Application Note 26

Configure TransPort as an L2TP over IPsec Client

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Contents

1 INTRODUCTION

1.1 Outline

This document describes how to configure a TransPort to be an L2TP over IPsec client.

1.2 Assumptions

This guide has been written for use by technically competent personnel with a good understanding of the communications technologies used in the product, and of the requirements for their specific application.

Configuration: This Application Note (AN) assumes that the router has a connection to the Internet using ADSL and interface PPP 1.

This AN applies to:

Models shown: Digi TransPort DR64 router.

Other Compatible Models: All Digi TransPort products.

Firmware versions: 5.123 and above.

Configuration: This AN assumes the devices are set to their factory default configurations. Most configuration commands are only shown if they differ from the factory default.

1.3 Corrections

Requests for corrections or amendments to this application note are welcome and should be addressed to: tech.support@digi.com

Requests for new ANs can be sent to the same address.

1.4 Version and Revision History

Version Number	Status
1.0	Published
1.1	Digi Transport branded
2.0	Updated for new web GUI

2 L2TP OVERVIEW

L2TP is a protocol-independent RFC standard protocol (RFC 2661) for encapsulating PPP data packets and passing them transparently across an IP internetwork.

L2TP has no encryption measures built into it and so it is often coupled with IPsec to provide an encrypted data tunnel across untrusted IP networks.

L2TP/IPsec has become a popular successor to PPTP in the 'Access VPN' arena, mainly due to its ability to utilise encryption and the fact that it is built into Windows 2000/XP and newer Operating Systems and available as a free option for older NT4/98/ME systems.

3 L2TP OPERATION

When sending data to an L2TP/IPsec host, the data is encapsulated many times in a similar way to the normal encapsulation of segments, packets and frames:

Data Description				
Plain IP Data				IP Data
				↓

IP Data inside PPP			PPP	IP Data
			↓	
PPP Data inside L2TP		L2TP	PPP	IP Data
		↓		
L2TP data encrypted inside Ipsec	Ipsec	L2TP	PPP	IP Data

We can take for example a PC wanting to send data across an L2TP/IPsec connection to a VPN host through a TransPort attached via Ethernet.

When data is seen for the subnet on the other side of the VPN tunnel, it will leave the PC via its default gateway and be routed by the TransPort to the PPP instance specified in the routing table.

This PPP instance is configured to use L2TP as its transport, and in turn L2TP will encapsulate the PPP data and forward it to the VPN host's IP address.

This L2TP data is then encrypted by IPsec as specified by an eroute which encrypts any traffic destined for the VPN host's IP address.

This encrypted data then passes to the Internet via whatever IP connection is specified either LAN/ISDN/GPRS/POTS where it can be received by the VPN host.

This example Event Log trace (to be read from the bottom up) shows the establishment of the L2TP/IPsec connection after a packet received from the PC destined for the VPN Host's network.

```
12:26:20, 17 Nov 2009,PPP 5 up
12:26:18, 17 Nov 2009,PPP 5 Start IPCP
12:26:17, 17 Nov 2009,PPP 5 Start AUTHENTICATE
12:26:14, 17 Nov 2009,PPP 5 Start LCP
12:26:14, 17 Nov 2009,PPP 5 Start
12:26:14, 17 Nov 2009,L2TP Call 0 up
12:26:13, 17 Nov 2009,L2TP Tunnel 0 up
12:26:02, 17 Nov 2009,New Ipsec SA created by 194.213.214.120
12:26:01, 17 Nov 2009,New Phase 2 IKE Session,Initiator
12:25:59, 17 Nov 2009,IKE Keys Negotiated
12:25:56, 17 Nov 2009,New Phase 1 IKE Session,Initiator
12:25:56, 17 Nov 2009,IKE Request Received From Eroute 0
12:25:55, 17 Nov 2009,GP socket connected: l_port[1701] r_ip[194.213.214.120]
r_port[1701]
12:25:55, 17 Nov 2009,IP Act_Rq to PPP 5-0: s_ip[192.168.0.1]
d_ip[192.168.10.12]
```

It is possible to use a TransPort as an L2TP client to an existing Access VPN service such as Microsoft 2003 Server RAS service, although you will need to enable the standard CHAP-MD5 authentication rather than the Microsoft proprietary MS-CHAP authentication.

4 CONFIGURING L2TP/IPSEC

There are four steps to configuring the TransPort as an L2TP/IPsec client.

1. Configuring a PPP Instance to use.
2. Configuring an L2TP instance.
3. Configuring an IPsec Eroute.

4. Configuring a static route.

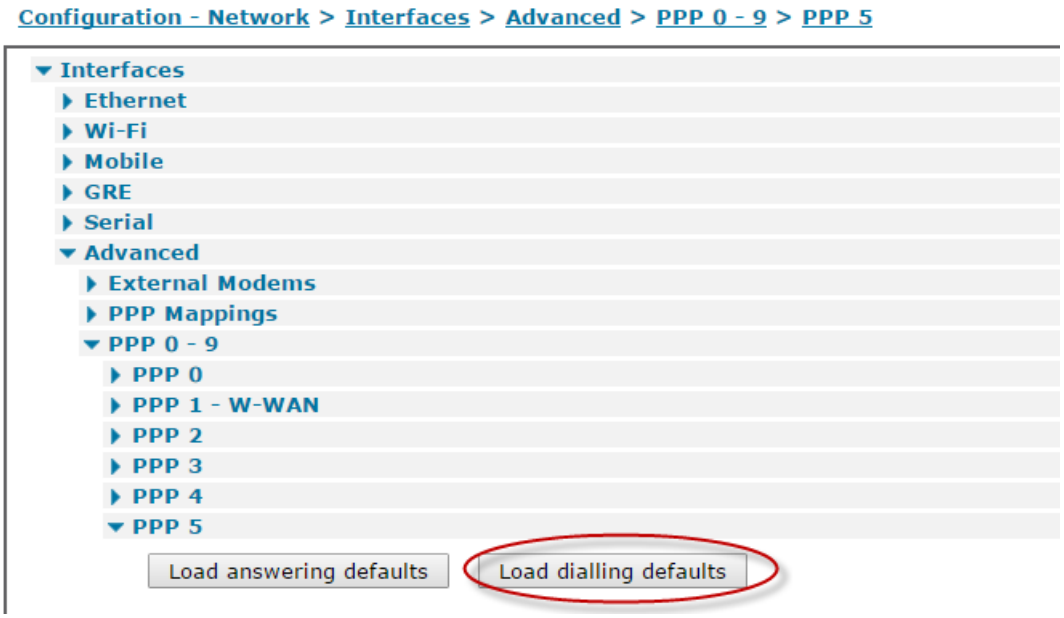
4.1 Configuring PPP

Choose a PPP instance for the L2TP connection to use. Note that this should be separate from any other PPP instances such as those used to dial an ISP.

