D-Link DFL-200

Network Security Firewall

Manual

D-Link

Building Networks for People

Ver.1.02

(20050419)

Contents

Introduction

The DFL-200 provides three 10/100M Ethernet network interface ports, which are (1) Internal/LAN, (1) External/WAN, and (1) DMZ port. It also provides easily operated software WebUI that allows users to set system parameters or monitor network activities using a web browser.

Features and Benefits

- **Firewall Security**
- **VPN Server/Client Supported**
- **Content Filtering**
- **Web Management**
  Configurable through any networked computer's web browser using Netscape or Internet Explorer.
- **Access Control supported**
  Allows you to assign different access rights for different users. Like Admin or Read-Only User.

Introduction to Firewalls

A firewall is a device that sits between your computer and the Internet that prevents unauthorized access to or from your network. A firewall can be a computer using firewall software or a special piece of hardware built specifically to act as a firewall. In most circumstances, a firewall is used to prevent unauthorized Internet users from accessing private networks or corporate LAN's and Intranets.

A firewall watches all of the information moving to and from your network and analyzes each piece of data. Each piece of data is checked against a set of criteria that the administrator configures. If any data does not meet the criteria, that data is blocked and discarded. If the data meets the criteria, the data is passed through. This method is called packet filtering.

A firewall can also run specific security functions based on the type of application or type of port that is being used. For example, a firewall can be configured to work with an FTP or Telnet server. Or a firewall can be configured to work with specific UDP or TCP ports to allow certain applications or games to work properly over the Internet.

Introduction to Local Area Networking

Local Area Networking (LAN) is the term used when connecting several computers together over a small area such as a building or group of buildings. LAN's can be connected over large areas. A collection of LAN's connected over a large area is called a Wide Area Network (WAN).

A LAN consists of multiple computers connected to each other. There are many types of media that can connect computers together. The most common media is CAT5 cable (UTP or STP twisted pair wire.) On the other hand, wireless networks do not use wires; instead they communicate over radio waves. Each computer must have a Network Interface Card (NIC), which communicates the data between computers. A NIC is usually a 10Mbps network card, a 10/100Mbps network card or a wireless network card.

Most networks use hardware devices such as hubs or switches that each cable can be connected to in order to continue the connection between computers. A hub simply takes any data arriving through each port and forwards the data to all other ports. A switch is more sophisticated, in that a switch can determine the destination port for a specific piece of data. A switch minimizes network traffic overhead and speeds up the communication over a network.

Networks take some time in order to plan and implement correctly. There are many ways to configure your network. You may want to take some time to determine the best network set-up for your needs.

LEDs

Power: A solid light indicates a proper connection to the power supply.

Status: System status indicators, The LED has a solid green, the device is working normally. If the LED is light off the unit is defective.

WAN, DMZ & LAN ports: Ethernet port indicators, Green. The LED flickers when the ports are sending or receiving data.

Physical Connections

Console: Serial access to the firewall software, 9600, 8bit, None Parity, 1Stop bit.

Internal Ports (LAN): Use these ports to connect the internal computers f the office.

DMZ Port: Use this port to connect to the company's server(s), which needs direct connection to the Internet (FTP, SNMP, HTTP and DNS).

External Port (WAN): Use this port to connect to the external router, DSL modem, or Cable modem.

Reset: Reset the DFL-200 to the original default settings.

DC Power: connect one end of the power supply to this port, the other end to the electrical wall outlet.

Package Contents

Contents of Package:

- **D-Link DFL-200 Firewall**
- Manual and CD
- Quick Installation Guide
- AC Power adapter

Note: Using a power supply with a different voltage rating than the one included with the DFL-200 will cause damage and void the warranty for this product.

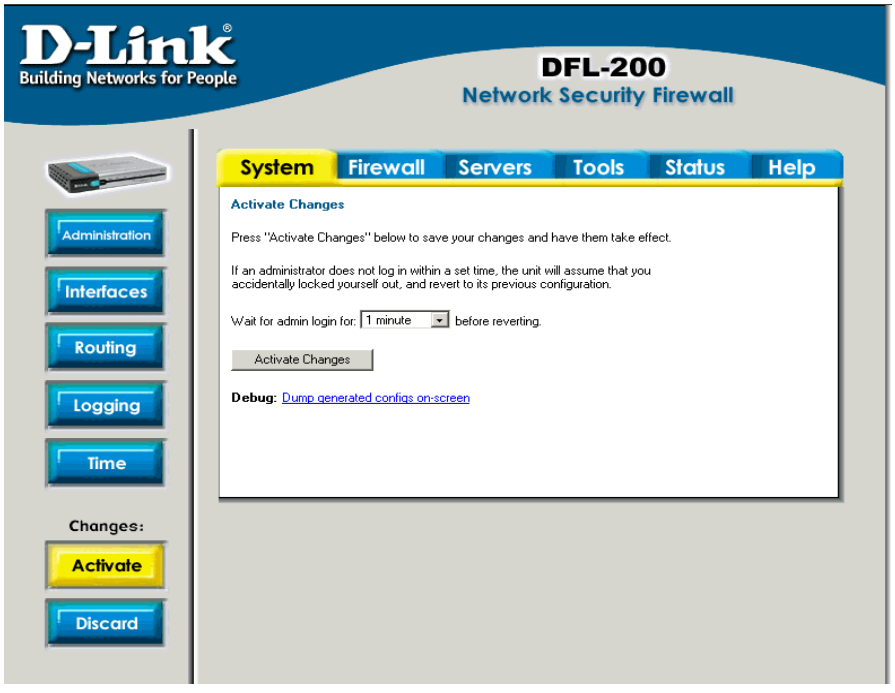
If any of the above items are missing, please contact your reseller.

System Requirements

- Computer with a Windows, Macintosh, or Unix based operating system with an installed Ethernet adapter
- Internet Explorer or Netscape Navigator, version 6.0 or above, with JavaScript enabled.

Managing D-Link DFL-200

When a change is done to the configuration a new icon named **Activate Changes** will appear. When all changes and administrator would like to do is done the changes need to be saved and activated to take effect, this is done by clicking on the Activate Changes button on the Activate Configuration Changes page. What will happen is that the firewall will save the configuration and reload it, letting the new changes take effect. But for the changes to become permanent the admin need to login again. This have to be done before a configurable timeout has been reached, this can be set on the Activate Configuration Changes page, by choosing the time from the dropdown menu.

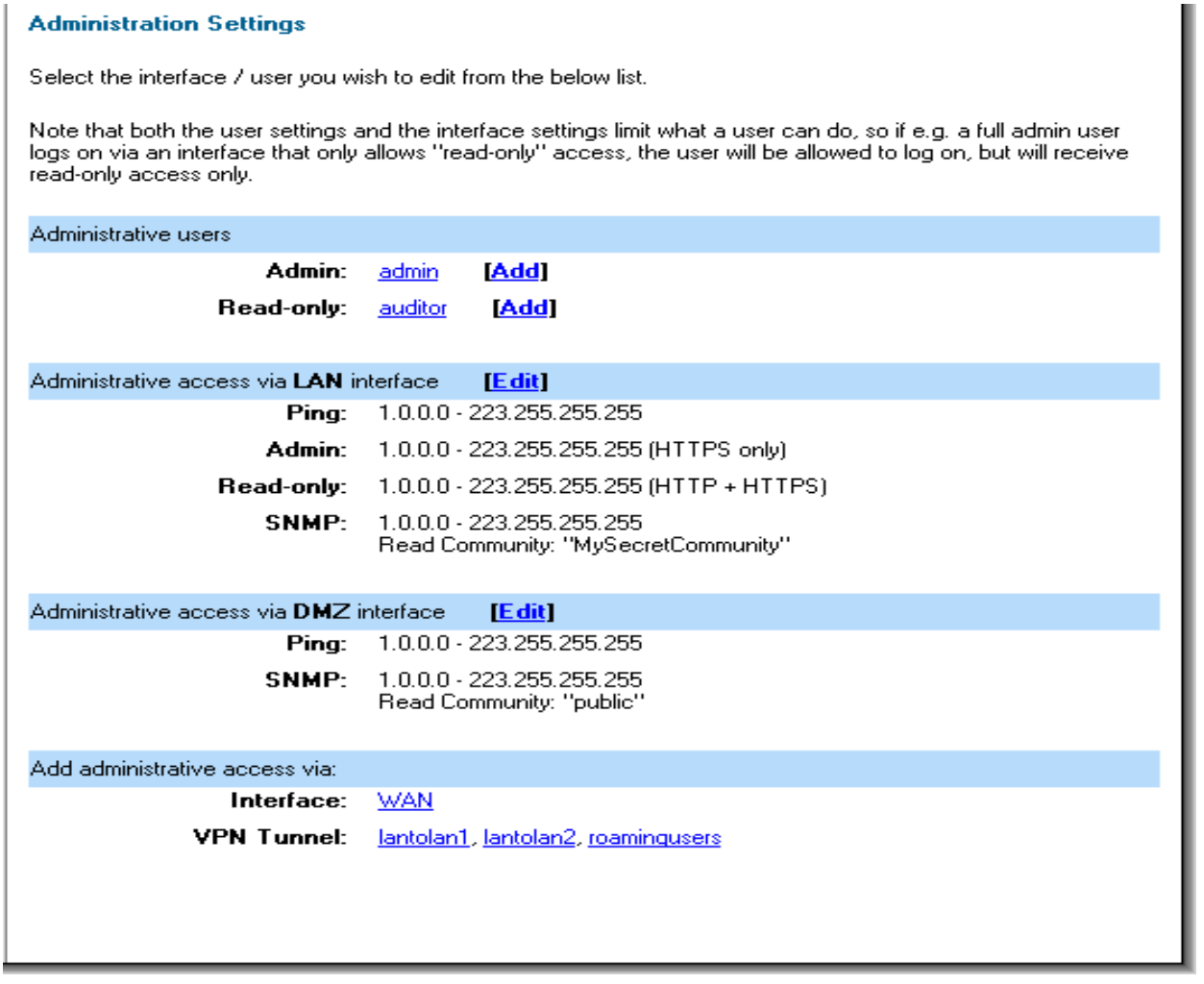


Resetting the DFL-200

To reset the DFL-200 to factory default settings you must hold the reset button down for at least 15 seconds after powering on the unit. You will first hear one beep, which will indicate that the firmware have started and the restoring have started, keep the button pressed in until you hear two consecutive beeps shortly after each other. After this you can release the reset button and the DFL-200 will continue to load and startup in default mode, i.e. with 192.168.1.1 on the LAN interface.

Administration Settings

Administrative Access



Ping – If enabled, specifies who can ping the interface IP of the DFL-200. Default if enabled is to allow anyone to ping the interface IP.

Admin – If enabled allows all users with admin access to connect to the DFL-200 and change configuration, can be **HTTPS** or **HTTP and HTTPS**.

Read-Only – If enabled allows all users with read-only access to connect to the DFL-200 and look at the configuration, can be **HTTPS** or **HTTP and HTTPS**. If there is no Admin access specified on an interface and only read-only, admin users can still connect but will be in read-only mode.

SNMP – Specifies if SNMP should be allowed or not on the interface, the DFL-200 only supports read-only access.

Add ping access to an interface

To add ping access click on the interface you would like to add it to.

Follow these steps to add ping access to an interface.

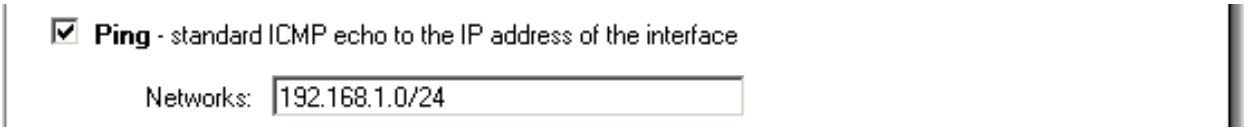
Step 1. Click on the interface you would like to add it to.

Step 2. Enable the **Ping** checkbox.

Step 3. Specify what networks are allowed to ping the interface, for example 192.168.1.0/24 for a whole network or 172.16.0.1 – 172.16.0.10 for a range.

Click the **Apply** button below to apply the setting or click Cancel to discard changes.

Example:



Add Admin access to an interface

To add admin access click on the interface you would like to add it to. Only users with the administrator rights can login on an interfaces where there is only admin access enabled.

Follow these steps to add admin access to an interface.

Step 1. Click on the interface you would like to add it to.

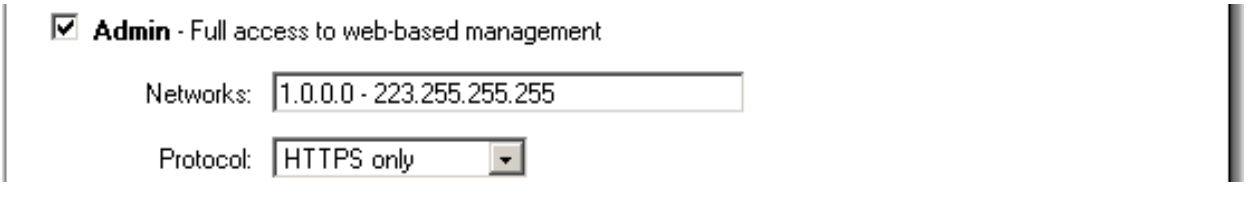
Step 2. Enable the **Admin** checkbox.

Step 3. Specify what networks are allowed to ping the interface, for example 192.168.1.0/24 for a whole network or 172.16.0.1 – 172.16.0.10 for a range.

Step 4. Specify protocol used to access the DFL-200 from the dropdown menu, either HTTP and HTTPS (Secure HTTP) or only HTTPS.

Click the **Apply** button below to apply the setting or click Cancel to discard changes.

Example:



Add Read-only access to an interface

To add read-only access click on the interface you would like to add it to, note that if you only have read-only access enable on an interface all users only get read-only access, even if they are administrators.

Follow these steps to add read-only access to an interface.

Step 1. Click on the interface you would like to add it to.

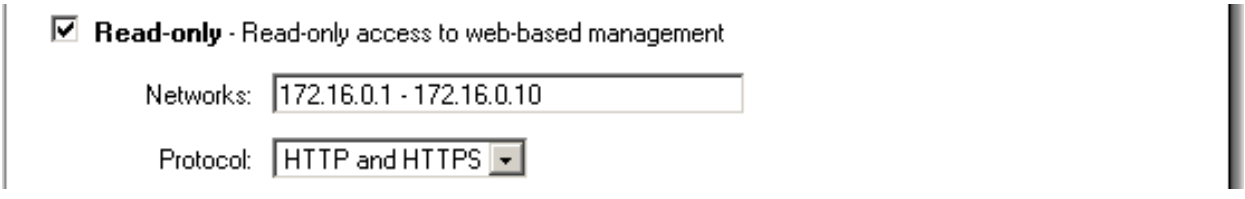
Step 2. Enable the **Read-only** checkbox.

Step 3. Specify what networks are allowed to ping the interface, for example 192.168.1.0/24 for a whole network or 172.16.0.1 – 172.16.0.10 for a range.

Step 4. Specify protocol used to access the DFL-200 from the dropdown menu, either HTTP and HTTPS (Secure HTTP) or only HTTPS.

Click the **Apply** button below to apply the setting or click Cancel to discard changes.

Example:



Enable SNMP access to an interface

Follow these steps to add read-only SNMP access to an interface.

Step 1. Click on the interface you would like to add it to.

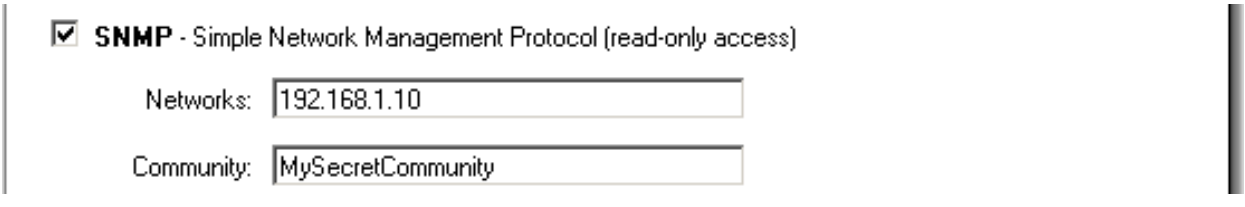
Step 2. Enable the **Read-only** checkbox.

Step 3. Specify what networks are allowed to ping the interface, for example 192.168.1.0/24 for a whole network or 172.16.0.1 – 172.16.0.10 for a range.

Step 4. Specify the community string used to authenticate against the DFL-200.

Click the **Apply** button below to apply the setting or click Cancel to discard changes.

Example:



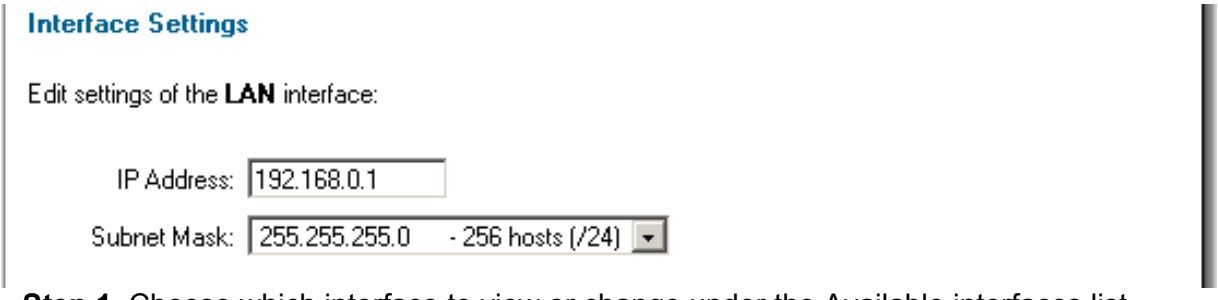
System

Interfaces

Click on **System** in the menu bar, and then click **interfaces** below it.

Change IP of the LAN or DMZ interface

Follow these steps to change the IP of the LAN or DMZ interface.



Step 1. Choose which interface to view or change under the Available interfaces list.

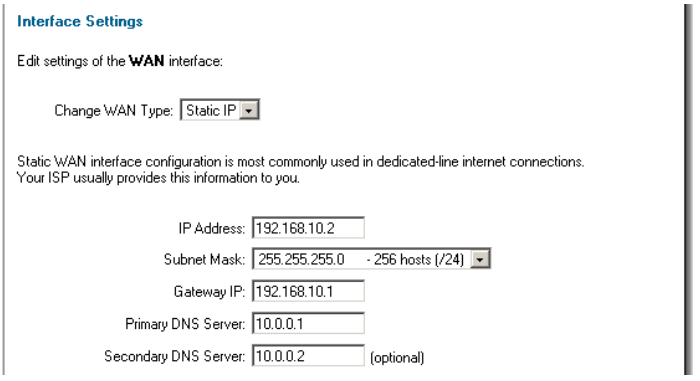
Step 2. Fill in the IP address of the **LAN** or **DMZ** interface. These are the address that will be used to ping the firewall, remotely control it and use as gateway for the internal hosts or DMZ hosts.

Step 3. Choose the correct Subnet mask of this interface from the drop down menu.

Click the **Apply** button below to apply the setting or click Cancel to discard changes.

WAN Interface Settings – Using Static IP

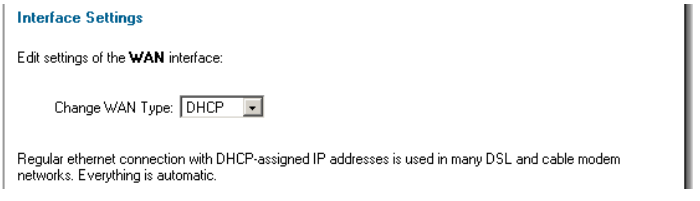
If you are using **Static IP** you have to fill in the IP address information provided to you by your ISP. All fields are required except the Secondary DNS Server. You should probably not use the numbers displayed in these fields, they are only used as an example.



- **IP Address** – The IP address of the **WAN** interface. This is the address that may be used to ping the firewall, remotely control it and be used as source address for dynamically translated connections.
- **Subnet Mask** – Size of the external network.
- **Gateway IP** – Specifies the IP address of the default gateway used to reach for the Internet.
- **Primary and Secondary DNS Server** – The IP addresses of your DNS servers, only the Primary DNS is required.

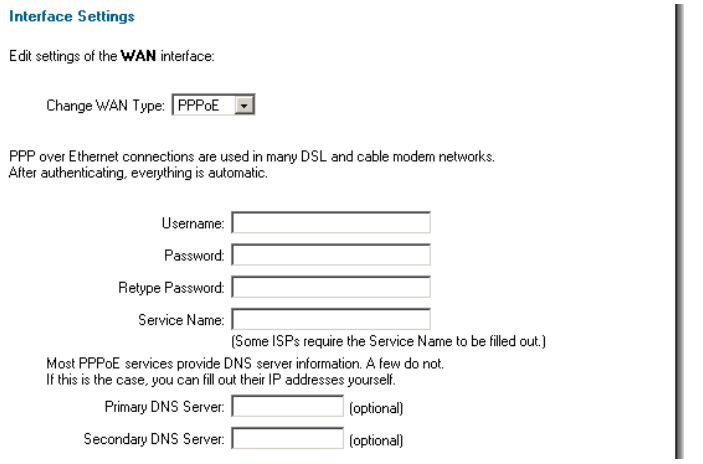
WAN Interface Settings – Using DHCP

If you are using **DHCP** there is no need to enter any values in any of fields.



WAN Interface Settings – Using PPPoE

Use the following procedure to configure the DFL-200 external interface to use PPPoE (Point-to-Point Protocol over Ethernet). This configuration is required if your ISP uses PPPoE to assign the IP address of the external interface. You will have to fill the username and password provided to you by your ISP.



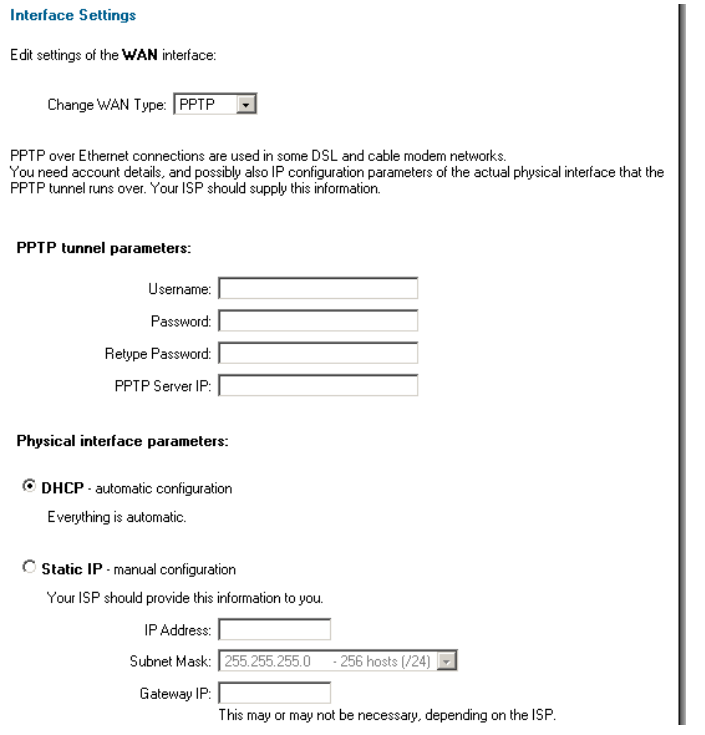
- **Username** – The login or username supplied to you by your ISP.
- **Password** – The password supplied to you by your ISP.
- **Service Name** – When using PPPoE some ISPs require you to fill in a Service Name.
- **Primary and Secondary DNS Server** – The IP addresses of your DNS servers, these are optional and are often provided by the PPPoE service.

WAN Interface Settings – Using PPTP

PPTP over Ethernet connections are used in some DSL and cable modem networks.

You need your account details, and possibly also IP configuration parameters of the actual physical interface that the PPTP tunnel runs over. Your ISP should supply this information.

- **Username** – The login or username supplied to you by your ISP.
- **Password** – The password supplied to you by your ISP.
- **PPTP Server IP** – The IP of the PPTP server that the DFL-200 should connect to.



Before PPTP can be used to connect to you ISP the physical (WAN) interface parameters need to be supplied, it's possible to use either **DHCP** or **Static IP**, this depends on the type of ISP used and this information should be supplied by them.

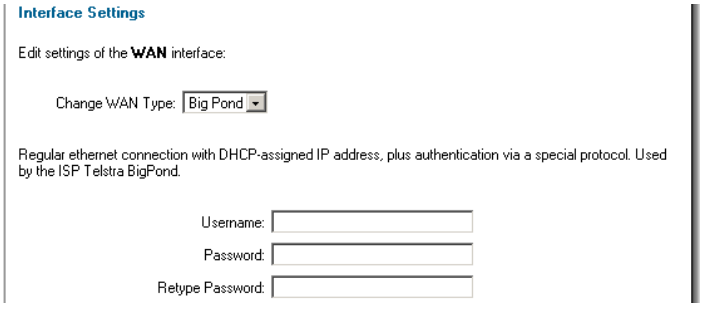
If using static IP, this information need to be filled in.

- **IP Address** – The IP address of the **WAN** interface. This IP is used to connect to the PPTP server.
- **Subnet Mask** – Size of the external network.
- **Gateway IP** – Specifies the IP address of the default gateway used to reach for the Internet.

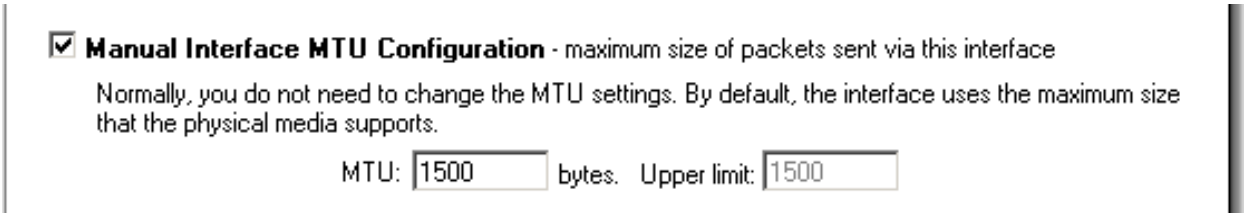
WAN Interface Settings – Using BigPond

The ISP Telstra BigPond uses BigPond for authentication; the IP is assigned with DHCP.

- **Username** – The login or username supplied to you by your ISP.
- **Password** – The password supplied to you by your ISP.



MTU Configuration



To improve the performance of your Internet connection, you can adjust the maximum transmission unit (MTU) of the packets that the DFL-200 transmits from its external interface. Ideally, you want this MTU to be the same as the smallest MTU of all the networks between the DFL-200 and the Internet. If the packets the DFL-200 sends are larger, they get broken up or fragmented, which could slow down transmission speeds.

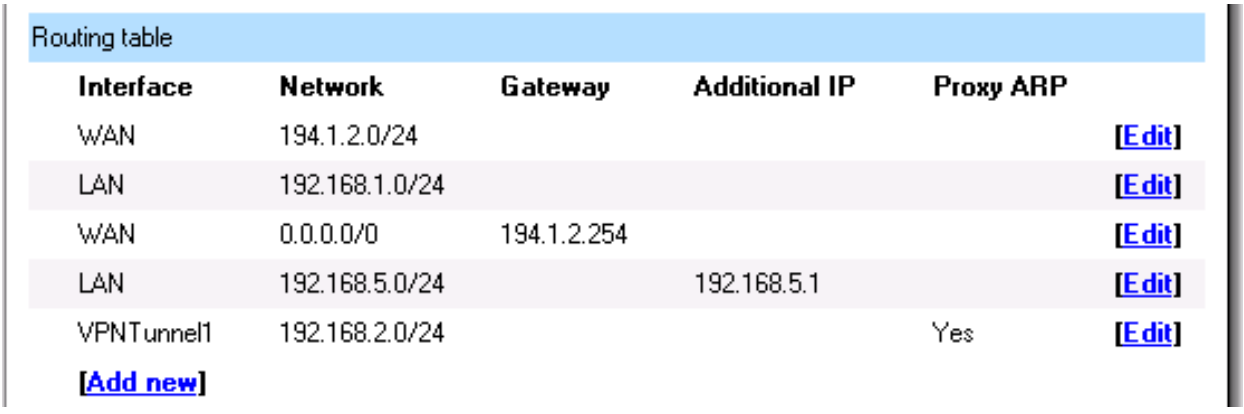
Trial and error is the only sure way of finding the optimal MTU, but there are some guidelines that can help. For example, the MTU of many PPP connections is 576, so if you connect to the Internet via PPPoE, you might want to set the MTU size to 576. DSL modems may also have small MTU sizes. Most ethernet networks have an MTU of 1500.

Note: If you connect to your ISP using DHCP to obtain an IP address for the external interface, you cannot set the MTU below 576 bytes due to DHCP communication standards.

Click the **Apply** button below to apply the setting or click Cancel to discard changes.

Routing

Click on **System** in the menu bar, and then click **Routing** below it, this will give a list of all configured routes, it will look something like this:



Routing table

Interface	Network	Gateway	Additional IP	Proxy ARP	
WAN	194.1.2.0/24				[Edit]
LAN	192.168.1.0/24				[Edit]
WAN	0.0.0.0/0	194.1.2.254			[Edit]
LAN	192.168.5.0/24		192.168.5.1		[Edit]
VPNTunnel1	192.168.2.0/24			Yes	[Edit]

[Add new]

The Routes configuration section describes the firewall's routing table. DFL-200 uses a slightly different way of describing routes compared to most other systems. However, we believe that this way of describing routes is easier to understand, making it less likely for users to cause errors or breaches in security.

Interface – Specifies which interface packets destined for this route shall be sent through.

Network – Specifies the network address for this route.

Gateway – Specifies the IP address of the next router hop used to reach the destination network. If the network is directly connected to the firewall interface, no gateway address is specified.

Local IP Address – The IP address specified here will be automatically published on the corresponding interface. This address will also be used as the sender address in ARP queries. If no address is specified, the firewalls own interface IP address will be used.

Proxy ARP – Specifies that the firewall shall publish this route via Proxy ARP.

One advantage with this form of notation is that you can specify a gateway for a particular route, without having a route that covers the gateway's IP address or despite the fact that the route that covers the gateway's IP address is normally routed via another interface.

The difference between this form of notation and that most commonly used is that there, you do not specify the interface name in a separate column. Instead, you specify the IP address of each interface as a gateway.

Note: The firewall does not Proxy ARP routes on VPN interfaces.

Add a new Static Route

Follow these steps to add a new route.

Step 1. Go to **System** and **Routing**.

Step 2. Click on **Add new** in the bottom of the routing table.

Step 3. Choose the interface that the route should be sent trough from the dropdown menu.

Step 4. Specify the Network and Subnet mask.

Step 5. If this network is behind a remote gateway enable the checkbox **Network is behind remote gateway** and specify the IP of that gateway

Click the **Apply** button below to apply the setting or click **Cancel** to discard changes.

Remove a Static Route

Follow these steps to add a remove a route.

Step 1. Go to **System** and **Routing**.

Step 2. Take **Edit** after the route you would like to remove.

