Quick Note 060

Configure a TransPort router as an EZVPN Client (XAUTH and MODECFG) to a Cisco Router running IOS 15.x

17 August 2017

Contents

1 INTRODUCTION

1.1 Introduction

The use of XAUTH and MODECFG with IPsec is not part of the standard IPsec implementation as published in the RFCs. There were some internet drafts which have now expired. However, many vendors including Cisco have chosen to implement XAUTH and MODECFG

1.2 Cisco EasyVPN

Cisco solutions using EasyVPN (also known as EzVPN) and also the Cisco software "VPN Client" make use of XAUTH and MODECFG. XAUTH and MODECFG are supported in TransPort firmware, and have been tested with the Cisco 1841 running IOS version 15.1. It is therefore possible to configure the TransPort to connect to Cisco 1841 using XAUTH and MODECFG, in a similar manner to the Cisco VPN Client.

The configuration suggested in this Application Note should also work on Cisco Routers running IOS version 15.x without modification.

It may also be possible to connect to other Cisco models and software versions, however testing all hardware and software variants is not possible.

For various reasons, it can be difficult to configure a Cisco VPN server (such as the Cisco 1841) to perform EasyVPN with the Cisco software VPN Client (i.e. to perform XAUTH and MODECFG) and to also perform "standard" IPsec with a non-Cisco device. To create a standard IPsec tunnel (i.e. not using XAUTH and MODECFG) between a Cisco and non-Cisco device, the restrictions seem to be that fixed IP addresses or certificate-based authentication must be used for the non-Cisco device. This is not always practical. For this reason, support for XAUTH and MODECFG is included in TransPort firmware.

EasyVPN supports two modes of operation: Client mode and Network Extension mode.

In Client mode, all traffic from the client side uses a single IP address for all hosts on the private network. This single IP address is assigned by the Cisco EasyVPN server as an attribute using MODECFG. All traffic that goes through the IPsec tunnel, regardless of which host on the client's network it originated from, is translated by the client using NAT so that the source address seen by the EasyVPN server is the single IP address that it assigned to the client and that it therefore expects to see.

Network Extension mode allows the client to present a full, routable network to the tunnelled (i.e. Cisco side) network. There are actually two sub-modes within Network Extension mode: NEM and NEM+. TransPort firmware currently supports Client mode and NEM mode, but not NEM+.

This application note will show only the steps required to set up Client mode connections.

1.3 XAUTH

XAUTH (IKE Extended Authentication) is an extra authentication process that occurs in between phase 1 and phase 2 of IPsec. It provides an additional level of authentication by allowing the IPsec gateway (i.e. VPN responder or server) to request extended authentication from remote users, thus forcing remote users to respond with their credentials before being allowed access to the VPN.

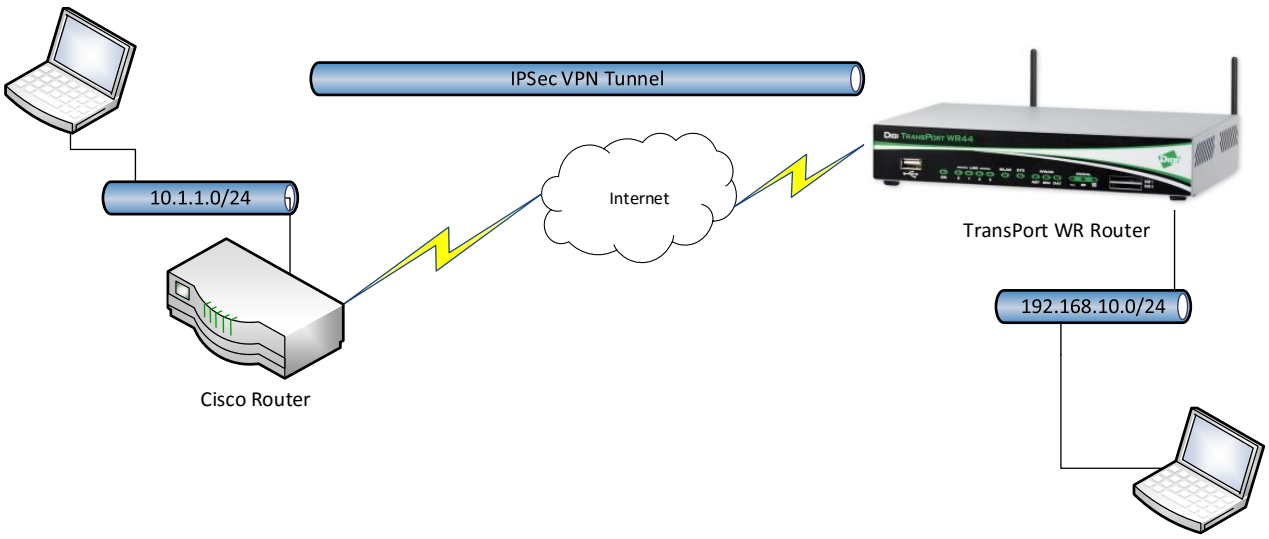
XAUTH essentially functions by firstly forming an IKE phase 1 SA using conventional IKE, then by extending the IKE exchange to include additional user authentication exchanges.