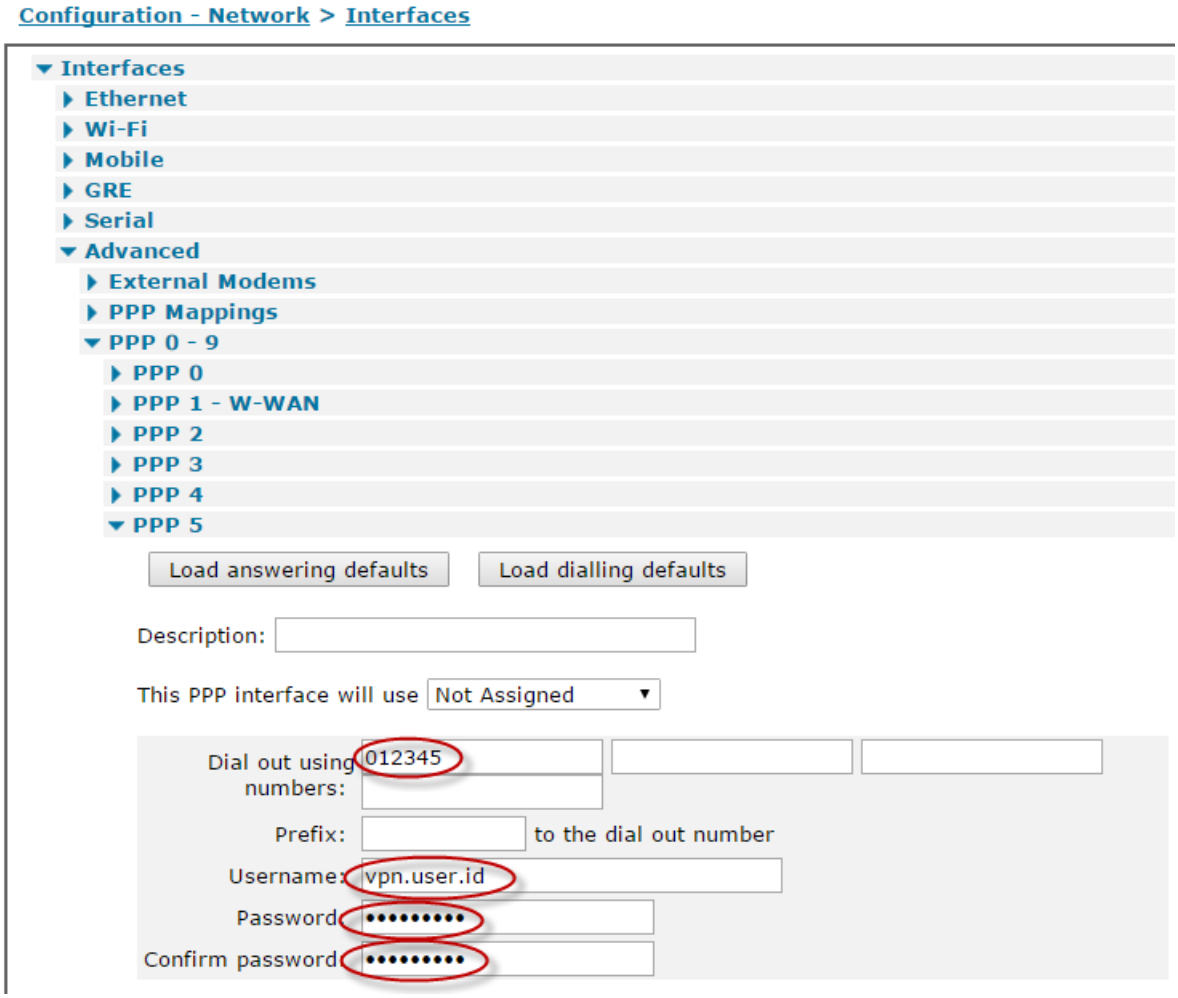
Ideally choose PPP 5 or higher since lower numbered PPP instances are preconfigured for other interfaces.

Navigate to **Configuration – Network > Interfaces > Advanced > PPP 0 – 9 > PPP 5**

Click on **"Load dialling defaults"** then scroll down and click **"Apply"**.



Then return to the PPP settings and enter the following parameters:



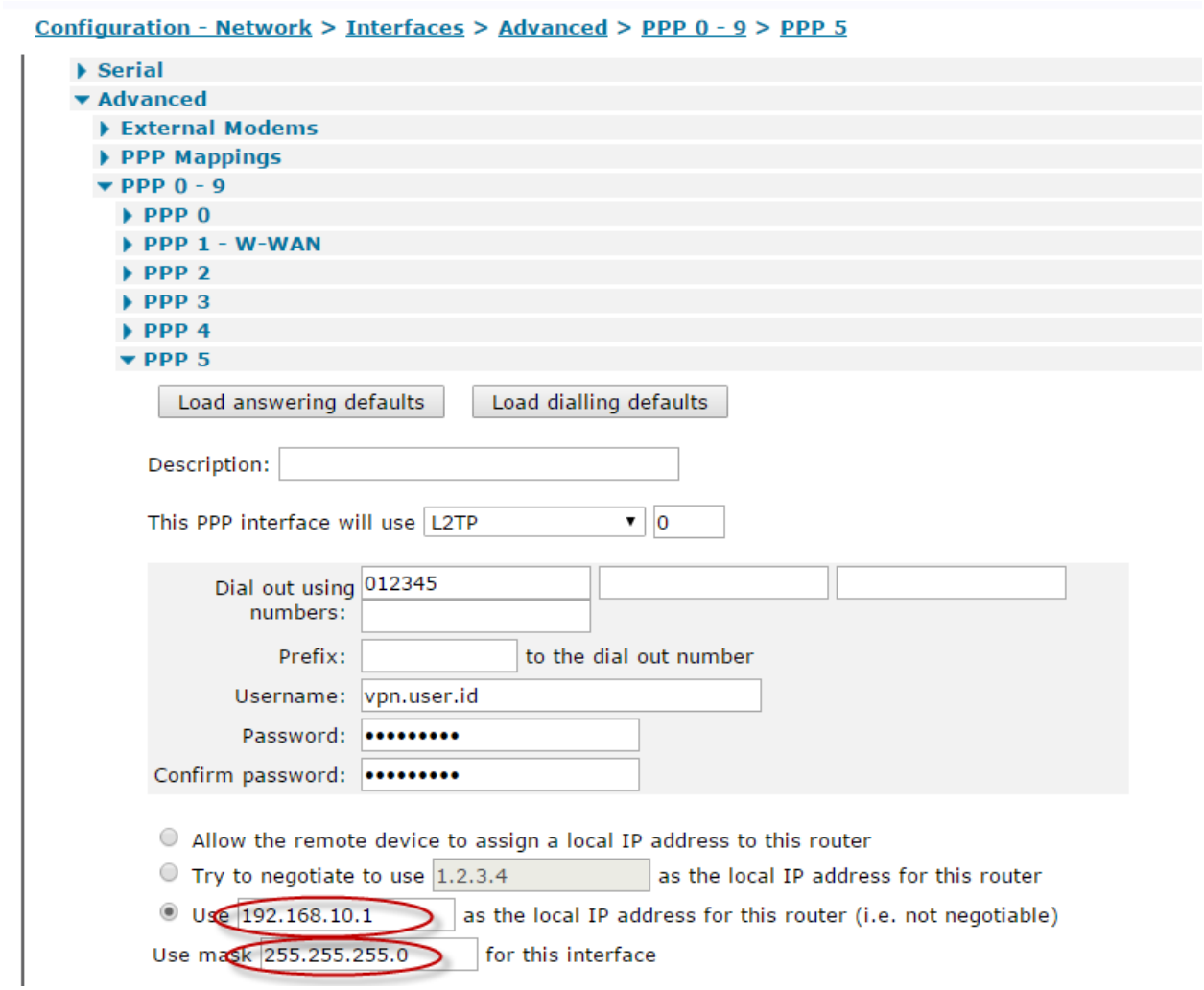
Click the **Apply** button to confirm these settings.

Parameter	Setting	Description
Dial out using numbers	012345	A Dummy Value
Username	vpn.user.id	VPN Username
Password	vpn.user.pass	VPN Password

Optional PPP configuration for IP addressing:

NOTE: If unsure, do not configure this. Allow the VPN responder to assign an IP address.

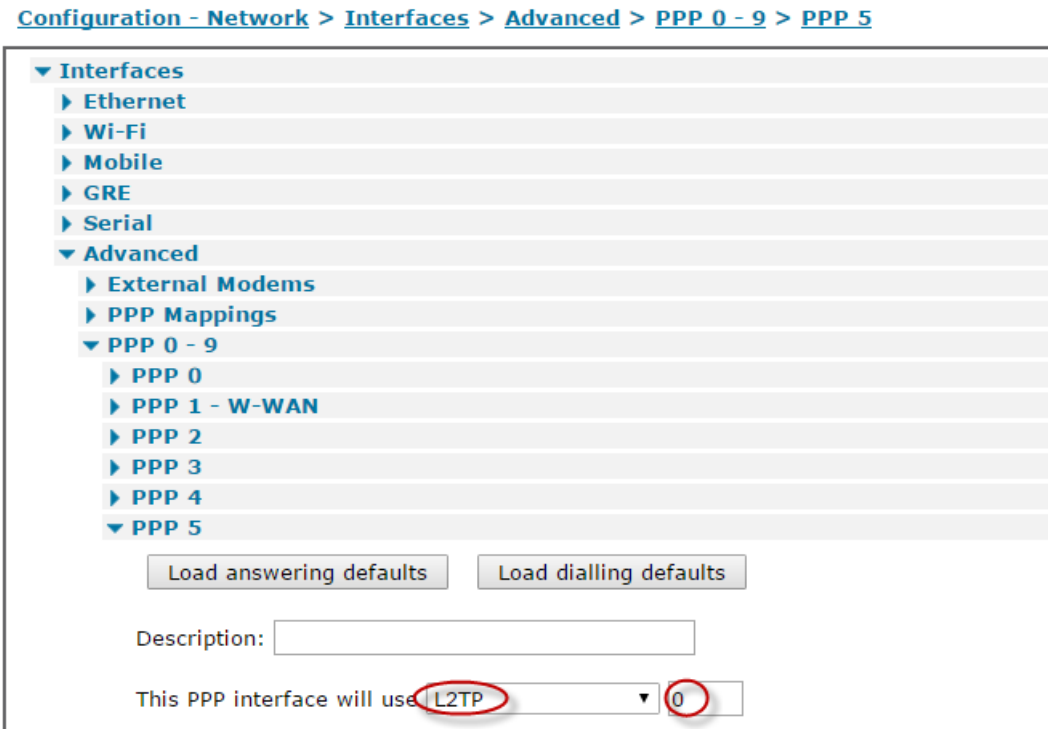
If you are going to be using a fixed IP address to the VPN host instead of a negotiated one, enter it in the following fields:



Click **Apply** to confirm these settings.

