be fixed IP like those required to be used for previous generation GPRS based implementations).

## 6 Interface Connections

### 6.1 Front Panel

The flying lead provides the main interface to the host *Mega\_Link* via it's COM1 connector.

Although this is using an RJ45 connector for backwards compatibility reasons, PLEASE NOTE that this is not an Ethernet compatible port.

The host *Mega\_Link* will be fitted with a *Mega\_Bridge* Interface Card (7503-1) to provide serial data interface and +5V power to the *Mega\_Bridge* expansion unit

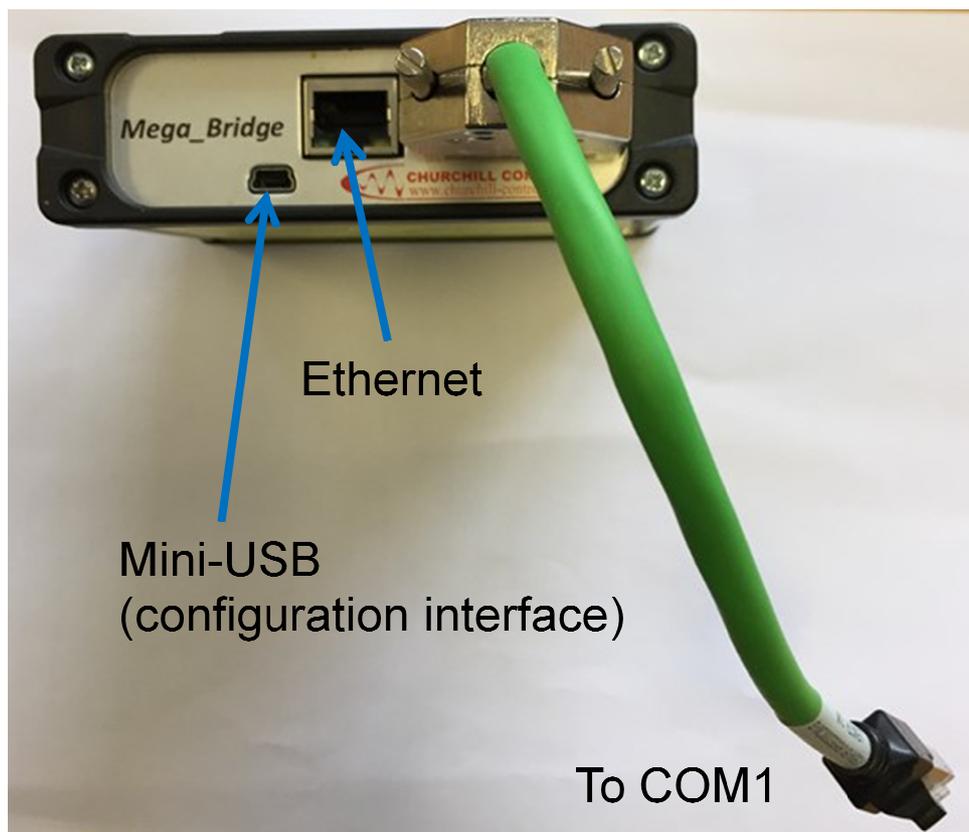


Figure 8: Front Panel Interfaces

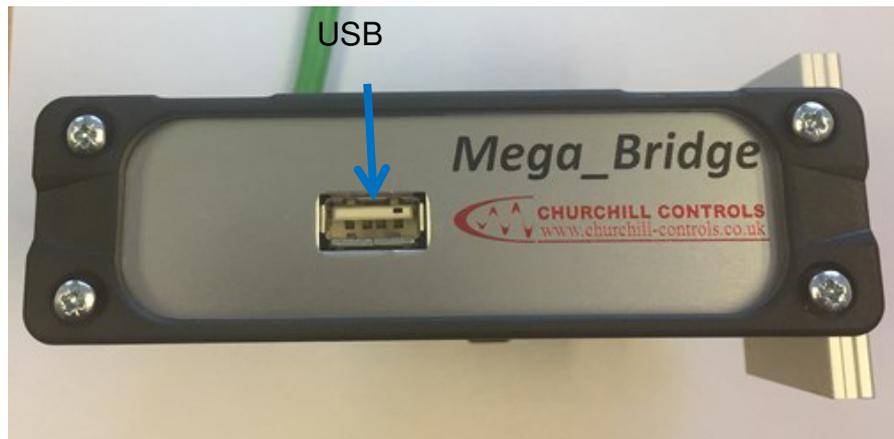
The RJ45 socket is the main Ethernet interface connection