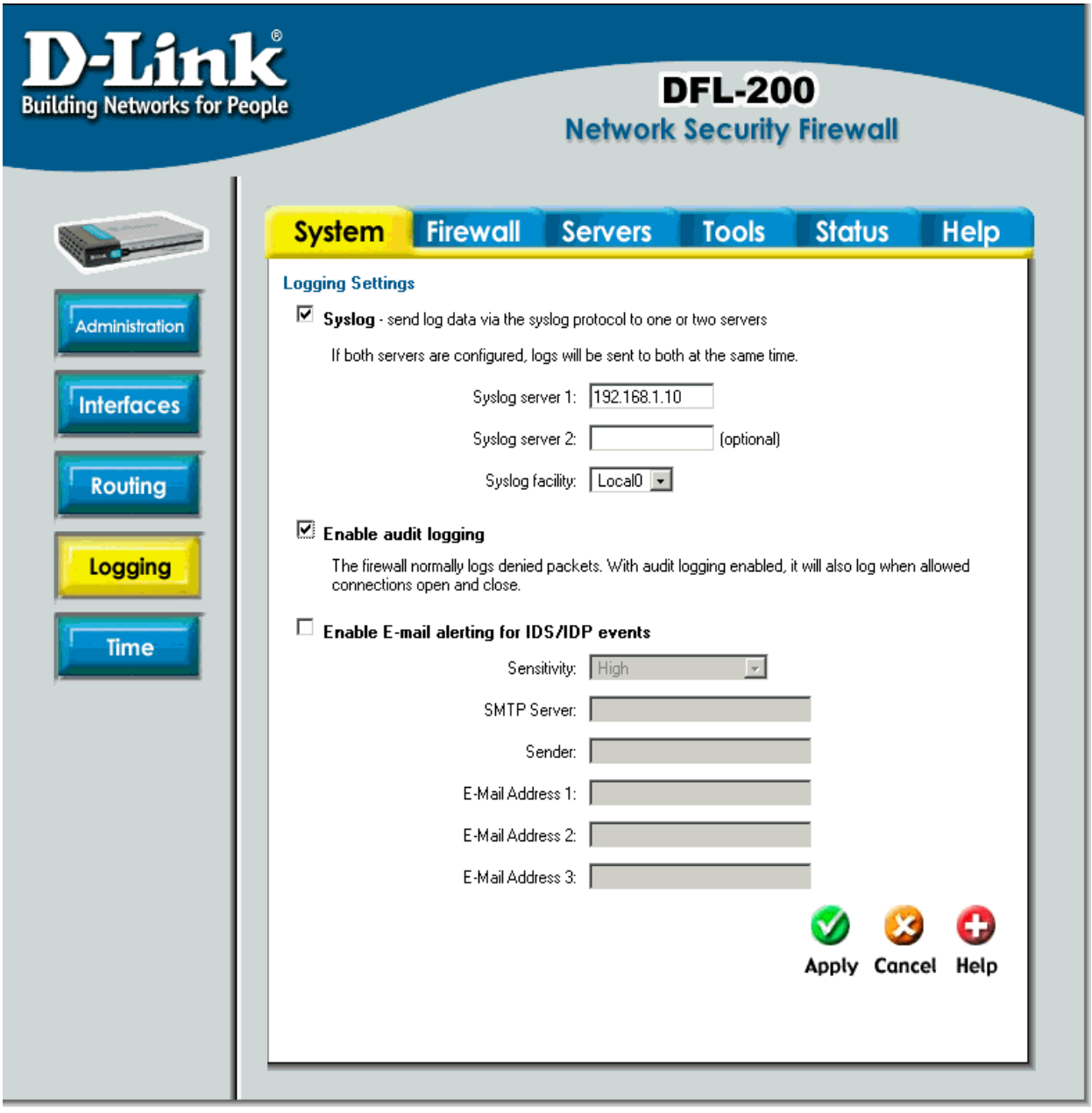
Step 3. Check the checkbox named **Delete this route**.

Click the **Apply** button below to apply the setting or click **Cancel** to discard changes.

Logging

Click on **System** in the menu bar, and then click **Logging** below it.

Logging, the ability to audit decisions made by the firewall, is a vital part in all network security products. The D-Link DFL-200 provides several options for logging its activity. The D-Link DFL-200 logs its activities by sending the log data to one or two log receivers in the network.



All logging is done to Syslog recipients. The log format used for syslog logging is suitable for automated processing and searching.

The D-Link DFL-200 specifies a number of events that can be logged. Some of those events, for instance, startup and shutdown events, are mandatory, and will always generate log entries. Others, for instance to log if when allowed connections are opened and closed, is configurable. It's also possible to have E-mail alerting for IDS/IDP events to up to three email addresses.

Enable Logging

Follow these steps to enable logging.

Step 1. Enable syslog by checking the **Syslog** box.

Step 2. Fill in your first syslog server as **Syslog server 1,** if you have two syslog servers you have to fill in the second one as **Syslog server 2**. You must fill in at least one syslog server for logging to work.

Step 3. Specify what facility to use by selecting the appropriate syslog facility. Local0 is the default facility.

Click the **Apply** button below to apply the setting or click Cancel to discard changes.

Enable Audit Logging

To start auditing all traffic trough the firewall, follow the sets below and the firewall will start logging all traffic trough the firewall, this is needed for running third party log analyzers on the logs and to see how much traffic different connections use.

Follow these steps to enable auditing.

Step 1. Enable syslog by checking the **Enable audit logging** box.

Click the **Apply** button below to apply the setting or click Cancel to discard changes.

Enable E-mail alerting for ISD/IDP events

Follow these steps to enable E-mail alerting.

Step 1. Enable E-mail alerting by checking the **Enable E-mail alerting for IDS/IDP events** checkbox.

Step 2. Choose the sensitivity level.

Step 3. In the **SMPT Server** field, fill in the SMTP server to which the DFL-200 should send email.

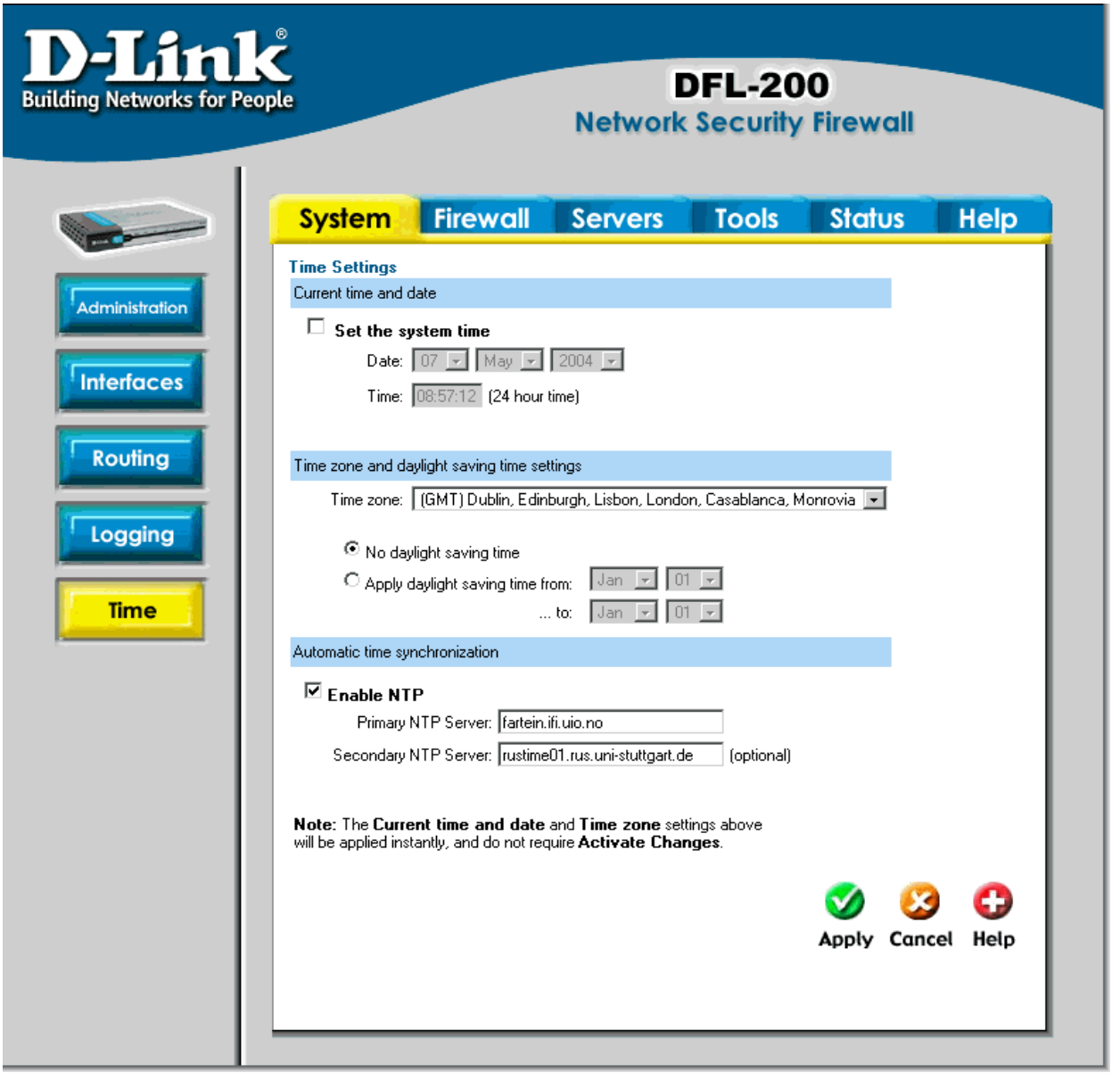
Step 4. Specify up to three valid email addresses to receive the email alerts.

Click the **Apply** button below to apply the setting or click Cancel to discard changes.

Intrusion attacks will always be logged in the usual logs if IDS is enabled for any of the rules. For more information about how to enable intrusion detection and prevention on a policy or port mapping, read more under **Policies** and **Port Mappings** in the Firewall section below.

Time

Click on **System** in the menu bar, and then click **Time** below it. This will give you the option to either set the system time by syncing to an Internet Network Time Server (NTP) or by entering the system time by hand.



Changing time zone

Follow these steps to change the time zone.

Step 1. Choose the correct time zone in the drop down menu.

Step 2. Specify your daylight time or choose no daylight saving time by checking the correct box.

Click the **Apply** button below to apply the setting or click Cancel to discard changes.

Using NTP to sync time

Follow these steps to sync to an Internet Time Server.

Step 1. Enable synchronization by checking the **Enable NTP** box.

Step 2. Enter the Server IP Address or Server name with which you want to synchronize.

Click the **Apply** button below to apply the setting or click Cancel to discard changes.

Setting time and date manually

Follow these steps to set the system time by hand.

Step 1. Checking the **Set the system time** box.

Step 2. Choose the correct date.

Step 3. Set the correct time in 24-hour format.

Click the **Apply** button below to apply the setting or click Cancel to discard changes.

Firewall

Policy

The Firewall Policy configuration section is the "heart" of the firewall. The policies are the primary filter that is configured to allow or disallow certain types of network traffic through the firewall.

When a new connection is being established through the firewall, the policies are evaluated, top to bottom, until a policy that matches the new connection is found. The Action of the rule is then carried out. If the action is Allow, the connection will be established and a state representing the connection is added to the firewall's internal state table. If the action is Drop, the new connection will be refused. The section below will explain the meanings of the various action types available.

Policy modes

The first step in configuring security policies is to configure the mode for the firewall. The firewall can run in NAT or No NAT (Route) mode. Select NAT mode to use DFL-1000 network address translation to protect private networks from public networks. In NAT mode, you can connect a private network to the internal interface, a DMZ network to the dmz interface, and a public network, such as the Internet, to the external interface. Then you can create NAT mode policies to accept or deny connections between these networks. NAT mode policies hide the addresses of the internal and DMZ networks from users on the Internet. In No NAT (Route) mode you can also create routed policies between interfaces. Route mode policies accept or deny connections between networks without performing address translation. To use NAT mode select **Hide source addresses (many-to-one NAT)** and to use No NAT (Route) mode choose **No NAT**.

Action Types

Drop – Packets matching Drop rules will immediately be dropped. Such packets will be logged if logging has been enabled in the Logging Settings page.

Reject – Reject works in basically the same way as Drop. In addition to this, the firewall sends an ICMP UNREACHABLE message back to the sender or, if the rejected packet was a TCP packet, a TCP RST message. Such packets will be logged if logging has been enabled in the Logging Settings page.

Allow – Packets matching Allow rules are passed to the stateful inspection engine, which will remember that a connection has been opened. Therefore, rules for return traffic will not be required as traffic belonging to open connections is automatically dealt with before it reaches the policies. Logging is carried out if audit logging has been enabled in the Logging Settings page.

Source and Destination Filter

Source Nets – Specifies the sender span of IP addresses to be compared to the received packet. Leave this blank to match everything.

Source Users/Groups – Specifies if an authenticated username is needed for this policy to match. Either make a list of usernames, separated by **,** or write **Any** for any authenticated user. If it's left blank there is no need for authentication for the policy.

Destination Nets – Specifies the span of IP addresses to be compared to the destination IP of the received packet. Leave this blank to match everything.

Destination Users/Groups – Specifies if an authenticated username is needed for this policy to match. Either make a list of usernames, separated by , or write Any for any authenticated user. If it's left blank there is no need for authentication for the policy.

Service Filter

Either choose a predefined service from the dropdown menu or make a custom.

The following custom services exist:

All – This service matches all protocols.

TCP+UDP+ICMP – This service matches all ports on either the TCP or the UDP protocol, including ICMP.

Custom TCP – This service is based on the TCP protocol.

Custom UDP – This service is based on the UDP protocol.

Custom TCP+UDP – This service is based on either the TCP or the UDP protocol.

The following is used when making a custom service:

Custom source/destination ports – For many services, a single destination port is sufficient. The source port most often be all ports, 0-65535. The http service, for instance, is using destination port 80. A port range can also be used, meaning that a range 137-139 covers ports 137, 138 and 139. Multiple ranges or individual ports may also be entered, separated by commas. For instance, a service can be defined as having source ports 1024-65535 and destination ports 80-82, 90-92, 95. In this case, a TCP or UDP packet with the destination port being one of 80, 81, 82, 90, 91, 92 or 95, and the source port being in the range 1024-65535, will match this service.

Schedule

If a schedule should be used for the policy, choose one from the dropdown menu, these are specified on the **Schedules** page. If the policy should always be active, choose Always from the dropdown menu.

Intrusion Detection / Prevention

The DFL-200 Intrusion Detection/Prevention System (IDS/IDP) is a real-time intrusion detection and prevention sensor that identifies and takes action against a wide variety of suspicious network activity. The IDS uses intrusion signatures, stored in the attack database, to identify the most common attacks. In response to an attack, the IDS protect the networks behind the DFL-200 by dropping the traffic. To notify of the attack the IDS sends an email to the system administrators if email alerting is converted. There are two modes that can be configured, either **Inspection Only** or **Prevention.** Inspection Only will only inspect the traffic and if the DFL-200 sees anything it will log, email an alert (if configured) and pass on the traffic, if Prevention is used the traffic will be dropped and logged and if configured a email alert will be sent.

D-Link updates the attack database periodically. Since firmware version 1.30.00 automatic updates are possible. If IDS or IDP is enabled for at least one of the policies or port mappings, auto updating of the IDS database will be enabled. The firewall will then automatically download the latest database from the D-Link website.

Add a new policy

Follow these steps to add a new outgoing policy.

Step 1. Choose the **LAN->WAN** policy list from the available policy lists.

Step 2. Click on the **Add new** link.

Step 3. Fill in the following values:

Name: Specifies a symbolic name for the rule. This name is used mainly as a rule reference in log data and for easy reference in the policy list.

Action: Select **Allow** to allow this type of traffic.

Source Nets: – Specifies the sender span of IP addresses to be compared to the received packet. Leave this blank to match everything.

Source Users/Groups: Specifies if an authenticated username is needed for this policy to match. Either make a list of usernames, separated by **,** or write **Any** for any authenticated user. If it's left blank there is no need for authentication for the policy.

Destination Nets: Specifies the span of IP addresses to be compared to the destination IP of the received packet. Leave this blank to match everything.

Destination Users/Groups: Specifies if an authenticated username is needed for this policy to match. Either make a list of usernames, separated by **,** or write **Any** for any authenticated user. If it's left blank there is no need for authentication for the policy.

Service: Either choose a predefined service from the dropdown menu or make a custom.

Schedule: Choose what schedule should be used for this policy to match, choose Always for no scheduling.

Click the **Apply** button below to apply the change or click **Cancel** to discard changes

Change order of policy

Follow these steps to change order of a policy.

Step 1. Choose the policy list you would like do change order in from the available policy lists.

Step 2. Click on the **Edit** link on the rule you want to delete.

Step 3. Change the number in the **Position** to the new line, this will after the apply button is clicked move this policy to this row and move the old policy and all after to one step down.

Click the **Apply** button below to apply the change or click **Cancel** to discard changes

Delete policy

Follow these steps to delete a policy.

Step 1. Choose the policy list you would like do delete the policy in from the available policy lists.

Step 2. Click on the **Edit** link on the rule you want to delete.

Step 3. Enable the **Delete policy** checkbox.

Click the **Apply** button below to apply the change or click **Cancel** to discard changes

Configure Intrusion Detection

Follow these steps to configure IDS on a policy.

Step 1. Choose the policy you would like have IDS on.

Step 2. Click on the **Edit** link on the rule you want to delete.

Step 3. Enable the **Intrusion Detection / Prevention** checkbox.

Step 4. Choose **Intrusion Detection** from the mode drop down list.

Step 5. Enable the alerting checkbox for email alerting.

Click the **Apply** button below to apply the change or click **Cancel** to discard changes

Configure Intrusion Prevention

Follow these steps to configure IDP on a policy.

Step 1. Choose the policy you would like have IDP on.

Step 2. Click on the **Edit** link on the rule you want to delete.

Step 3. Enable the **Intrusion Detection / Prevention** checkbox.

Step 4. Choose **Prevention** from the mode drop down list.

Step 5. Enable the alerting checkbox for email alerting.

Click the **Apply** button below to apply the change or click **Cancel** to discard changes

Port mapping / Virtual Servers

The Port mapping / Virtual Servers configuration section is where you can configure virtual servers like Web servers on the DMZ or similar. It is also possible to use Intrusion Detection / Prevention on Port mapped services, these are done in the same way as on policies, so see that chapter for more information.

Mappings are read from top to bottom, and the first matching mapping is carried out.

Add a new mapping

Follow these steps to add a new mapping on the WAN interface.

Step 1. Choose the **WAN** policy list from the available policy lists.

Step 2. Click on the **Add new** link.

Step 3. Fill in the following values:

Name: Specifies a symbolic name for the rule. This name is used mainly as a rule reference in log data and for easy reference in the policy list.

Source Nets: Specify the source networks, leave blank for everyone (0.0.0.0/0).

Source Users/Groups: Specifies if an authenticated username is needed for this mapping to match. Either make a list of usernames, separated by **,** or write **Any** for any authenticated user. If it's left blank there is no need for authentication for the policy.

Destination Nets: Leave empty for the interfaces own IP or enter a new IP if using Virtual IP.

Service: Either choose a predefined service from the dropdown menu or make a custom.

Pass To: The IP of the server that the traffic should be passed to.

Schedule: Choose what schedule should be used for this mapping to match, choose Always for no scheduling.

Click the **Apply** button below to apply the change or click **Cancel** to discard changes

Delete mapping

Follow these steps to delete a mapping.

Step 1. Choose the mapping list (WAN, LAN or DMZ) you would like do delete the mapping from.

Step 2. Click on the **Edit** link on the rule you want to delete.

Step 3. Enable the **Delete mapping** checkbox.

Click the **Apply** button below to apply the change or click **Cancel** to discard changes.

Users

User Authentication allows an administrator to grant or reject access to specific users from specific IP addresses, based on their user credentials.

Before any traffic is allowed to pass through any policies configured with username or groups, the user must first authenticate him/her-self. The DFL-200 can either verify the user against a local database or passes along the user information to an external authentication server, which verifies the user and the given password, and transmits the result back to the firewall. If the authentication is successful, the DFL.700 will remember the source IP address of this user, and any matching policies with usernames or groups configured will be allowed. Specific policies that deal with user authentication can be defined, thus leaving policies that not require user authentication unaffected.

The DFL-200 supports the RADIUS (Remote Authentication Dial In User Service) authentication protocol. This protocol is heavily used in many scenarios where user authentication is required, either by itself or as a front-end to other authentication services.

The DFL-200 RADIUS Support

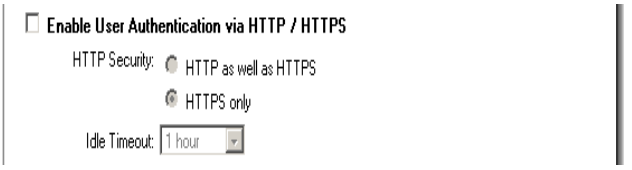
The DFL-200 can use RADIUS to verify users against for example Active Directory or Unix password-file. It is possible to configure up to two servers, if the first one is down it will try the second IP instead.

The DFL-200 can use CHAP or PAP when communicating with the RADIUS server. **CHAP** (Challenge Handshake Authentication Protocol) does not allow a remote attacker to extract the user password from an intercepted RADIUS packet. However, the password must be stored in plaintext on the RADIUS server. **PAP** (Password Authentication Protocol) might be defined as the less secure of the two. If a RADIUS packet is intercepted while being transmitted between the firewall and the RADIUS server, the user password can be extracted, given time. The upside to this is that the password does not have to be stored in plaintext in the RADIUS server.

The DFL700 uses a shared secret when connecting to the RADIUS server. The shared secret enables basic encryption of the user password when the RADIUS-packet is transmitted from the firewall to the RADIUS server. The shared secret is case sensitive, can contain up to 100 characters, and must be typed exactly the same on both the firewall and the RADIUS server.

Enable User Authentication via HTTP / HTTPS

Follow these steps to enable User Authentication.



Step 1. Enable the checkbox for User Authentication.

Step 2. Specify if HTTP and HTTPS or only HTTPS should be used for the login.

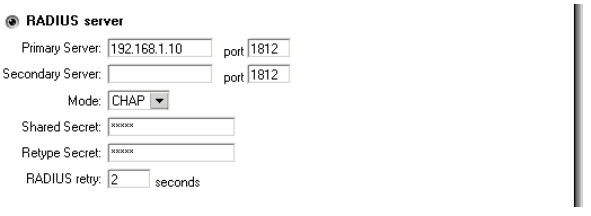
Step 3. Specify the idle-timeout, the time a user can be idle before being logged out by the firewall.

Step 4. Choose new ports for the management WebUI to listen on as the user authentication will use the same ports as the management WebUI is using..

Click the **Apply** button below to apply the setting or click **Cancel** to discard changes.

Enable RADIUS Support

Follow these steps to enable RADIUS support.



Step 1. Enable the checkbox for RADIUS Support.

Step 2. Fill in up to two RADIUS servers.

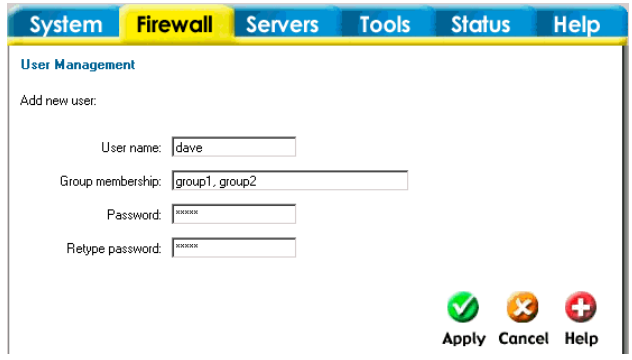
Step 3. Specified which mode to use, PAP or CHAP.

Step 3. Specify the shared secret for this connection.

Click the **Apply** button below to apply the setting or click **Cancel** to discard changes.

Add User

Follow these steps to add a new user.



Step 1. Click on **add** after the type of user you would like to add, Admin or Read-only.

Step 2. Fill in **User name;** make sure you are not trying to add one that already exists.

Step 3. Specified what groups the user should be a member of.

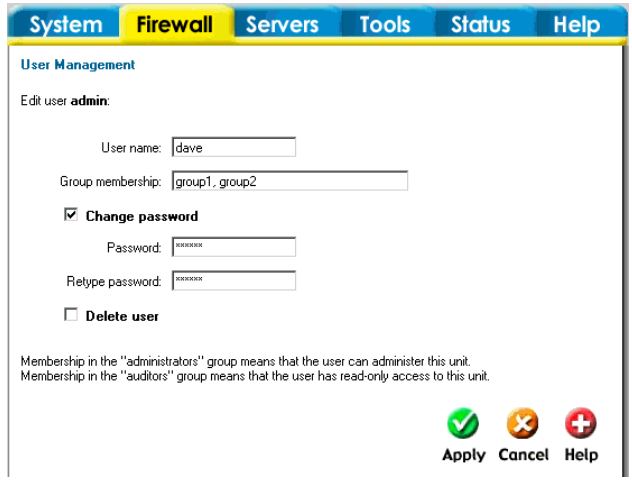
Step 3. Specify the password for the new user.

Click the **Apply** button below to apply the setting or click **Cancel** to discard changes.

Note: The user name and password should be at least six characters long. The user name and password can contain numbers (0-9) and upper and lower case letters (A-Z, a-z). Special characters and spaces are not allowed.

Change User Password

To change the password of a user click on the user name and you will see the following screen.



Follow these steps to change a users password.

Step 1. Click on the user you would like to change level of.

Step 2. Enable the **Change password** checkbox.

Step 3. Enter the new password twice.

Click the **Apply** button below to apply the setting or click Cancel to discard changes.

Note: The password should be at least six characters long. The password can contain numbers (0-9) and upper and lower case letters (A-Z, a-z). Special characters and spaces are not allowed.

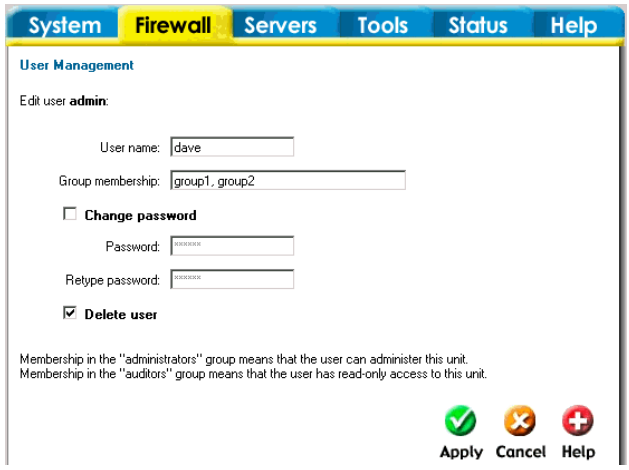
Delete User

To delete a user click on the user name and you will see the following screen.

Follow these steps to delete a user.

Step 1. Click on the user you would like to change level of.

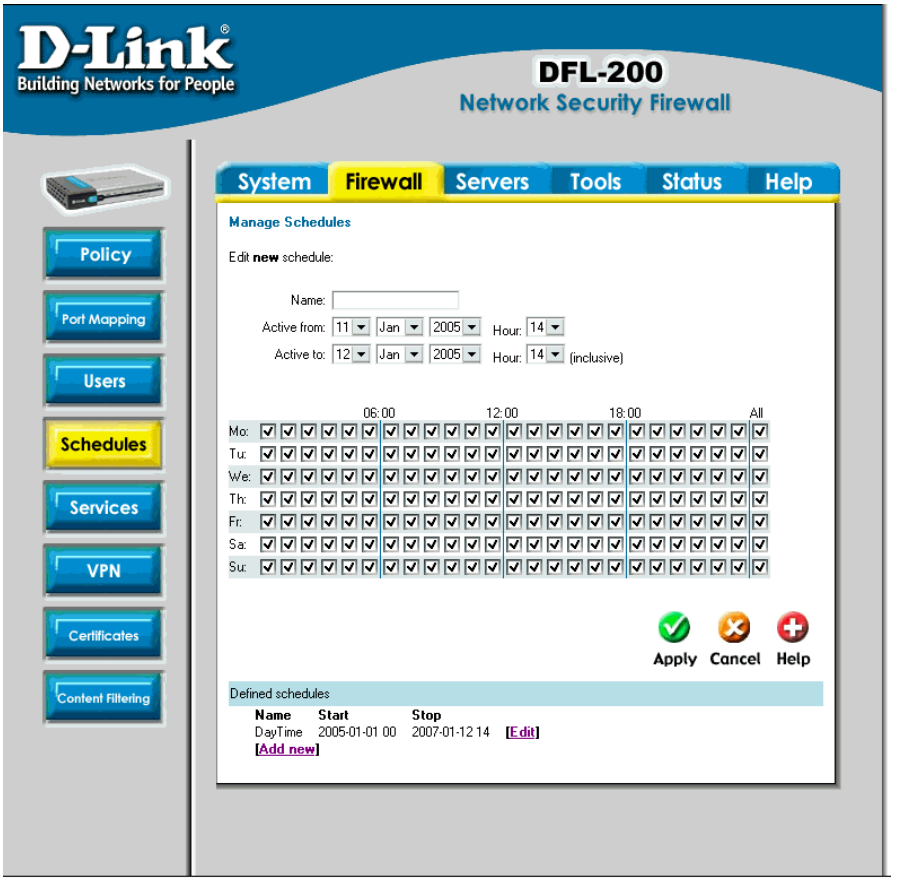
Step 2. Enable the **Delete user** checkbox.



Click the **Apply** button below to apply the setting or click Cancel to discard changes.

Note: Deleting a user is irreversible; once the user is deleted, it cannot be undeleted.

Schedules



It is possible to configure a schedule for policies to take affect. By creating a schedule, the DFL-200 is allowing the firewall policies to be used at those designated times only. Any activities outside of the scheduled time slot will not follow the policies and will therefore likely not be permitted to pass through the firewall. The DFL-200 can be configured to have a start time and stop time, as well as creating 2 different time periods in a day. For example, an organization may only want the firewall to allow the internal network users to access the Internet during work hours. Therefore, one may create a schedule to allow the firewall to allow traffic Monday-Friday, 8AM-5PM only. During the non-work hours, the firewall will not allow Internet access.

Add new recurring schedule

Follow these steps to add new recurring schedule.

Step 1. Go to Firewall and Schedules and choose Add new.

Step 2. Choose the starting and ending date and hour when the schedule should be active.

Step 3. Use the checkboxes to set the times this schedule should be active. If all boxes are checked the schedule will be active all the time from the starting to the ending date. If all boxes are unchecked the schedule never will trigger.

Click the **Apply** button below to apply the change or click **Cancel** to discard changes.

Services

A service is basically a definition of a specific IP protocol with corresponding parameters. The service http, for instance, is defined as to use the TCP protocol with destination port 80.

Services are simplistic, in that they cannot carry out any action in the firewall on their own. Thus, a service definition does not include any information whether the service should be allowed through the firewall or not. That decision is made entirely by the firewall policies, in which the service is used as a filter parameter.

Adding TCP, UDP or TCP/UDP Service

For many services, a single destination port is sufficient. The http service, for instance, is using destination port 80. To use a single destination port, enter the port number in the destination ports text box. In most cases, all ports (0-65535) have to be used as source ports. The second option is to define a port range, a port range is inclusive, meaning that a range 137-139 covers ports 137, 138 and 139.

Multiple ranges or individual ports may also be entered, separated by commas. For instance, a service can be defined as having source ports 1024-65535 and destination ports 80-82, 90-92, 95. In this case, a TCP or UDP packet with the destination port being one of 80, 81, 82, 90, 91, 92 or 95, and the source port being in the range 1024-65535, will match this service.

Follow these steps to add a TCP, UDP or TCP/UDP service.

Step 1. Go to Firewall and Service and choose Add new.

Step 2. Enter a Name for the service in the name field. This name will appear in the service list when you add a new policy. The name can contain numbers (0-9) and upper and lower case letters (A-Z, a-z), and the special characters - and _. No other special characters and spaces are allowed.

Step 3. Select TCP/UDP Service.

Step 4. Select the protocol (either TCP, UDP or both TCP/UDP) used by the service.

Step 5. Specify a source port or range for this service by typing in the low and high port numbers. Enter 0-65535 for all ports, or a single port like 80 for only one source port.

Step 6. Specify a destination port or range for this service by typing in the low and high port numbers. Enter 0-65535 for all ports, or a single port like 80 for only one destination port.

Step 7. Enable the Syn Relay checkbox if you want to protect the destination from SYN flood attacks.

Click the **Apply** button below to apply the change or click **Cancel** to discard changes.

Adding IP Protocol

When the type of the service is IP Protocol, an IP protocol number may be specified in the text field. To have the service match the GRE protocol, for example, the IP protocol should be specified as 47. A list of some defined IP protocols can be found in the appendix named “IP Protocol Numbers”.

IP protocol ranges can be used to specify multiple IP protocols for one service. An IP protocol range is similar to the TCP and UDP port range described previously; the range 1-4, 7 will match the protocols ICMP, IGMP, GGP, IP-in-IP and CBT.

Follow these steps to add a TCP, UDP or TCP/UDP service.

Step 1. Go to Firewall and Service and choose new.

Step 2. Enter a Name for the service in the name field. This name will appear in the service list when you add a new policy. The name can contain numbers (0-9) and upper and lower case letters (A-Z, a-z), and the special characters - and _. No other special characters and spaces are allowed.

Step 3. Select IP Protocol.

Step 4. Specify a comma-separated list of IP protocols.

Click the **Apply** button below to apply the change or click **Cancel** to discard changes.

Grouping Services

Services can be grouped in order to simplify configuration. Consider a web server using standard http as well as SSL encrypted http (https). Instead of having to create two separate rules allowing both types of services through the firewall, a service group named, for instance, Web, can be created, with the http and the https services as group members.

Follow these steps to add a group.

Step 1. Go to Firewall and Service and choose new.

Step 2. Enter a Name for the service in the name field. This name will appear in the service list when you add a new policy. The name can contain numbers (0-9) and upper and lower case letters (A-Z, a-z), and the special characters - and _. No other special characters and spaces are allowed.

Step 3. Select Group.

Step 4. Specify a comma-separated list of existing services.

Click the **Apply** button below to apply the change or click **Cancel** to discard changes.