Parameter	Setting	Description
local IP address	192.168.10.1	Fixed IP address example **(Optional)**
mask	255.255.255.0	Fixed mask example **(Optional)**

Next, select L2TP as the transport for this PPP instance:

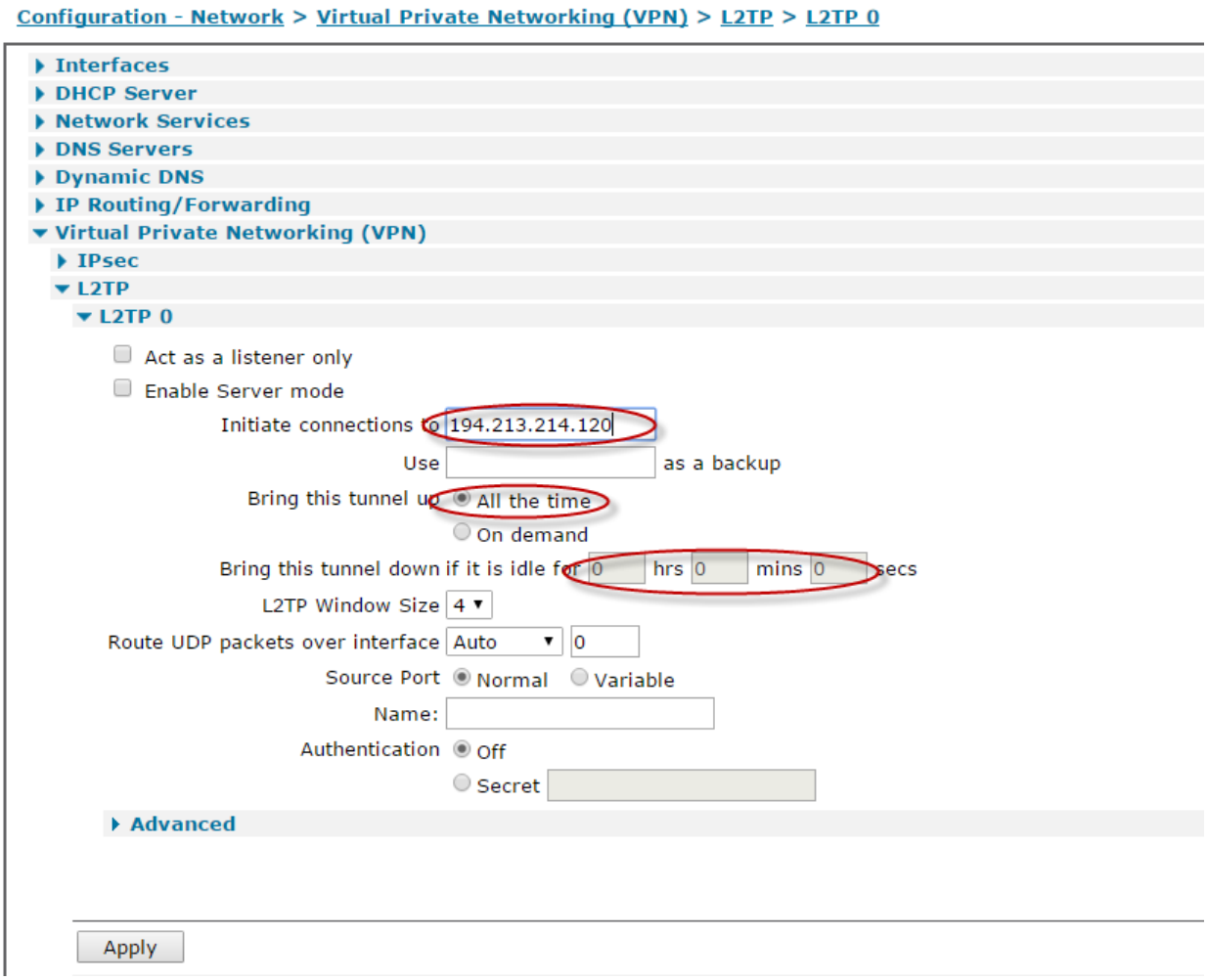


Click the **Apply** button to confirm these settings.

Parameter	Setting	Description
Layer 1 Interface	L2TP	
Layer 1 Interface #	0	

4.2 Configuring L2TP

Navigate to **Configuration – Network > Virtual Private Networking (VPN) > L2TP > L2TP 0**



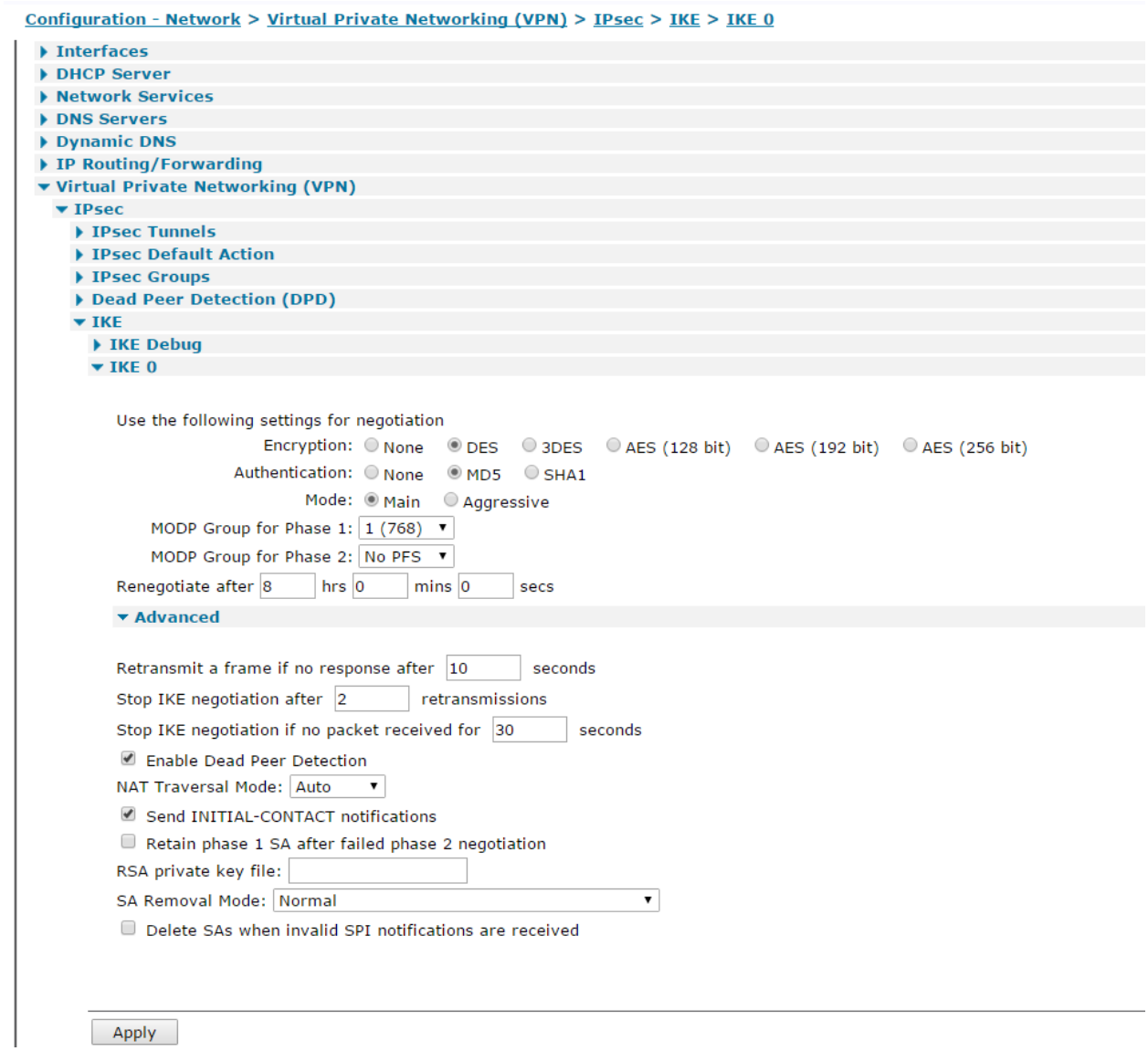
Click the **Apply** button to confirm these settings.