The Mini-USB socket is used for configuration and diagnostics only.

### 6.2 Rear Panel

The main USB interface port is located on the rear panel.

This can be connected to the USB diagnostics connector on the host *Mega\_Link* using a standard USB-A to USB-B cable. As detailed in section 5.3, Wi-Fi or 3G/4G dongles can be connected to this if required.



*Figure 9: Rear Panel Interfaces*

### **6.3 USB Dongles**

A small USB hub can be used to conveniently connect both a Wi-Fi and/or a 3G/4G dongle and the host *Mega\_Link* diagnostics USB interface cable.



*Figure 10: USB Port Interfaces*

## 7 Information Needed to Set-up a *Mega\_Bridge* System

### 7.1 General

In general, all but the simplest system may require some input information from the customer, most likely from their network administration people and/or their 3rd party communications providers.

Before attempting to set up a *Mega\_Bridge* system, ask the following questions to understand the system better:

- **Which *Mega\_Link* is the basestation?**  
The Basestation connected *Mega\_Bridge* becomes the messaging broker for a local system and has extra responsibility than an ordinary Outstation.
- **What is the Station Address of each *Mega\_Link* host to the *Mega\_Bridge*?**  
*Mega\_Link* messages are routed and directed based on their station address, hence messages going to the wrong address will be ignored as they're not for the intended system!

### 7.2 Local Mode

- **What is the fixed IP address of the *Mega\_Bridge* attached to the *Mega\_Link* Basestation?**  
The *Mega\_Bridge* connected to the basestation *Mega\_Link* becomes the messaging broker for a local system, you will need to enter this target broker IP address into the configuration of each outstation *Mega\_Bridge*.
- **Is the system on a closed LAN/WAN or distributed across the internet?**  
Using a closed network LAN or WAN (or dedicated connected ADSL modems), where all the devices can see each other on the same network can benefit from using a MQTT broker hosted locally on the basestation *Mega\_Link*.

Otherwise, if the *Mega\_Bridge* devices are distributed across networks, to overcome Network Address Translation while maintaining security, a cloud broker service will need to be administered in Remote Mode.

### 7.3 Remote Mode

- **Customer Company name and System name used in the *Mega\_Bridge*?**  
The Company and System name needs to be the same on each *Mega\_Bridge* within the same system as these parameters are used to ensure that they talk only to devices on that system. Any misspelt or wrong information will be sent to a topic where no devices will be listening. Please see section **Error! Reference source not found.** for more information on MQTT and Topics.

## 8 Setting up the *Mega\_Bridge*

## 8 Setting up the *Mega\_Bridge*

### 8.1 Accessing the Configuration Web Application

The *Mega\_Bridge* configuration is managed locally on each device using its own locally hosted web server. To access the configuration web application initially, the easiest method is to directly connect to the device via the Mini-USB port located on the front panel, see Figure 8.

Open a web browser, such as Google Chrome. Your computer will recognise the *Mega\_Bridge* as a network device with the static IP address “**192.168.7.2**” by typing this into your web browser.

The web application will work in any browser, offline or online, as the files are locally hosted by the *Mega\_Bridge* itself, just navigate to the URL shown below which is the device IP address. Please note this IP address is only for the physically connected device, once an IP address is allocated from your network or through a VPN, a new connection can then be made via that IP address if desired.