This means that a single pre-shared key can be used for many remote VPN users, but each user can have their own username and password for XAUTH. The head-end unit can be configured to authorise the username and password against a local table, or against an external device using for example RADIUS or TACACS.

1.4 MODECFG

MODECFG allows configuration information to be assigned by the IPsec server to the client. For EasyVPN Client mode as described in this application note, MODECFG is essentially used by the EasyVPN server (Cisco 1841) to assign a single IP address to the client (TransPort WR21) which must be used as the source address for all traffic traversing the IPsec tunnel from the client side.

1.5 Network Diagram



1.6 Outline

This guide details the steps involved in configuring a Digi TransPort as an Easy VPN client to a Cisco 1841 running IOS 15.x (configuration may differ on older versions). The document will assume that WAN connectivity is configured and available on both units. In this example, the TransPort will use 0.0.0.0/0.0.0.0 for the Remote LAN configuration. All traffic will be sent through the tunnel.

1.7 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. It also assumes a basic ability to access and navigate a Digi TransPort router and configure it with basic routing functions

This application note applies to:

Model: Digi TransPort WR11/21/31/41/44

Model: Cisco 1841

Firmware versions:
WR44: 5.2.17.10 and later
Cisco: 15.1 and later

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

Please note: This application note has been specifically rewritten for the specified firmware versions and later but will work on earlier versions of firmware. Please contact tech.support@digi.com if your require assistance in upgrading the firmware of the TransPort WR routers.

1.8 Corrections

Requests for corrections or amendments to this application note are welcome and should be addressed to: tech.support@digi.com Requests for new application notes can be sent to the same address.

