# FAQ

## FUYL Tower name and the Neighbourhood page

Subnets and IP addresses

# Neighborhood tower visibility and subnets

The Neighborhood function is provided to show FUYL Towers installed on the Local Area Network. There are several reasons why Neighborhood maps may not display *all* FUYL Towers on a LAN, and to understand why, a little background is required.

To improve network security and performance, network administrators often divide IP addresses into groupings known as *subnets*. Routers may then be configured to restrict network traffic between subnets, and, where necessary, to entirely block certain types of traffic between them. A LAN administrator can alter the range of available addresses in a subnet by altering the *subnet mask* configuration setting.

So for example, one of our in-house subnets provides us with a range of available IP addresses to use:

**172.168.232.**0 to **172.168.232**.255

The subnet in this instance is named as '172.168.232.0'.

> *Note that a FUYL Tower admin can alter the subnet mask and IP address from the Managment Portal Networking page, after selecting Fixed IP.*

How do we know which subnet the FUYL Tower is on? By default, FUYL Towers are configured (using the subnet mask) to use only the first three blocks of their IP address to identify the network subnet - and the rest of the address identifies the device. So for example we have an in-house FUYL Tower connected over ethernet cable to our router. This router's DHCP server has assigned the tower with an IP address of:

IP address: 172.168.232.**250**

The FUYL Tower regards the '250' part as its actual address (the *host identifier*), and the first three blocks of the address (172.168.232) indicate the subnet address is 172.168.232.0.

The Neighborhood function uses a methodology known as Network Discovery to determine the presence of other FUYL Towers on the LAN, as well as to announce its own presence. When a FUYL Tower powers up, it sends a *multicast* Network Discovery message (ie: a message intended for all) to all other FUYL Towers to announce its presence. Each tower then maintains a list of towers that it has 'heard' from along with their locations, and these appear on each tower's map.

Problems with Neighborhood visibility can arise because on many networks, router will automatically block multicast signals from routing to other subnets. Two local FUYL Towers installed on different subnets will therefore not be visible on each other's Neighborhood map.

> *Note that it may be possible (depending upon the router) for LAN administrators to configure their routers to allow the Network Discovery signal to be forwarded to other subnets.*

## Disappearing neighbours after changing connection from ethernet to WiFi

One scenario where FUYL Towers may not be visible to each other can occur when the FUYL Towers operate on different interfaces (ethernet or WiFi). This is because many router allocate a different subnet for each of their interfaces. For example, on our in-house FUYL Tower, re-configuring the formerly ethernet-connected tower to connect over WiFi (remembering to disconnect the ethernet cable before resetting!) results in the WiFi router's DHCP server allocating a new IP address *and subnet*:

IP address: 172.168.233.**143**
Subnet address: **172.168.233**.0

Hence FUYL Towers which were previously visible when our ethernet-connected FUYL Tower was on subnet 172.168.23**2**.0 will no longer be visible on the tower's Neighborhood map, as it is now on subnet 172.168.23**3**.0.

# Friendly names

A Friendly name is a 'human-friendly' alternative to the IP address entered in the browser address bar. These are familiar to us when accessing a webpage on the internet - rather than entering 240.162.232.200 we would instead enter something like "sourceforge.com". To achieve this, a remote Domain Name Server (eg: Google's DNS server at 8.8.8.8) holds a list of registered names and their associated IP addresses. When the DNS server receives a request for the address of 'sourceforge.com', it looks up the associated IP address in a table, returns it, and the browser uses this IP address to access the page. A DNS server may also be located within the user network's local router.

Because FUYL Towers may be installed in isolated networks with no Internet access, a remote DNS server may not be accessible. To provide a similar capability, we instead use a technology known as *zero-configuration* mDNS (Multicast Domain Name Server). This requires that each device on the network maintains its own lookup table of friendly names/IP addresses. When a FUYL Tower is given a new name, it attempts to send this name – and its IP address – to all devices on the network by sending a *multicast* message (ie: a message intended for all devices on the network).

If you set (and save) the FUYL Tower name, the name will appear on all Management Portal pages – but it will not yet be available for use from your direct-connected laptop. The FUYL Tower must first be power-cycled before the mDNS multicast message (ie: broadcast to all devices) is sent out on the LAN announcing the new friendly name for this IP address. Your computer will add this name/IP address to its lookup table for future use, and the tower may now be accessed using an address such as:

> myfriendlyname.local:9898

However, the multicast packet may not be received by some devices within the network. This is because networks are often subdivided into different subnets, and by default, most routers are configured to prevent multicast messages from routing to other subnets. Thus a friendly name for a FUYL Tower on one subnet will not be recognised by a computer on a different network subnet.

This sort of problem can occur after changing the laptop *or* the FUYL Tower's connections from ethernet to WiFi (and vice versa). This is because many routers allocate a different subnet for each of their interfaces (wired ethernet or WiFi).

> *Note: It is possible with some routers to configure them to forward multicast messages across subnets – but this will depend on the router.*

# My Windows device cannot recognise friendly names

By default, Apple products are zero-configuration-ready, and will be able to utilise friendly names out of the box. This is not so for Windows devices, and to get around this we must first install an application such as iTunes, which includes mDNS.

# Direct connection and friendly names

Direct connection is just that – no Local Area Network connection, but simply a computer directly connected to the FUYL Tower using the ethernet cable.  The FUYL Tower will then use a default IP address and port number of:

169.254.172.16:9898

If you set (and save) the FUYL Tower name, the name will appear on all Management Portal pages – but it will not yet be available for use from your direct-connected laptop. The FUYL Tower must first be power-cycled. Power-cycling causes an mDNS multicast (ie: broadcast to all devices) to be sent out on the LAN, announcing the new friendly name for this IP address. The laptop will add this name/IP address to its lookup table for future use, and the tower may now be accessed using an address such as:

myfriendlyname.local:9898

If you now reconnect the FUYL Tower to the LAN but do not reconnect your laptop ethernet cable to same LAN subnet, you will not be able to use your friendly name. This may occur if the laptop attempts to locate the FUYL Tower from its WiFi interface. *You must also connect your laptop to the same subnet as the FUYL Tower* to be able to use the friendly name.

When direct connected, the zero configuration service will (effectively) have saved the following to the laptop lookup table:

myfriendlyname.local  = 169.254.172.16

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This may occur if, after disconnecting the direct connect because many routers allocate a different subnet for each of their interfaces (wired ethernet or WiFi). So again on our in-house FUYL Tower, re-configuring the formerly ethernet-connected tower to connect over WiFi (remembering to disconnect the ethernet cable before resetting!) results in the WiFi router's DHCP server allocating a new IP address *and subnet*:

The important thing to note is that your laptop must be on the same network subnet as the FUYL Tower in order to use your friendly name.