Parameter	Setting	Description
Initiate connections to	194.213.214.120	IP Address of VPN Host (example)
Bring this tunnel up	All the time	All the time – Permanent Internet connection On demand – GPRS / Dial-on-demand connection
Bring this tunnel down if it is idle for	0 hrs 0 mins 0 secs	0 hrs 0 mins 0 secs – Permanent Internet connection 0 hrs 1 mins 0 secs – GPRS / Dial-on-demand connection

4.3 Configuring IPsec

Navigate to **Configuration – Network > Virtual Private Networking (VPN) > IPsec > IKE > IKE 0**

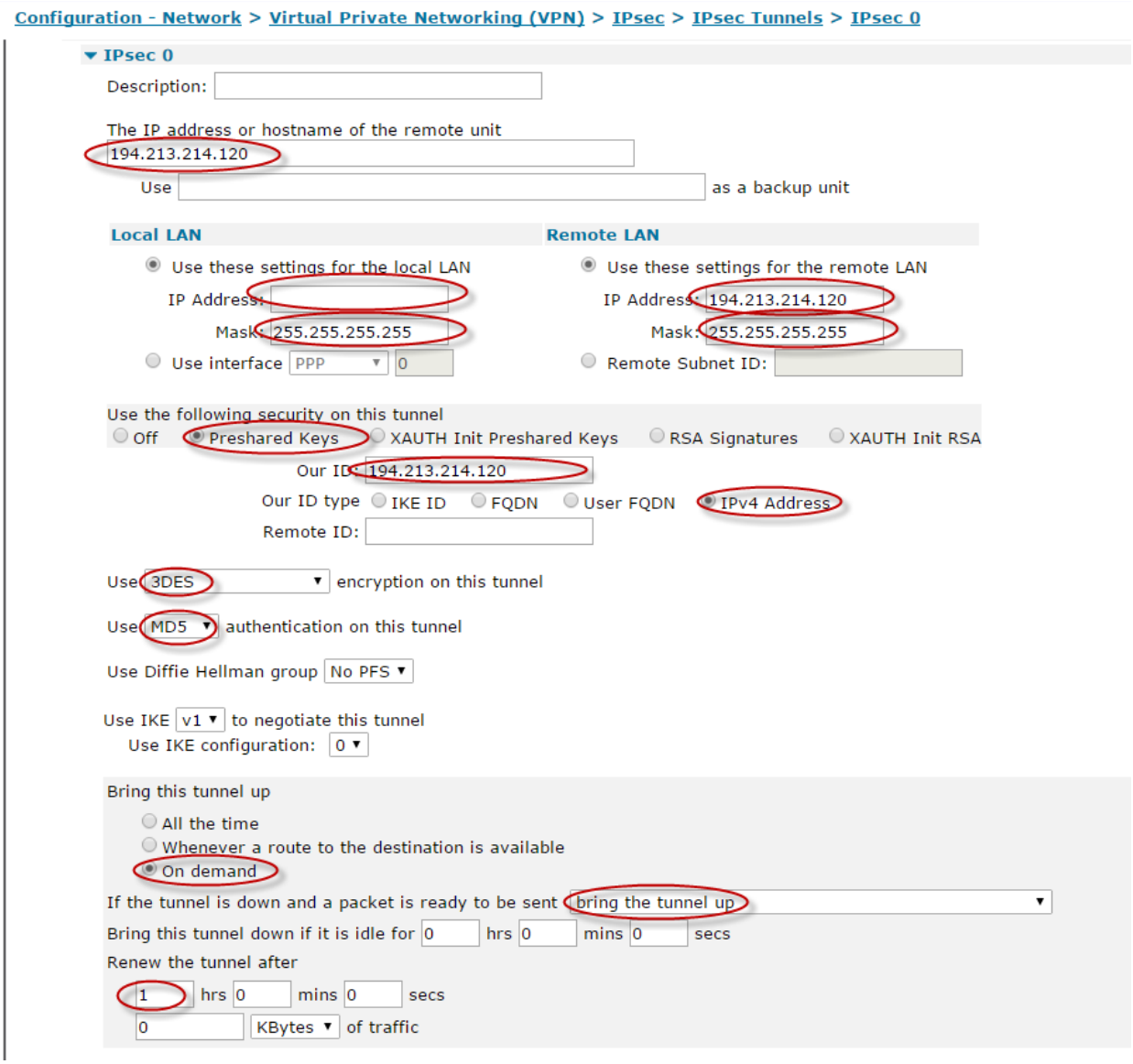
The settings for IKE 0 are the factory defaults and do not need to be changed.