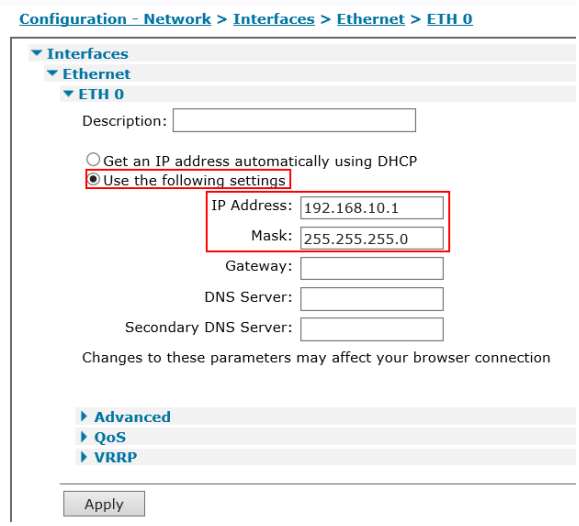
1.9 Version

Version Number	Status
1.0	Completed 14.08.2017

2 TRANSPORT CONFIGURATION

2.1 Local Ethernet Interface Configuration

Navigate to **Configuration – Network > Interfaces > Ethernet > Ethernet 0**



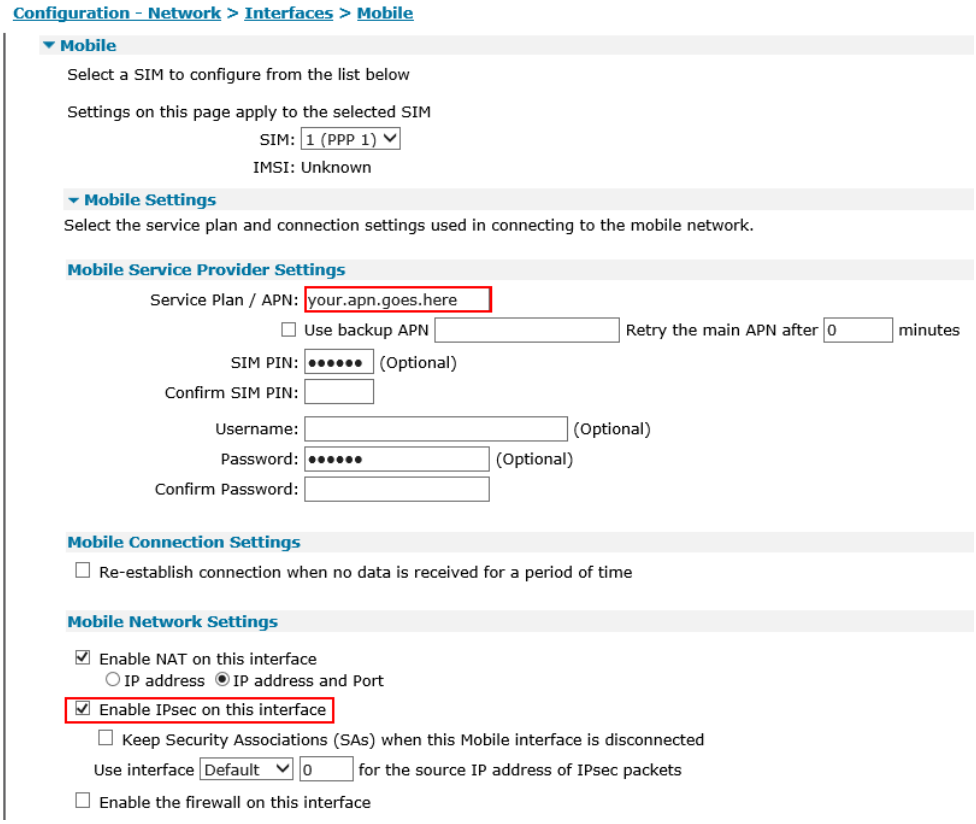
Parameter	Setting	Description
Use the following settings	Checked	A static IP Address will be used in this example
IP Address	192.168.10.1	IP Address of the TransPort WR21 Ethernet Interface. In this example, this IP Address is in the subnet range used for the Tunnel (useful for testing)
Mask	255.255.255.0	Subnet mask

2.2 WAN interface configuration

In this example, the mobile interface will be used as the WAN interface on which the IPsec tunnel will be established.

Navigate to:

Configuration – Network > Interfaces > Mobile



Parameter	Setting	Description
Service Plan / APN	Your.APN.goes.here	Enther the APN of your mobile provider
Enable IPsec on this interface	Checked	Enable IPsec to be built on this WAN interface

Please note: If required, enter a SIM PIN and Username/Password for this SIM card and APN.