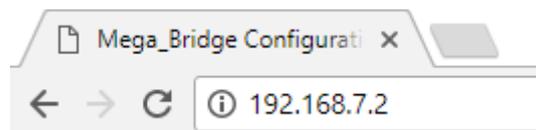


Figure 11: Default URL for connection via Mini-USB cable

**Please allow at least 2 minutes from power up (or rebooting) for the unit to boot up and keep trying to open the web page.**

## 8.2 Setting the Mega\_Bridge Configuration

### 8.2.1 Configuration Wizard for General Settings in Local & Remote Modes

The home screen looks like this.

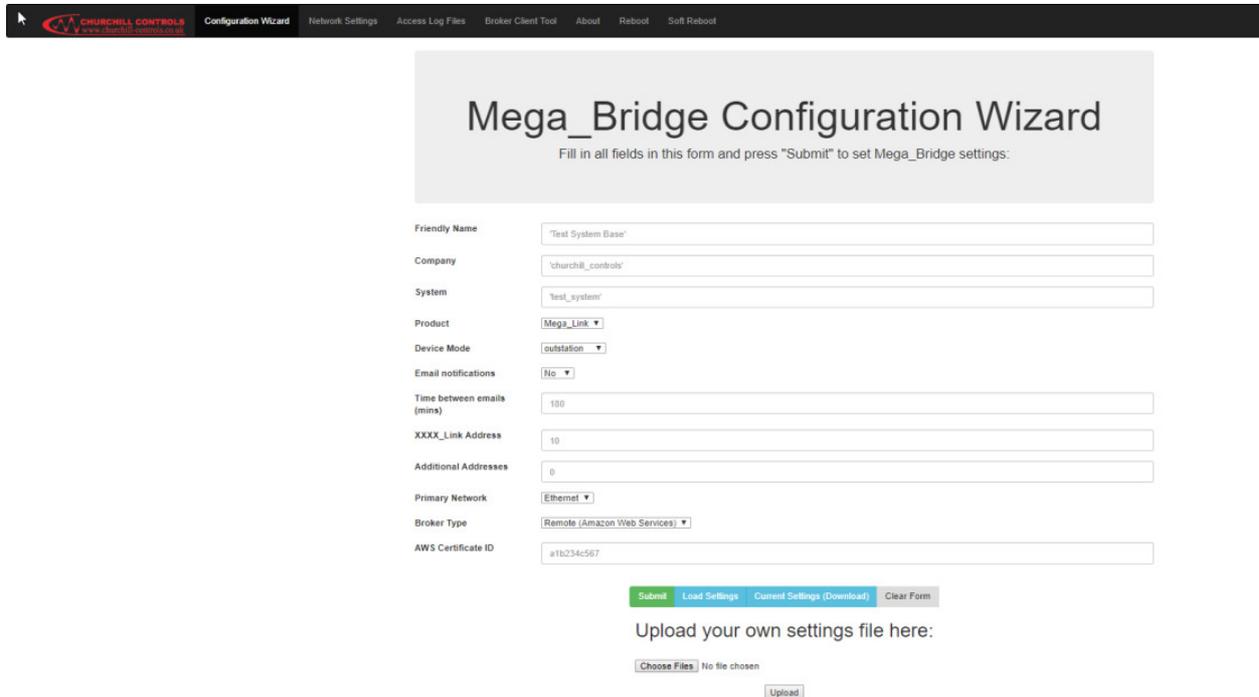


Figure 12: Configuration Web Application Home Page

The *Mega\_Bridge* configuration is stored as a JSON file which can be edited and displayed from this configuration page. There are options to load the previous configuration, write a completely new configuration or to simply make edits where necessary. The user can also upload and download configuration files making it easy to transfer between devices if all configurations are stored.

