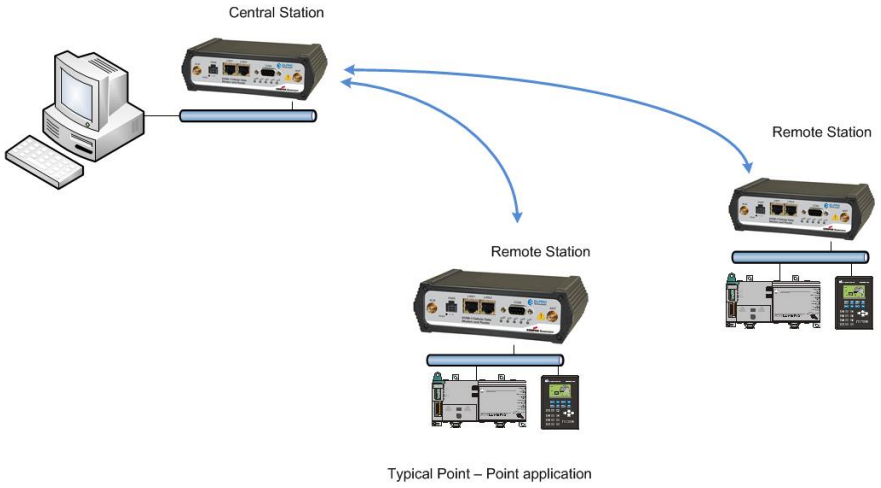
GRE Tunnel

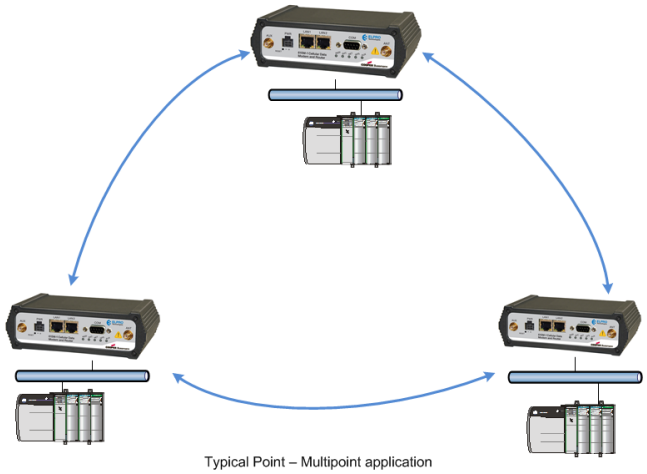
The following application note demonstrates the configuration of the ELPRO 645M-1 modem utilizing the ***GRE Tunnelling*** feature. Generic Routing Encapsulation (GRE) is a tunnelling protocol which will encapsulate a wide variety of network layer protocols inside a point to point link. There are some benefits of using GRE in that it will allow multicast packets to traverse across a network and routing of multiple subnets. When using a Public Cellular network it is recommend that some form of security be used to protect the data from eavesdropping. The following GRE example is performed over a Private Cellular network which prohibits Public access.

Network Example - Overview

Typical network applications that GRE can be used for are Master – Slave and Point to Multipoint applications as seen below. This application note will cover configuration for both of these examples.