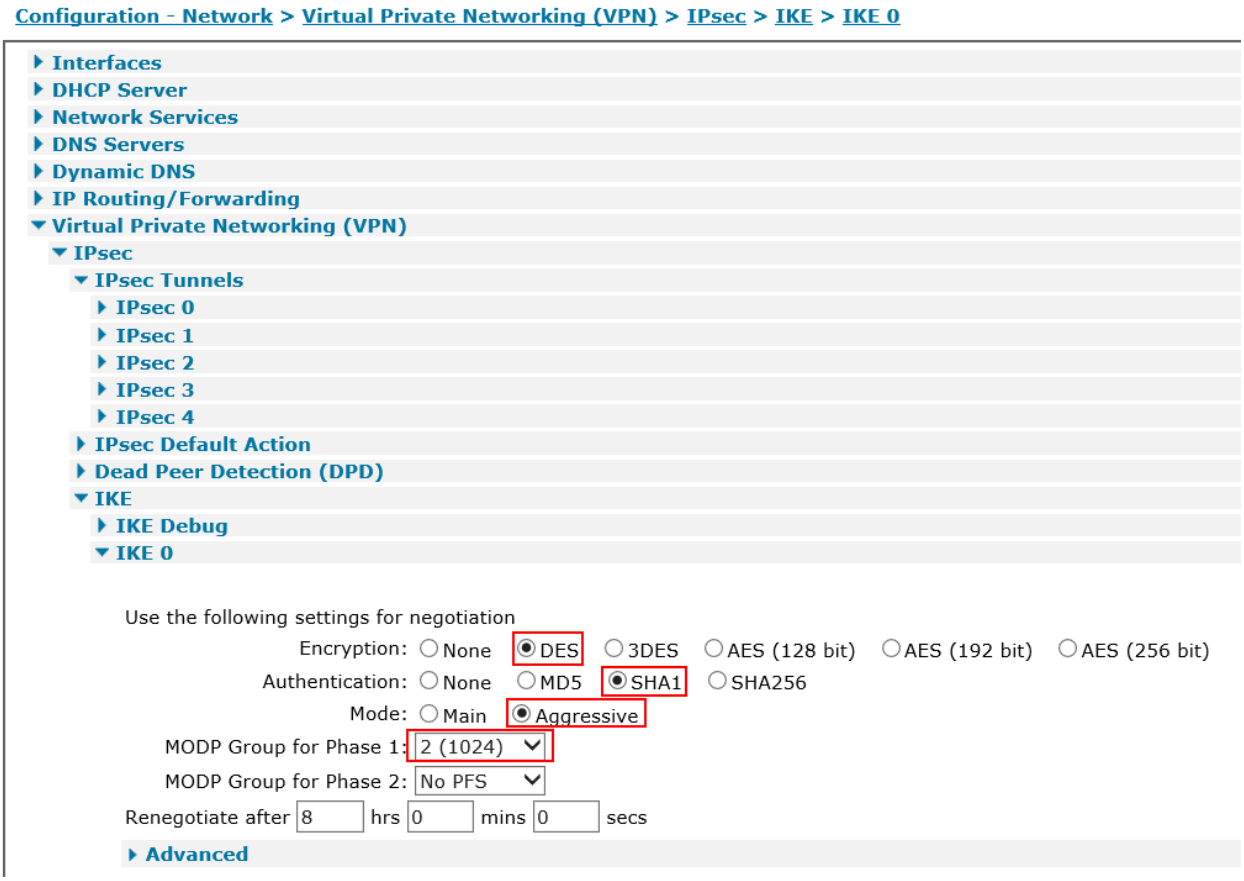
2.3 *Tunnel Configuration*

Open a web browser to the IP address of the TransPort WR21 router.

2.3.1 Phase 1 Settings

Navigate to:

Configuration – Network > Virtual Private Network (VPN) >IKE > IKE 0

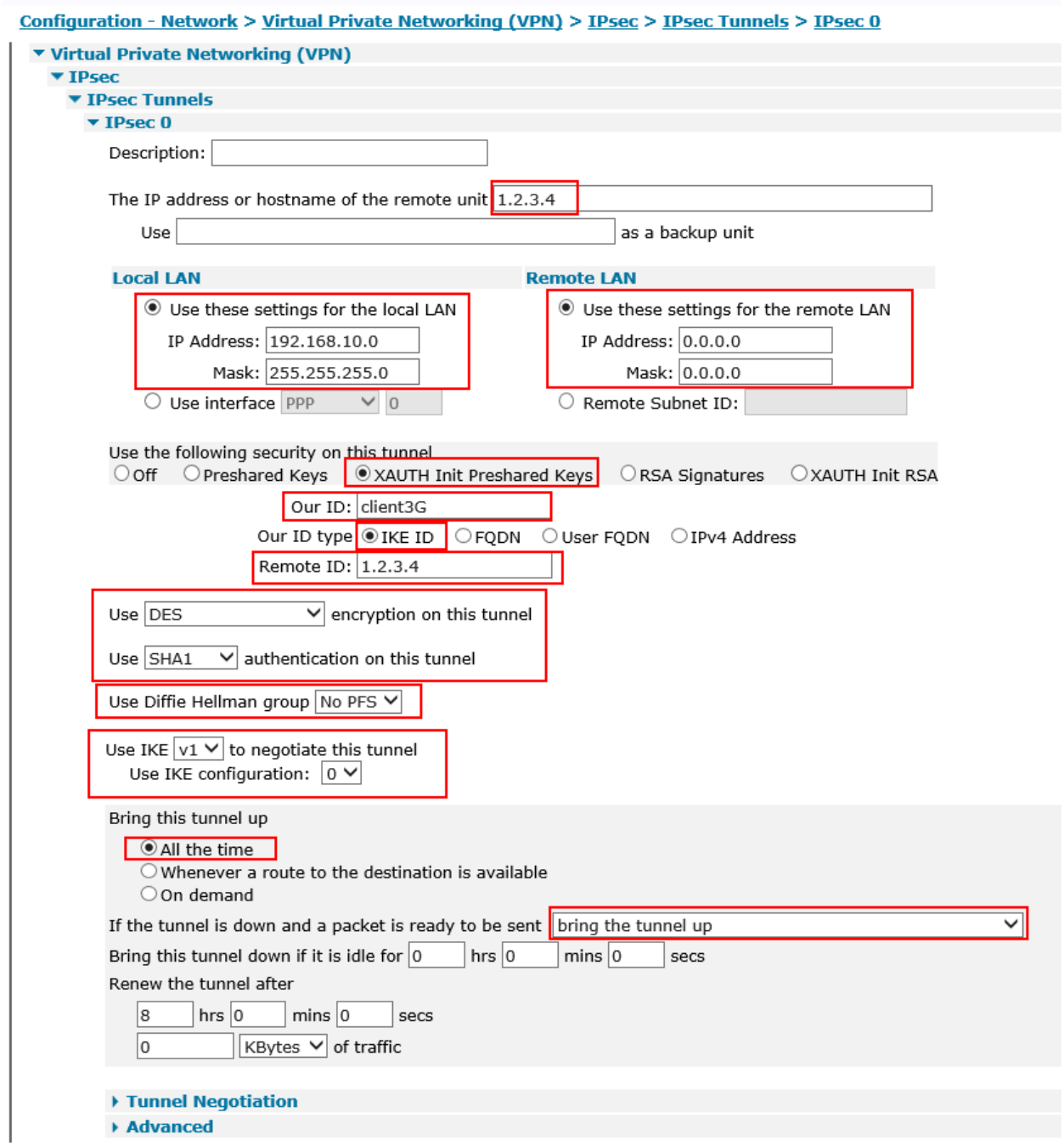


Parameter	Setting	Description
Encryption	DES	Encryption algorithm used in this tunnel
Authentication	SHA1	Authentication algorithm used in this tunnel
Mode	Aggressive	IKE Mode used in this tunnel
MODP Group for Phase 1	2 (1024)	Key length used in the IKE Diffie-Hellman exchange
MODP Group for Phase 2	No PFS	Key length used in the ESP Diffie-Hellman exchange

2.3.2 Phase 2 settings

Navigate to:

Configuration – Network > Virtual Private Network (VPN) > IPsec > IPsec 0 – 9 > IPsec 0

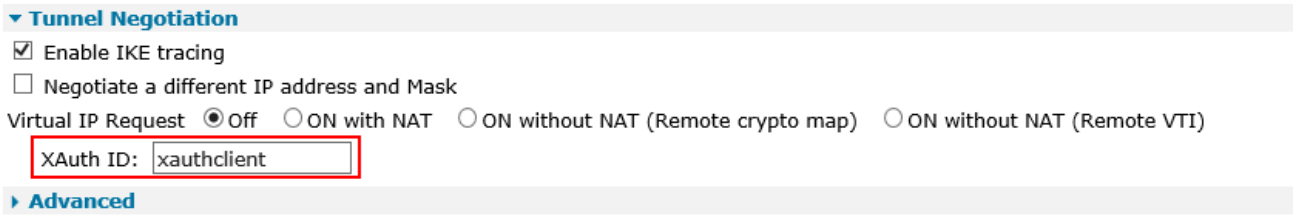


Parameter	Setting	Description
The IP address or hostname of the remote unit	1.2.3.4	WAN IP Address of the Cisco 1841
Local LAN settings		
Use these settings for the local LAN	Checked	Local LAN subnet
IP Address	192.168.10.0	Local LAN subnet IP Address
Mask	255.255.255.0	Local LAN subnet mask
Remote LAN settings		
Use these settings for the local LAN	Checked	Remote LAN subnet
IP Address	0.0.0.0	Remote LAN subnet IP Address
Mask	0.0.0.0	Remote LAN subnet mask
Tunnel Security		
XAUTH Init Preshared Keys	Checked	Use XAUTH Init preshared keys for authentication on this tunnel
Our ID	client3G	The ID of the VPN initiator router (this router)
Remote ID	1.2.3.4	The ID of the VPN responder router (remote router)
Our ID type	IKE ID	Use IKE ID type ID
Use () encryption on this tunnel	DES	The IPsec encryption algorithm to use is DES
Use () authentication on this tunnel	SHA1	The IPsec ESP authentication to use is SHA1
Tunnel creation		
Bring this tunnel up	On demand	
If the tunnel is down and a packet is ready to be sent	Bring the tunnel up	

Click **Apply**

Navigate to:

Configuration – Network > Virtual Private Network (VPN) > IPsec > IPsec 0 – 9 > IPsec 0 > Tunnel Negotiation