**In General a Mega\_Bridge configuration will require the following:**

- Friendly Name
- **Customer/Company name\***
- **System name\***
- Product type
- Device Mode
- Associated **Mega\_Link** Station Address
- Primary Network
- Broker Type

\***Company** and **System** names need to be accurate and consistent across all *Mega\_Bridge* devices within a single system, this is a way of differentiating different systems and also for later understanding when it comes to configuration management. For example; having one unit with “Churchill Controls” and another “CCL” will result in two different message paths.

While all other fields need to be filled in, they don't need to be specific to operation and can be used to identify information when later looking at the configuration.

For example, "Friendly Name" is there to give your *Mega\_Bridge* an easily identifiable name for future reference.

#### Additional Settings:

- **Product** – This should always be set to Mega\_Link. Other options only apply if you are connected to a Nano\_Link or Micro\_Link.
- **Email Notifications** – In the event of a fault, Churchill Controls can receive technical details of the fault. This should allow any issues to be identified quickly. These can be enabled or disabled with the dropdown box.
- **Time between emails** – If email notifications are enabled, this specifies a time out period for these emails. This can be increased in order to reduce data usage if there is a recurring fault.
- **AWS Certificate ID** – If using a remote broker this must match the first 10 characters of the certificate and private key stored on the Mega\_Bridge.
- **Local basestation IP** – This must match the static IP address set in the network settings for the basestation.

Entry	Local	Remote
Friendly Name	Text	Text
Company	Text	Text
System	Text	Text
Product	Mega_Link	Mega_Link
Device Mode	Basestation/Outstation	Basestation/Outstation
XXXX_Link_Address	Base=0, Out=10, 20, 30 etc.	Base=0, Out=10, 20, 30 etc.
Additional Addresses	For expansion modules	For expansion modules
Primary_Network	Ethernet/WiFi/3G/4G	Ethernet/WiFi/3G/4G
Broker Type	Local	Remote (Amazon Web Services)
Local Basestation IP	IP address text	N/A
AWS Certificate ID	N/A	Certificate file name text

## 8.3 Mega\_Bridge Network Settings for Local Mode ONLY

### 8.3.1 Network Settings

# Network Settings

This page allows the user to change Wi-Fi settings and VPN connections

### Set Static IP Address

To commit changes, press submit and the network will restart.

Static IP

Subnet Address

Default Gateway

Submit
Revert to DHCP

Network Information

### Set Wireless Network Settings:

To commit changes, press submit and the network will restart.

SSID

*Figure 13: Network Settings Page*

This page can be used to make any changes to the current network settings on the *Mega\_Bridge* or to query the current settings. There is also a section here to configure connectivity to a VPN service running through OpenVPN.

Instructions for all those settings are contained in this section.

### 8.3.2 Check Current Network Information

Below the Static IP form there is a button “Network Information”, this will query the *Mega\_Bridge* network connections and return the IP address information. The information will open in a new tab and be displayed in JSON format and display as below.

- Eth0 – Physical Ethernet Port connection
- Eth1 – 3G/4G Dongle connection
- Wlan0 – Wireless connection
- Tun0 – VPN tunnel connection

Any changes to the network settings can be verified through this button and do not need a reboot. If pressing the button immediately after making changes, there might be slight delay for the page to reload. If the connection isn't showing in network information, there is no connection on that interface, or the settings may not be correctly entered in the relevant fields.

### 8.3.3 Setting Static IP Address

Setting a static IP on the *Mega\_Bridge* is a very simple process.

Before getting started on setting a static IP address for the *Mega\_Bridge*, you need to consider three things:

- What static IP do you intend to set?
- What is the network subnet address?
- What is the address of the default gateway/router?

With this information, enter each address into the relevant section on the form and press the green “Submit” button below the form and the IP address will now be set.

Please note that this IP address is now set on the *Mega\_Bridge* for all networks, to revert to DHCP, refer to next section.