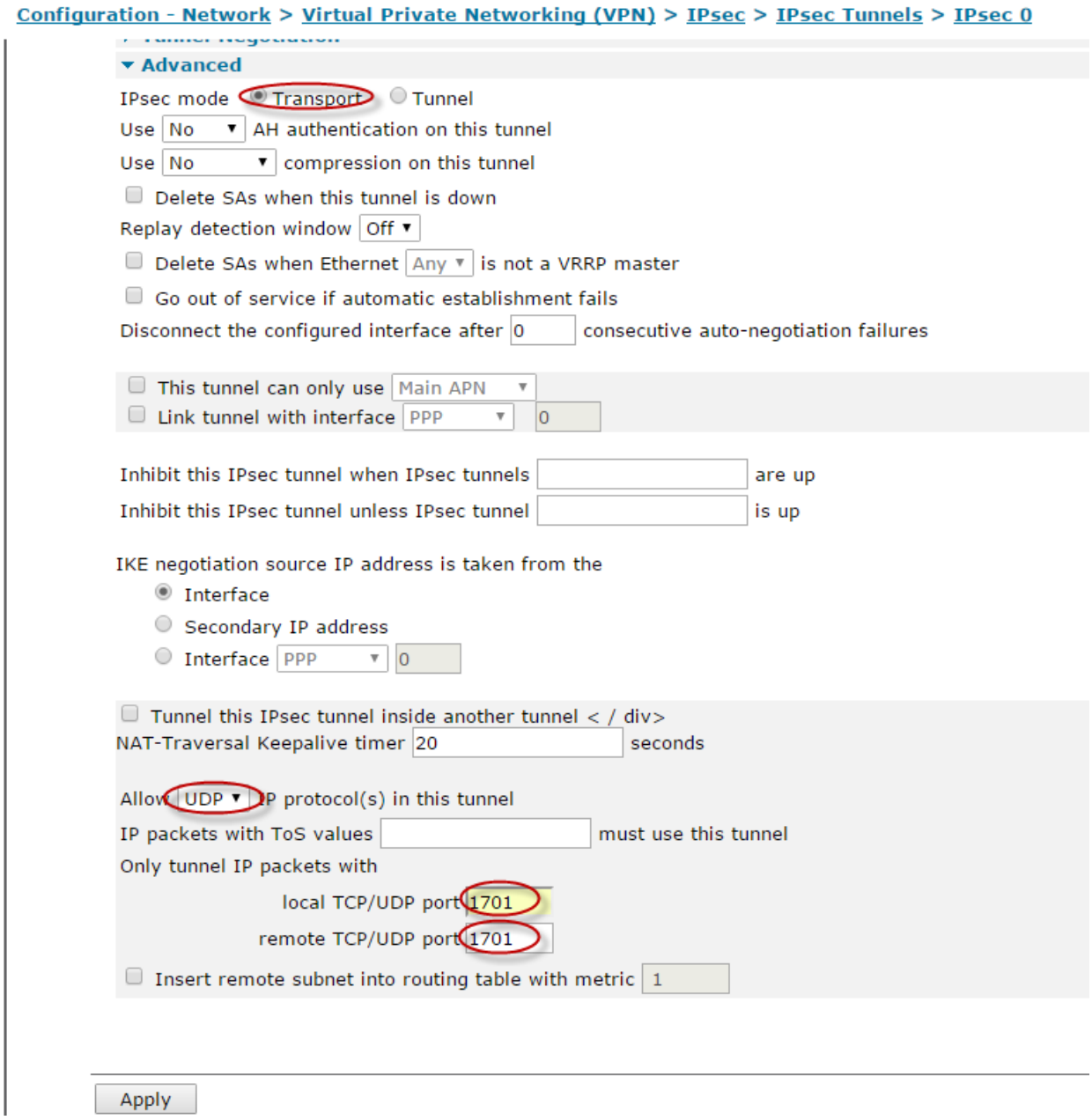


Click the **Apply** button to confirm these settings.

Navigate to **Configuration – Network > Virtual Private Networking (VPN) > IPsec > IPsec Tunnels > IPsec o**

Choose the first available Eroute (in this case Eroute o) and enter the following parameters:





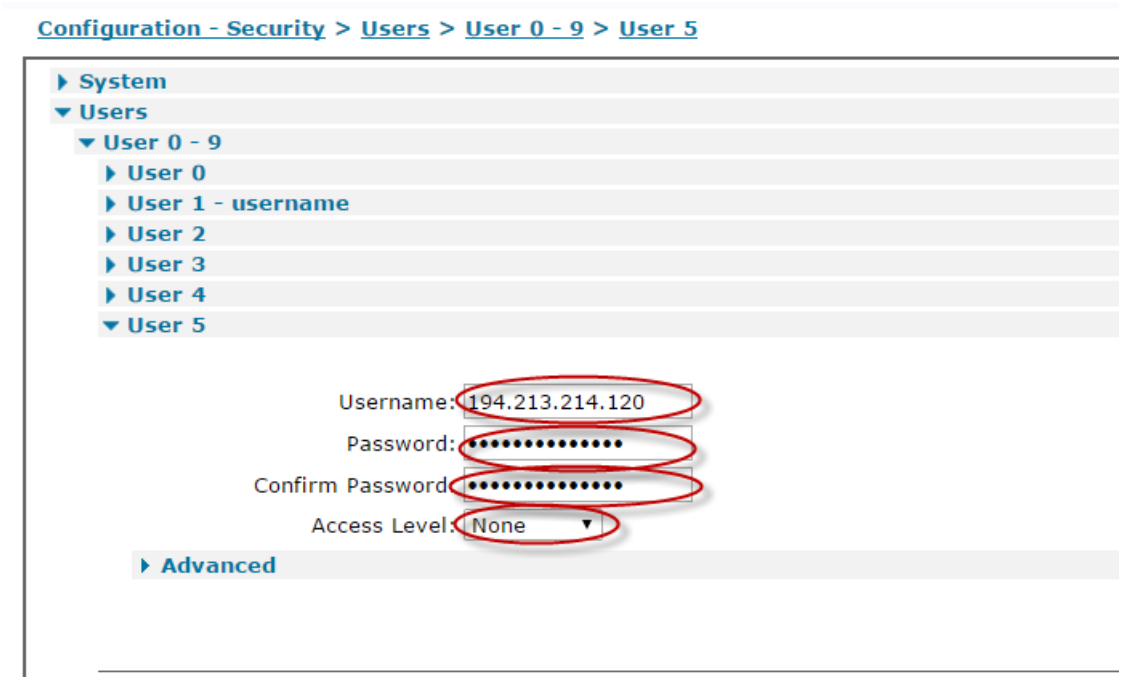
Click the **Apply** button to confirm these settings.