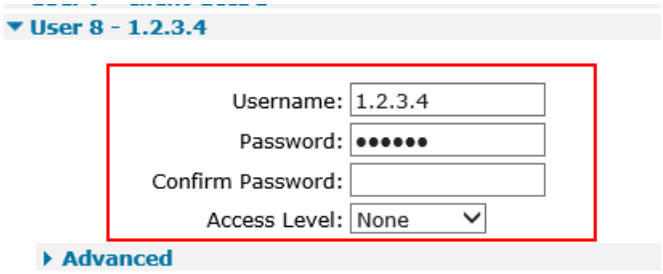
Parameter	Setting	Description
XAuth ID	Xauthclient	XAuth username

Click **Apply**

2.4 Configure users

Navigate to **Configuration - Security > Users > User 0-9 > User 8**

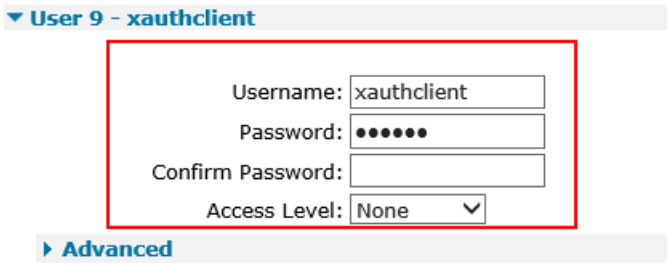
Here the pre-shared key is configured using the hostname or IP address of the Cisco. The username value should therefore match the Peer ID set in the IPsec configuration above:



Parameter	Setting	Description
Username	1.2.3.4	Enter the IP Address of the Cisco (WAN)
Password	digidigi	Enter the vpn_group password
Access Level	None	As this user is only for the pre-shared key, no access will be granted to the router for this username

Navigate to **Configuration - Security > Users > User 0-9 > User 9**

This is where the VPN user password is stored. The username for this user has to match the XAUTH ID in the IPsec configuration above:



Parameter	Setting	Description
Username	xauthclient	Enter the XAUTH username which must be the same as the XAUTH ID configured in the IPsec tunnel instance
Password	digixauth	Enter XAUTH password
Access Level	None	As this user is only for the group, no access will be granted to the router for this username

Click **Apply**

Save configuration

3 CISCO 1841 CONFIGURATION

3.1 Cisco 1841 Configuration

The following will assume that the Cisco is a model 1841 running firmware version 15.1, that it is not currently in service and that it has been reset to factory defaults.

Do not proceed with a reset if the 1841 is in service. Normal precautions should be taken, for example backing up existing configuration.

For reference the following Cisco resource explains how to configure the Cisco 1841 series via the command line interface:https://www.cisco.com/c/en/us/td/docs/routers/access/1800/1841/software/configuration/guide/sw/b_cli.html

Some of the commands that are shown grouped together below must be entered in the exact sequence indicated, therefore it is recommended to enter the commands in the order in which they appear below.

3.2 Configure basic routing

Configure the WAN interface

```
interface FastEthernet0/0
no shut
ip address 1.2.3.4 255.255.255.248
duplex auto
speed auto
```

Configure the LAN interface

```
interface FastEthernet0/1
ip address 10.1.1.254 255.255.255.0
duplex auto
speed auto
```

Configure the default route, which in this example points to an ADSL Router via the WAN interface

```
ip route 0.0.0.0 0.0.0.0 62.11.22.33
```

Configure authentication

```
aaa new-model
aaa authentication login userauthen local
aaa authorization network groupauthor local
aaa session-id common
```

Configure the XAUTH username and PASSWORD:

```
username xauthclient password 0 digixauth
```

3.3 Configure IKE/ISAKMP

Configure an IKE policy. The following parameters should all match the respective parameters in the TransPort configuration. The policy [priority] uniquely identifies the IKE policy and assigns a priority to the policy. Use an integer from 1 to 65,534, with 1 being the highest priority and 65,534 the lowest.