### 8.3.4 Setting DHCP Addressing

DHCP is the default IP address method used for the *Mega\_Bridge* at outstations and if a static IP is previously already set then all that needs to be done is to press the “Revert to DHCP” button and the network settings will change. The change will be reflected in “Network information”.

NB: If you’re accessing the web server via the static IP, this will no longer be working as the address has changed, please either check network settings via the mini-USB cable method or check for *Mega\_Bridge* IP address in your network router’s attached device list.

### 8.3.5 Settings WI-FI Credentials

Before changing the Wireless Network Settings you’ll need two things:

- Wireless Network Name(SSID)
- Network Password

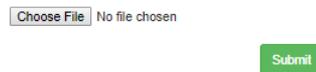
Both need to be entered into the form for wireless network settings and exactly as in the exact case they are written. The change will be reflected in “Network information”.

Wlan0 will be showing if all settings are correctly entered, if it doesn’t show then the settings will not have been entered correctly.

Please try again and remember not to leave any whitespace and ensure that the dongle is correctly plugged in with the indicator LEDs alight.

## 8.4 Upload VPN configuration

Upload your specific VPN "client.conf" file here:



Choose File No file chosen

Submit

*Figure 14: VPN configuration section under Network Settings*

By default, the *Mega\_Bridge* will come without VPN configuration preset and will need to be configured on first use. After this, unless there are any changes from the server side, connection will be made whenever a network interface becomes active.

Churchill Controls Ltd provide a VPN network service that can be administered on request, in which case your configuration files will be directly sent. Whether it is your own VPN or Churchill Controls VPN a client configuration needs to be installed on the *Mega\_Bridge*. The "client.conf" file needs to be chosen using the buttons provided and this will upload and refresh the network settings to your desired VPN.

1. Press "Choose File" button
2. Navigate to "client.conf" stored on your computer
3. Select the file and it will appear in place of "No-File Chosen" to "client.conf"
4. Press "Submit"

No other file format or name will be accepted by the *Mega\_Bridge*, please make sure this name is correct, originally the VPN server file might download as a ".OVPN" file, this is safe to rename.

Further options of VPN may be added in later software updates if this is required please contact Churchill Controls for more information on your requirements or register your interest in updates.

## 9 Example for Setting the Mega\_Bridge Configuration for Local Mode

### 9.1 General

Please work through the following example stages in the order given, using your system names and allocated addresses etc. and paying particular attention to which basestation/outstation that the USB cable is plugged into at each step. After plugging in the USB cable please wait long enough for the USB device drivers to enumerate before trying to open a web page.

### 9.2 Setting Up Basestation for Local Mode

#### 9.2.1 Configuration Wizard for Basestation in Local Mode

First you need to set up the basestation basic configuration in the Configuration Wizard tab.

Connect USB cable from PC to the microUSB on front panel of basestation Mega\_Bridge unit.

Here is an example of the Configuration Wizard window for a basestation in local mode.

<b>Friendly Name</b>	<input type="text" value="MegaBridge_Hayden_Control"/>
<b>Company</b>	<input type="text" value="acme_water"/>
<b>System</b>	<input type="text" value="hayden_wwtw"/>
<b>Product</b>	<input type="text" value="Mega_Link"/>
<b>Device Mode</b>	<input type="text" value="basestation"/>
<b>XXXX_Link Address</b>	<input type="text" value="0"/>
<b>Additional Addresses</b>	<input type="text" value="0"/>
<b>Primary Network</b>	<input type="text" value="Ethernet"/>
<b>Broker Type</b>	<input type="text" value="Local"/>
<b>Local Basestation IP</b>	<input type="text" value="192.168.1.135"/>
<b>AWS Certificate ID</b>	<input type="text" value="4df9c3c0dc"/>

*Figure 15: Example Configuration Web Wizard Home Page for Basestation (Local Mode)*

This is a basestation so the "Device Mode" = basestation and the "XXXX\_Link Address = 0 by default.