Typical Point – Point application

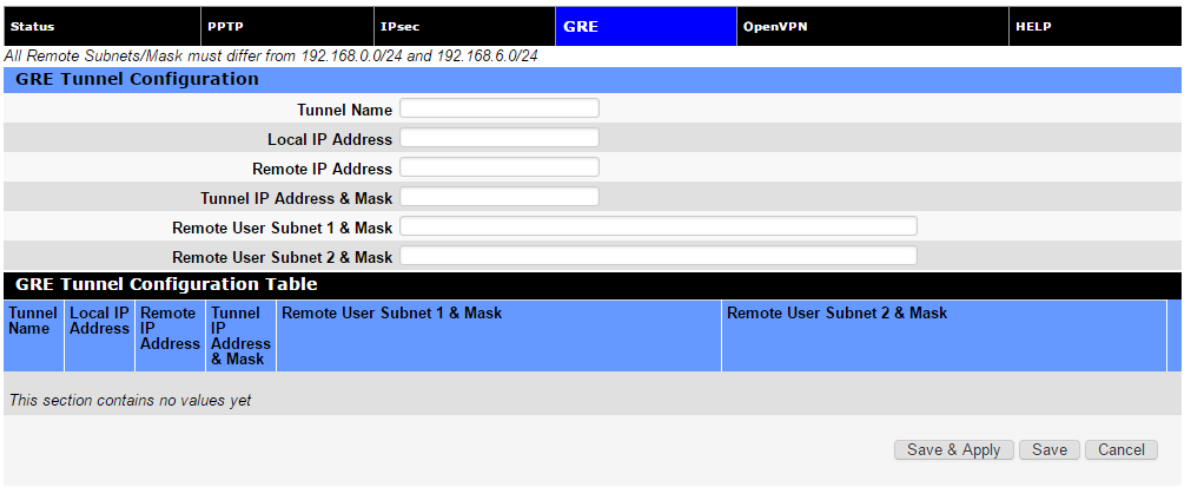


Typical Point – Multipoint application

The ELPRO 645M-1 ***GRE Tunnelling*** configuration is located under *Security - GRE* webpage link.

Feature Overview

The GRE page is used to add and delete GRE tunnels. Up to two networks that lie beyond the tunnel may be specified and routes to those networks are automatically created when the tunnel is established. Static Local and Remote Cellular IP addresses are required to allow for the tunnel automatic (re)connection.



Local IP Address: The PPP (Cellular) IP Address of the local ELPRO 645M-1

Remote IP Address: The PPP (Cellular) IP Address of the remote ELPRO 645M-1

Tunnel IP Address & Mask: The GRE virtual tunnel IP Address and Mask

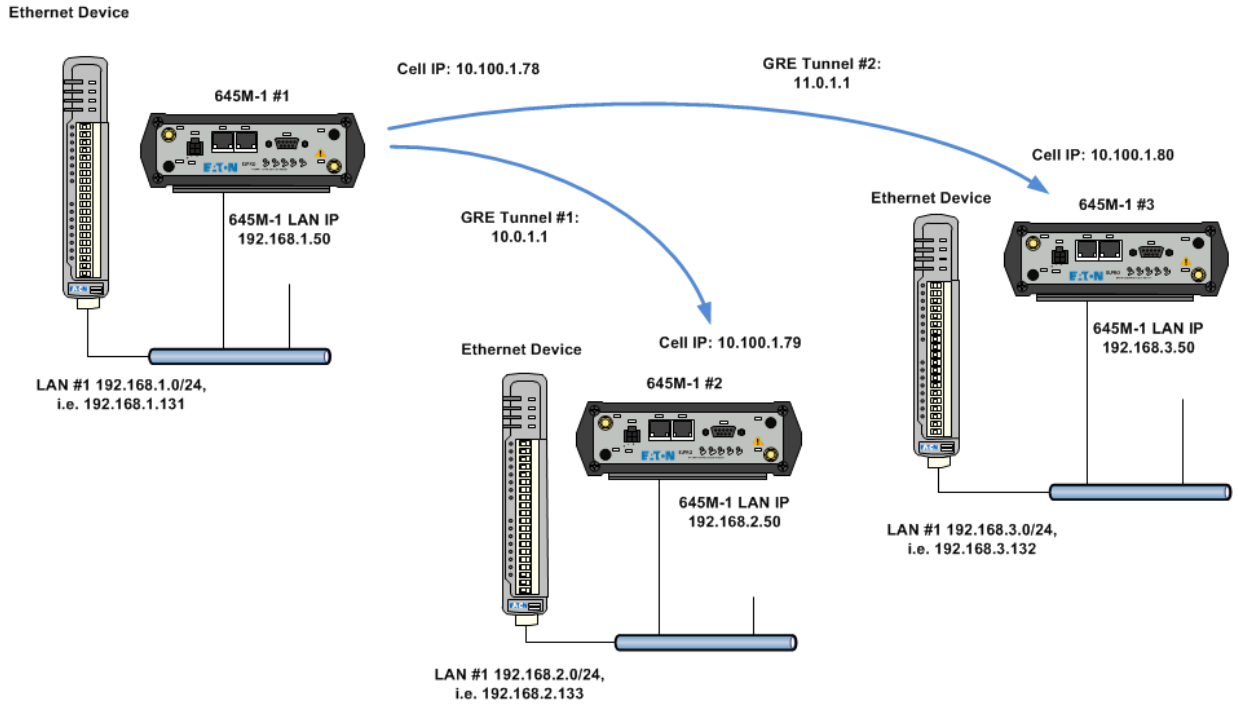
Remote User Subnet 1 & Mask: The LAN Address & Mask of the remote ELPRO 645M-1