The default settings will be used besides the following:

```
crypto isakmp policy 10
authentication pre-share
group 2
crypto isakmp keepalive 60 periodic
```

Configure the isakmp client configuration group (vpn_group):

```
crypto isakmp client configuration group client3G
key digixauth
save-password
```

3.4 Configure IPsec

Create a transform-set to match the TransPort's configuration:

```
crypto ipsec transform-set ESP-DES-SHA esp-des esp-sha-hmac
```

Create the EZVPN client configuration and group:

```
crypto ipsec client ezvpn client3G
connect auto
group client-acc3G key digixauth
mode network-extension
peer a.b.c.d default
peer e.f.g.h
idletime 60
username xauthclient password digixauth
xauth userid mode local
```

Create the crypto dynamic-map that match TransPort's configuration:

```
crypto dynamic-map Dyn-acc3G 1
set transform-set ESP-DES-SHA
```

Create the crypto map that match TransPort's configuration and set the authentication for IPSEC to use user authentication:

```
crypto map Map-acc3G client authentication list userauthen
crypto map Map-acc3G isakmp authorization list groupauthor
crypto map Map-acc3G client configuration address respond
crypto map Map-acc3G 1 ipsec-isakmp dynamic Dyn-acc3G
```

Apply the crypto map to the WAN interface

```
interface FastEthernet0/0
crypto map Map-acc3G
crypto ipsec client ezvpn client-acc3G
```

Save Configuration

```
write mem
```

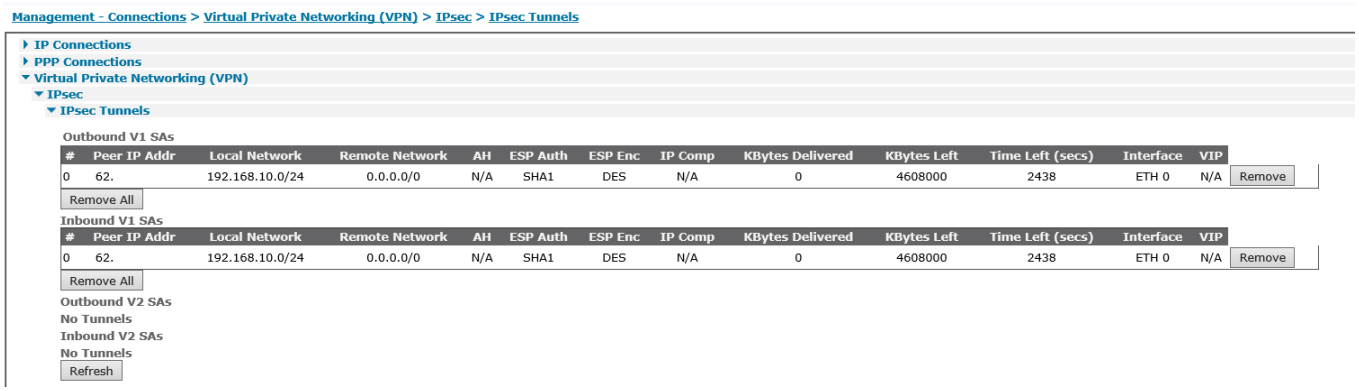
4 TESTING

4.1 Tunnel Status

Verify that the tunnel is now up on.

Digi TransPort:

Navigate to **Management > Connections > VPN > IPsec > IPsec Tunnels**



Cisco:

```
Router#show crypto ipsec sa

interface: FastEthernet0/0
    Crypto map tag: Map-acc3G, local addr 62.00.00.000

   protected vrf: (none)
   local  ident (addr/mask/prot/port): (0.0.0.0/0.0.0.0/0/0)
   remote ident (addr/mask/prot/port): (192.168.10.0/255.255.255.0/0/0)
   current_peer 92.001.000.000 port 4500
     PERMIT, flags={}
    #pkts encaps: 1, #pkts encrypt: 1, #pkts digest: 1
    #pkts decaps: 1, #pkts decrypt: 1, #pkts verify: 1
    #pkts compressed: 0, #pkts decompressed: 0
    #pkts not compressed: 0, #pkts compr. failed: 0
    #pkts not decompressed: 0, #pkts decompress failed: 0
    #send errors 0, #recv errors 0

     local crypto endpt.: 62.00.00.000, remote crypto endpt.: 92.001.000.000
     path mtu 1500, ip mtu 1500, ip mtu idb FastEthernet0/0
     current outbound spi: 0xD1AD18B(219861387)
     PFS (Y/N): N, DH group: none

     inbound esp sas:
      spi: 0x17A213CB(396497867)
        transform: esp-des esp-sha-hmac ,
        in use settings ={Tunnel UDP-Encaps, }
```

```
        conn id: 2011, flow_id: FPGA:11, sibling_flags 80000046, crypto map:
Map-acc3G
        sa timing: remaining key lifetime (k/sec): (4580251/2296)
        IV size: 8 bytes
        replay detection support: Y
        Status: ACTIVE

     inbound ah sas:

     inbound pcp sas:

     outbound esp sas:
      spi: 0xD1AD18B(219861387)
        transform: esp-des esp-sha-hmac ,
        in use settings ={Tunnel UDP-Encaps, }
        conn id: 2012, flow_id: FPGA:12, sibling_flags 80000046, crypto map:
Map-acc3G
        sa timing: remaining key lifetime (k/sec): (4580251/2296)
        IV size: 8 bytes
        replay detection support: Y
        Status: ACTIVE

     outbound ah sas:

     outbound pcp sas:
```

4.2 Ping test

4.2.1 TransPort

To test that the VPN connection is successful, traffic needs to be routed via the TransPort to the remote network from ETH 0.