If there are no expansion modules then "Additional Addresses" = 0. See appendix TBA for how to configure for use of expansion modules.

For a local system select "Broker Type" = Local.

This is a basestation and it's own static IP address must be entered in the "Local Basestation IP" box.

In a local system ignore the "AWS Certificate ID" box.

Then hit submit to set and remember the configuration settings.

Having submitted this basic configuration the next step is to enter the Network Settings.

## 9.2.2 Network Settings for Basestation in Local Mode

**NB: It is best to have the Ethernet cable already plugged into a live network (or at least a network switch) for the following process to work efficiently.**

For a fixed IP basestation enter the following three things into the "Network Settings" tab.

# Network Settings

This page allows the user to change Wi-Fi settings and VPN connections

### Set Static IP Address (Ethernet):

To commit changes, press submit and the network will restart.

Static IP	192.168.1.135
Subnet Address	255.255.255.0
Default Gateway	192.168.1.1

Submit

Revert to DHCP
Network Information

*Figure 16: Example Network Settings for Basestation (Local Mode)*

"Static IP" = 192.168.1.135 (an example basestation Fixed IP address, obtained from network administration people).

"Subnet Address" = 255.255.255.0 (an example basestation subnet address, obtained from network administration people).

"Default Gateway" = 192.168.1.1 (an example for basestation default gateway, obtained from network administration people).

Then hit submit to set and remember the network settings.

### 9.2.3 Checking Network Settings for Basestation in Local Mode

Press the grey "Network Information" button (in the "Network Settings" tab and you will see a summary of the stored network information settings.

**Default Gateway**

---

'xxx.xxx.xxx.xxx'

---

Submit

Revert to DHCP

Network Information

*Figure 17: Checking Network Information for Basestation (Local Mode)*

Example fixed IP network settings.

```
{
  "Interface": "eth0",
  "Subnet": "255.255.255.0",
  "Address": "192.168.1.135",
  "Gateway": "192.168.1.1",
  "IP Method": "fixed"
}
```

### 9.2.4 Restart or rebooting To Bring Setup Into Effect for Basestation

To make settings come into effect, you must now either remove and reapply power or use the reboot command in "Reboot" tab and confirming okay. Please note that this will cause the web page to disappear for obvious reasons.

## 9.3 Setting Up Outstation for Local Mode

### 9.3.1 Configuration Wizard for Outstation in Local Mode

Next you need to set up each of the outstation(s) basic configuration in their Configuration Wizard tabs in their device web page.

Connect USB cable from PC to the microUSB on front panel of the outstation Mega\_Bridge unit to be configured.

Here is an example of the Configuration Wizard window for a outstation in local mode.

<b>Friendly Name</b>	<input type="text" value="MegaBridge_Hayden_Pumps"/>
<b>Company</b>	<input type="text" value="acme_water"/>
<b>System</b>	<input type="text" value="hayden_wwtw"/>
<b>Product</b>	<input type="text" value="Mega_Link ▼"/>
<b>Device Mode</b>	<input type="text" value="outstation ▼"/>
<b>XXXX_Link Address</b>	<input type="text" value="10"/>
<b>Additional Addresses</b>	<input type="text" value="0"/>
<b>Primary Network</b>	<input type="text" value="Ethernet ▼"/>
<b>Broker Type</b>	<input type="text" value="Local ▼"/>
<b>Local Basestation IP</b>	<input type="text" value="192.168.1.135"/>
<b>AWS Certificate ID</b>	<input type="text" value="4df9c3c0dc"/>

*Figure 18: Example Configuration Web Wizard Home Page for Outstation (Local Mode)*

This is a outstation so the "Device Mode" = outstation and "XXXX\_Link Address = 10 by default. It is recommended that the first (or single) outstation Mega\_Link is set to station addresses 10. Subsequent multiple outstations are then 20, 30, 40 etc.