Protocol-independent settings

Allow ICMP errors from the destination to the source – ICMP error messages are sent in several situations: for example, when an IP packet cannot reach its destination. The purpose of these error control messages is to provide feedback about problems in the communication environment.

However, ICMP error messages and firewalls are usually not a very good combination; the ICMP error messages are initiated at the destination host (or a device within the path to the destination) and sent to the originating host. The result is that the ICMP error message will be interpreted by the firewall as a new connection and dropped, if not explicitly allowed by the firewall rule-set. Now, allowing any inbound ICMP message to be able have those error messages forwarded is generally not a good idea.

To solve this problem, DFL-200 can be instructed to pass an ICMP error message only if it is related to an existing connection. Check this option to enable this feature for connections using this service.

ALG – Like other stateful inspection based firewalls, DFL-200 filters on information found in packet headers, for instance in IP, TCP, UDP and ICMP headers.

In some situations though, filtering on header data only is not sufficient. The FTP protocol, for instance, includes IP address and port information in the protocol payload. In these cases, the firewall needs to be able to examine the payload data and carry out appropriate actions. DFL-200 provides this functionality using Application Layer Gateways, also known as ALGs.

To use an Application Layer Gateway, the appropriate Application Layer Gateway definition is selected in the dropdown menu. The selected Application Layer Gateway will thus manage network traffic that matches the policy using this service.

Currently, DFL-200 supports two Application Layer Gateways, one is used to manage the FTP protocol and the other one is a HTTP Content Filtering ALG. For detailed information about how to configure the HTTP Application Layer Gateway, please see the Content Filtering chapter.

VPN

Introduction to IPSec

This chapter introduces IPSec, the method, or rather set of methods used to provide VPN functionality. IPSec, Internet Protocol Security, is a set of protocols defined by the IETF, Internet Engineering Task Force, to provide IP security at the network layer.

An IPSec based VPN, such as DFL-200 VPN, is made up by two parts:

- Internet Key Exchange protocol (IKE)
- IPSec protocols (ESP)

The first part, IKE, is the initial negotiation phase, where the two VPN endpoints agree on which methods will be used to provide security for the underlying IP traffic. Furthermore, IKE is used to manage connections, by defining a set of Security Associations, SAs, for each connection. SAs are unidirectional, so there will be at least two SAs per IPSec connection. The other part is the actual IP data being transferred, using the encryption and authentication methods agreed upon in the IKE negotiation. This can be accomplished in a number of ways; by using the IPSec protocol ESP.

To set up a Virtual Private Network (VPN), you do not need to configure an Access Policy to enable encryption. Just fill in the following settings: VPN Name, Source Subnet (Local Net), Destination Gateway (If LAN-to-LAN), Destination Subnet (If LAN-to-LAN) and Authentication Method (Pre-shared key or Certificate). The firewalls on both ends must use the same Pre-shared key or set of Certificates and IPSec lifetime to make a VPN connection.

Introduction to PPTP

PPTP, Point-to-Point Tunneling Protocol, is used to provide IP security at the network layer.

A PPTP based VPN is made up by these parts:

- Point-to-Point Protocol (PPP)
- Authentication Protocols (PAP, CHAP, MS-CHAP v1, MS-CHAP v2)
- Microsoft Point-To-Point Encryption (MPPE)
- Generic Routing Encapsulation (GRE)

PPTP uses TCP port 1723 for it's control connection and uses GRE (IP protocol 47) for the PPP data. PPTP supports data encryption by using MPPE.

Introduction to L2TP

L2TP, Layer 2 Tunneling Protocol, is used to provide IP security at the network layer.

An L2TP based VPN is made up by these parts:

- Point-to-Point Protocol (PPP)
- Authentication Protocols (PAP, CHAP, MS-CHAP v1, MS-CHAP v2)
- Microsoft Point-To-Point Encryption (MPPE)

L2TP uses UDP to transport the PPP data, this is often encapsulated in IPSec for encryption instead of using MPPE.

Point-to-Point Protocol

PPP (Point-to-Point Protocol) is a standard for transporting datagram's over point-to-point links. It is used to encapsulate IP packets for transport between two peers.

PPP consists of these three components:

- Link Control Protocols (LCP), to negotiate parameters, test and establish the link.
- Network Control Protocol (NCP), to establish and negotiate different network layer protocols (DFL-200 only supports IP)
- Data encapsulation, to encapsulate datagram's over the link.

To establish a PPP tunnel, both sides send LCP frames to negotiate parameters and test the data link. If authentication is used, at least one of the peers has to authenticate itself before the network layer protocol parameters can be negotiated using NCP. During the LCP and NCP negotiation optional parameters such as encryption, can be negotiated. When LCP and NCP negotiation is done, IP datagram's can be sent over the link.

Authentication Protocols

PPP supports different authentication protocols, PAP, CHAP, MS-CHAP v1 and MS-CHAP v2 is supported. Which authentication protocol to use is negotiated during LCP negotiation.

PAP

PAP (Password Authentication Protocol) is a simple, plaintext authentication scheme, which means that user name and password are sent in plaintext. PAP is therefore not a secure authentication protocol.

CHAP

CHAP (Challenge Handshake Authentication Protocol) is a challenge-response authentication protocol specified in RFC 1994. CHAP uses a MD5 one-way encryption scheme to hash the response to a challenge issued by the DFL-200. CHAP is better then PAP in that the password is never sent over the link. Instead the password is used to create the one-way MD5 hash. That means that CHAP requires passwords to be stored in a reversibly encrypted form.

MS-CHAP v1

MS-CHAP v1 (Microsoft Challenge Handshake Authentication Protocol version 1) is similar to CHAP, the main difference is that with MS-CHAP v1 the password only needs to be stored as a MD4 hash instead of a reversibly encrypted form. Another difference is that MS-CHAP v1 uses MD4 instead of MD5.

MS-CHAP v2

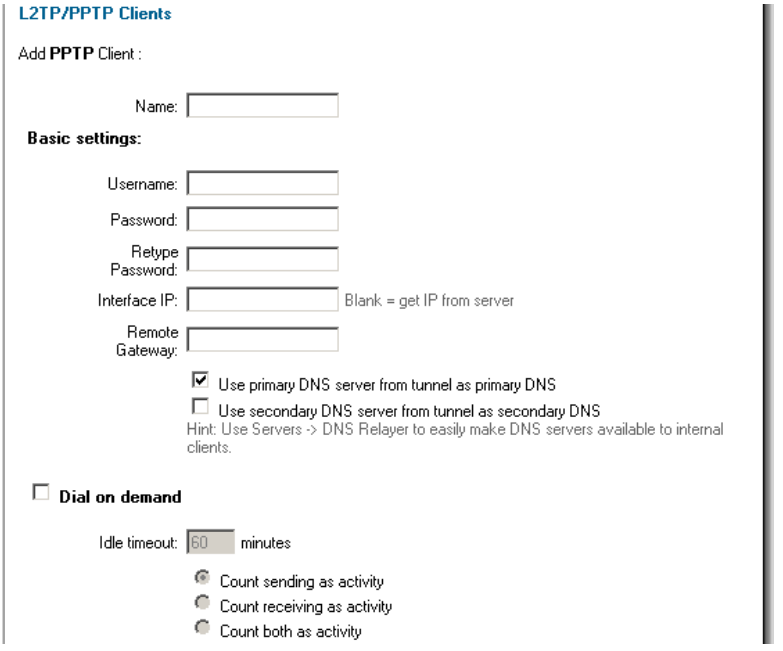
MS-CHAP v2 (Microsoft Challenge Handshake Authentication Protocol version 1) is more secure then MS-CHAP v1 as it provides two –way authentication.

MPPE, Microsoft Point-To-Point Encryption

MPPE is used is used to encrypt Point-to-Point Protocol (PPP) packets. MPPE uses the RSA RC4 algorithm to provide data confidentiality. The length of the session key to be used for the encryption can be negotiated. MPPE currently supports 40-bit, 56-bit and 128-bit RC4 session keys.

L2TP/PPTP Clients

General parameters



Name – Specifies a name for the PPTP/L2TP Client.

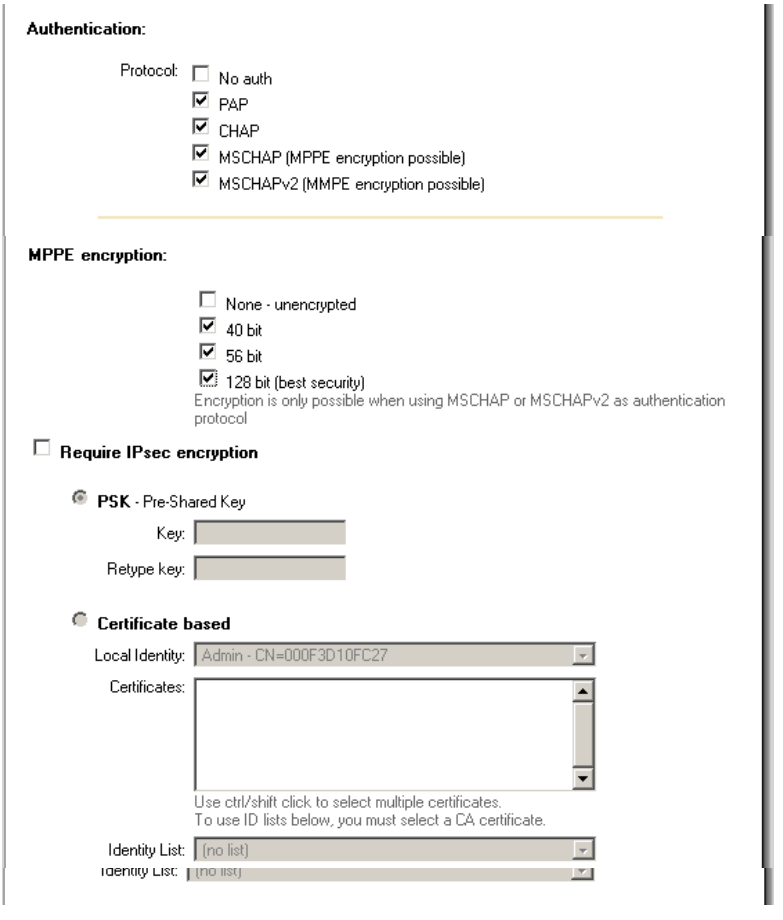
Username - Specify the username to use for this PPTP/L2TP Client.

Password/Confirm Password - The password to use for this PPTP/L2TP Client.

Interface IP.- Specifies if the L2TP/PPTP Client should try to use a specified IP or get one from the server.

Remote Gateway - The IP address of the PPTP/L2TP Server. To connect to

Dial on demand is used when the tunnel should only be used when needed, if diabled the tunnel will always try to be up.



Authentication protocol

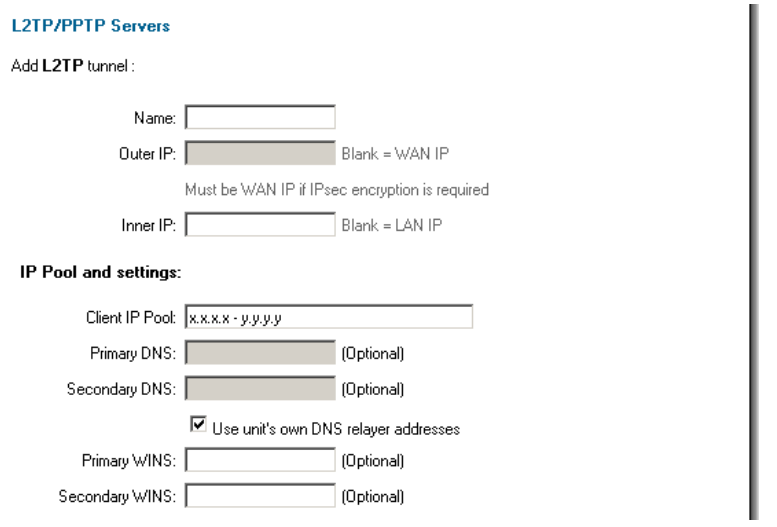
Specify if, and what authentication protocol to use, read more about the different authentication protocols in the **Authentication Protocol Introduction** chapter.

MPPE encryption

If MPPE encryption is going to be used, this is where the encryption level is configured.

If L2TP or PPTP over **IPSec** is going to be used it has to be enabled and configured to either use a Pre-Shared Key or a Certificate.

L2TP/PPTP Servers



Name – Specifies a name for this PPTP/L2TP Server.

Outer IP - Specifies the IP that the PPTP/L2TP server should listen on, leave it Blank for the WAN IP.

Inner IP - Specifies the IP inside the tunnel, leave it Blank for the LAN IP.

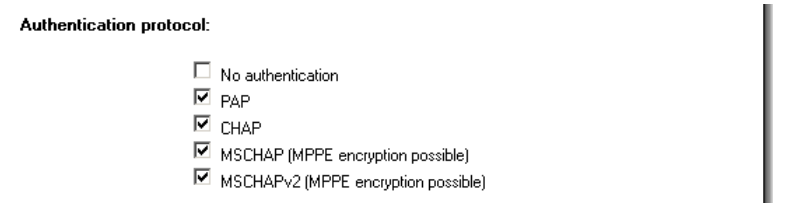
IP Pool and settings

Client IP Pool - A range, group or network that the PPTP/L2TP Server will use as IP address pool to give out IP addresses to the clients from.

Primary/Secondary DNS - IP of the primary and secondary DNS servers.

Primary/Secondary WINS - IP of the Windows Internet Name Service (WINS) servers that are used in Microsoft environments which uses the NetBIOS Name Servers (NBNS) to assign IP addresses to NetBIOS names.

Authentication protocol



Specify if, and what authentication protocol to use, read more about the different authentication protocols in the **Authentication Protocol Introduction** chapter.

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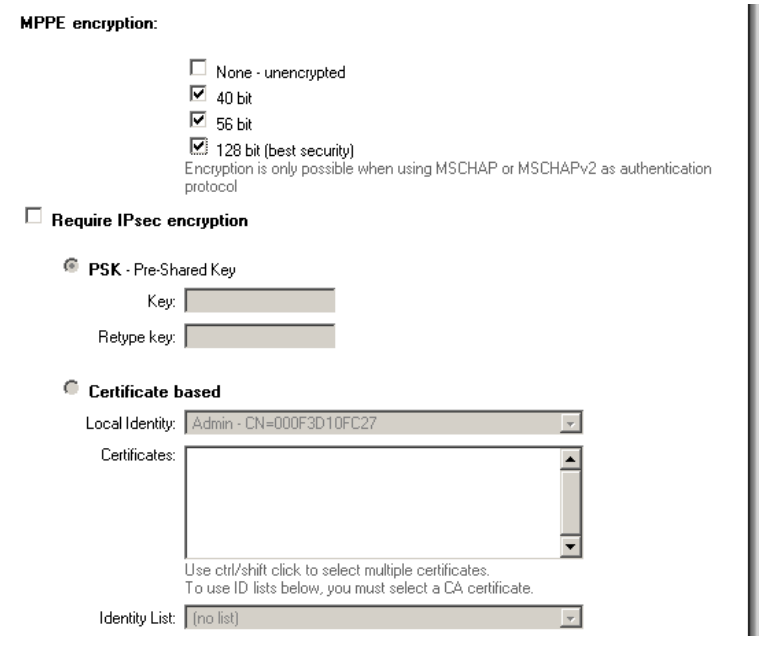
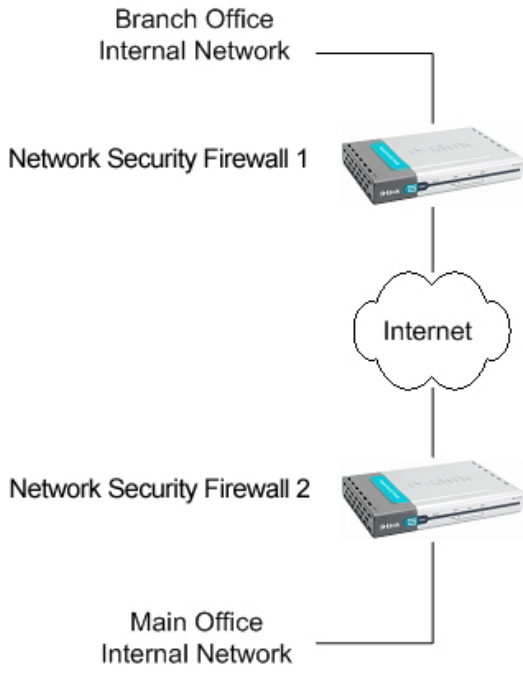


VPN between two networks



In the following example users on the main office internal network can connect to the branch office internal network vice versa. Communication between the two networks takes place in an encrypted VPN tunnel that connects the two DFLs Network Security Firewall across the Internet. Users on the internal networks are not aware that when they connect to a computer on the other network that the connection runs across the Internet.

As shown in the example, you can use the DFL to protect a branch office and a small main office. Both of these DFLs can be configured as IPSec VPN gateways to create the VPN that connects the branch office network to the main office network.

The example shows a VPN between two internal networks, but you can also create VPNs between an internal network behind one VPN gateway and a DMZ network behind another or between two DMZ networks. The networks at the ends of the VPN tunnel are selected when you configure the VPN policy.

Creating a LAN-to-LAN IPSec VPN Tunnel

Follow these steps to add LAN-to-LAN Tunnel.

Step 1. Go to Firewall and VPN and choose **Add new** in the IPSec tunnels section.

Step 2. Enter a Name for the new tunnel in the name field. The name can contain numbers (0-9) and upper and lower case letters (A-Z, a-z), and the special characters - and _. No other special characters and spaces are allowed.

Step 3. Specify your local network, or your side of the tunnel, for example 192.168.1.0/255.255.255.0, in the Local Net field.

Step 4. Choose authentication type, either PSK (Pre-shared Key) or Certificate-based. If you choose PSK make sure both firewalls use exactly the same PSK.

Step 5. As Tunnel Type choose LAN-to-LAN tunnel and specify the network behind the other DFL-200 as Remote Net also specify the external IP of the other DFL-200, this can be an IP or a DNS name.

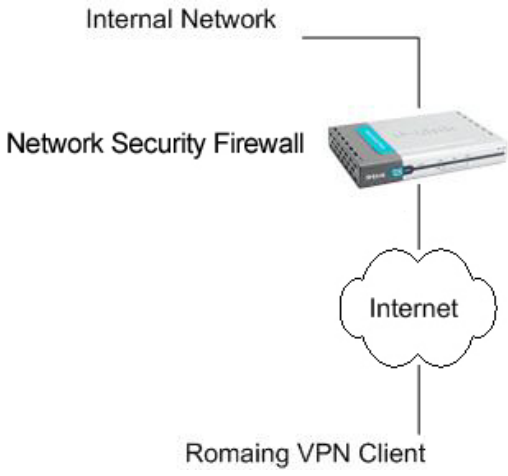
Click the **Apply** button below to apply the change or click **Cancel** to discard changes.

Repeat this on the firewall on the other site.

VPN between client and an internal network

In the following example users can connect to the main office internal network from anywhere on the Internet. Communication between the client and the internal network takes place in an encrypted VPN tunnel that connects the DFL and the roaming users across the Internet.

The example shows a VPN between a roaming VPN client and the internal network, but you can also create a VPN tunnel that uses the DMZ network. The networks at the ends of the VPN tunnel are selected when you configure the VPN policy.



Creating a Roaming Users IPSec VPN Tunnel

Follow these steps to add a roaming users tunnel.

Step 1. Go to Firewall and VPN and choose **Add new** in the IPSec tunnels section.

Step 2. Enter a Name for the new tunnel in the name field. The name can contain numbers (0-9) and upper and lower case letters (A-Z, a-z), and the special characters - and _. No other special characters and spaces are allowed.

Step 3. Specify your local network, or your side of the tunnel, for example 192.168.1.0/255.255.255.0, in the Local Net field. This is the network your roaming VPN clients should be allowed to connect to.

Step 4. Choose authentication type, either PSK (Pre-shared Key) or Certificate-based. If you choose PSK make sure the clients use exactly the same PSK.

Step 5. As Tunnel Type choose Roaming User.

Click the **Apply** button below to apply the change or click **Cancel** to discard changes.

Adding a L2TP/PPTP VPN Client

Follow these steps to add a L2TP or PPTP VPN Client configuration.

Step 1. Go to Firewall and VPN and choose **Add new PPTP client** or **Add new L2TP client** in the L2TP/PPTP Clients section.

Step 2. Enter a Name for the new tunnel in the name field. The name can contain numbers (0-9) and upper and lower case letters (A-Z, a-z), and the special characters - and _. No other special characters and spaces are allowed.

Step 3. Enter the username and password for the PPTP or L2TP Client.

Step 4. Specifies if the IP should be received from the server or if one should be specified. Should be left blank in most scenarios.

Step 5. Specify the **Remote Gateway**; this should be the IP of the L2TP or PPTP Server you are connecting to.

Step 6. If you are using IPSec encryption for the L2TP or PPTP Client choose authentication type, either PSK (Pre-shared Key) or Certificate-based.

Click the **Apply** button below to apply the change or click **Cancel** to discard changes.

Adding a L2TP/PPTP VPN Server

Follow these steps to add a L2TP or PPTP VPN Server configuration that listens on the WAN IP.

Step 1. Go to Firewall and VPN and choose **Add new PPTP server** or **Add new L2TP server** in the L2TP/PPTP Server section.

Step 2. Enter a Name for the new tunnel in the name field. The name can contain numbers (0-9) and upper and lower case letters (A-Z, a-z), and the special characters - and _. No other special characters and spaces are allowed.

Step 3. Specify the **Client IP Pool**; this should be a range of unused IP's on the LAN interface that should be handed out to the L2TP or PPTP Clients.

Step 4. If you are using IPSec encryption for the L2TP or PPTP Client choose authentication type, either PSK (Pre-shared Key) or Certificate-based.

Click the **Apply** button below to apply the change or click **Cancel** to discard changes.

VPN – Advanced Settings

Advanced settings for a VPN tunnel is used when one need change some characteristics of the tunnel when using for example trying to connect to a third party VPN Gateway. The different settings to set per tunnel is the following:

Limit MTU

Whit this setting it's possible to limit the MTU (Max Transferable Unit) of the VPN tunnel.

IKE Mode

Specify if Main mode IKE or Aggressive Mode IKE should be used when establishing outbound VPN Tunnels. Inbound main mode connections will always be allowed. Inbound aggressive mode connections will only be allowed if this setting is set to aggressive mode.

IKE DH Group

Here it's possible to configure the Diffie-Hellman group to 1 (modp 768-bit), 2 (modp 1024-bit) or 5 (modp 1536-bit).

PFS – Perfect Forward Secrecy

If PFS, Perfect Forwarding Secrecy, is enabled, a new Diffie-Hellman exchange is performed for each phase-2 negotiation. While this is slower, it makes sure that no keys are dependent on any other previously used keys; no keys are extracted from the same initial keying material. This is to make sure that, in the unlikely event that some key was compromised; no subsequent keys can be derived.

NAT Traversal

Here it's possible to configure how the NAT Traversal code should behave.

Disabled - The firewall does not send the Vendor ID's that include NAT-T support when setting up the tunnel.

On if supported and need NAT - Will only use NAT-T if one of the VPN gateways is NATed.

On if supported - Always tries to use NAT-T when setting up the tunnel.

Keepalives

No keepalives – Keep-alive is disabled.

Automatic keepalives - The firewall will send ICMP pings to IP Addresses automatically discovered from the VPN Tunnel settings.

Manually configured IP addresses - Configure the source and destination IP addresses used when sending the ICMP pings

Proposal Lists

To agree on the VPN connection parameters, a negotiation process is performed. As the result of the negotiations, the IKE and IPSec security associations (SAs) are established. As the name implies, a proposal is the starting point for the negotiation. A proposal defines encryption parameters, for instance encryption algorithm, life times etc, that the VPN gateway supports.

There are two types of proposals, IKE proposals and IPSec proposals. IKE proposals are used during IKE Phase-1 (IKE Security Negotiation), while IPSec proposals are using during IKE Phase-2 (IPSec Security Negotiation).

A Proposal List is used to group several proposals. During the negotiation process, the proposals in the proposal list are offered to the remote VPN gateway one after another until a matching proposal is found.

IKE Proposal List

Cipher – Specifies the encryption algorithm used in this IKE proposal. Supported algorithms are AES, 3DES, DES, Blowfish, Twofish and CAST128.

Hash – Specifies the hash function used to calculate a check sum that reveals if the data packet is altered while being transmitted. MD5 and SHA1 are supported algorithms.

Life Times – Specifies in KB or seconds when the security associations for the VPN tunnel need to be re-negotiated.

IPSec Proposal List

Cipher – Specifies the encryption algorithm used in this IPSec proposal. Supported algorithms are AES, 3DES, DES, Blowfish, Twofish and CAST128.

HMAC – Specifies the hash function used to calculate a check sum that reveals if the data packet is altered while being transmitted. MD5 and SHA1 are supported algorithms.

Life Times – Specifies in KB or seconds when the security associations for the VPN tunnel need to be re-negotiated.

Certificates

A certificate is a digital proof of identity. It links an identity to a public key in a trustworthy manner. Certificates can be used to authenticate individual users or other entities. These types of certificates are commonly called end-entity certificates.

Before a VPN tunnel with certificate based authentication can be set up, the firewall needs a certificate of its own and that of the remote firewall. These certificates can either be self-signed certificates, or issued by a CA.

Trusting Certificates

When setting up a VPN tunnel, the firewall has to be told whom it should trust. When using pre-shared keys, this is simple. The firewall trusts anyone who has the same pre-shared key.

When using certificates, on the other hand, you tell the firewall that it can trust anyone whose certificate is signed by a given CA. Before a certificate is accepted, the following steps are taken to verify the validity of the certificate:

- Construct a certification path up to the trusted root CA.
- Verify the signatures of all certificates in the certification path.
- Fetch the CRL for each certificate to verify that none of the certificates have been revoked.

Local identities

This is a list of all the local identity certificates that can be used in VPN tunnels. A local identity certificate is used by the firewall to prove its identity to the remote VPN peer.

To add a new local identity certificate, click Add new. The following pages will allow you to specify a name for the local identity, and upload the certificate and private key files. This certificate can be selected in the Local Identity field on the VPN page.

This list also includes a special certificate called Admin. This is the certificate used by the web interface to provide HTTPS access.

Note: The certificate named Admin can only be replaced, not deleted or renamed. This is used for HTTPS access to the DFL-200.

Certificates of remote peers

This is a list of all certificates of individual remote peers.

To add a new remote peer certificate, click Add new. The following pages will allow you to specify a name for the remote peer certificate and upload the certificate file. This certificate can be selected in the Certificates field on the VPN page.

Certificate Authorities

This is a list of all CA certificates. To add a new Certificate Authority certificate, click Add new. The following pages will allow you to specify a name for the CA certificate and upload the certificate file. This certificate can be selected in the Certificates field on the VPN page.

Note: If the uploaded certificate is a CA certificate, it will automatically be placed in the Certificate Authorities list, even if Add New was clicked in the Remote Peers list. Similiarly, a non-CA certificate will be placed in the Remote Peers list even if Add New was clicked from the Certificate Authorities list.

Identities

This is a list of all the configured Identity lists. An Identity list can be used on the VPN page to limit inbound VPN access from this list of known identities.

Normally, a VPN tunnel is established if the certificate of the remote peer is present in the Certificates field in the VPN section, or if the remote peer's certificate is signed by a CA whose certificate is present in the Certificates field in the VPN section. However, in some cases it might be necessary to limit who can establish a VPN tunnel even among peers signed by the same CA.

The Identity list can be selected in the Identity List field on the VPN page.

If an Identity List is configured, the firewall will match the identity of the connecting remote peer against the Identity List, and only allow it to open the VPN tunnel if it matches the contents of the list.

If no Identity List is used, no identity matching is done.

Content Filtering

DFL-200 HTTP content filtering can be configured to scan all HTTP content protocol streams for URLs or for web page content.

You can configure URL blacklist to block all or just some of the pages on a website. Using this feature you can deny access to parts of a web site without denying access to it completely.

The HTTP content filter can also be configured to strip contents like ActiveX, Flash and cookies.

There is also a URL whitelist for URLs that should be excluded from all Content Filtering.

To have the URL white/black list match entire sites, you will most likely want to use wildcards before and after the host names, e.g. "*example.com/*". However, this will also trigger on e.g. "myexample.com/", so you may want to split it up in two patterns, e.g. "example.com/*" and "*.example.com/*", to catch the domain name by itself as well as variants with prefixed host names ("www.") without having the filter trigger on domains ending with the same text.

Note: For HTTP URL filtering to work, all HTTP traffic needs to go trough a policy using a service with the HTTP ALG, which is the case for the "http-outbound" service by default.

Also note that the HTTP content filter cannot examine HTTPS (encrypted) connections due to their encrypted nature. If you wish to block access to HTTPS sites, you will need to configure rules in the firewall policy to block access to port 443 (https) on the IP addresses in question.

Active content handling

Active content handling can be enabled or disabled by checking the checkbox before each type you would like to strip. For example to strip ActiveX and Flash enable the checkbox named Strip ActiveX objects. It is possible to strip ActiveX, Flash, Java, JavaScript and VBScript. It is also possible to block cookies.

Edit the URL Global Whitelist

Follow these steps to add or remove a url.

Step 1. Go to Firewall and Content Filtering and choose Edit global URL whitelist

Step 2. Add/edit or remove the URL that should never be checked with the Content Filtering.

Click the **Apply** button below to apply the change or click **Cancel** to discard changes.

Edit the URL Global Blacklist

Follow these steps to add or remove a url.

Step 1. Go to Firewall and Content Filtering and choose Edit global URL blacklist

Step 2. Add/edit or remove the URL that should be checked with the Content Filtering.

Click the **Apply** button below to apply the change or click **Cancel** to discard changes.

Note: For HTTP URL filtering to work, all HTTP traffic needs to go trough a policy using a service with the HTTP ALG.

Active content handling

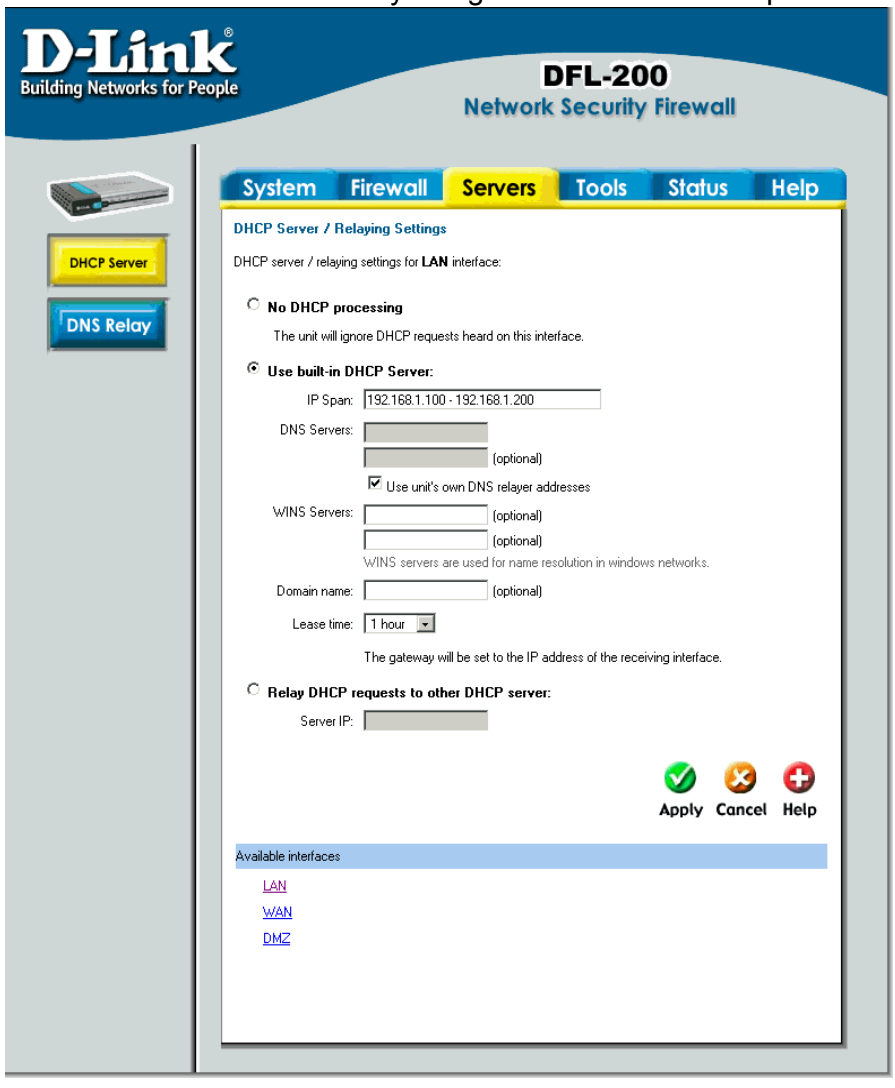
Active content handling can be enabled or disabled by checking the checkbox before each type you would like to strip. For example to strip ActiveX and Flash enable the checkbox named Strip ActiveX objects. It's possible to strip ActiveX, Flash, Java, JavaScript and VBScript, it's also possible to block cookies.