Remote User Subnet 2 & Mask: The 2nd subnet LAN Address & Mask of the remote ELPRO 645M-1

Application Example – Master - Slave

Central 645M-1 #1 Master to Slave Remotes

Each ELPRO 645M-1 is required to have a static cellular IP Address and distinct LAN IP subnet address.



In order to create a point to point connection between the ELPRO 645M-1 LAN networks, we will have to define GRE tunnels between the units. The example above demonstrates a Central ELPRO 645M-1 modem which requires LAN2LAN communication to two remote 645M-1 modems. In this case, two GRE tunnels will be added in the Central Modem and one GRE Tunnel will be added in each of the remote 645M-1 modems.

Note: The LAN networks connected on each modem must be using a different Subnet and will have a unique GRE tunnel address configured. In this application the following LAN IP addresses will be assigned to each of the 645M-1 Modem,

645M-1 #1 – 192.168.1.50
645M-1 #2 – 192.168.2.50
645M-1 #3 – 192.168.3.50

Browse into the ELPRO 645M-1 #1 web interface under: ***Security – GRE*** and configure two GRE tunnels.

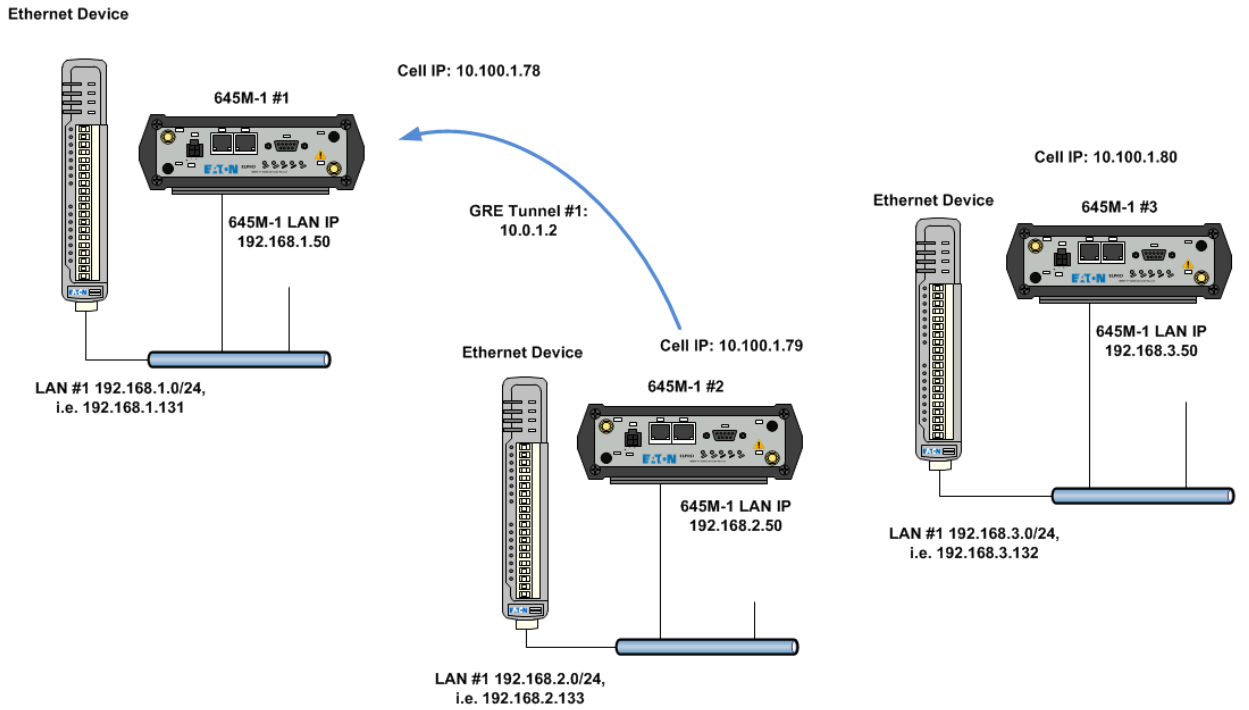
GRE Tunnel Configuration Table

Tunnel Name	Local IP Address	Remote IP Address	Tunnel IP Address & Mask	Remote User Subnet 1 & Mask	Remote User Subnet 2 & Mask	
Tunnel	10.100.1.78	10.100.1.79	10.0.1.1/24	192.168.2.0/24		Edit Delete
Tunnel2	10.100.1.78	10.100.1.80	11.0.1.1/24	192.168.3.0/24		Edit Delete

GRE Tunnel list configured for Central 615M-1 #1 Modem

Remote 645M-1 #2 Slave Remote to Central Master

To set the return GRE Tunnel browse to ***Security – GRE*** of the remote 645M-1 #2 web interface and configure a GRE tunnel back to the Central 645M-1 # 1 modem.