If there are no expansion modules then "Additional Addresses" = 0. See appendix TBA for how to configure for use of expansion modules.

For a local system select "Broker Type" = Local.

This is an outstation and it needs to be told the static IP address of its corresponding basestation, so please enter this in the "Local Basestation IP" box.

In a local system ignore the "AWS Certificate ID" box.

Then hit submit to set and remember the configuration settings.

Having submitted this basic configuration the next step is to enter the Network Settings.

### 9.3.2 Network Settings for Outstation in Local Mode

**NB: It is best to have the Ethernet cable already plugged into a live network (or at least a network switch) for the following process to work efficiently.**

There are two options for the Network Settings on an outstation.

The default is to use a dynamic IP which is where there is no need to enter any allocated IP address and to rely on a network DHCP server within the host network to automatically provide this.

This option is enabled by default but to go back to it for what ever reason use the "Revert to DHCP" button and then skip to section 9.3.3.

For the option of using a fixed IP outstation enter the following three things into the "Network Settings" tab.

## Set Static IP Address (Ethernet):

To commit changes, press submit and the network will restart.

<b>Static IP</b>
192.168.1.102
<b>Subnet Address</b>
255.255.255.0
<b>Default Gateway</b>
192.168.1.1

*Figure 19: Example Network Settings for Outstation (Local Mode)*

"Static IP" = 192.168.1.102 (an example outstation Fixed IP address, obtained from network administration people).

"Subnet Address" = 255.255.255.0 (an example basestation subnet address, obtained from network administration people).

"Default Gateway" = 192.168.1.1 (an example for basestation default gateway, obtained from network administration people).

Then hit submit to set and remember the network settings.

### 9.3.3 Checking Network Settings for Outstation in Local Mode

Press the grey "Network Information" button (in the "Network Settings" tab and you will see a summary of the stored network information settings.

**Default Gateway**

---

'xxx.xxx.xxx.xxx'

---

**Submit**

**Revert to DHCP**    **Network Information**

*Figure 20: Checking Network Information for Outstation (Local Mode)*

Example dynamic IP network settings for Outstation only, "IP Method" = "DHCP".

```
{
  "Interface": "eth0",
  "Subnet": "255.255.255.0",
  "Address": "192.168.1.26",
  "Gateway": "192.168.1.1",
  "IP Method": "dhcp"
}
```

Example fixed IP network settings for Outstation, "IP Method" = "fixed".

```
{
  "Interface": "eth0",
  "Subnet": "255.255.255.0",
  "Address": "192.168.1.102",
  "Gateway": "192.168.1.1",
  "IP Method": "fixed"
}
```

### 9.3.4 Restart or rebooting To Bring Setup Into Effect for Outstation

To make settings come into effect, you must now either remove and reapply power or use reboot command in "Reboot" tab and confirming okay. Please note that this will cause the web page to disappear for obvious reasons.

## 10 Example for Setting the Mega\_Bridge Configuration for Remote Mode

### 10.1.1 General

Please work through the following example stages in order, using your system names and allocated addresses etc. and playing particular attention to which basestation/outstation that the USB cable is plugged into at each step. After plugging in the USB cable please wait long enough for the USB device drivers to enumerate before trying to open a web page.

## 10.2 Setting Up Basestation for Remote Mode

### 10.2.1 Configuration Wizard for Basestation in Remote Mode

First you need to set up the basestation basic configuration in the Configuration Wizard tab.

Connect USB cable from PC to the microUSB on front panel of basestation Mega\_Bridge unit.

Here is an example of the Configuration Wizard window for a basestation in Remote Mode.