Note: For HTTP URL filtering to work, all HTTP traffic needs to go trough a policy using a service with the HTTP ALG.

Servers

DHCP Server Settings

The DFL-200 contains a DHCP server; DHCP (Dynamic Host Configuration Protocol) is a protocol that lets network administrators to automatically assign IP numbers to computers on a network. The DFL-200 DHCP Server helps to minimize the work necessary to administer a network, as there is no need for another server running DHCP Server software.



The DFL-200 DHCP Server only implements a subset of the DHCP protocol necessary to serve a small network, these are:

- IP address
- Netmask
- Subnet
- Gateway address
- DNS Servers
- WINS Servers
- Domain name

The DFL-200 DHCP Server assigns and manages IP addresses from specified address pools within the firewall to the DHCP clients.

Note: Leases are remembered over a re-configure or reboot of the firewall.

The DFL-200 also includes a DHCP Relayer. A DHCP relayer is a form of gateway between a DHCP Server and its users. The relayer intercepts DHCP queries from the users and forwards them to a DHCP server while setting up dynamic routes based on leases. This enables the firewall to keep an accurate routing table based on active users and protects the DHCP server to some degree among other things.

Note: There can only be one DHCP Server or DHCP Relay configured per interface.

Enable DHCP Server

To enable the DHCP Server on an interface, click on **Servers** in the menu bar, and then click **DHCP Server** below it.

Follow these steps to enable the DHCP Server on the LAN interface.

Step 1. Choose the LAN interface from the Available interfaces list.

Step 2. Enable by checking the **Use built-in DHCP Server** box.

Step 3. Fill in the IP Span, the start and end IP for the range of IP addresses that the DFL-200 can assign.

Step 4. Fill in the DNS servers DHCP server will assigns to the clients, at least one should be provided. If the DNS relayer is configured the DHCP server can assign those.

Step 5. Optionally type in the WINS servers the DHCP server assigns to the clients.

Step 6. Optionally type in the domain that the DHCP server assigns to the clients.

Step 7. Choose for how long the DHCP server will give out leases before the client have to renew them.

Click the **Apply** button below to apply the setting or click **Cancel** to discard changes

Enable DHCP Relay

To enable the DHCP Relay on an interface, click on **Servers** in the menu bar, and then click **DHCP Server** below it.

Follow these steps to enable the DHCP Relayer on the LAN interface.

Step 1. Choose the LAN interface from the Available interfaces list.

Step 2. Enable by checking the **Relay DHCP Requests to other DHCP server** box.

Step 3. Fill in the IP of the DHCP Server; note that it should be on another interface then where the DHCP request is coming from, i.e. a server on the DMZ.

Click the **Apply** button below to apply the setting or click **Cancel** to discard changes

Disable DHCP Server/Relayer

To disable the DHCP Server on an interface, click on **Servers** in the menu bar, and then click **DHCP Server** below it. Here click on the interface that you want to disable the DHCP server or relayer on.

Follow these steps to disable the DHCP Server or Relayer on the LAN interface.

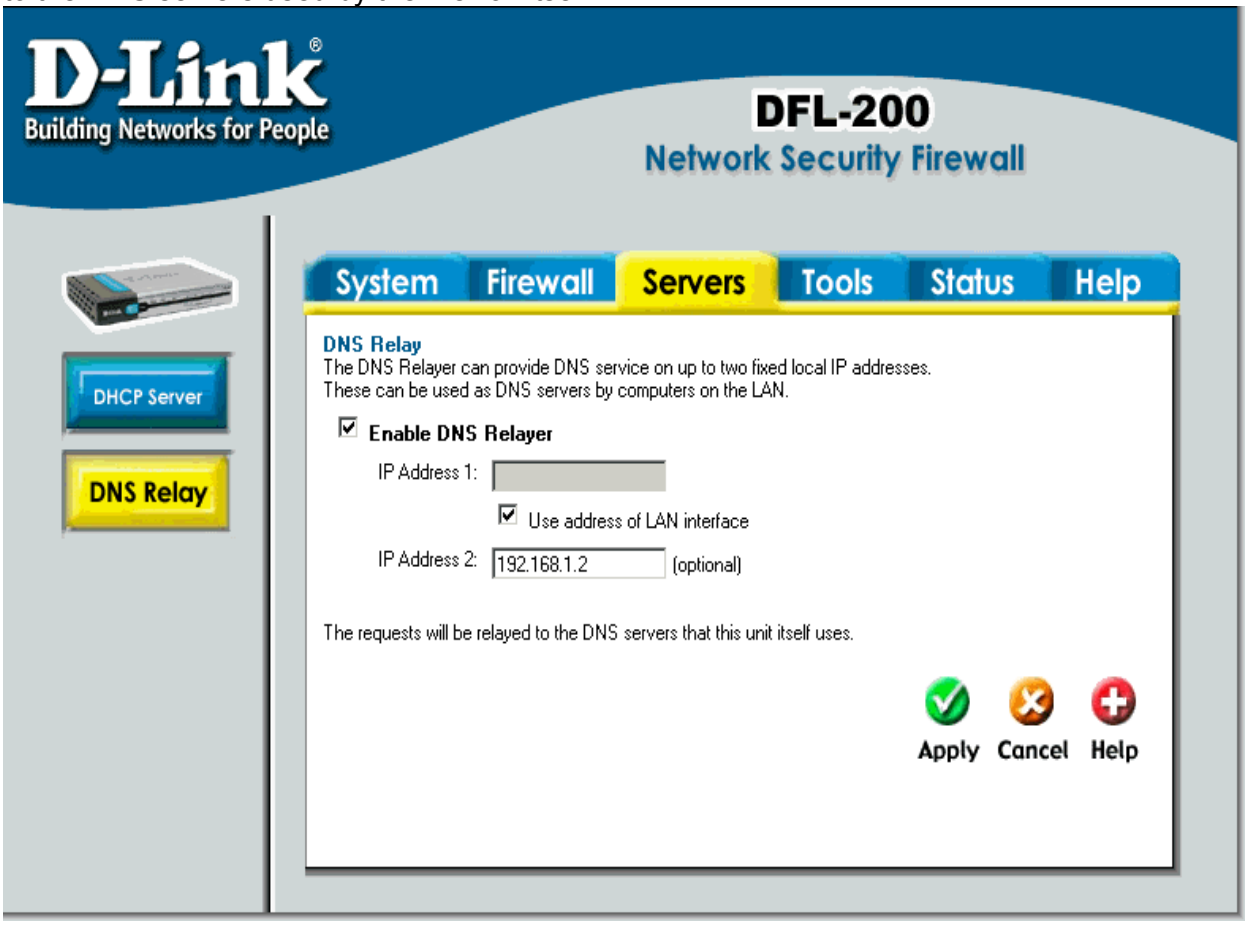
Step 1. Choose the LAN interface from the Available interfaces list.

Step 2. Disable by checking the **No DHCP processing** box.

Click the **Apply** button below to apply the setting or click **Cancel** to discard changes

DNS Relayer Settings

Click on **Servers** in the menu bar, and then click **DNS Relay** below it. The DFL-200 contains a DNS relayer that you can be configured to relay DNS queries from the internal LAN to the DNS servers used by the firewall itself.



Enable DNS Relayer

Follow these steps to enable the DNS Relayer.

Step 1. Enable by checking the **Enable DNS Relayer** box.

Step 2. Enter the IP numbers that the DFL-200 should listen for DNS queries on.

Note: If “Use address of LAN interface” is checked, you don’t have to enter an IP in IP Address 1 as the firewall will know what address to use.

Click the **Apply** button below to apply the setting or click **Cancel** to discard changes.

Disable DNS Relayer

Follow these steps to disable the DNS Relayer.

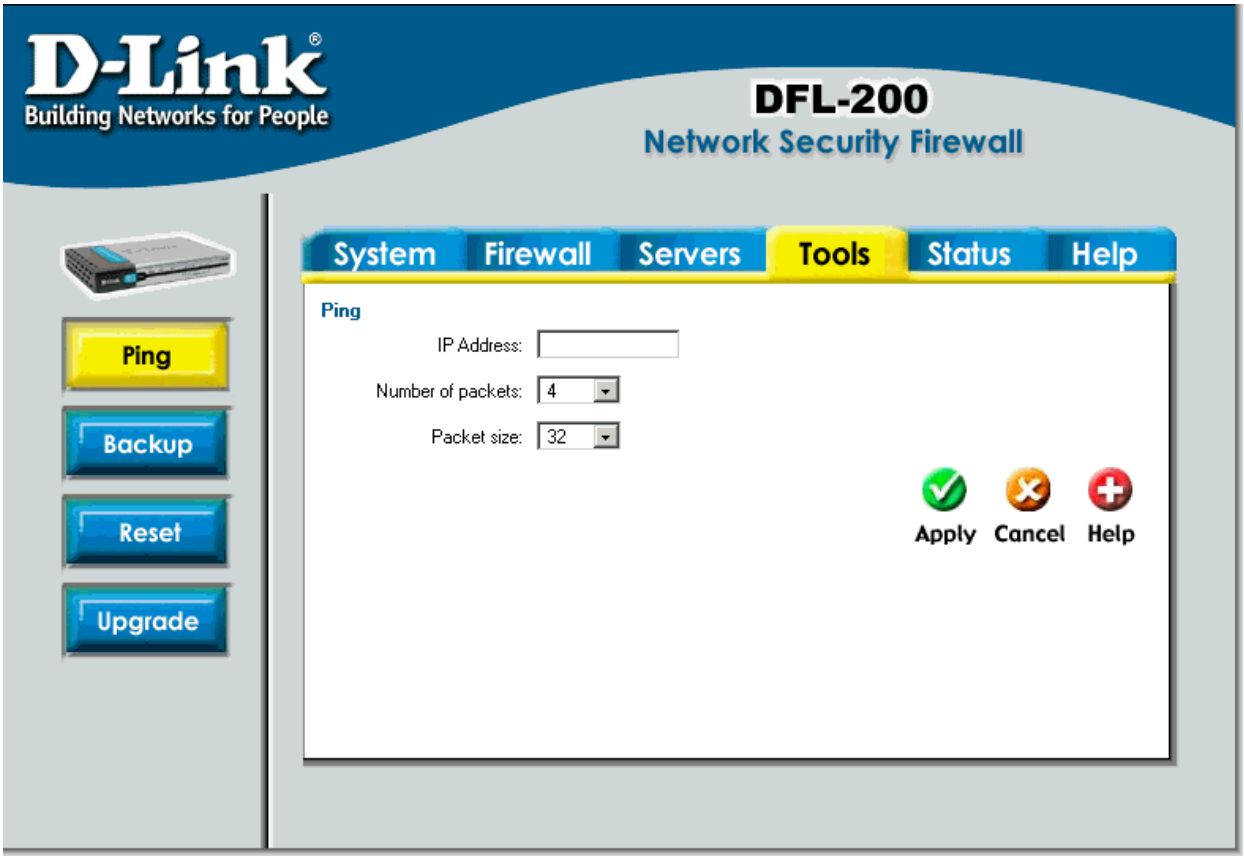
Step 1. Disable by un-checking the **Enable DNS Relayer** box.

Click the **Apply** button below to apply the setting or click **Cancel** to discard changes.

Tools

Ping

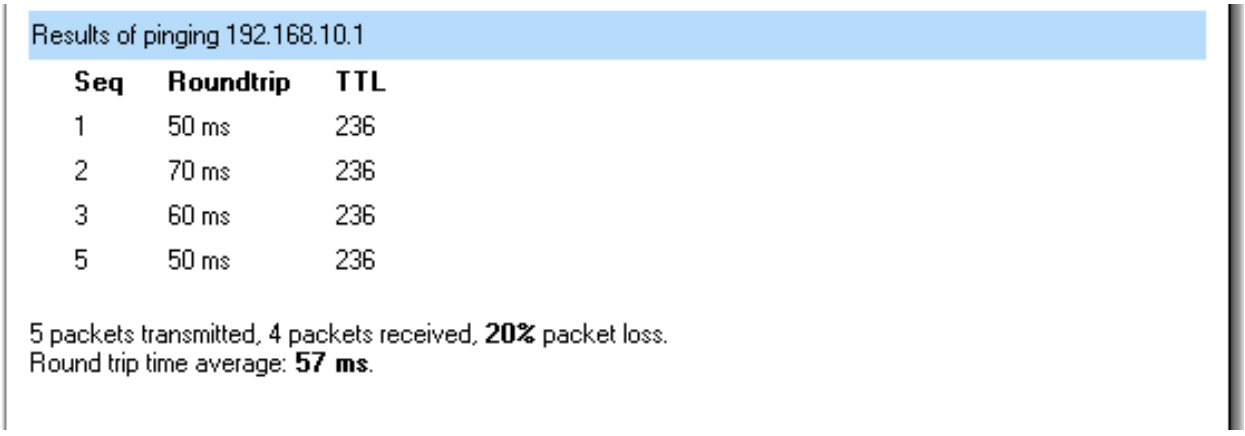
Click on **Tools** in the menu bar, and then click **Ping** below it. This tool is used to send a specified number of ICMP Echo Request packets to a given destination. All packets are sent in immediate succession rather than one per second. This behavior is the best one suited for diagnosing connectivity problems.



- **IP Address** – Target IP to send the ICMP Echo Requests to.
- **Number of packets** – Number of ICMP Echo Request packets to send, up to 10.
- **Packet size** – Size of the packet to send, between 32 and 1500 bytes.

Ping Example

In this example, the **IP Address** is 192.168.10.1 the **Number of packets** is five, after clicking on **Apply** the firewall will start to send the ICMP Echo Requests to the specified IP. After a few seconds the result will be shown, in this example only four out of five packets was received back, a 20% packet loss, and the average time for the packets to travel to and from the specified IP was 57 ms.



Dynamic DNS

The **Dynamic DNS** (require Dynamic DNS Service) allows you to alias a dynamic IP address to a static hostname, allowing your device to be more easily accessed by specific name. When this function is enabled, the IP address in Dynamic DNS Server will be automatically updated with the new IP address provided by ISP.

Click DynDNS in the Tools menu to enter Dynamic DNS configuration.

The firewall provides a list of a few predefined DynDNS service providers; users have to register with one of these providers before trying to use this function.

Add Dynamic DNS Settings

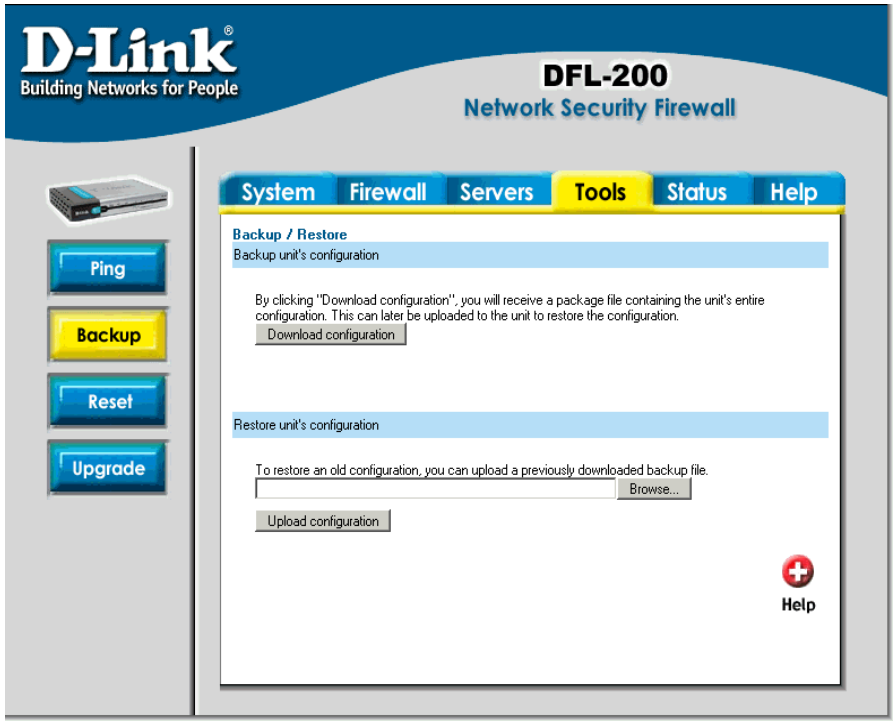
Follow these steps to enable Dynamic DNS.

Step 1. Go to Tools and DynDNS.

Step 2. Choose what Dynamic DNS service you would like to use, and fill in the needed information, username and password in all cases and domains in all but cjb.net.

Click the **Apply** button below to apply the setting or click **Cancel** to discard changes.

Backup



Click on **Tools** in the menu bar, and then click **Backup** below it. Here a administrator can backup and restore the configuration. The configuration file stores system settings, IP addresses of Firewall's network interfaces, address table, service table, IPSec settings, port mapping and policies. When the configuration process is completed, system administrator can download the configuration file into local disc as a backup. System Administrators can restore the firewall's configuration file with the one stored on disc.

Exporting the DFL-200's Configuration

Follow these steps to export the configuration.

Step 1. Under the **Tools** menu and the **Backup** section**,** click on the Download configuration button.

Step 2. When the File Download pop-up window appears, choose the destination place in which to save the exported file. The Administrator may choose to rename the file if preferred.

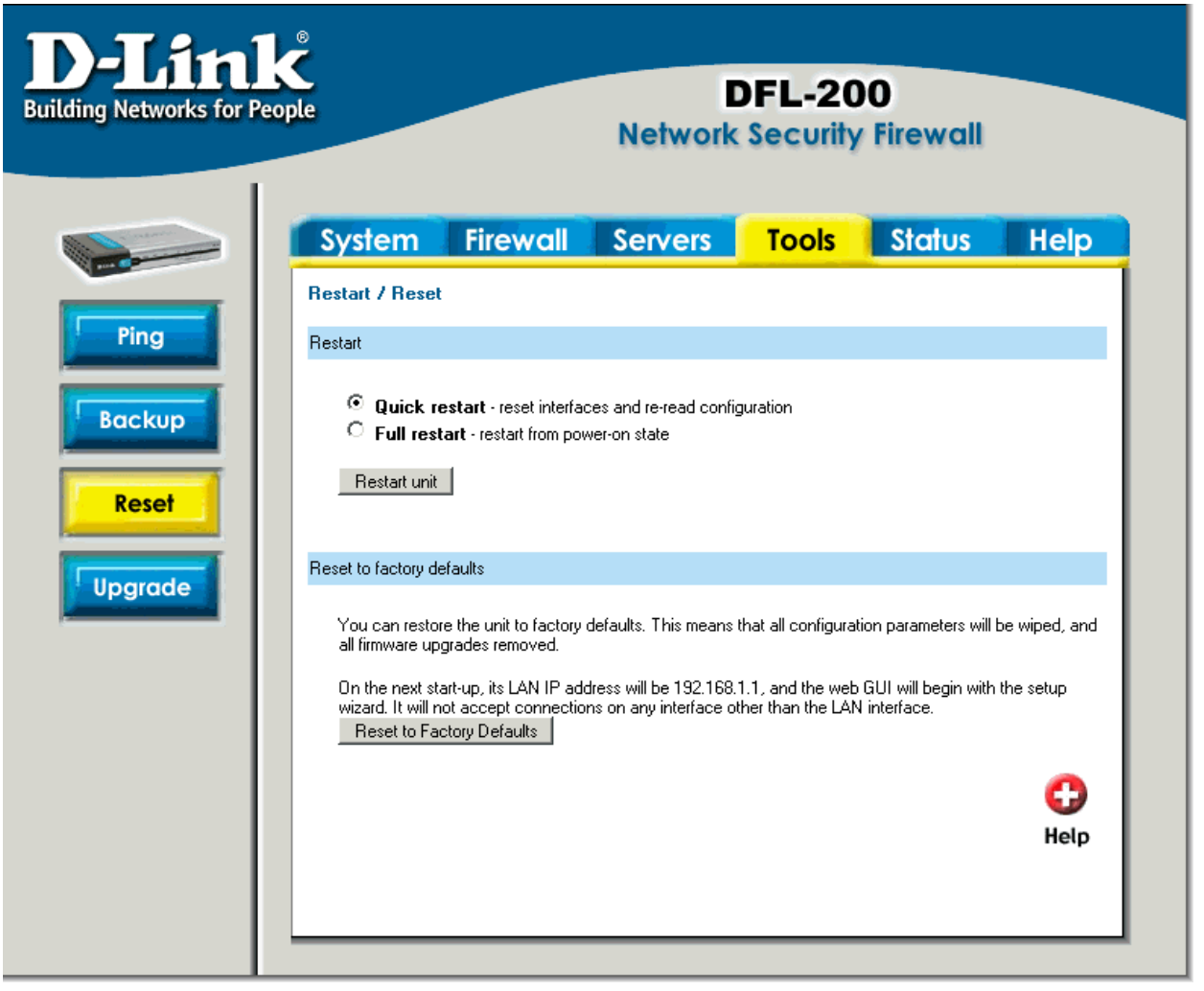
Restoring the DFL-200's Configuration

Follow these steps to restore the configuration.

Step 1. Under the **Tools** menu and the **Backup** section, click on the **Browse** button next to the empty field. When the **Choose File** pop-up window appears, select the file to which contains the saved firewall settings, then click **OK**.

Step 2. Click **Upload Configuration** to import the file into the Firewall.

Restart/Reset



Restarting the DFL-200

Follow these steps restart the DFL-200.

Step 1. Choose if you want to do a quick or full restart.

Step 2. Click **Restart Unit** and the unit will restart.

Restoring system settings to factory defaults

Use the following procedure to restore system settings to the values set at the factory. This procedure will possibly change the DFL-200 firmware version to lower version if it has been upgraded.

This procedure deletes all of the changes that you have made to the DFL-200 configuration and reverts the system to its original configuration including resetting interface addresses.

ollow these steps reset the DFL-200 to factory default.

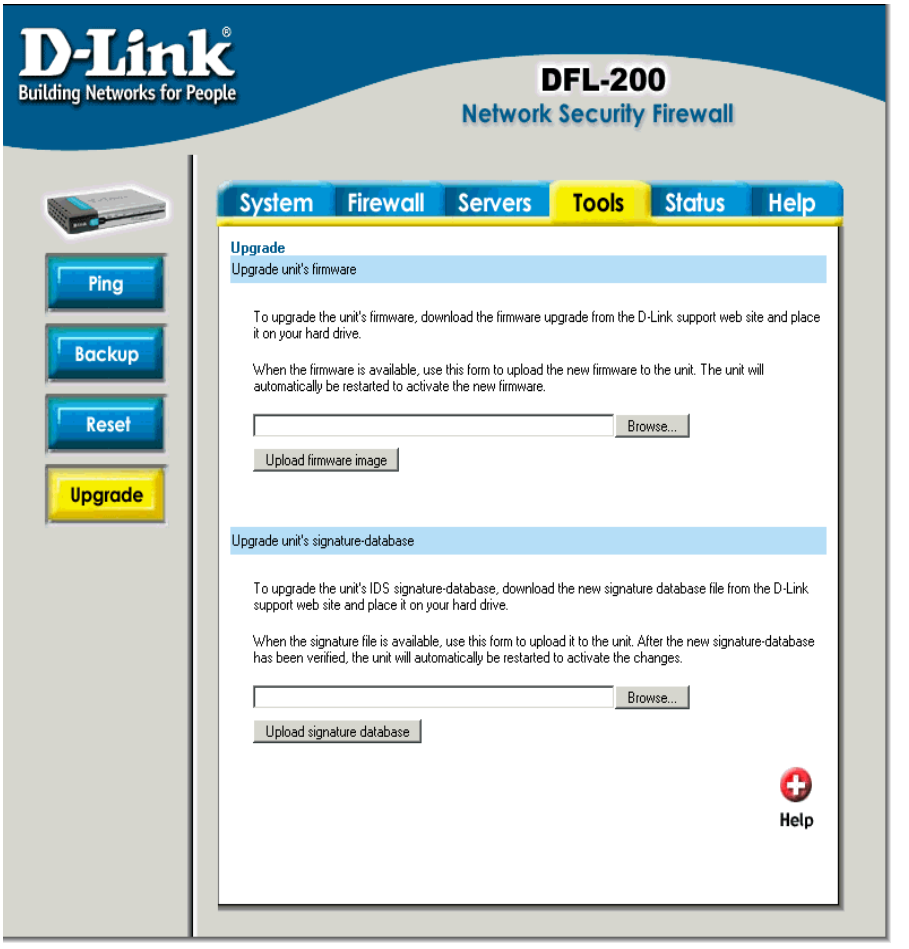
Step 1. Under the **Tools** menu and the **Reset** section, click on the **Reset to Factory Defaults** button.

Step 2. Click **OK** in the dialog to reset the unit to factory default, or press **Cancel** to cancel.

You can restore your system settings by uploading a previously downloaded system configurations file to the DFL-200 if a backup of the device has been done.

Upgrade

The DFL-200's software, IDS signatures and system parameters are all stored on a flash memory card. The flash memory card is re-writable and re-readable.



Upgrade Firmware

To upgrade the firmware first download the correct firmware image from D-Link. After having the newest version of software, please store it on the hard disk, then connect to the firewall's WebUI, enter **Upgrade** on the **Tools** menu, click **Browse** and choose the file name of the newest version of the firmware, then click **Upload firmware image**.

The updating process won't overwrite the system configuration, so it is not necessary but still a good idea to backup it before upgrading the software.

Upgrade IDS Signature-database

To upgrade the signature-database first download the newest IDS signatures from D-Link. After having the newest version of software connect to the firewall's WebUI, enter **Upgrade** on the **Tools** menu, click **Browse** in the **Upgrade Unit's signature-database** section and choose the file name of the newest version of the IDS signatures, then click **Upload signature database**.

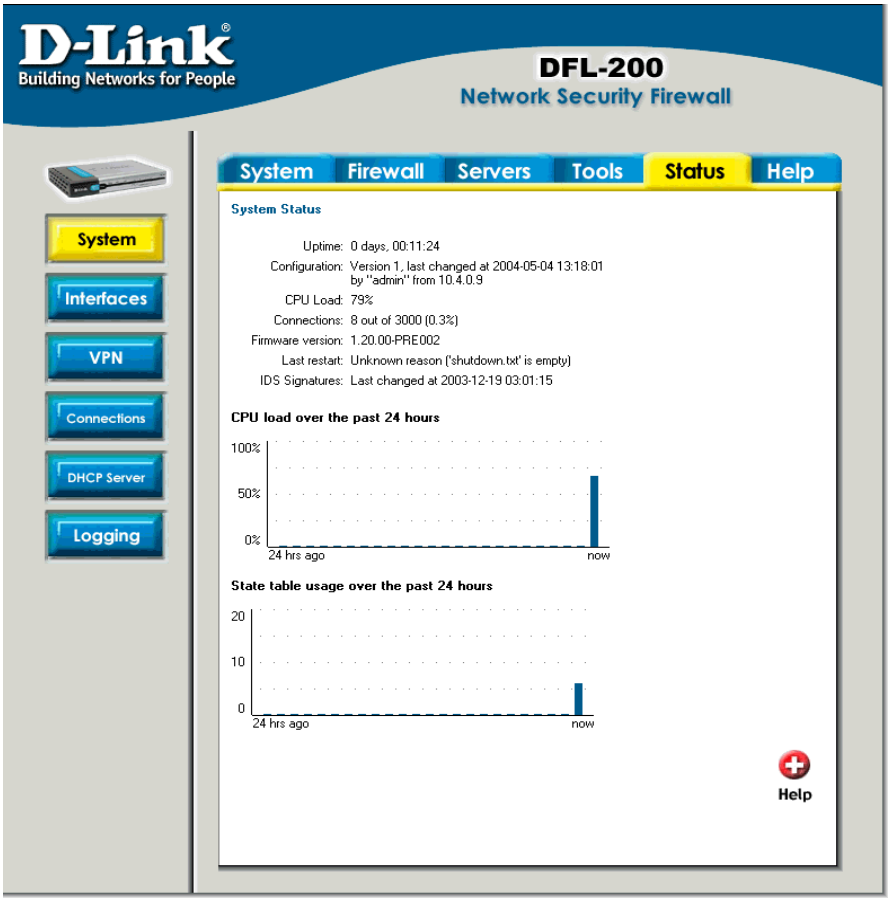
Status

In this section, the DFL-200 displays the status information about the Firewall.

Administrator may use Status to check the System Status, Interface statistics, VPN, connections and DHCP Servers.

System

Click on **Status** in the menu bar, and then click **System** below it. A window will appear providing some information about the DFL-200.



Uptime – The time the firewall have been running, since the last reboot or start.

CPU Load – Percentage of cpu used.

Connections – Number of current connections trough the firewall.

Firmware version – The firmware version running on the firewall.

Last restart – The reason for the last restart.

IDS Signatures – The IDS signature versions.

There are also two graphs on this page, one showing the CPU usage during the last 24 hours. The other one is showing the state table usage during the last 24 hours.

Interfaces

Click on **Status** in the menu bar, and then click **Interfaces** below it. A window will appear providing information about the interfaces in the DFL-200. By default information about the **LAN** interface will be show, to see another one click on that interface (**WAN** or **DMZ**).

Interface – Name of the interface shown, LAN, WAN or DMZ.

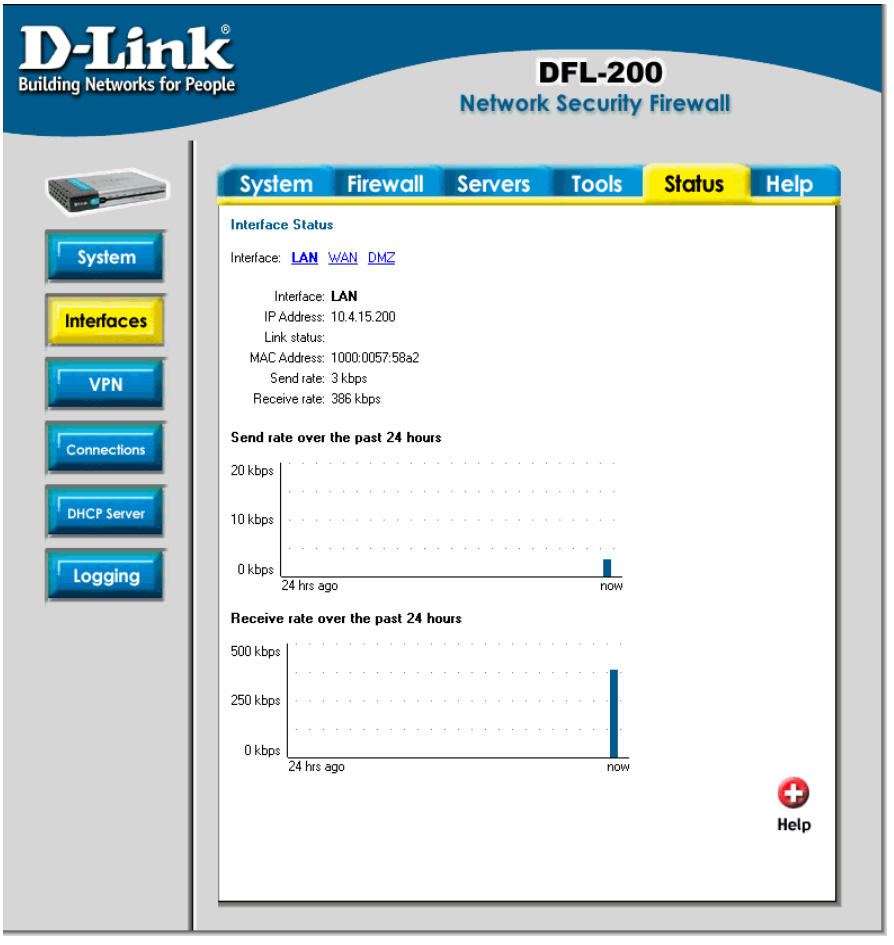
Link status – Displays what link the current interface has, the speed can be 10 or 100 Mbps and the duplex can be Half or Full.

MAC Address – MAC address of the interface.

Send rate – Current amount of traffic sent trough the interface.

Receive rate – Current amount of traffic received trough the interface.

There are also two graphs displaying the send and receive rate trough the interfaces during the last 24 hours.