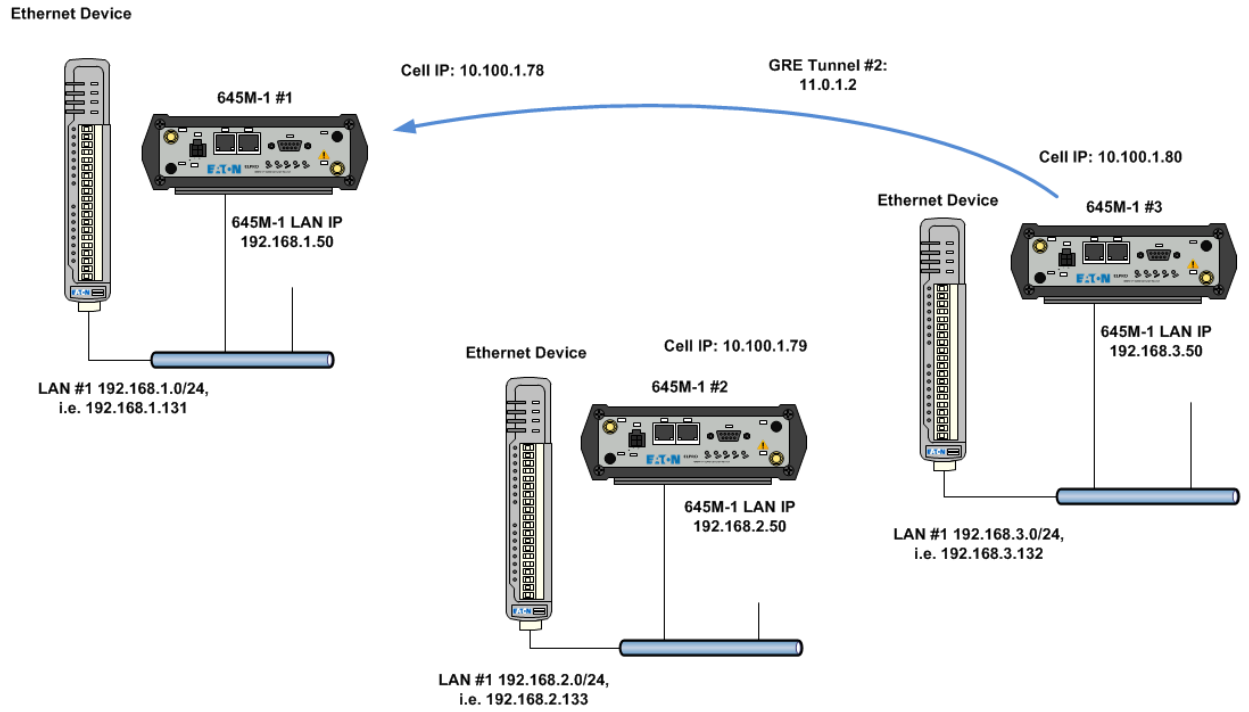
GRE Tunnel Configuration Table

Tunnel Name	Local IP Address	Remote IP Address	Tunnel IP Address & Mask	Remote User Subnet 1 & Mask	Remote User Subnet 2 & Mask	
Tunnel	10.100.1.79	10.100.1.78	10.0.1.2/24	192.168.1.0/24		Edit Delete

GRE Tunnel list configured for Remote 615M-1 #2 Modem

Remote 645M-1 #3 Slave Remote to Central Master

To set the return GRE Tunnel browse to ***Security – GRE*** of the remote 645M-1 #3 web interface and configure a GRE tunnel back to the Central 645M-1 # 1 modem.



GRE Tunnel Configuration Table

Tunnel Name	Local IP Address	Remote IP Address	Tunnel IP Address & Mask	Remote User Subnet 1 & Mask	Remote User Subnet 2 & Mask	
Tunnel	10.100.1.80	10.100.1.78	11.0.1.2/24	192.168.1.0/24		Edit Delete

GRE Tunnel list configured for Remote 615M-1 #3 Modem

LAN2LAN Communication tests:

When the GRE tunnels are established between the ELPRO 645M-1 modems, a communication test will be done to ensure LAN2LAN communications through GRE.

Test#1: Connect a laptop with IP address 192.168.1.100 and default gateway of 192.168.1.50 (645M-1 #1 LAN IP Address) to the **ELPRO 645M-1 #*1.*** Note: Also make sure there are no other Network connections configured, i.e. Wifi.

- Ping the ELPRO 645M-1 #2 LAN IP Address 192.168.2.50– Pings should reply