# Mega\_Bridge Configuration Wizard

Fill in all fields in this form and press "Submit" to set Mega\_Bridge settings:

Friendly Name	<input type="text" value="MegaBridge_base4"/>
Company	<input type="text" value="churchill"/>
System	<input type="text" value="megabridge_system4"/>
Product	<input type="text" value="Mega_Link"/>
Device Mode	<input type="text" value="basestation"/>
XXXX_Link Address	<input type="text" value="0"/>
Additional Addresses	<input type="text" value="0"/>
Primary Network	<input type="text" value="3G/4G"/>
Broker Type	<input type="text" value="Remote (Amazon Web Services)"/>
Local Basestation IP	<input type="text" value="192.168.1.69"/>
AWS Certificate ID	<input type="text" value="a438b48bc7"/>

*Figure 21: Example Configuration Web Wizard Home Page for Basestation (Remote Mode)*

This is a basestation so the "Device Mode" = basestation and the "XXXX\_Link Address" = 0 by default.

If there are no expansion modules then "Additional Addresses" = 0. See appendix TBA for how to configure for use of expansion modules.

Set the "Primary Network" = 3G/4G.

For a Remote system select "Broker Type" = Remote (Amazon Web Services).

In Remote Mode the "Local Basestation IP" address is not relevant.

In Remote Mode there must be a valid entry in the "AWS Certificate ID" box which exactly matches the certificate files already downloaded to the Mega\_Bridge memory.

Then hit submit to set and remember the configuration settings.

Having submitted this basic configuration there is no need to enter any Network Settings like you would have to do for Local Mode.

### 10.2.2 Network Settings for Basestation in Remote Mode

In Remote Mode this setup step is not required.

### 10.2.3 Checking Network Settings for Basestation in Remote Mode

In Remote Mode this setup step is not relevant.

### 10.2.4 Restart or rebooting To Bring Setup Into Effect for Basestation

To make settings come into effect, you must now either remove and reapply power or use the reboot command in "Reboot" tab and confirming okay. Please note that this will cause the web page to disappear for obvious reasons.

## 10.3 Setting Up Outstation for Remote Mode

### 10.3.1 Configuration Wizard for Outstation in Remote Mode

Next you need to set up each of the outstation(s) basic configuration in their Configuration Wizard tabs in their device web page.

Connect USB cable from PC to the microUSB on front panel of outstation Mega\_Bridge unit.

Here is an example of the Configuration Wizard window for an outstation in Remote Mode.

Friendly Name	MegaBridge_out4
Company	churchill
System	megabridge_system4
Product	Mega_Link ▼
Device Mode	outstation ▼
XXXX_Link Address	10
Additional Addresses	0
Primary Network	3G/4G ▼
Broker Type	Remote (Amazon Web Services) ▼
Local Basestation IP	192.168.1.69
AWS Certificate ID	23f45c5959

*Figure 22: Example Configuration Web Wizard Home Page for Outstation (Remote Mode)*

This is a outstation so the "Device Mode" = outstation and "XXXX\_Link Address = 10 by default. It is recommended that the first (or single) outstation Mega\_Link is set to station addresses 10. Subsequent multiple outstations are then 20, 30, 40 etc.

If there are no expansion modules then "Additional Addresses" = 0. See appendix TBA for how to configure for use of expansion modules.

Set the "Primary Network" = 3G/4G.

For a Remote system select "Broker Type" = Remote (Amazon Web Services).

In Remote Mode the "Local Basestation IP" address is not relevant.

In Remote Mode there must be a valid entry in the "AWS Certificate ID" box which exactly matches the certificate files already downloaded to the Mega\_Bridge memory.

Then hit submit to set and remember the configuration settings.

Having submitted this basic configuration the next step is to enter the Network Settings.

### 10.3.2 Network Settings for Outstation in Remote Mode

In Remote Mode this setup step is not required.

### 10.3.3 Checking Network Settings for Outstation in Remote Mode

In Remote Mode this setup step is not relevant.

### 10.3.4 Restart or rebooting To Bring Setup Into Effect for Outstation

To make settings come into effect, you must now either remove and reapply power or use the reboot command in "Reboot" tab and confirming okay. Please note that this will cause the web page to disappear for obvious reasons.