VPN

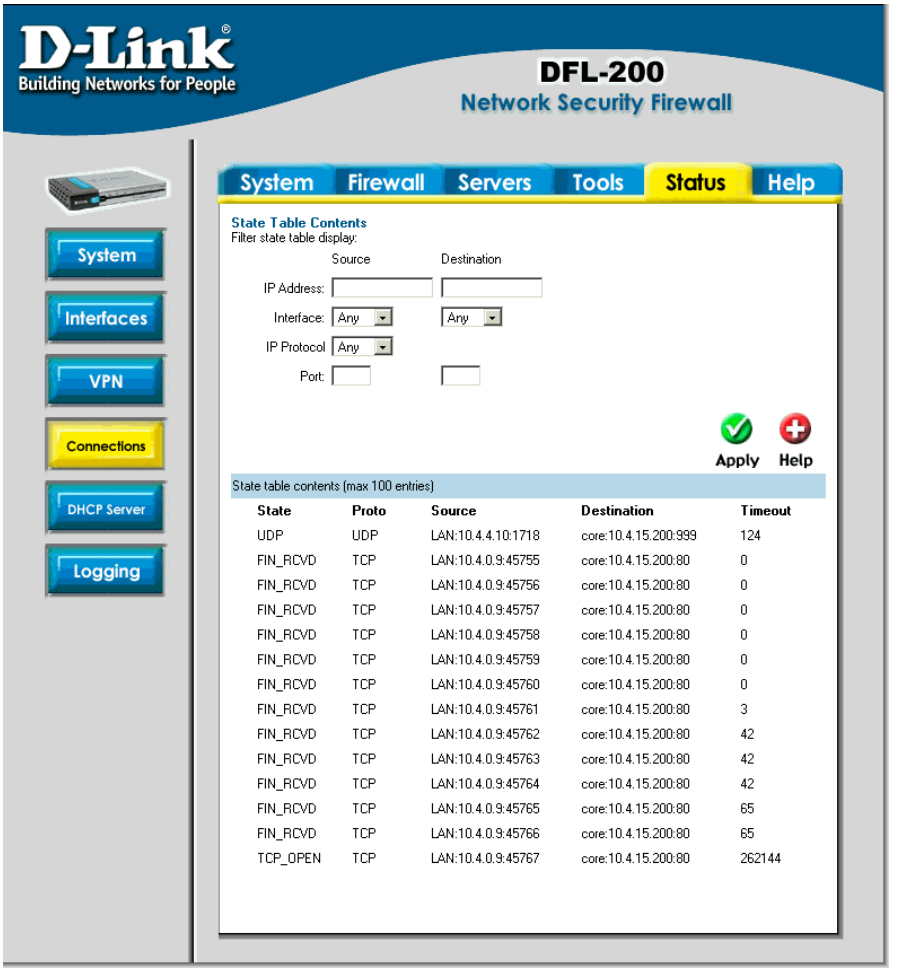
Click on **Status** in the menu bar, and then click **Interfaces** below it. A window will appear providing information about the VPN connections done in the DFL-200. By default information about the first VPN tunnel will be show, to see another one click on that VPN tunnels name.

The two graphs display the send and receive rate trough the selected VPN tunnel during the last 24 hours.

On this example a tunnel named **RoamingUsers** is selected, this is a tunnel that allows roaming users. So under the IPSec SA listing each roaming user connected to this tunnel is shown.

Connections

Click on **Status** in the menu bar, and then click **Connections** below it. A window will appear providing information about the content of the state table.



Shows the last 100 connections opened through the firewall. Connections are created when traffic is permitted to pass via the policies.

Each connection has two timeout values, one in each direction. These are updated when the firewall receives packets from each end of the connection. The value shown in the **Timeout** column is the lower of the two values.

Possible values in the **State** column include: TPC_CLOSE, TCP_OPEN, SYN_RECV, FIN_RECV and so on.

The **Proto** column can have:

TCP - The connection is a TCP connection

PING - The connection is an ICMP ECHO connection

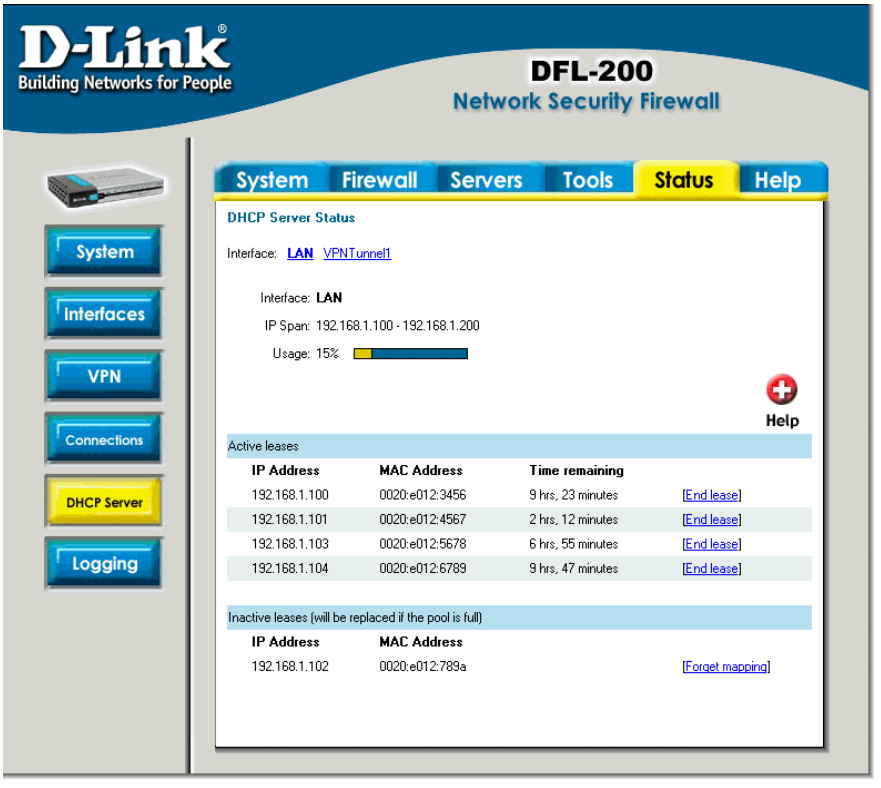
UDP - The connection is a UDP connection

RAWIP - The connection uses an IP protocol other than TCP, UDP or ICMP

The **Source** and **Destination** columns show from what ip and port on the source interface is the connection, and to what interface with what port number is the connection to.

DHCP Server

Click on **Status** in the menu bar, and then click **DHCP Server** below it. A window will appear providing information about the configured DHCP Servers. By default information about the **LAN** interface will be show, to see another one click on that interface.



Interface – Name of the interface the DHCP Server is running on.

IP Span – Displays the configured ranges of IP's that are given out as DHCP leases.

Usage – Display how much of the IP range is give out to DHCP clients.

Active leases are the current computers using this DHCP server. It is also possible to end a computers lease from here by clicking on **End lease** after that IP.

Inactive leases are leases that are not currently in use but have been used by a computer before, that computer will get that lease the next time it is on the network. If there is no free IP in the pool these IP's will be used for new computers.

Logging

Click on **Status** in the menu bar, and then click **Logging** below it. A window will appear showing the internal log if the DFL-200. It will show the last 500 records logged.

Users

Click on **Status** in the menu bar, and then click **Users** below it. A window will appear providing user information.

Currently authenticated users – users logged in using HTTP/HTTPS authentication, users logged in on PPTP and L2TP servers will be listed here. Users can be forced to log out by clicking logout.

Currently recognized privileges – all users and groups that are used in policies are listed here. These users and groups will be able to use HTTP and HTTPS authentication.

Interfaces where authentication are available – here all interfaces where HTTP and HTTPS authentication is possible is listed.

How to read the logs

Although the exact format of each log entry depends on how your syslog recipient works, most are very much alike. The way in which logs are read is also dependent on how your syslog recipient works. Syslog daemons on UNIX servers usually log to text files, line by line.

Most syslog recipients preface each log entry with a timestamp and the IP address of the machine that sent the log data:

Oct 20 2003 09:45:23 gateway

This is followed by the text the sender has chosen to send. All log entries from DFL-200 are prefaced with "EFW:" and a category, e.g. "DROP:"

Oct 20 2003 09:45:23 gateway EFW: DROP:

Subsequent text is dependent on the event that has occurred.

USAGE events

These events are sent periodically and provide statistical information regarding connections and amount of traffic.

Example:

Oct 20 2003 09:45:23 gateway EFW: USAGE: conns=1174 if0=core ip0=127.0.0.1 tp0=0.00 if1=wan ip1=192.168.10.2 tp1=11.93 if2=lan ip2=192.168.0.1 tp2=13.27 if3=dmz ip3=192.168.1.1 tp3=0.99

The value after conns is the number of open connections trough the firewall when the usage log was sent. The value after tp is the throughput through the firewall at the time the usage log was logged.

DROP events

These events may be generated by a number of different functions in the firewall. The most common source is probably the policies.

Example:

Oct 20 2003 09:42:25 gateway EFW: DROP: prio=1 rule=Rule_1 action=drop recvif=wan srcip=192.168.10.2 destip=192.168.0.1 ipproto=TCP ipdatalen=28 srcport=3572 destport=135 tcphdrlen=28 syn=1

In this line, traffic from 192.168.10.2 coming from the WAN side of the firewall, connecting to 192.168.10.1 on port 135 is dropped. The protocol used is TCP.

CONN events

These events are generated if auditing has been enabled.

One event will be generated when a connection is established. This event will include information about protocol, receiving interface, source IP address, source port, destination interface, destination IP address and destination port.

Open Example:

Oct 20 2003 09:47:56 gateway EFW: CONN: prio=1 rule=Rule_8 conn=open connipproto=TCP connrecvif=lan connsrcip=192.168.0.10 connsrcport=3179 conndestif=wan conndestip=64.7.210.132 conndestport=80

In this line, traffic from 192.168.0.10 on the LAN interface is connecting to 64.7.210.132 on port 80 on the WAN side of the firewall (internet).

Another event is generated when the connection is closed. The information included in the event is the same as in the event sent when the connection was opened, with the exception that statistics regarding sent and received traffic is also included.

Close Example:

Oct 20 2003 09:48:05 gateway EFW: CONN: prio=1 rule=Rule_8 conn=close connipproto=TCP connrecvif=lan connsrcip=192.168.0.10 connsrcport=3179 conndestif=wan conndestip=64.7.210.132 conndestport=80 origsent=62 termsent=60

In this line, the connection in the other example is closed.

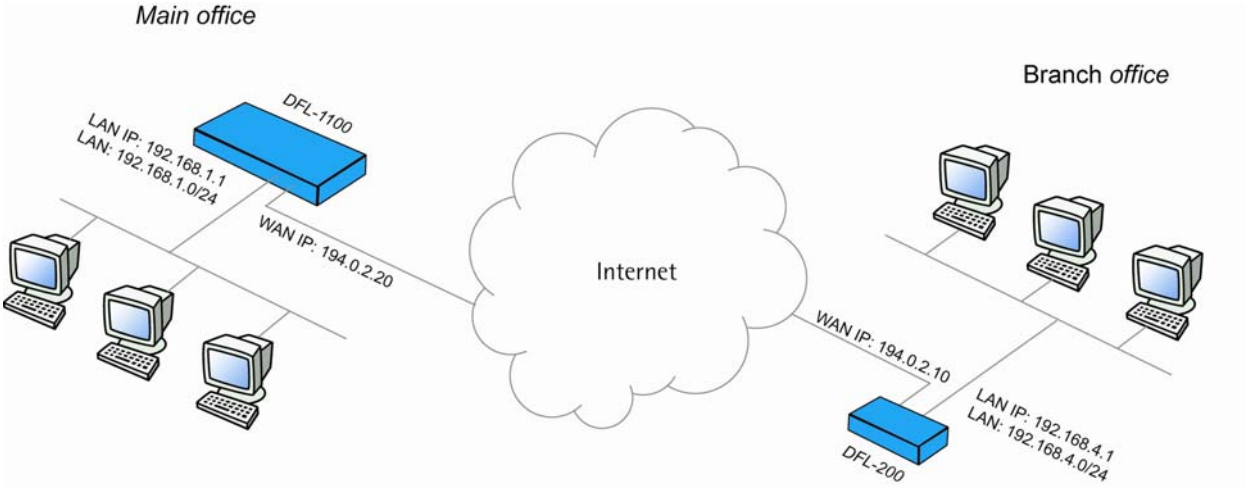
Step by step guides

In the following guides example IPs, users, sites and passwords are used. You will have to exchange the IP addresses and sites to your own. Passwords used in these examples are not recommended for real life use. Passwords and keys should be chosen so that they are impossible to guess or find out by eg a dictionary attack.

In these guides for example ***Firewall->Users*** will mean that **Firewall** first should be selected from the menu at the top of the screen,

and than the **Users** button to the left of the screen.

LAN-to-LAN VPN using IPsec



Settings for Branch office

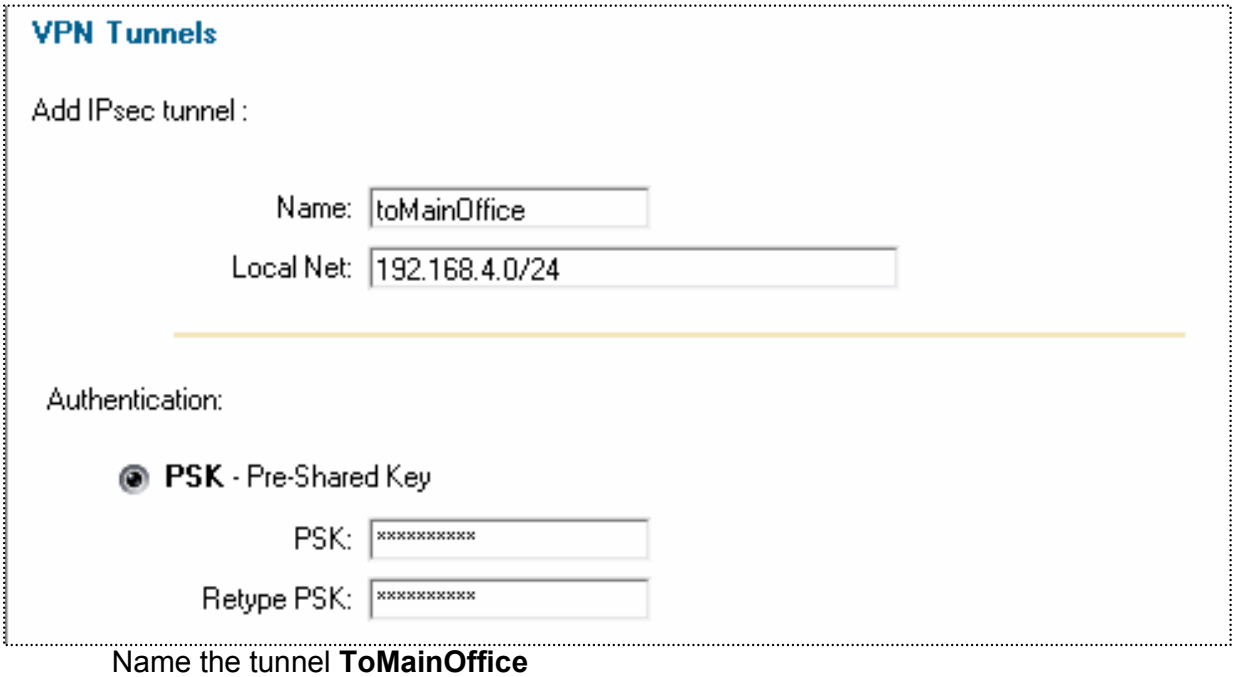
1. Setup interfaces, ***System->Interfaces***:

WAN IP: **193.0.2.10**

LAN IP: **192.168.4.1**, Subnet mask: **255.255.255.0**

2. Setup IPsec tunnel, ***Firewall->VPN:***

Under IPsec tunnels click ***Add new***

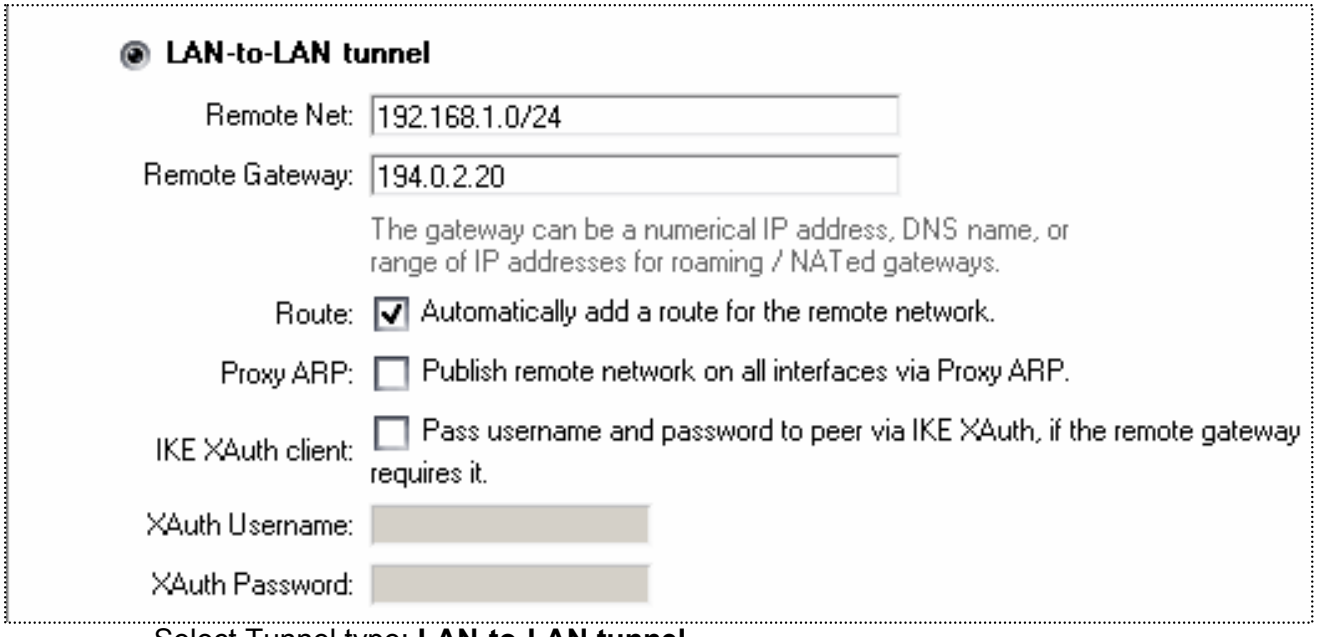


Name the tunnel **ToMainOffice**

Local net: **192.168.4.0/24**

PSK: **1234567890** (Note! You should use a key that is hard to guess)

Retype PSK: **1234567890**



Select Tunnel type: **LAN-to-LAN tunnel**

Remote Net: **192.168.1.0/24**

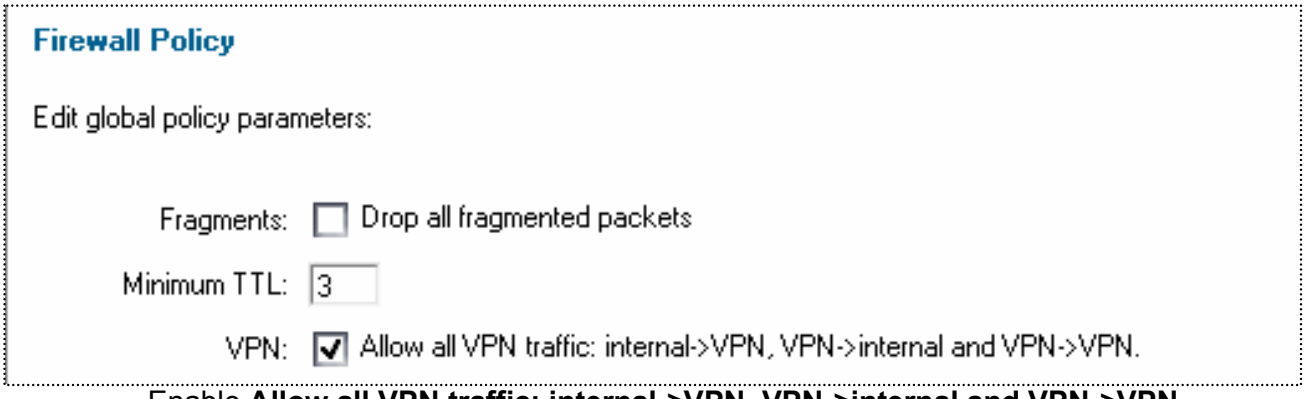
Remote Gateway: **194.0.2.20**

Enable **Automatically add a route for the remote network**

Click ***Apply***

3. Setup policies for the new tunnel, ***Firewall->Policy:***

Click ***Global policy parameters***



Enable **Allow all VPN traffic: internal->VPN, VPN->internal and VPN->VPN**

Click ***Apply***

4. Click ***Activate*** and wait for the firewall to restart

Settings for Main office

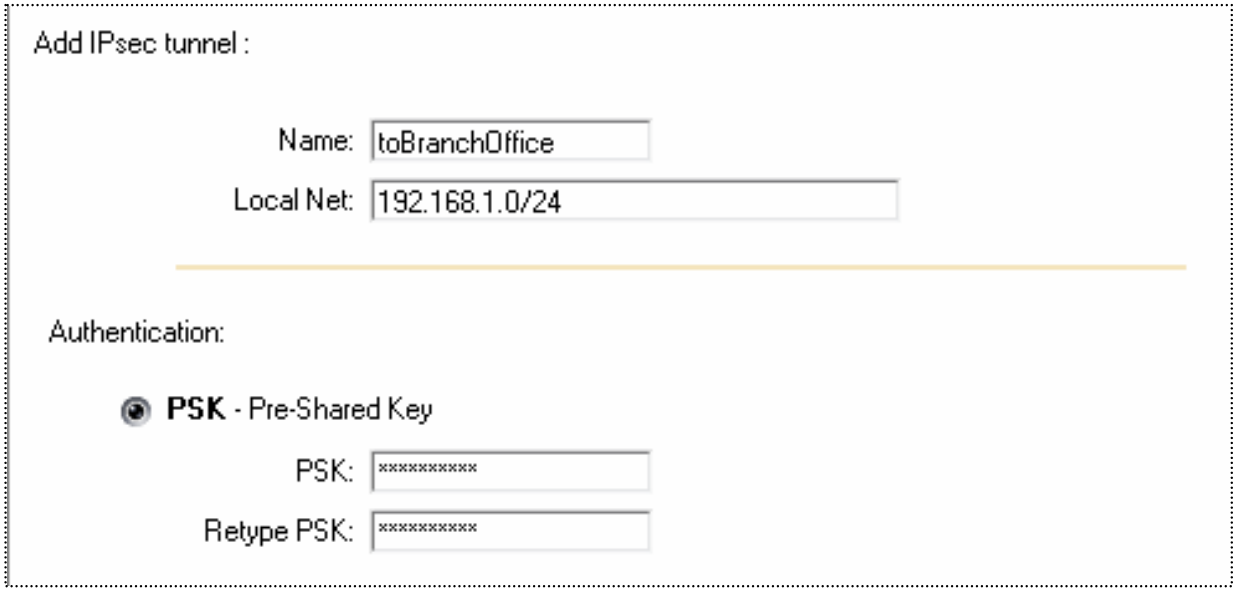
1. Setup interfaces, ***System->Interfaces***:

WAN IP: **193.0.2.20**

LAN IP: **192.168.1.1**, Subnet mask: **255.255.255.0**

2. Setup IPsec tunnel, ***Firewall->VPN:***

Under IPsec tunnels click ***add new***

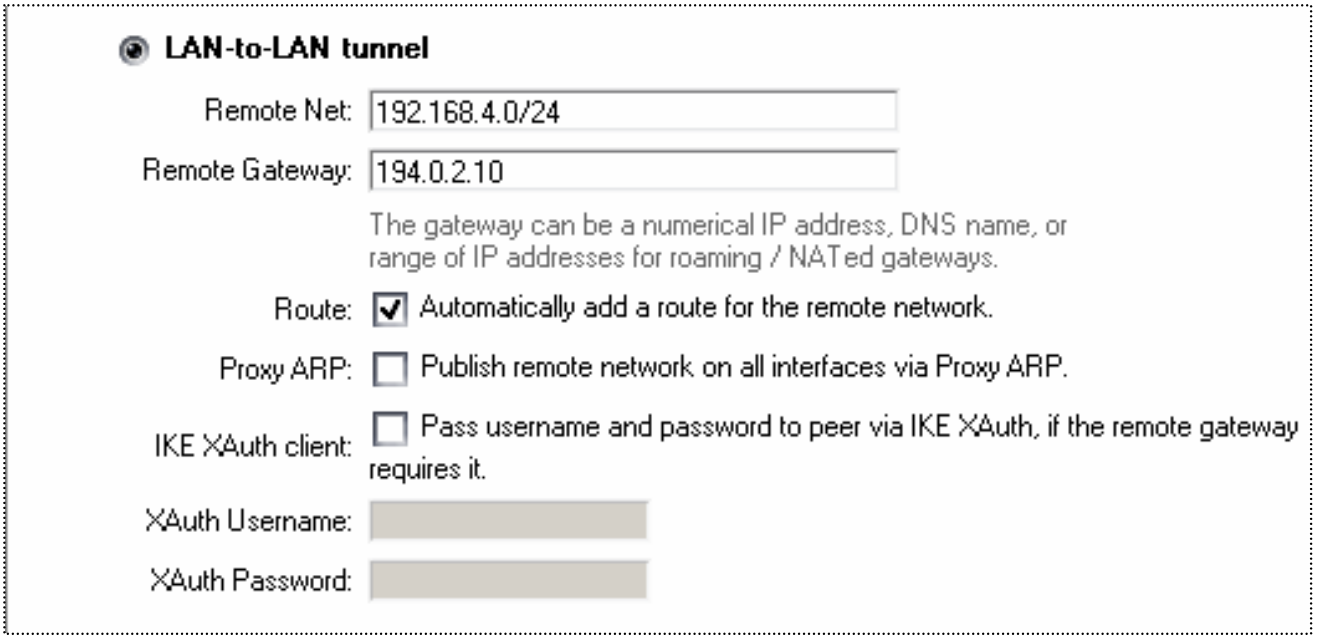


Name the tunnel **ToBranchOffice**

Local net: **192.168.1.0/24**

PSK: **1234567890** (Note! You should use a key that is hard to guess)

Retype PSK: **1234567890**



Select Tunnel type: **LAN-to-LAN tunnel**

Remote Net: **192.168.4.0/24**

Remote Gateway: **194.0.2.10**

Enable “Automatically add a route for the remote network”

Click ***Apply***

3. Setup policies for the new tunnel, ***Firewall->Policy:***

Click ***Global policy parameters***

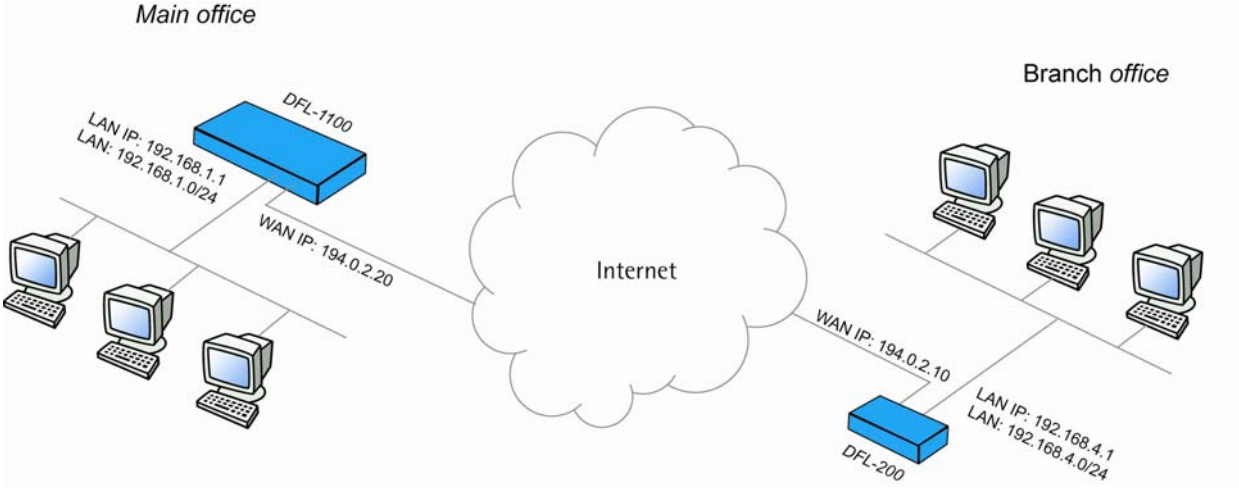
Enable **Allow all VPN traffic: internal->VPN, VPN->internal and VPN->VPN**

Click ***Apply***

4. Click ***Activate*** and wait for the firewall to restart

This example will allow *all* traffic between the two offices. To get a more secure solution read the **A more secure LAN-to-LAN VPN solution** in this chapter.

LAN-to-LAN VPN using PPTP



Settings for Branch office

1. Setup interfaces, ***System->Interfaces***:

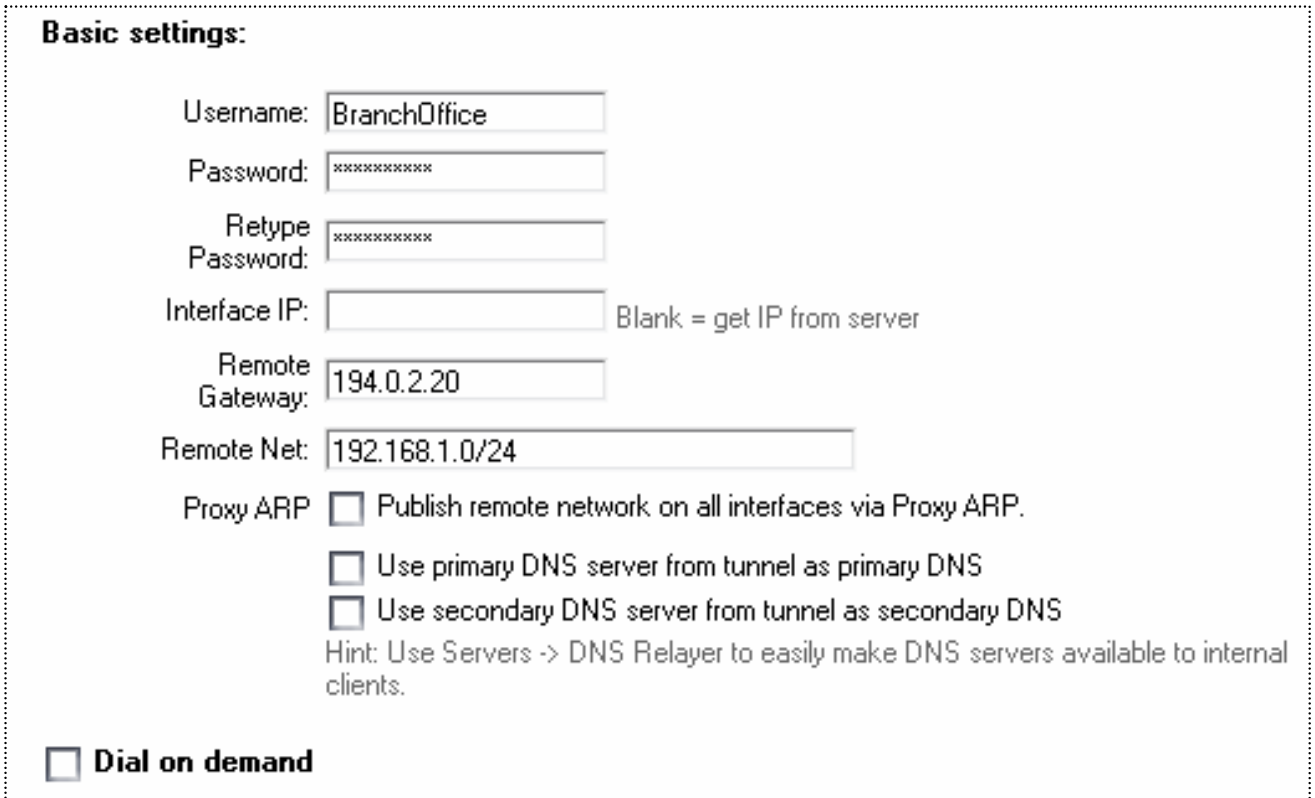
WAN IP: **193.0.2.10**

LAN IP: **192.168.4.1**, Subnet mask: **255.255.255.0**

2. Setup PPTP client, ***Firewall->VPN:***

Under PPTP/L2TP clients click ***Add new PPTP client***

Name the tunnel **toMainOffice**



Username: **BranchOffice**

Password: **1234567890** (Note! You should use a password that is hard to guess)

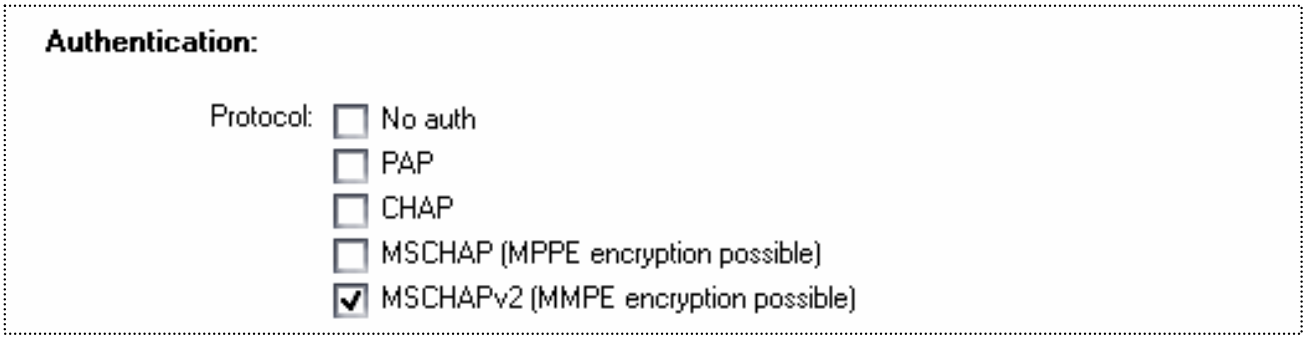
Retype password: **1234567890**

Interface IP: leave blank

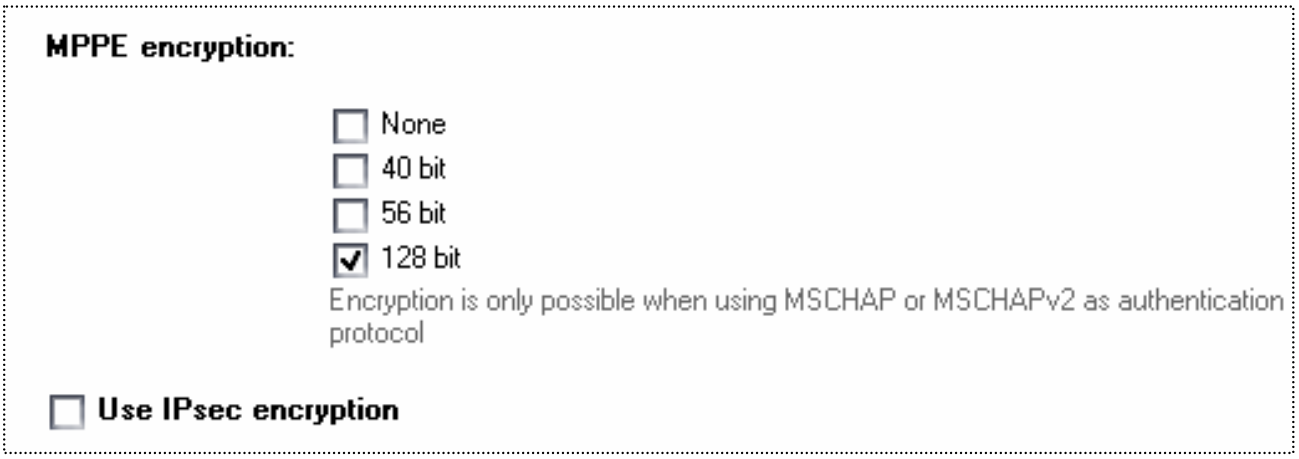
Remote gateway: **192.0.2.20**

Remote net: **192.168.1.0/24**

Dial on demand: leave unchecked



Under authentication **MSCHAPv2** should be the only checked option.