From a computer connected to the TransPort's ETH 0 port and in the 192.168.10.0 subnet, issue a ping to the Cisco's FastEthernet0/1 address:

```
Microsoft Windows [Version 6.1.7600]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.
C:\Windows\System32>ping 10.1.1.254
Pinging 10.1.1.254 with 32 bytes of data:
Reply from 10.1.1.254: bytes=32 time=2100ms TTL=126
Reply from 10.1.1.254: bytes=32 time=95ms TTL=126
Reply from 10.1.1.254: bytes=32 time=110ms TTL=126
Reply from 10.1.1.254: bytes=32 time=104ms TTL=126
Ping statistics for 10.1.1.254:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 95ms, Maximum = 2100ms, Average = 602ms
```

From the TransPort's web interface. Navigate to **Administration > Execute a command**

```
Ping 10.1.1.254 -e2

Command: ping 10.1.1.254 -e2

Command result

Pinging Addr [10.1.1.254]

sent PING # 1
PING receipt # 1 : response time 0.06 seconds
Iface: ETH 0
Ping Statistics
Sent         : 1
Received     : 1
Success      : 100 %
Average RTT : 0.06 seconds

OK
```

4.2.2 Cisco

```
Router#ping 192.168.10.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.10.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 56/58/64 ms
Router#
```

5 CONFIGURATION FILES

TransPort WR21

```
eth 0 IPaddr "192.168.10.1"
def_route 0 ll_ent "ppp"
def_route 0 ll_add 1
eroute 0 peerip "1.2.3.4"
eroute 0 peerid "1.2.3.4"
eroute 0 ourid "client3G"
eroute 0 locip "192.168.10.0"
eroute 0 locmsk "255.255.255.0"
eroute 0 remip "0.0.0.0"
eroute 0 remmsk "0.0.0.0"
eroute 0 ESPauth "SHA1"
eroute 0 ESPenc "DES"
eroute 0 authmeth "XAUTHINITPRE"
eroute 0 nosa "TRY"
eroute 0 autosa 2
eroute 0 enckeybits 128
eroute 0 xauthid "xauthclient"
eroute 0 debug ON
ppp 1 ipsec ON
ike 0 keybits 128
ike 0 authalg "SHA1"
ike 0 aggressive ON
ike 0 ikegroup 2
ike 0 noresp ON
ike 0 deblevel 4
ike 0 delmode 3
user 8 name "1.2.3.4"
user 8 epassword "xxxxxxx"
user 8 access 4
user 9 name "xauthclient"
user 9 epassword "xxxxxxx"
user 9 access 4
```

Cisco 1841

```
aaa new-model
!
!
aaa authentication login userauthen local
aaa authorization network groupauthor local
!
aaa session-id common
!
username xauthclient password 0 digixauth
!
crypto isakmp policy 10
authentication pre-share
group 2
crypto isakmp keepalive 60 periodic
!
```

```
crypto isakmp client configuration group client3G
key digixauth
save-password
!
!
crypto ipsec transform-set ESP-DES-SHA esp-des esp-sha-hmac
!
!
crypto dynamic-map Dyn-acc3G 1
set transform-set ESP-DES-SHA
!
!
crypto map Map-acc3G client authentication list userauthen
crypto map Map-acc3G isakmp authorization list groupauthor
crypto map Map-acc3G client configuration address respond
crypto map Map-acc3G 1 ipsec-isakmp dynamic Dyn-acc3G
!
!
!
!
!
interface FastEthernet0/0
 ip address 1.2.3.4 255.255.255.248
 duplex auto
 speed auto
 crypto map Map-acc3G
 crypto ipsec client ezvpn client3G
!
interface FastEthernet0/1
 ip address 10.1.1.254 255.255.255.0
 duplex auto
 speed auto
!
!
ip route 0.0.0.0 0.0.0.0 62.00.00.000
!
```