Parameter	Setting	Description
The IP address or hostname of the remote unit	194.213.214.120	IP Address of VPN Host (example)
Local LAN – IP Address		Leave Blank
Local LAN – Mask	255.255.255.255	Subnet Mask
Remote LAN – IP Address	194.213.214.120	IP Address of VPN Host (example)
Remote LAN – Mask	255.255.255.255	Subnet Mask
Use the following security	Preshared Keys	Authentication Method

on this tunnel		
Our ID	194.213.214.120	IP Address of VPN Host (example)
Our ID type	IPv4 Address	
Use ___ encryption on this tunnel	3DES	ESP Encryption Algorithm
Use ___ authentication on the tunnel	MD5	ESP Authentication Algorithm
Bring this tunnel up	On demand	
If the tunnel is down…	Bring the tunnel up	
Renew the tunnel after (time)	1 hour	This has to match the VPN Host (example)
Renew the tunnel after (traffic)	0 Kbytes	This has to match the VPN Host (example)
IPsec mode	Transport	
Allow ___ IP protocol(s)…	UDP	L2TP is UDP
local TCP/UDP port	1701	Source port (L2TP uses port 1701)
remote TCP/UDP port	1701	Destination port (L2TP uses port 1701)

4.4 Configure the IPsec Pre-shared key

Navigate to **Configuration - Security > Users > User 0 - 9** and select an available User ID to enter the IPsec Pre-shared key. In this example, **User 5** will be used.



Click the **Apply** button to confirm these settings.

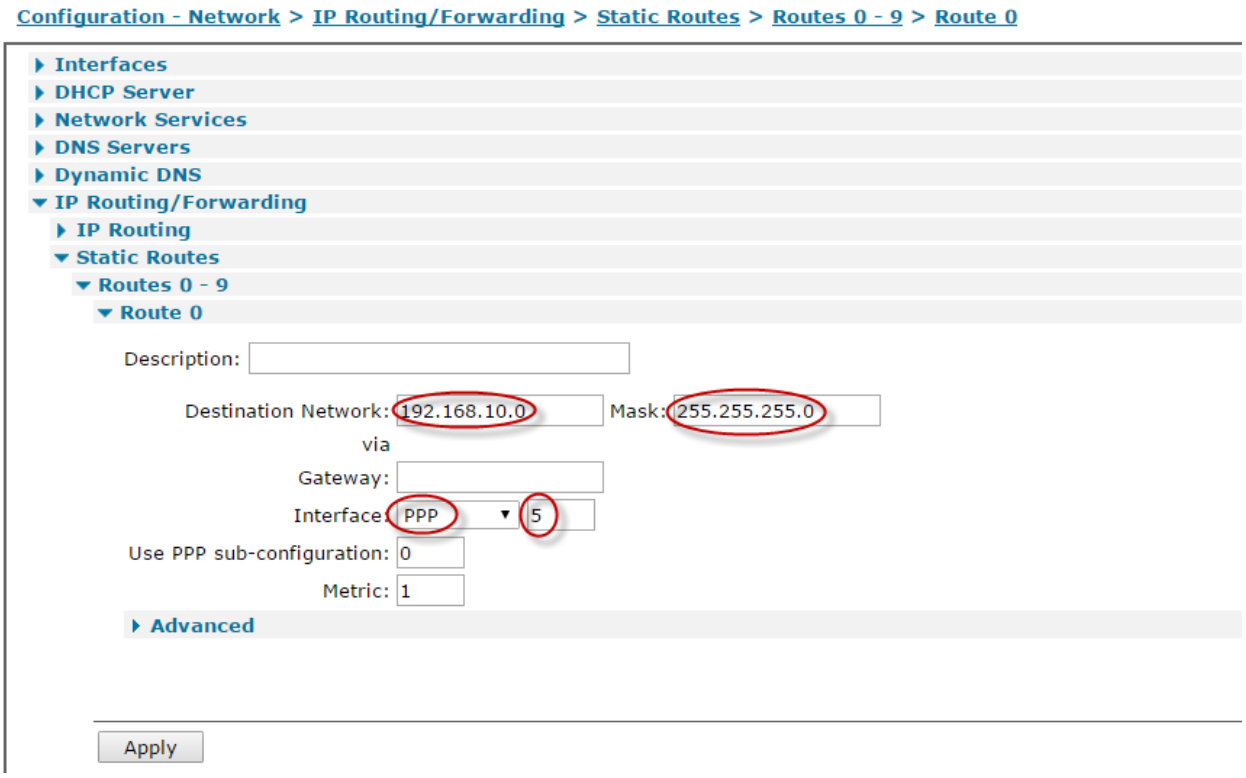
Parameter	Setting	Description

Username	194.213.214.120	IP Address of VPN Host (example)
Password	*********	Value for Pre-shared Key
Confirm Password	*********	Value for Pre-shared Key
Access Level	None	Level of router administration access

4.5 Configuring a static route

Navigate to **Configuration - Network > IP Routing/Forwarding > Static Routes > Routes 0 - 9 > Route 0**

If Static route 0 is in use, choose the first available static route and enter:

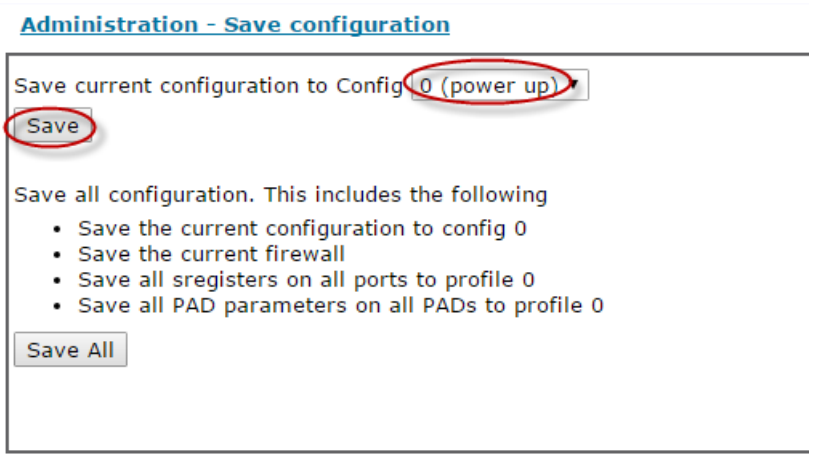


Click the **Apply** button to confirm these settings.