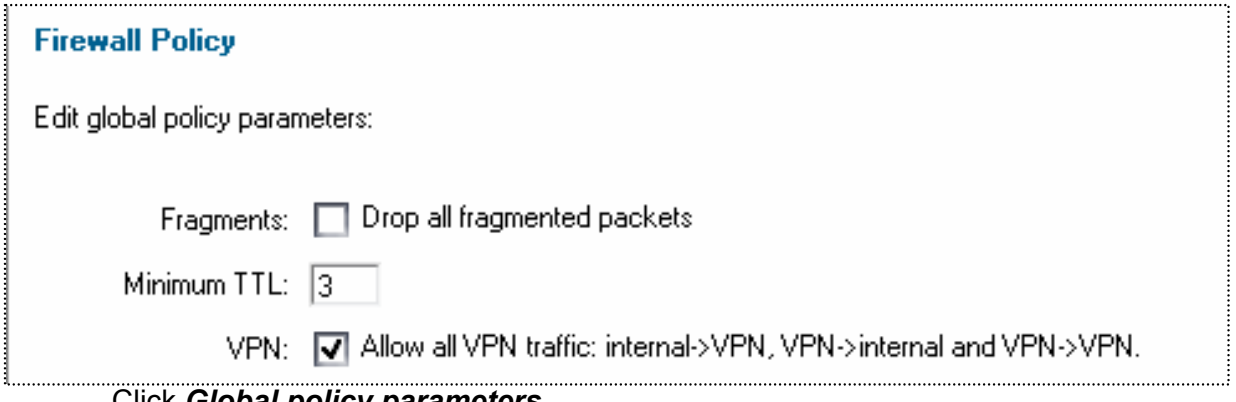


Under MPPE encryption **128 bit** should be the only checked option.

Leave **Use IPsec encryption** unchecked

Click ***Apply***

3. Setup policies for the new tunnel, ***Firewall->Policy:***



Click ***Global policy parameters***

Enable **Allow all VPN traffic: internal->VPN, VPN->internal and VPN->VPN**

Click ***Apply***

4. Click ***Activate*** and wait for the firewall to restart.

Settings for Main office

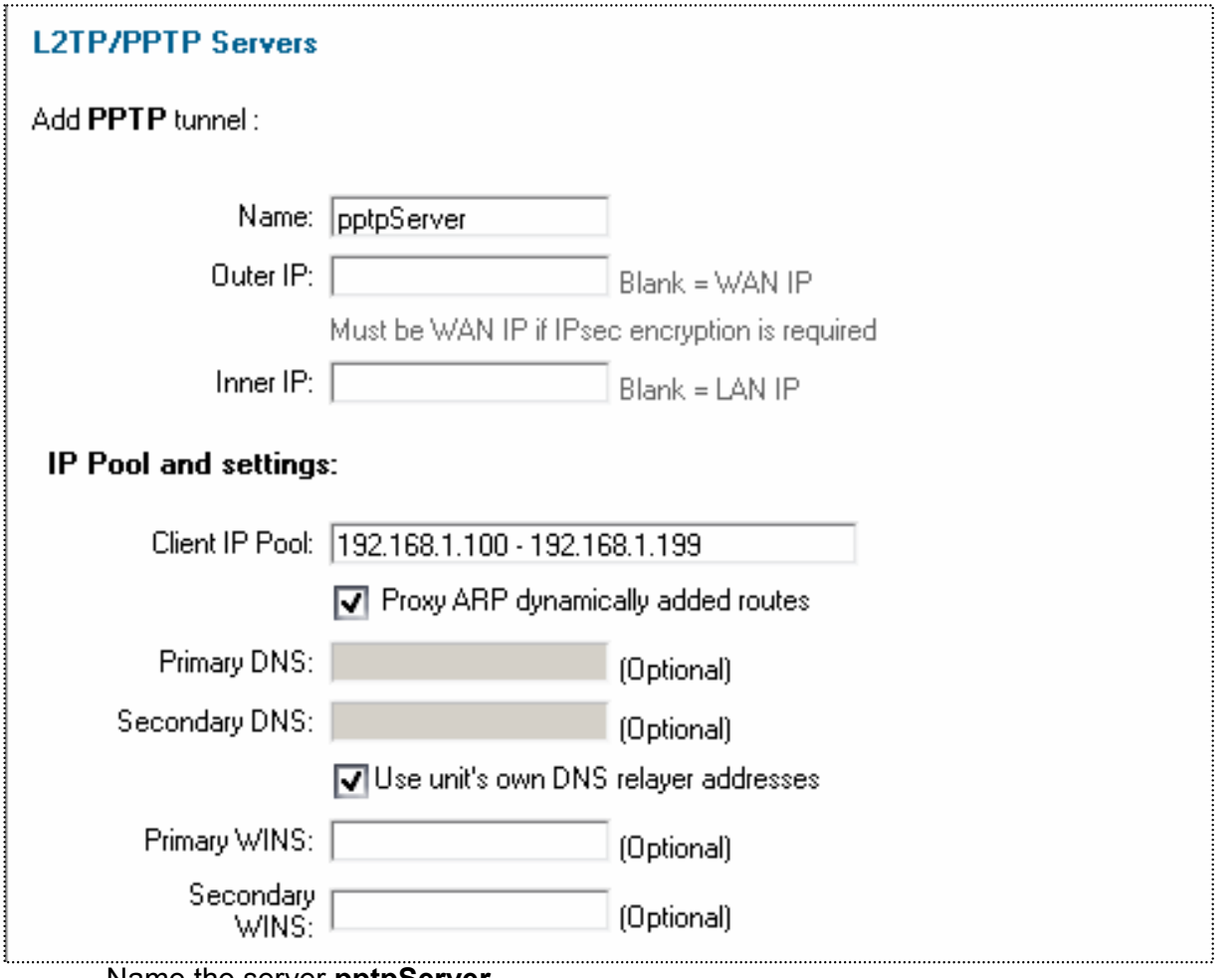
1. Setup interfaces, ***System->Interfaces***:

WAN IP: **193.0.2.20**

LAN IP: **192.168.1.1**, Subnet mask: **255.255.255.0**

2. Setup PPTP server, ***Firewall->VPN:***

Under L2TP / PPTP Server click **Add new PPTP server**



Name the server **pptpServer**

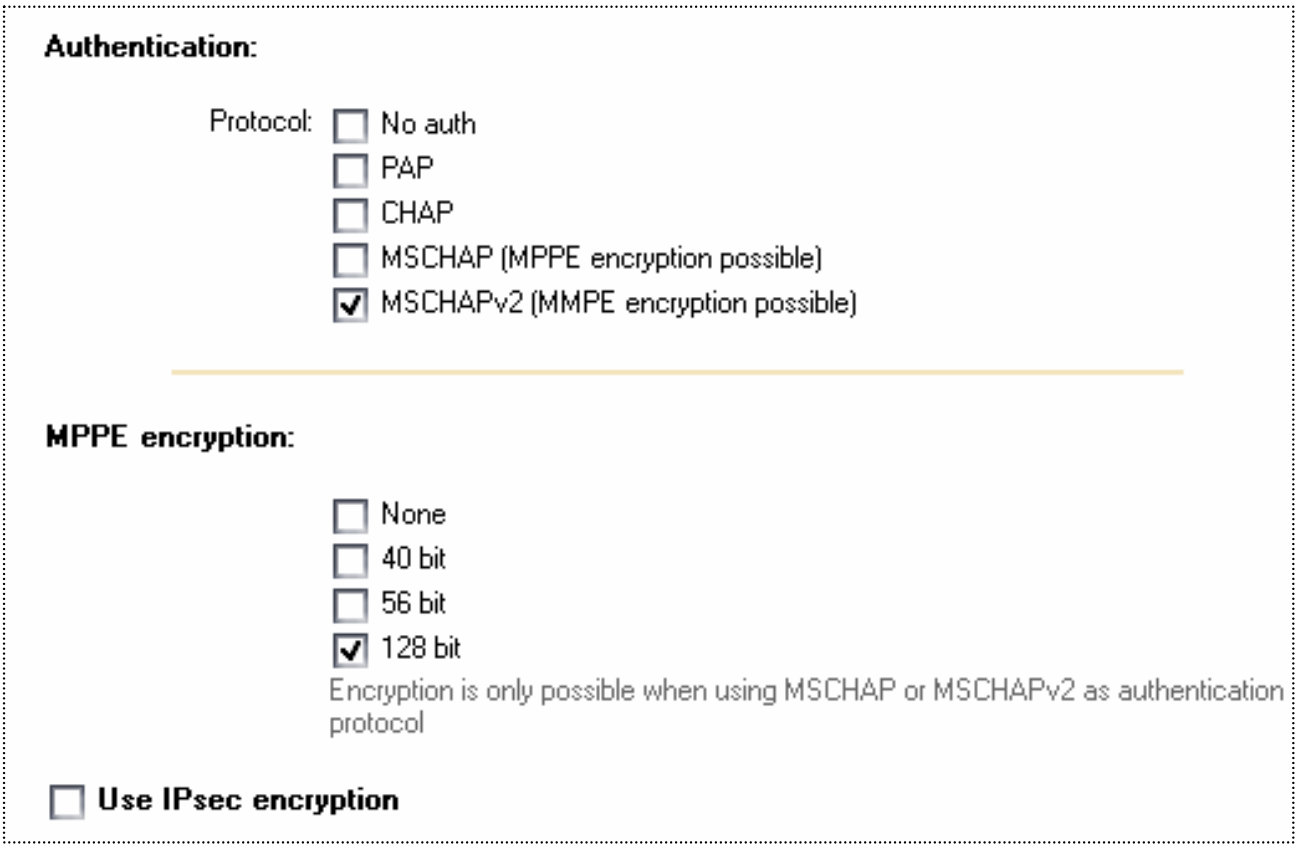
Leave Outer IP and Inner IP blank

Set client IP pool to **192.168.1.100 – 192.168.1.199**

Check **Proxy ARP dynamically added routes**

Check **Use unit's own DNS relayer addresses**

Leave WINS settings blank



Under authentication **MSCHAPv2** should be the only checked option.

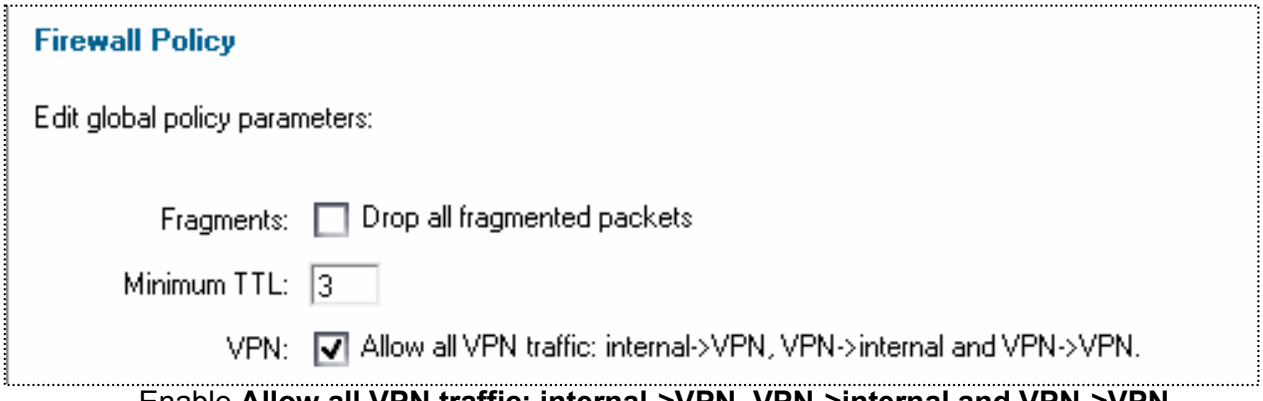
Under MPPE encryption **128 bit** should be the only checked option.

Leave **Use IPsec encryption** unchecked

Click ***Apply***

3. Setup policies for the new tunnel, ***Firewall->Policy:***

Click ***Global policy parameters***



Enable **Allow all VPN traffic: internal->VPN, VPN->internal and VPN->VPN**

Click ***Apply***

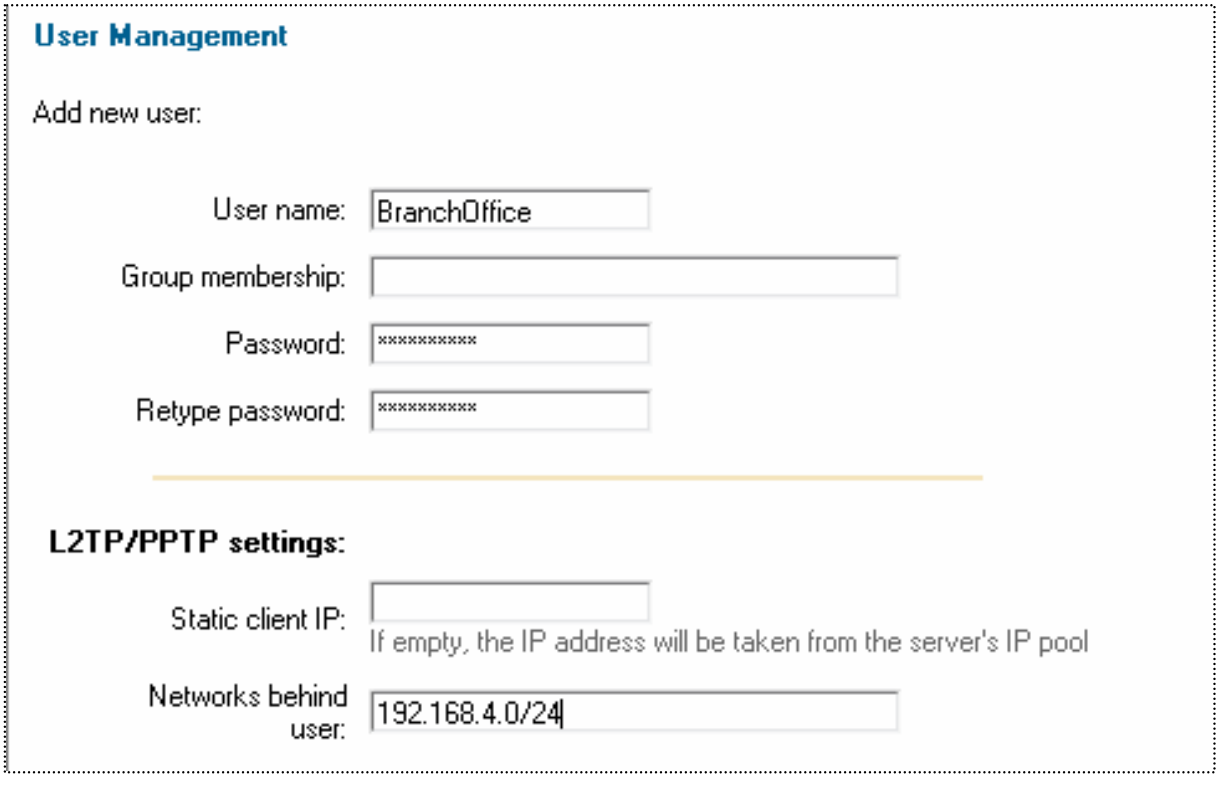
4. Set up authentication source, ***Firewall->Users***:

Select **Local database**

Click ***Apply***

5. Add a new user, ***Firewall->Users***:

Under **Users in local database** click ***Add new***



Name the new user **BranchOffice**

Enter password: **1234567890**

Retype password: **1234567890**

Leave static client IP empty (could also be set to eg 192.168.1.200. If no IP is set here the IP pool from the PPTP server settings are used).

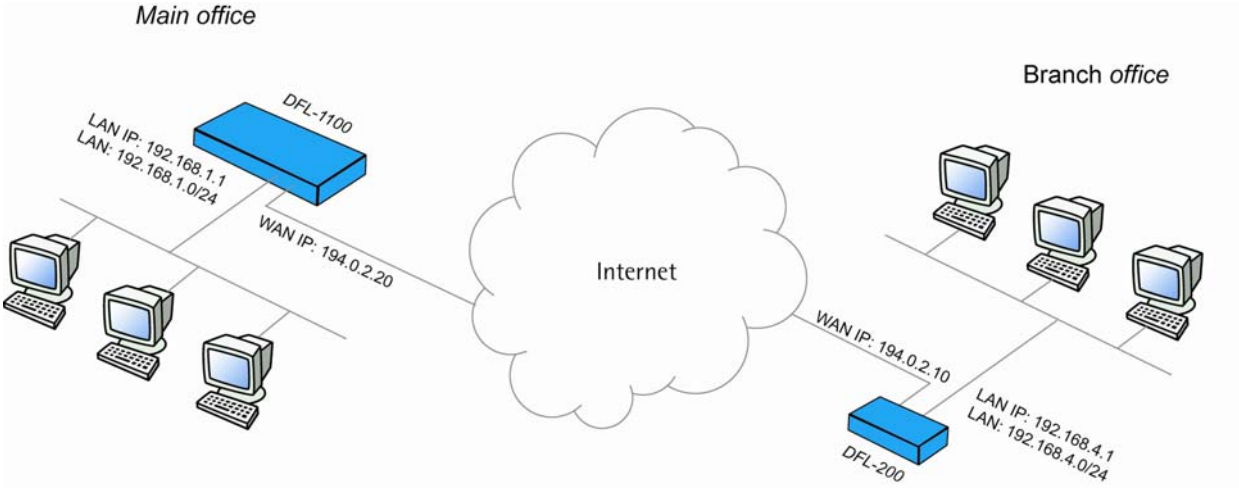
Set Networks behind user to **192.168.4.0/24**

Click ***Apply***

6. Click **Activate** and wait for the firewall to restart.

This example will allow *all* traffic between the two offices. To get a more secure solution read the **A more secure LAN-to-LAN VPN solution** section in this chapter.

LAN-to-LAN VPN using L2TP



Settings for Branch office

1. Setup interfaces, ***System->Interfaces***:

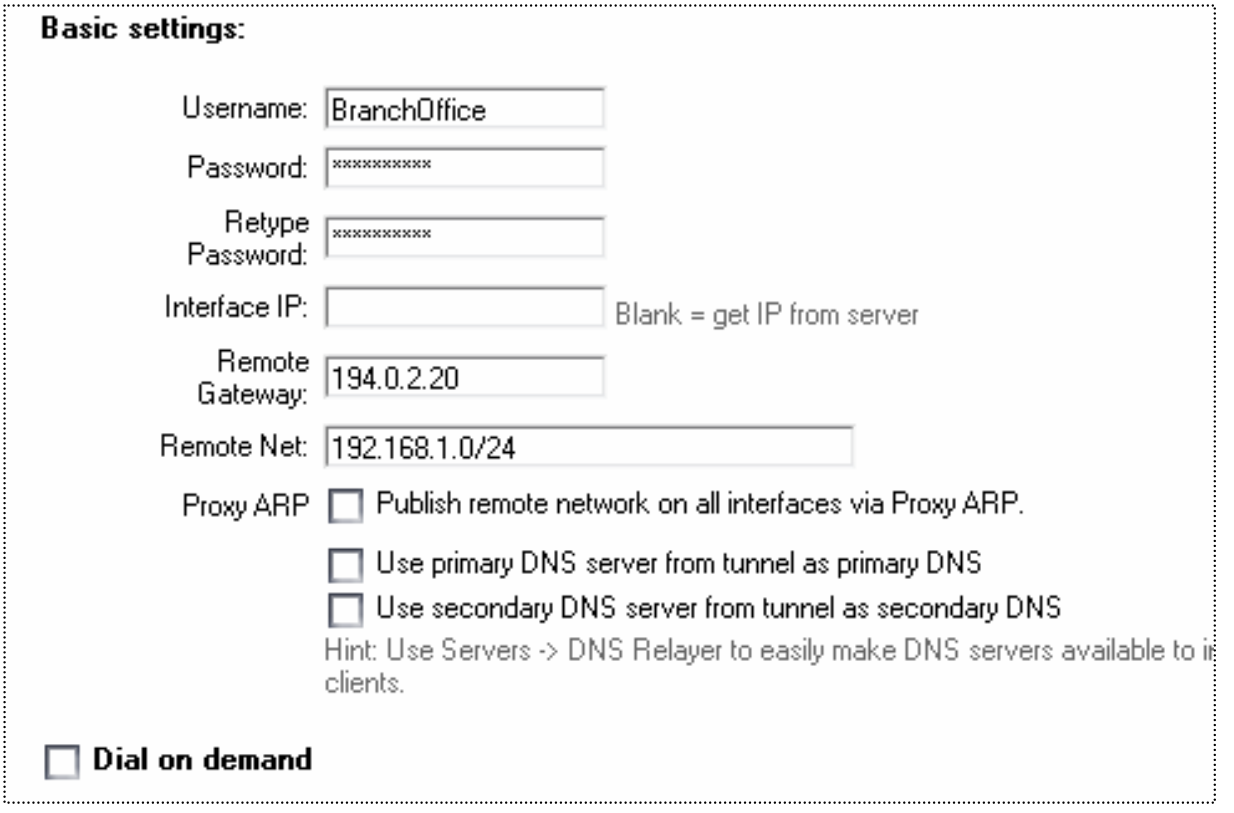
WAN IP: **193.0.2.10**

LAN IP: **192.168.4.1**, Subnet mask: **255.255.255.0**

2. Setup L2TP client, ***Firewall->VPN:***

Under L2TP / PPTP client click **Add new L2TP client**

Name the server **toMainOffice**



Username: **BranchOffice**

Password: **1234567890** (Note! You should use a password that is hard to guess)

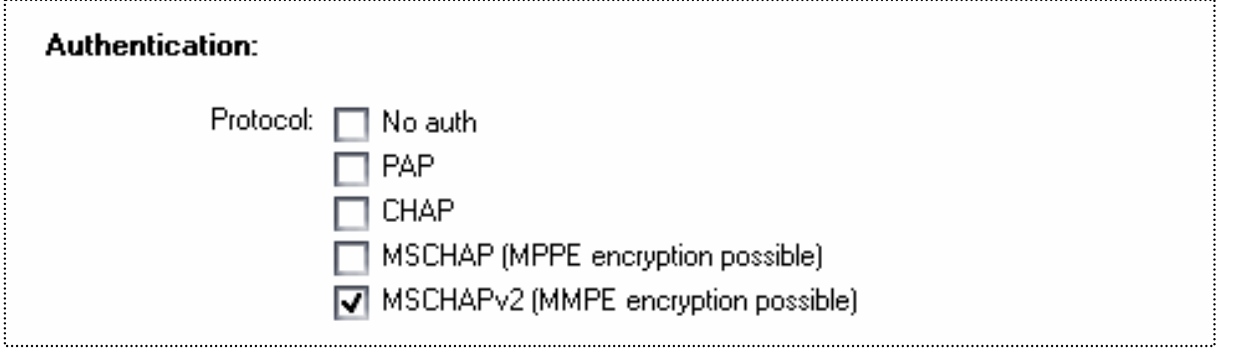
Retype password: **1234567890**

Interface IP: leave blank

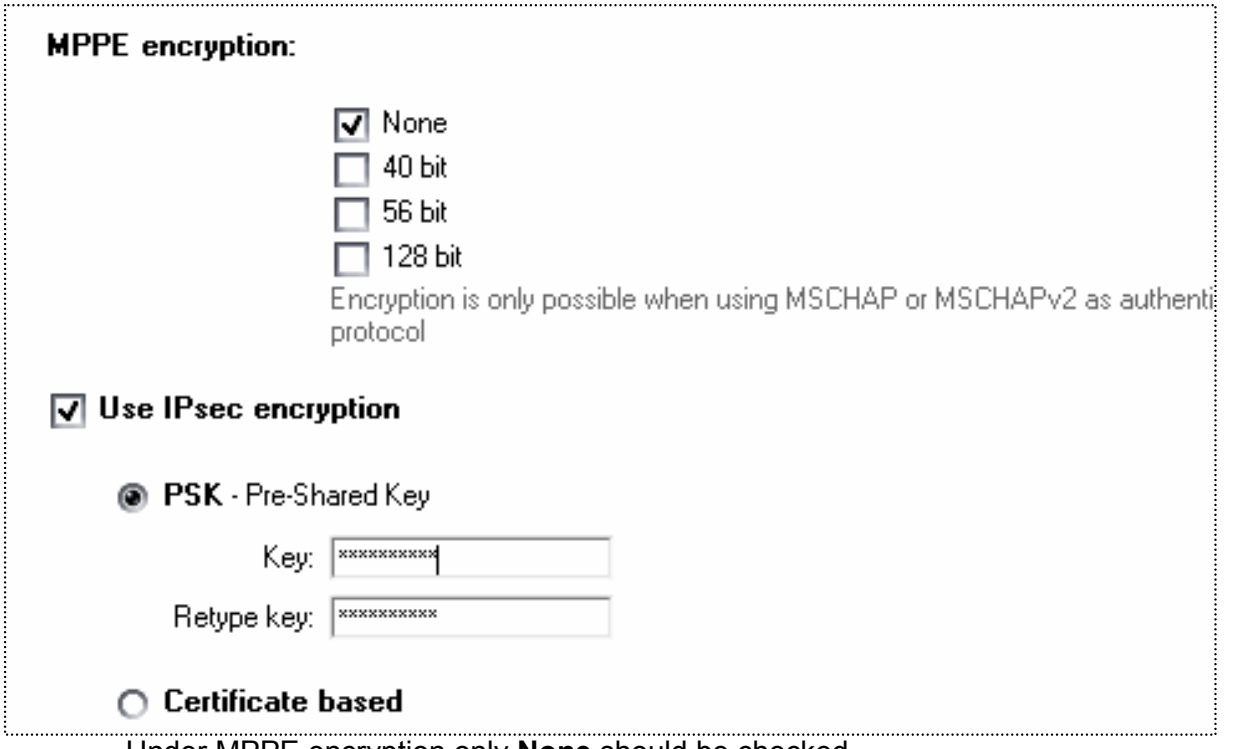
Remote gateway: **192.0.2.20**

Remote net: **192.168.1.0/24**

Dial on demand: leave unchecked



Under authentication only **MSCHAPv2** should be checked



Under MPPE encryption only **None** should be checked

Check **Use IPsec encryption**

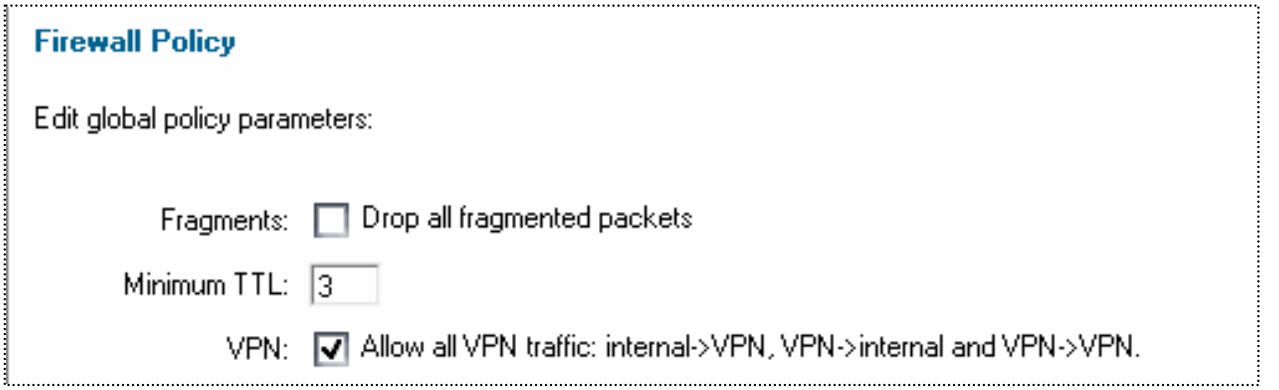
Enter key **1234567890** (Note! You should use a key that is hard to guess)