- Ping the ELPRO 645M-1 #3 LAN IP Address 192.168.3.50– Pings should reply

If you are unable to ping the destination IP, try to ping the Main Cell IP or the Remote Cell IP.

Test#2: Connect a laptop with IP address 192.168.2.100 and default gateway of 192.168.2.50 (645M-1 #2 LAN IP Address) to the **ELPRO 645M-1 #*2***

- Ping the ELPRO 645M-1 #1 LAN IP Address – 192.168.1.50 Pings should reply

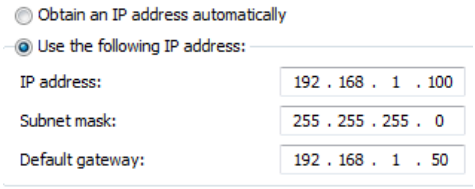
Test#3: Connect a laptop with IP address 192.168.3.100 and default gateway of 192.168.3.50 (645M-1 #3 LAN IP Address) to the **ELPRO 645M-1 #*3***

- Ping the ELPRO 645M-1 #1 LAN IP Address –192.168.1.50 Pings should reply

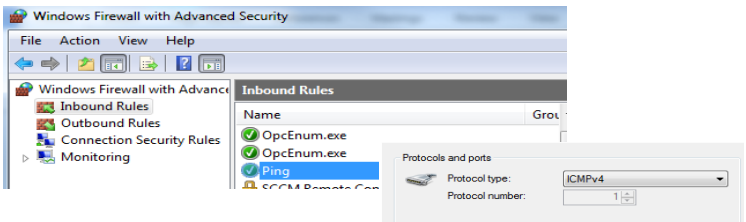
Data flow will only occur via configured GRE tunnels, that is with above configuration you will not be able to ping between ELPRO 645M-1 #2 and ELPRO 645M-1 #3 as there is no GRE Tunnel configuration set between these 2 modems. If communications between all modems is required use Point o Multipoint Configuration

Common problems that can prevent data transfer beyond the modems Ethernet ports are,

1. The Ethernet device connected to the 645M-1 does not have the Default Gateway address set to the connected modems LAN IP address. I.e. 645M-1 #1 LAN IP 192.168.1.50, 645M-1 #2 192.168.2.50,and 645M-1 #3 192.168.3.50.