Parameter	Setting	Description
Destination Network	192.168.10.0	LAN Subnet of VPN Host (example)
Mask	255.255.255.0	Subnet Mask of VPN Host (example)
Interface	PPP	
Interface #	5	The Number of the PPP interface configured (example)

4.6 Saving the configuration

Navigate to **Administration - Save configuration**



Click the **Save** button to save the settings.

5 TESTING

To test the link, you will need to send data to the remote network (example: ping 192.168.10.1). You should then be able to see in the Event Log the L2TP traffic being encrypted in an IPsec tunnel and then sent using PPP 2 to the remote network.

```
12:26:20, 17 Nov 2009,PPP 5 up
12:26:18, 17 Nov 2009,PPP 5 Start IPCP
12:26:17, 17 Nov 2009,PPP 5 Start AUTHENTICATE
12:26:14, 17 Nov 2009,PPP 5 Start LCP
12:26:14, 17 Nov 2009,PPP 5 Start
12:26:14, 17 Nov 2009,L2TP Call 0 up
12:26:13, 17 Nov 2009,L2TP Tunnel 0 up
12:26:02, 17 Nov 2009,New IPsec SA created by 194.213.214.120
12:26:01, 17 Nov 2009,New Phase 2 IKE Session,Initiator
12:25:59, 17 Nov 2009,IKE Keys Negotiated
12:25:56, 17 Nov 2009,New Phase 1 IKE Session,Initiator
12:25:56, 17 Nov 2009,IKE Request Received From Eroute 0
12:25:55, 17 Nov 2009,GP socket connected: l_port[1701] r_ip[194.213.214.120]
r_port[1701]
12:25:55, 17 Nov 2009,IP Act_Rq to PPP 5-0: s_ip[192.168.0.1] d_ip[192.168.10.1]
```

Once the tunnel is up, the traffic can be routed and a reply to your ping should be seen.

6 CONFIGURATION FILES

6.1 TransPort Configuration Files

This is the relevant configuration from the router:

```
l2tp 0 remhost "194.213.214.120"

route 0 IPaddr "192.168.10.0"
route 0 ll_ent "PPP"
route 0 ll_add 5

eroute 0 peerip "194.213.214.120"
eroute 0 ourid "194.213.214.120"
```

```
eroute 0 ouridtype 3
eroute 0 locmsk "255.255.255.255"
eroute 0 remip "194.213.214.120"
eroute 0 remmsk "255.255.255.255"
eroute 0 mode "Transport"
eroute 0 ESPauth "MD5"
eroute 0 ESPenc "3DES"
eroute 0 proto "UDP"
eroute 0 locport 1701
eroute 0 remport 1701
eroute 0 ltime 3600
eroute 0 authmeth "PRESHARED"
eroute 0 nosa "TRY"

ppp 5 l1iface "L2TP"
ppp 5 phonenum "012345"
ppp 5 username "vpn.user.id"
ppp 5 epassword "Li94FFBfQk4cTUAORQ==" #This is the enciphered password
ppp 5 r_addr OFF
ppp 5 l_addr ON
ppp 5 l_pap OFF
ppp 5 l_chap OFF

user 5 name "194.213.214.120"
user 5 epassword "Li94FFVfTBJGWFIJ"
user 5 access 4

#Optional PPP 5 configuration from page 6, if unsure, do not use:
ppp 5 IPaddr "192.168.10.1"
ppp 5 mask "255.255.255.0"
ppp 5 l_addr OFF
```

6.2 TransPort Firmware Versions

This is the firmware \ hardware information from the unit:

```
ati5
Digi TransPort WR44v2-U8G1-WE2-XX Ser#:291603
Software Build Ver 5.2.12.5 Nov 2 2015 05:02:14 LW
ARM Bios Ver 7.56u v45 800MHz B995-M1003-F80-O1000140,2 MAC:00042d047313
Power Up Profile: 0
Async Driver              Revision: 1.19  Int clk
Wi-Fi                     Revision: 2.0
Ethernet Hub Driver       Revision: 1.11
Firewall                  Revision: 1.0
EventEdit                 Revision: 1.0
Timer Module              Revision: 1.1
AAL                       Revision: 1.0
ADSL                      Revision: 1.0
(B)USBHOST                Revision: 1.0
L2TP                      Revision: 1.10
PPTP                      Revision: 1.00
TACPLUS                   Revision: 1.00
MySQL                     Revision: 0.01
LAPB                      Revision: 1.12
X25 Layer                 Revision: 1.19
MACRO                     Revision: 1.0
PAD                       Revision: 1.4
X25 Switch                Revision: 1.7
V120                      Revision: 1.16
TPAD Interface            Revision: 1.12
SCRIBATSK                 Revision: 1.0
```

```
BASTSK                    Revision: 1.0
ARM Sync Driver           Revision: 1.18
TCP (HASH mode)           Revision: 1.14
TCP Utils                 Revision: 1.13
PPP                       Revision: 1.19
WEB                       Revision: 1.5
SMTP                      Revision: 1.1
FTP Client                Revision: 1.5
FTP                       Revision: 1.4
IKE                       Revision: 1.0
PollANS                   Revision: 1.2
PPPOE                     Revision: 1.0
BRIDGE                    Revision: 1.1
MODEM CC (Telit LTE)      Revision: 5.2
FLASH Write               Revision: 1.2
Command Interpreter       Revision: 1.38
SSLCLI                    Revision: 1.0
OSPF                      Revision: 1.0
BGP                       Revision: 1.0
QOS                       Revision: 1.0
RADIUS Client             Revision: 1.0
SSH Server                Revision: 1.0
SCP                       Revision: 1.0
CERT                      Revision: 1.0
LowPrio                   Revision: 1.0
Tunnel                    Revision: 1.2
OVPN                      Revision: 1.2
TEMPLOG                   Revision: 1.0
OK
```