Retype key **1234567890**

Click ***Apply***

3. Setup policies for the new tunnel, ***Firewall->Policy:***

Click ***Global policy parameters***



Enable **Allow all VPN traffic: internal->VPN, VPN->internal and VPN->VPN**

Click ***Apply***

4. Click **Activate** and wait for the firewall to restart

Settings for Main office

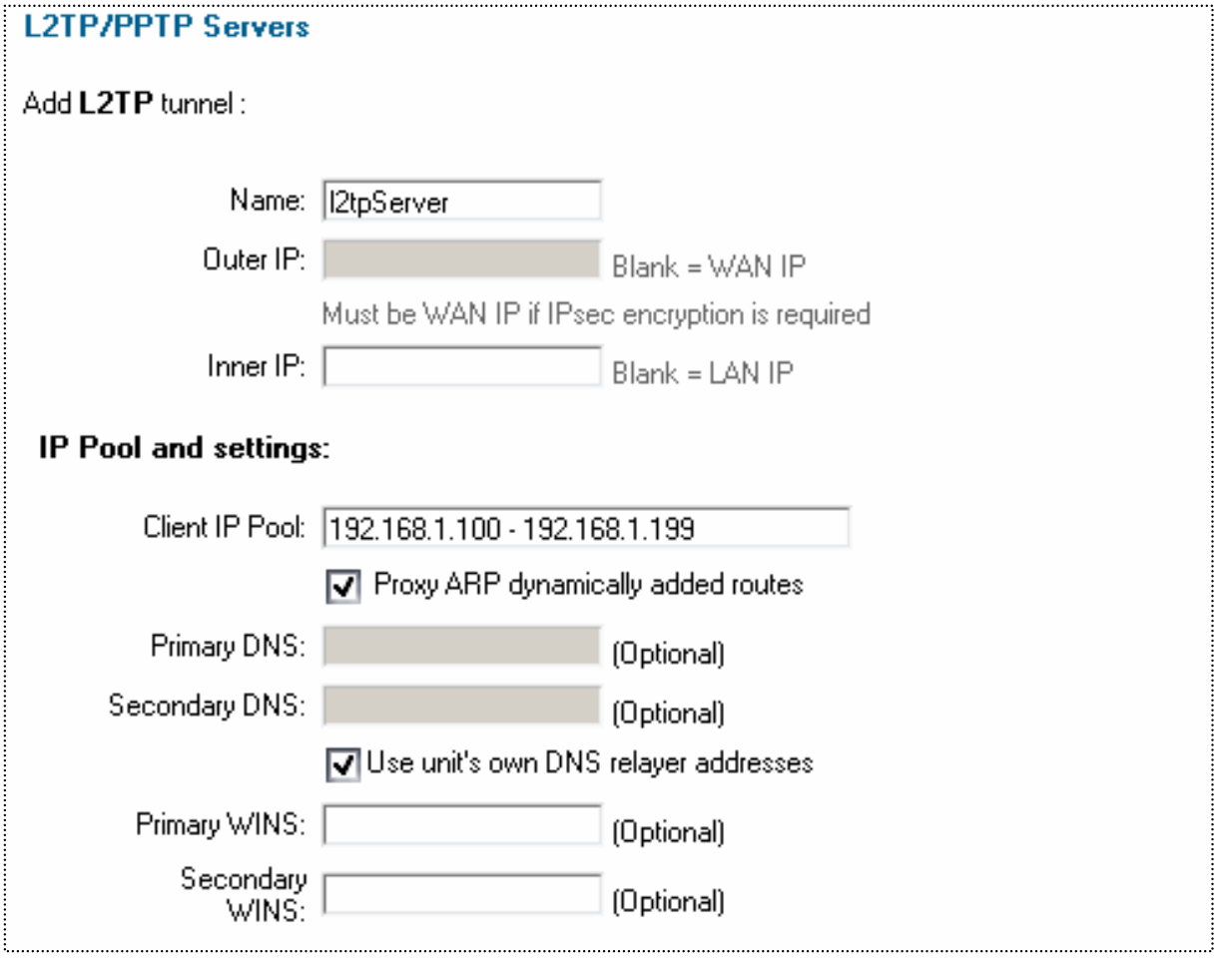
1. Setup interfaces, ***System->Interfaces***:

WAN IP:**193.0.2.20**

LAN IP: **192.168.1.1**, Subnet mask: **255.255.255.0**

2. Setup L2TP server, ***Firewall->VPN:***

Under L2TP / PPTP Server click **Add new L2TP server**



Name the server **l2tpServer**

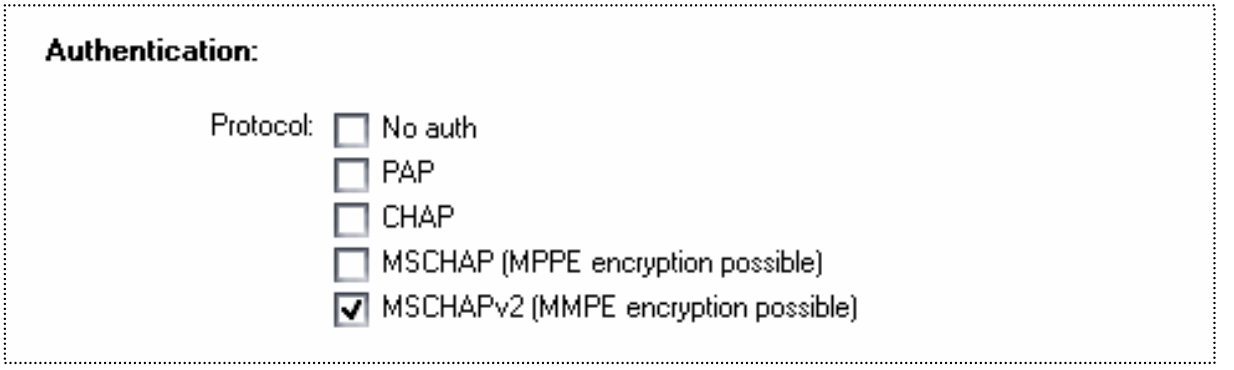
Leave Outer IP and Inner IP blank

Set client IP pool to **192.168.1.100 – 192.168.1.199**

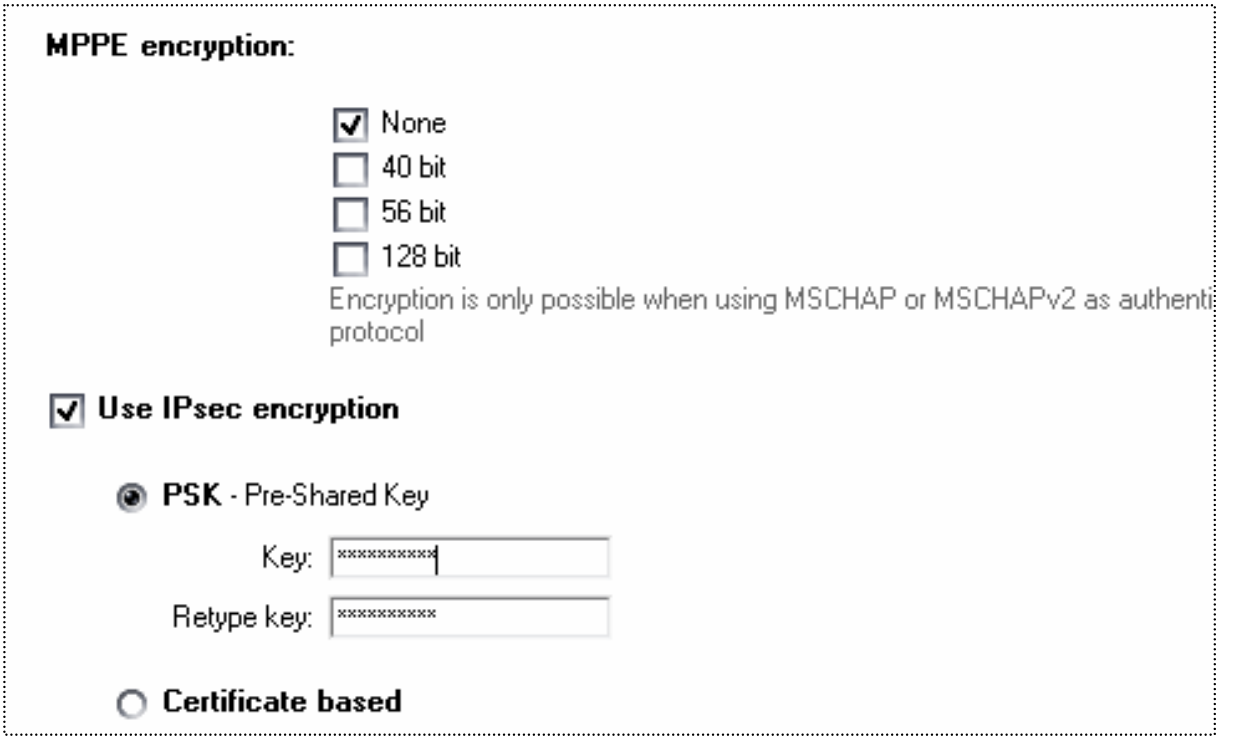
Check **Proxy ARP dynamically added routes**

Check **Use unit's own DNS relayer addresses**

Leave WINS settings blank



Under authentication **MSCHAPv2** should be the only checked option.



Under MPPE encryption **None** should be the only checked option.

Check **Use IPsec encryption**

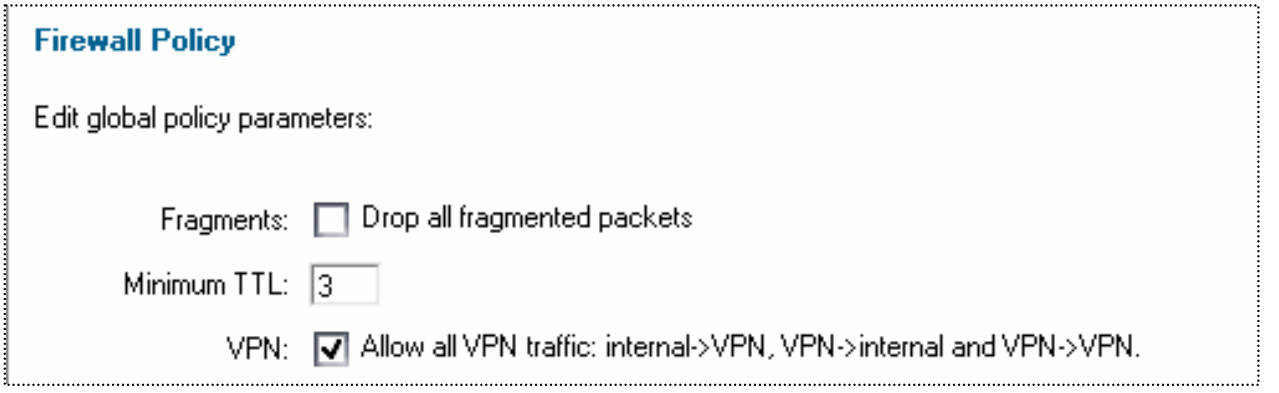
Enter key **1234567890** (Note! You should use a key that is hard to guess)

Retype key **1234567890**

Click ***Apply***

3. Setup policies for the new tunnel, ***Firewall->Policy:***

Click ***Global policy parameters***



Enable **Allow all VPN traffic: internal->VPN, VPN->internal and VPN->VPN**

Click ***Apply***

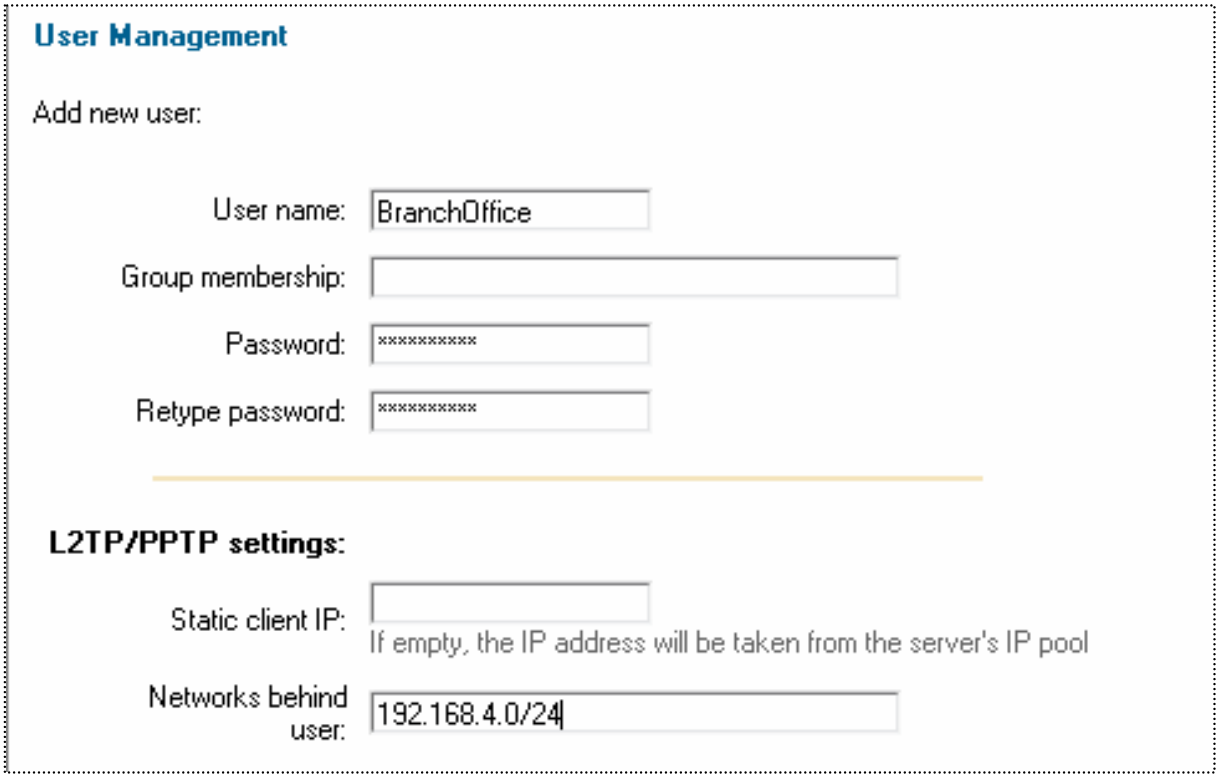
4. Set up authentication source, ***Firewall->Users***:

Select **Local database**

Click ***Apply***

5. Add a new user, ***Firewall->Users***:

Under **Users in local database** click ***Add new***



Name the new user **BranchOffice**

Enter password: **1234567890**

Retype password: **1234567890**

Leave static client IP empty (could also be set to eg 192.168.1.200. If no IP is set here the IP pool from the L2TP server settings are used).

Set Networks behind user to **192.168.4.0/24**

Click ***Apply***

6. Click **Activate** and wait for the firewall to restart.

This example will allow *all* traffic between the two offices. To get a more secure solution read the **A more secure LAN-to-LAN VPN solution** section in this chapter.

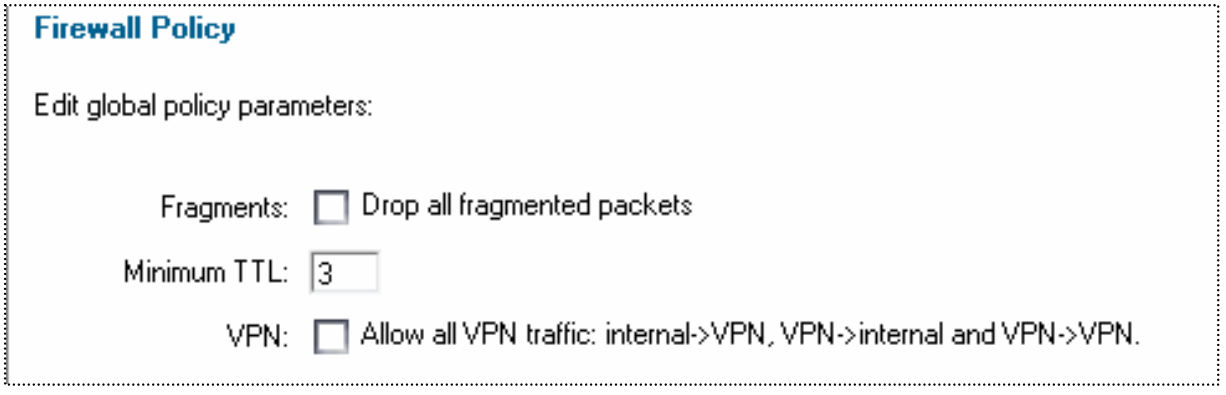
A more secure LAN-to-LAN VPN solution

Go get a more secure solution, policies should be created instead of allowing all traffic between the two offices. The following steps will show how to enable some common services. In this example we have a mail server, ftp server and a web server (intranet) in the main office that we want to access from the branch office.

Settings for Branch office

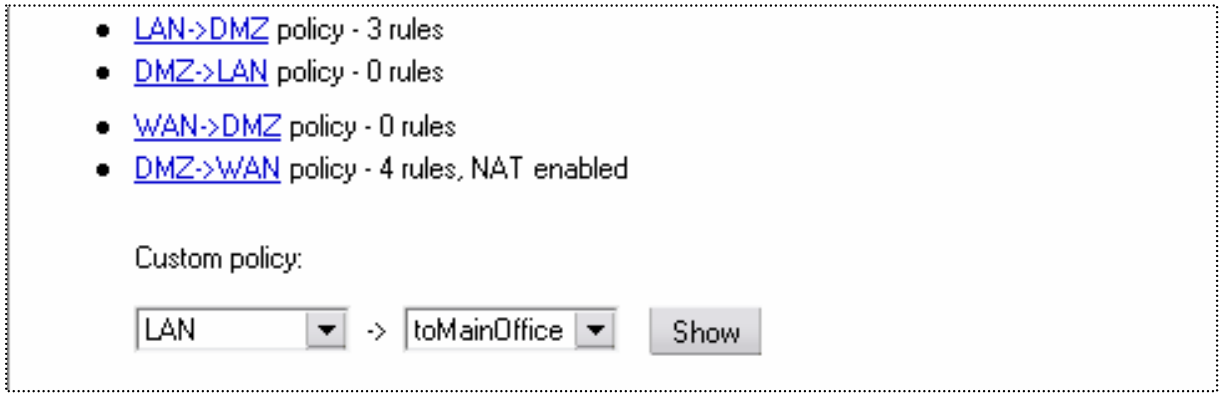
1. Setup policies for the new tunnel, ***Firewall->Policy:***

Click ***Global policy parameters***



Disable **Allow all VPN traffic: internal->VPN, VPN->internal and VPN->VPN**

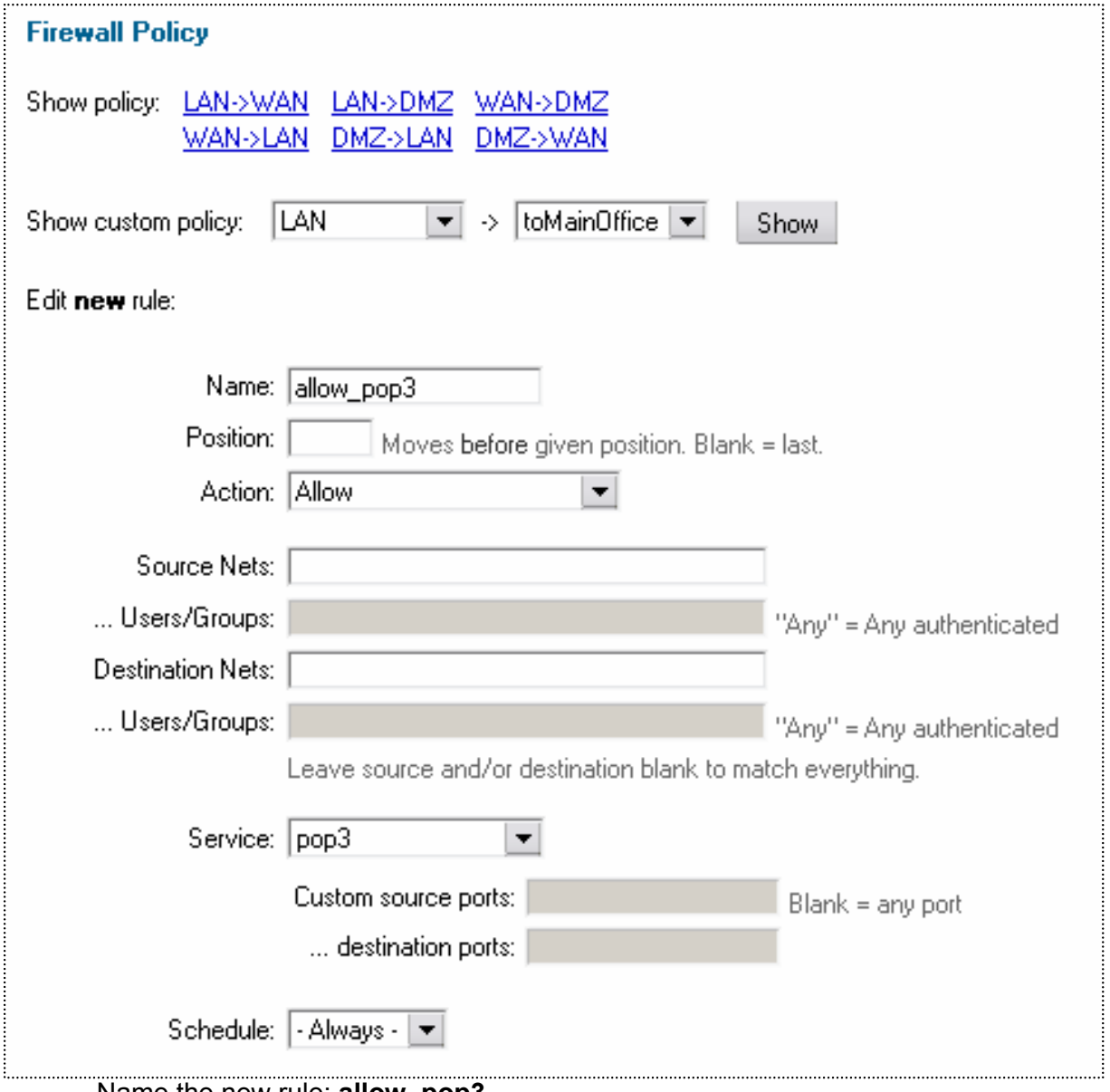
Click ***Apply***



2. Now is it possible to create policies for the VPN interfaces. Select from **LAN** to **toMainOffice** and click ***Show***.

3. Click ***Add new*** to create the first rule

4. Setup the new rule:



Name the new rule: **allow_pop3**

Select action: **Allow**

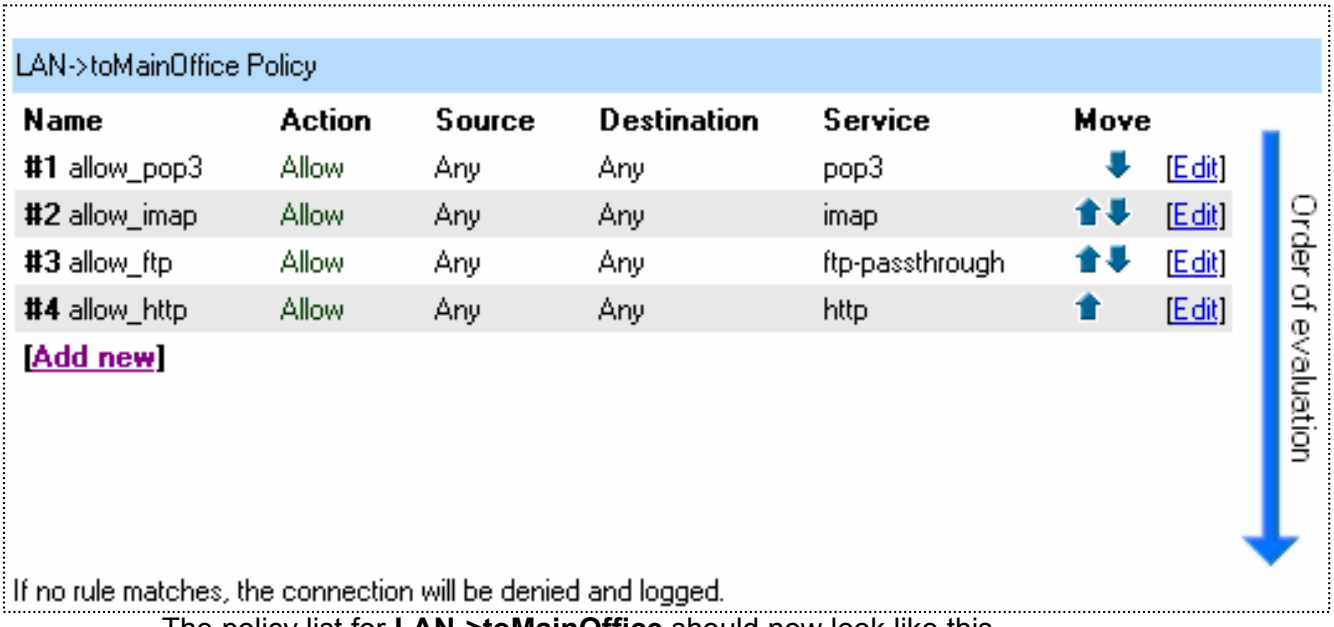
Select service: **pop3**

Select schedule: **Always**

We don't want any Intrusion detection for now, so leave this option unchecked.

Click ***Apply***

5. The first policy rule is now created. Repeat step 4 to create services named **allow_imap**, **allow_ftp** and **allow_http**. The services for these policies should be **imap**, **ftp_passthrough** and **http**.



The policy list for **LAN->toMainOffice** should now look like this.

6. Click ***Activate*** and wait for the firewall to restart.

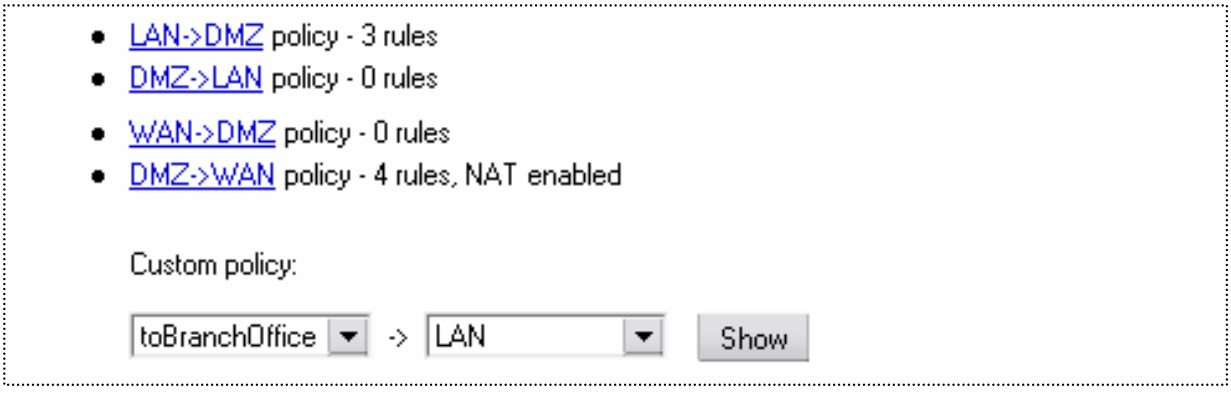
Settings for Main office

1. Setup policies for the new tunnel, ***Firewall->Policy:***

Click ***Global policy parameters***

Disable **Allow all VPN traffic: internal->VPN, VPN->internal and VPN->VPN**

Click ***Apply***

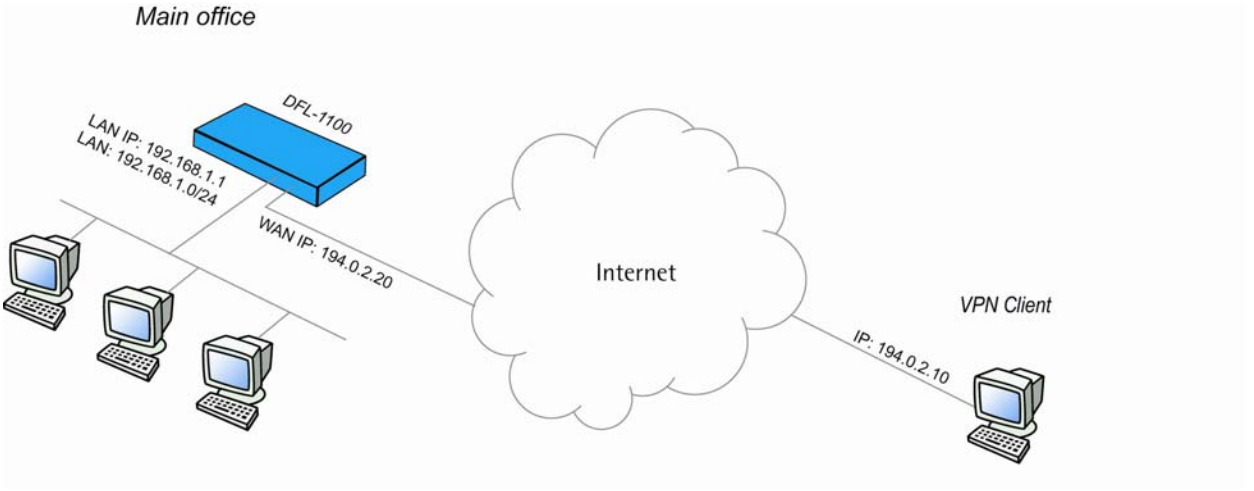


2. Now is it possible to create policies for the VPN interfaces. Select from **toBranchOffice** to **LAN** and click ***Show***.

3. Create same 4 policy rules as was created on the branch office firewall (**allow_pop3**, **allow_imap**, **allow_ftp** and **allow_http**).

4. Click ***Activate*** and wait for the firewall to restart.

Windows XP client and PPTP server



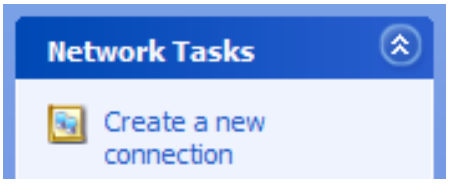
Settings for the Windows XP client

1. Open the control panel (Start button -> Control panel).

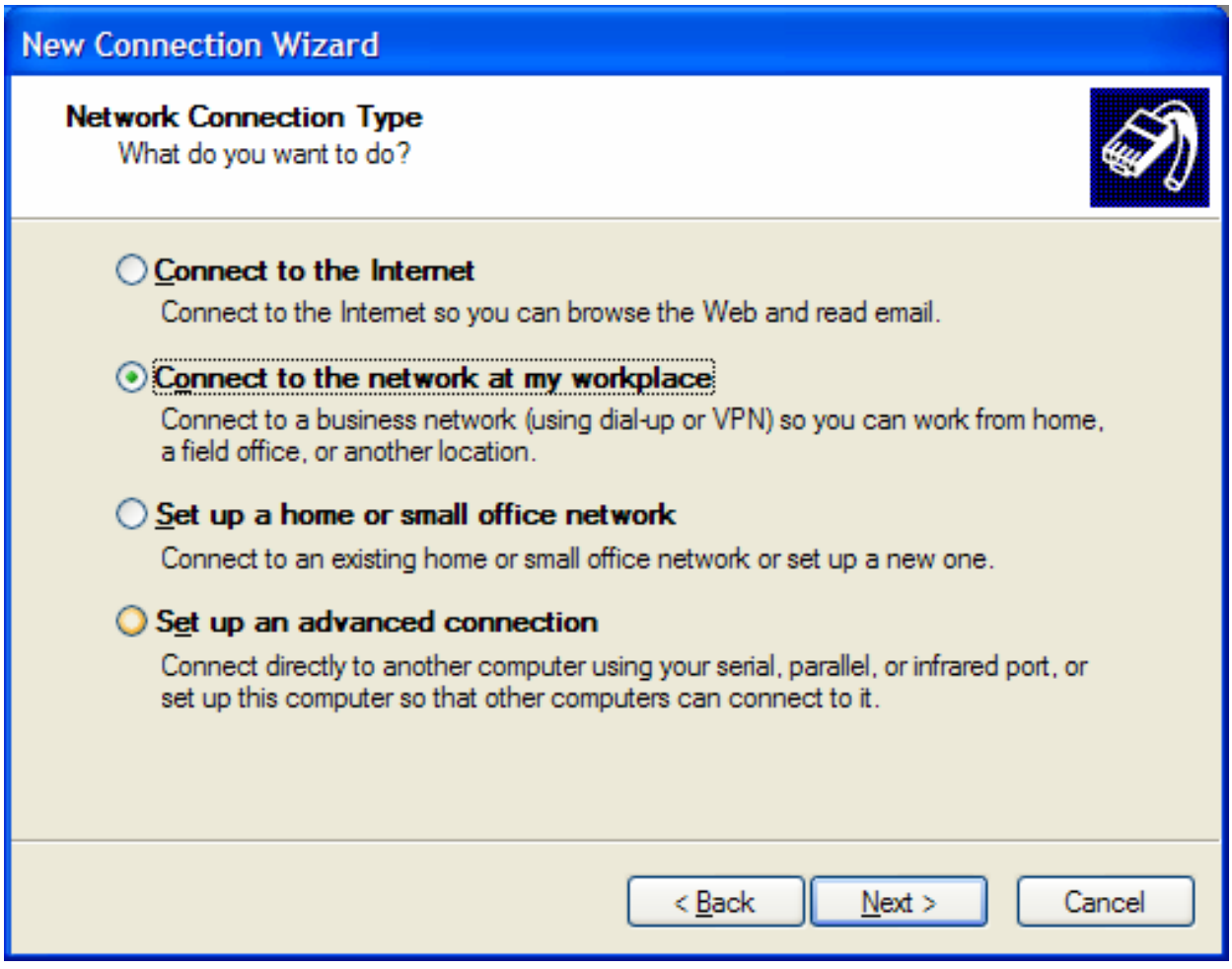
2. If you are using the Category view, click on the **Network and Internet Connections** icon. Then click **Create a connection to the network on your workplace** and continue to step 6.

If you are using the Classic view, click on the **Network Connections** icon.