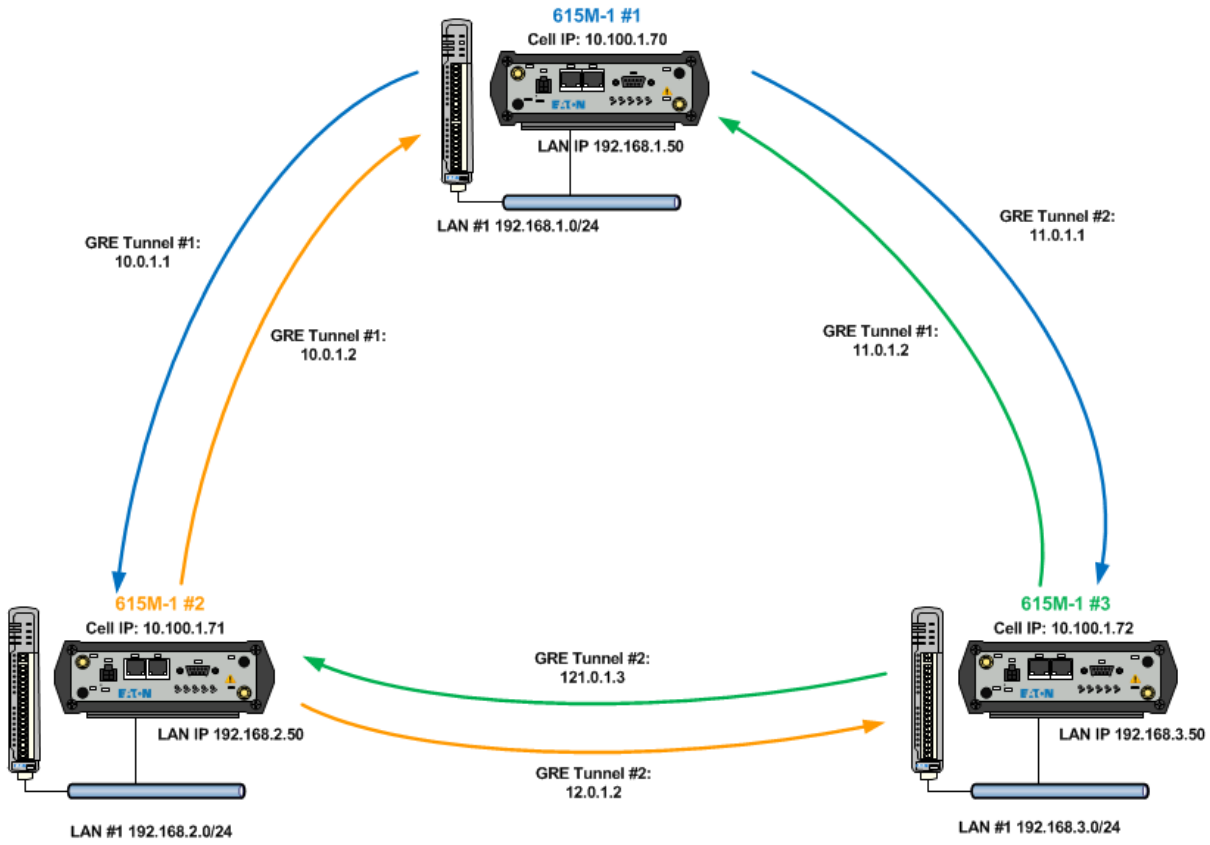


- The Connected Ethernet device is blocking the incoming ICMP (Ping) commands (if a PC), this can be resolved via Windows firewall by adding an Inbound Rule.



Point to Multipoint

If Point to Multipoint is required then setup the modems as above however each Modem will have a GRE entry in the table for each connection, i.e. each Modem will have two GRE Tunnels configured, one for each of the connections to the other modems.



Amendment Register:

Issue No.	Date	Details of Amendment
1.0	19/06/17	Draft Issue
1.1	15/10/18	Elpro branding