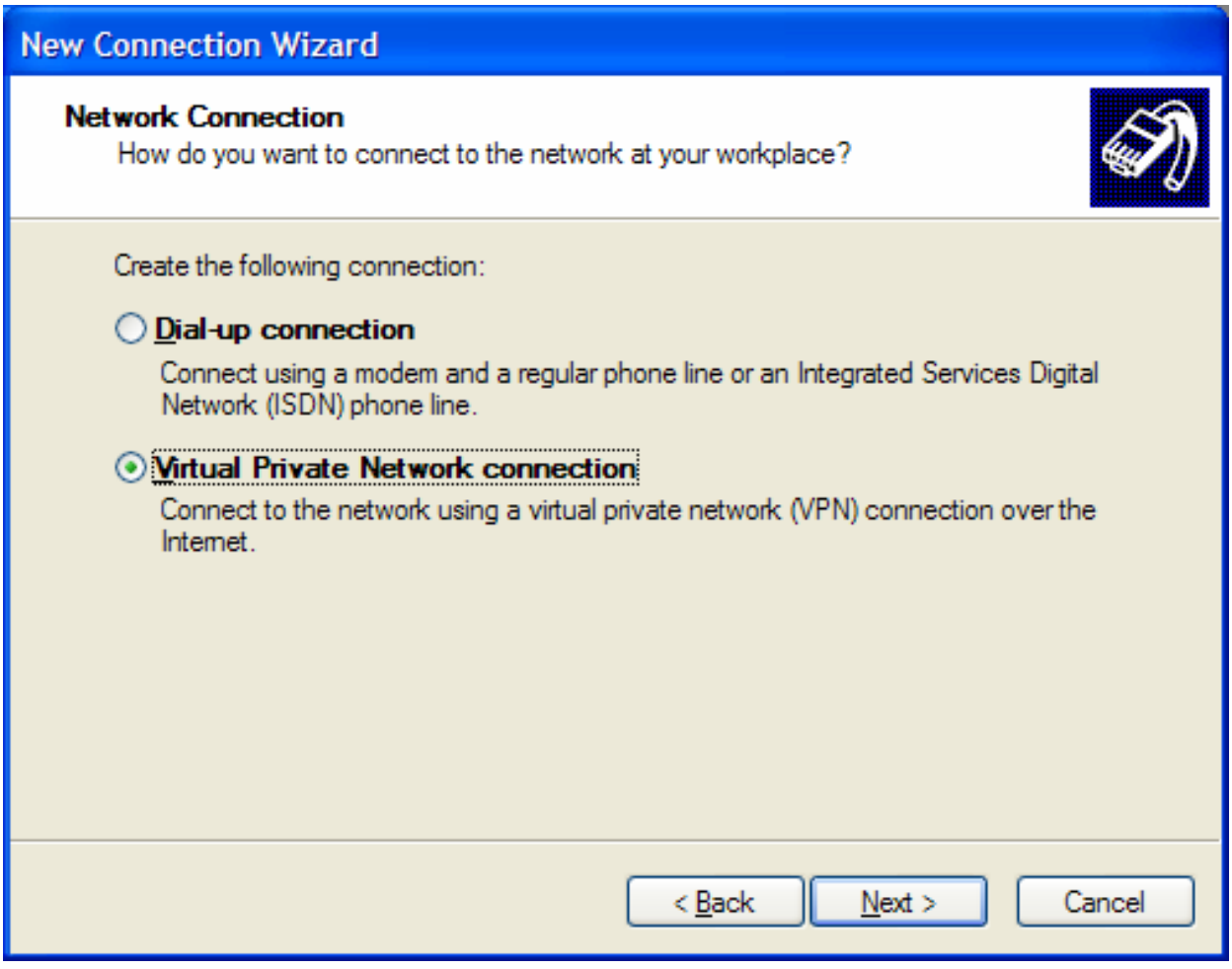
3. Under Network task, click **Create a new connection**



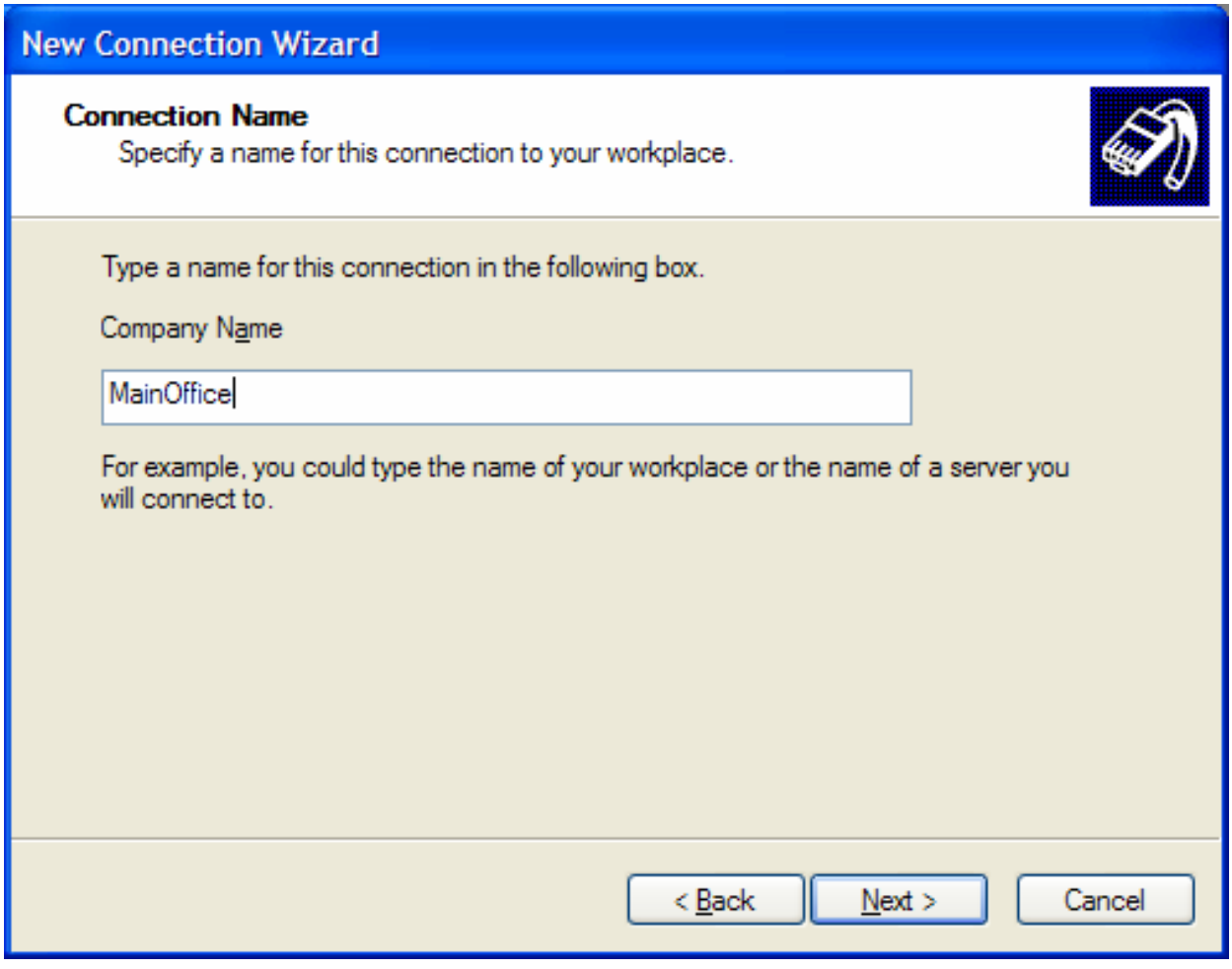
4. The **New connection wizard** window opens up. Click ***next***.



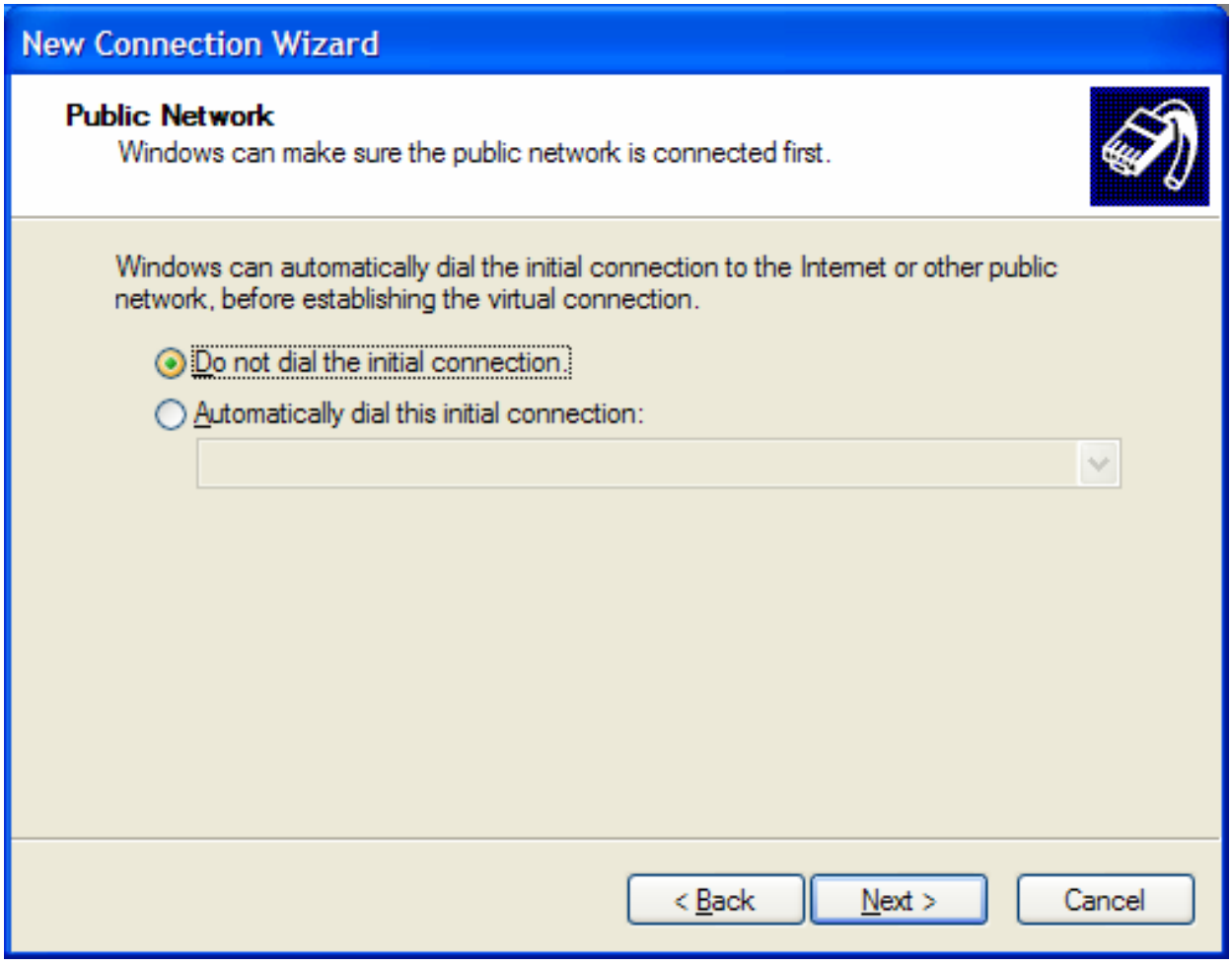
5. Select **Connect to the network at my workplace** and click ***Next***



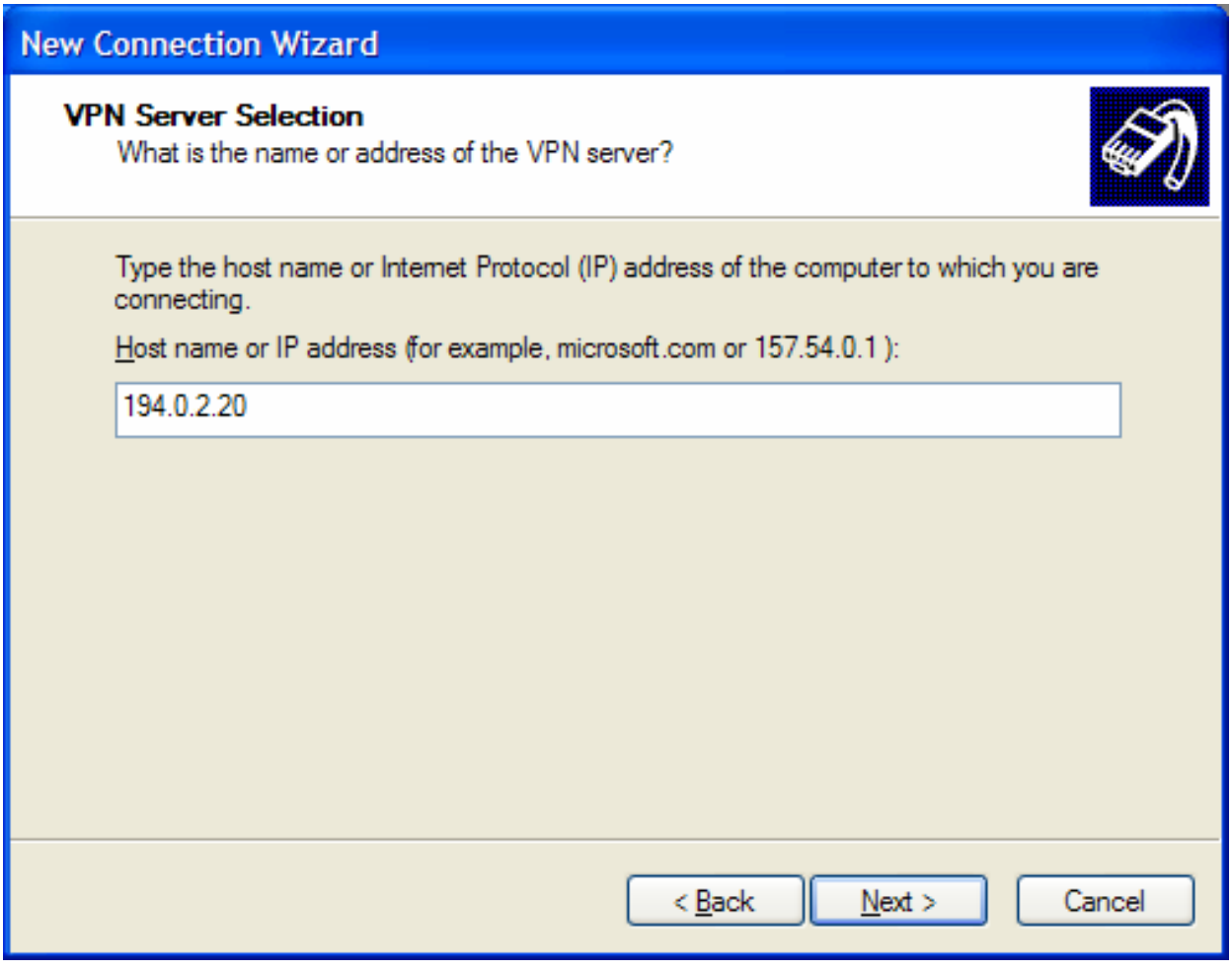
6. Select **Virtual Private Network connection** and click ***Next***



7. Name the connection **MainOffice** and click ***Next***

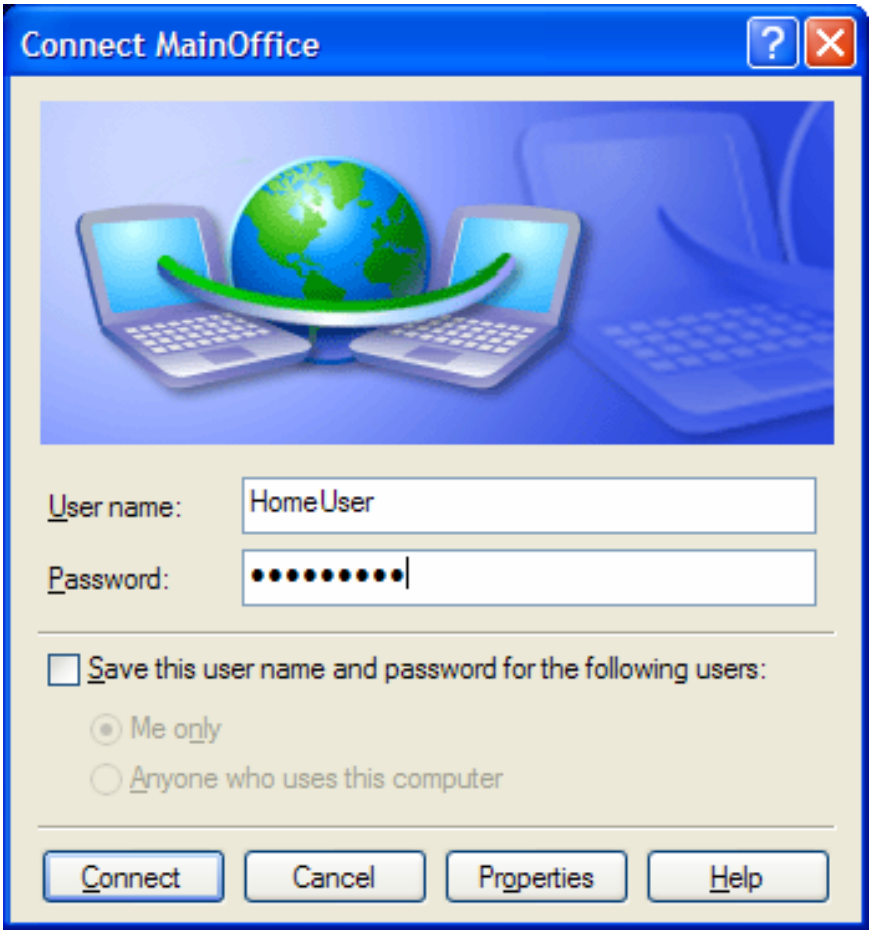


8. Select **Do not dial the initial connection** and click ***Next***



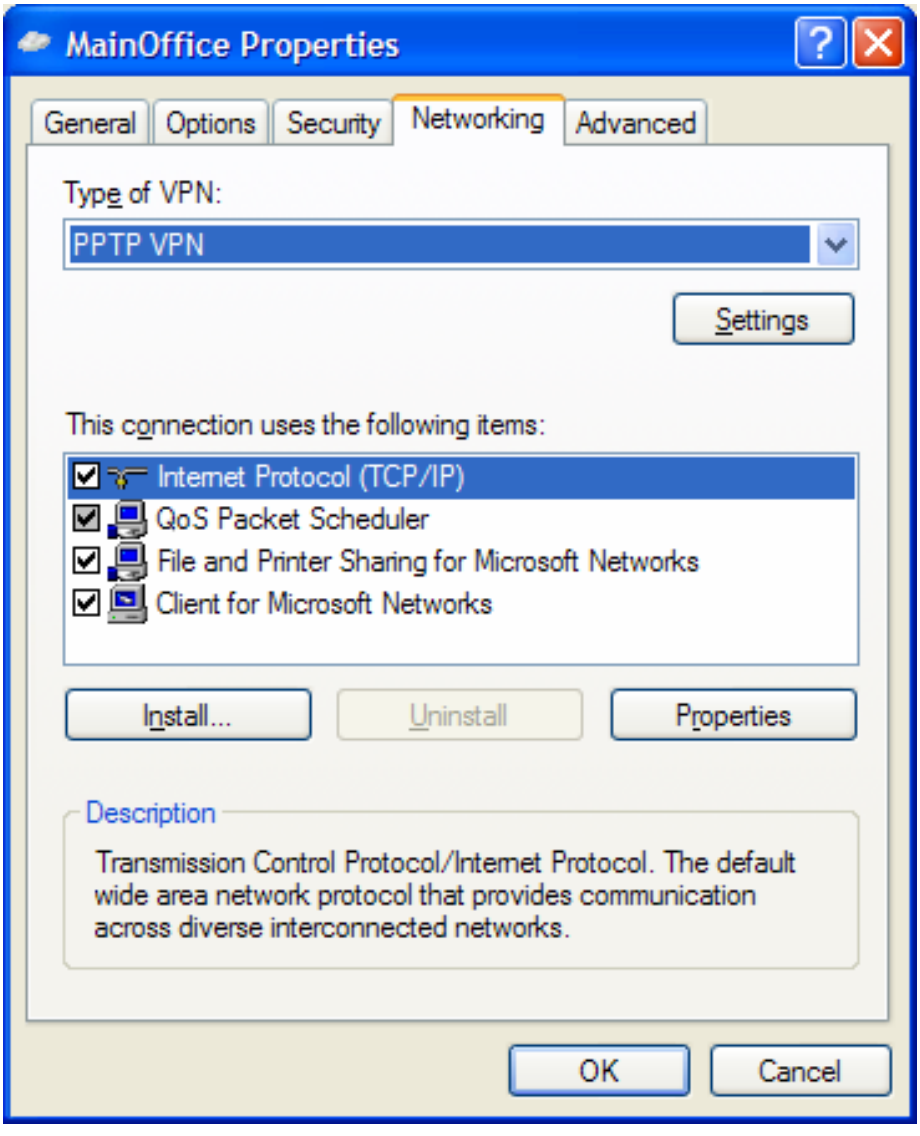
9. Type the IP address to the server, **194.0.2.20**, and click ***Next***

10. Click ***Finish***



11. Type user name **HomeUser** and password **1234567890** (Note! You should use a password that is hard to guess)

12. Click ***Properties***



13. Select the **Networking tab** and change **Type of VPN** to **PPTP VPN**. Click ***OK***.

All settings needed for the XP client is now done. When we have set up the server on the firewall you can click **Connect** to establish the connection to the Main office

Settings for Main office

1. Setup interfaces, ***System->Interfaces***:

WAN IP:**193.0.2.20**

LAN IP: **192.168.1.1**, Subnet mask: **255.255.255.0**

2. Setup PPTP server, ***Firewall->VPN:***

Under L2TP / PPTP Server click **Add new PPTP server**

Name the server **pptpServer**

Leave Outer IP and Inner IP blank

Set client IP pool to **192.168.1.100 – 192.168.1.199**

Check **Proxy ARP dynamically added routes**

Check **Use unit's own DNS relayer addresses**

Leave WINS settings blank

Under authentication **MSCHAPv2** should be the only checked option.

Under MPPE encryption **128 bit** should be the only checked option.

Leave **Use IPsec encryption** unchecked

Click ***Apply***

3. Setup policies for the new tunnel, ***Firewall->Policy:***

Click ***Global policy parameters***

Enable **Allow all VPN traffic: internal->VPN, VPN->internal and VPN->VPN**

Click ***Apply***

4. Set up authentication source, ***Firewall->Users***:

Select **Local database**

Click ***Apply***

5. Add a new user, ***Firewall->Users***:

Under **Users in local database** click ***Add new***

Name the new user **HomeUser**

Enter password: **1234567890**

Retype password: **1234567890**

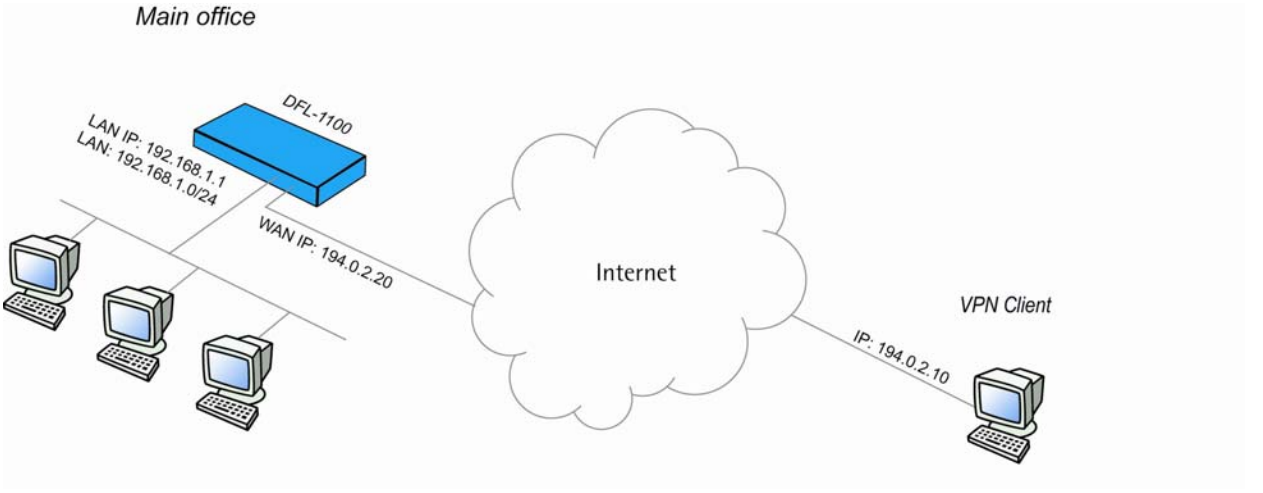
Leave static client IP empty (could also be set to eg 192.168.1.200. If no IP is set here the IP pool from the PPTP server settings are used).

Click ***Apply***

6. Click ***Activate*** and wait for the firewall to restart.

This example will allow *all* traffic from the client to the main office network. To get a more secure solution read the **Settings for the Main office** part of **A more secure LAN-to-LAN VPN solution** section in this chapter.

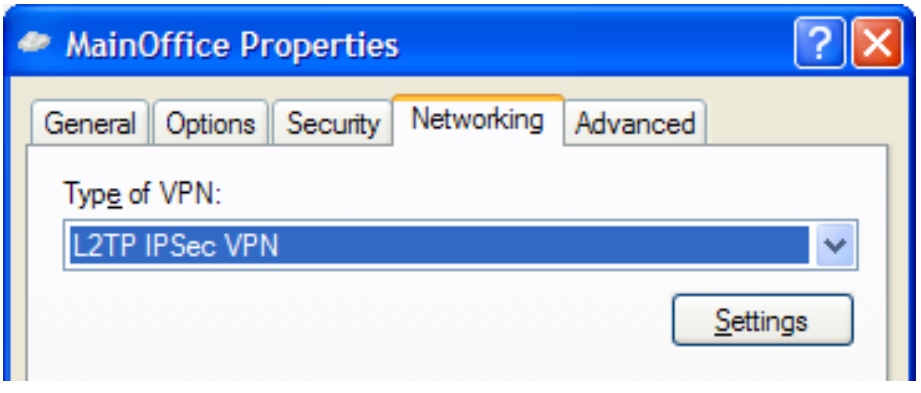
Windows XP client and L2TP server



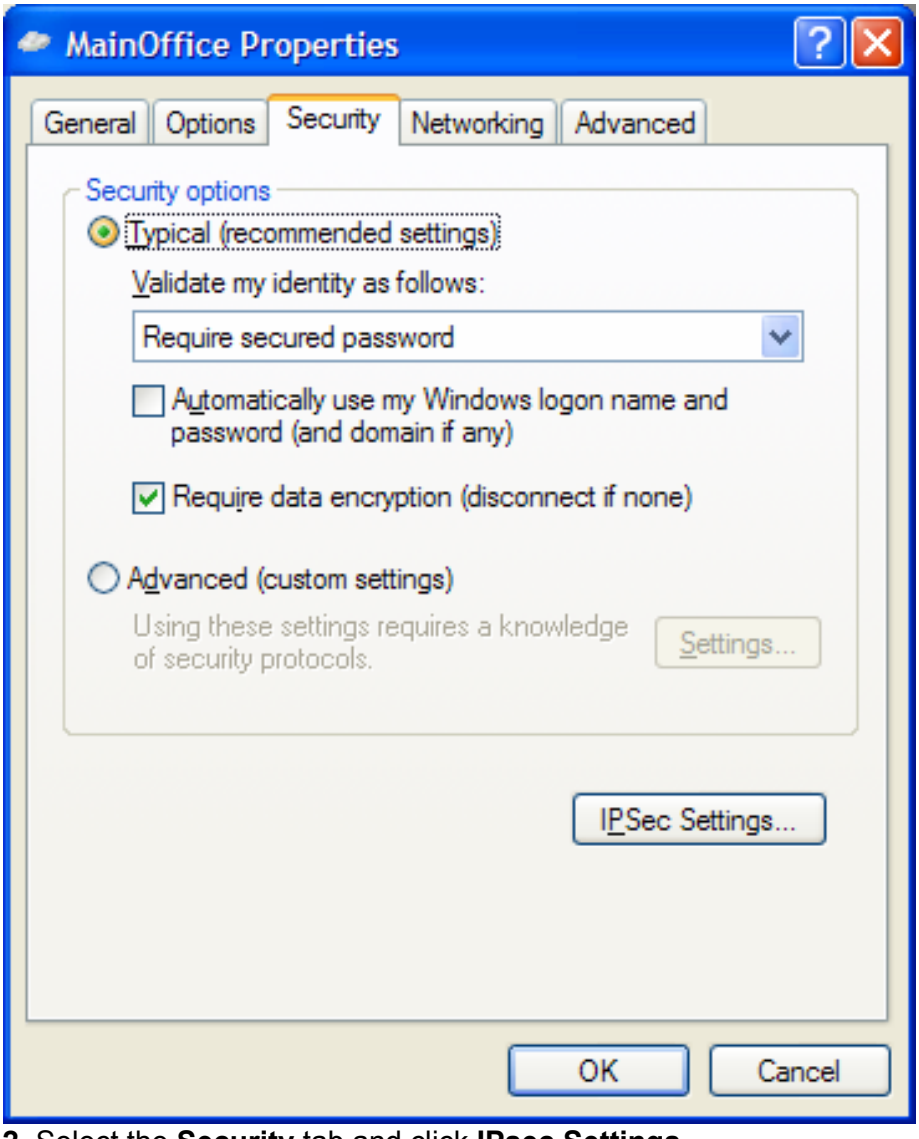
The Windows XP client to L2TP server setup is quite similar to the PPTP setup above.

Settings for the Windows XP client

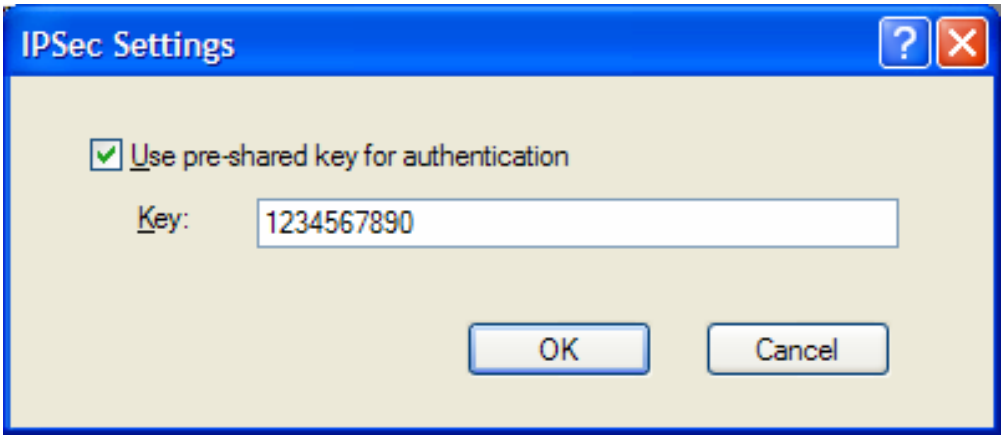
To setup a L2TP connection from Windows XP to the Main office firewall, you can follow the steps in the PPTP guide above for the client side. The only changes from that guide is:



1. In step 13, change the **Type of VPN** to **L2TP IPsec VPN**.



2. Select the **Security** tab and click **IPsec Settings**



3. Check **Use pre-shared key for authentication**, type the key and click ***OK***

Settings for Main office

1. Setup interfaces, ***System->Interfaces***:

WAN IP:**193.0.2.20**

LAN IP: **192.168.1.1**, Subnet mask: **255.255.255.0**

2. Setup L2TP server, ***Firewall->VPN:***

Under L2TP / PPTP Server click **Add new L2TP server**

Name the server **l2tpServer**

Leave Outer IP and Inner IP blank

Set client IP pool to **192.168.1.100 – 192.168.1.199**

Check **Proxy ARP dynamically added routes**

Check **Use unit's own DNS relayer addresses**

Leave WINS settings blank

Under authentication **MSCHAPv2** should be the only checked option

Under MPPE encryption **None** should be the only checked option

Check the **Use IPsec encryption** box

Enter the pre-shared key, **1234567890**, and retype same pre-shared key

Click ***Apply***

3. Setup policies for the new tunnel, ***Firewall->Policy:***

Click ***Global policy parameters***

Enable **Allow all VPN traffic: internal->VPN, VPN->internal and VPN->VPN**

Click ***Apply***

4. Set up authentication source, ***Firewall->Users***:

Select **Local database**

Click ***Apply***

5. Add a new user, ***Firewall->Users***:

Under **Users in local database** click ***Add new***

Name the new user **HomeUser**

Enter password: **1234567890**

Retype password: **1234567890**

Leave static client IP empty (could also be set to eg 192.168.1.200. If no IP is set here the IP pool from the PPTP server settings are used).

Click ***Apply***

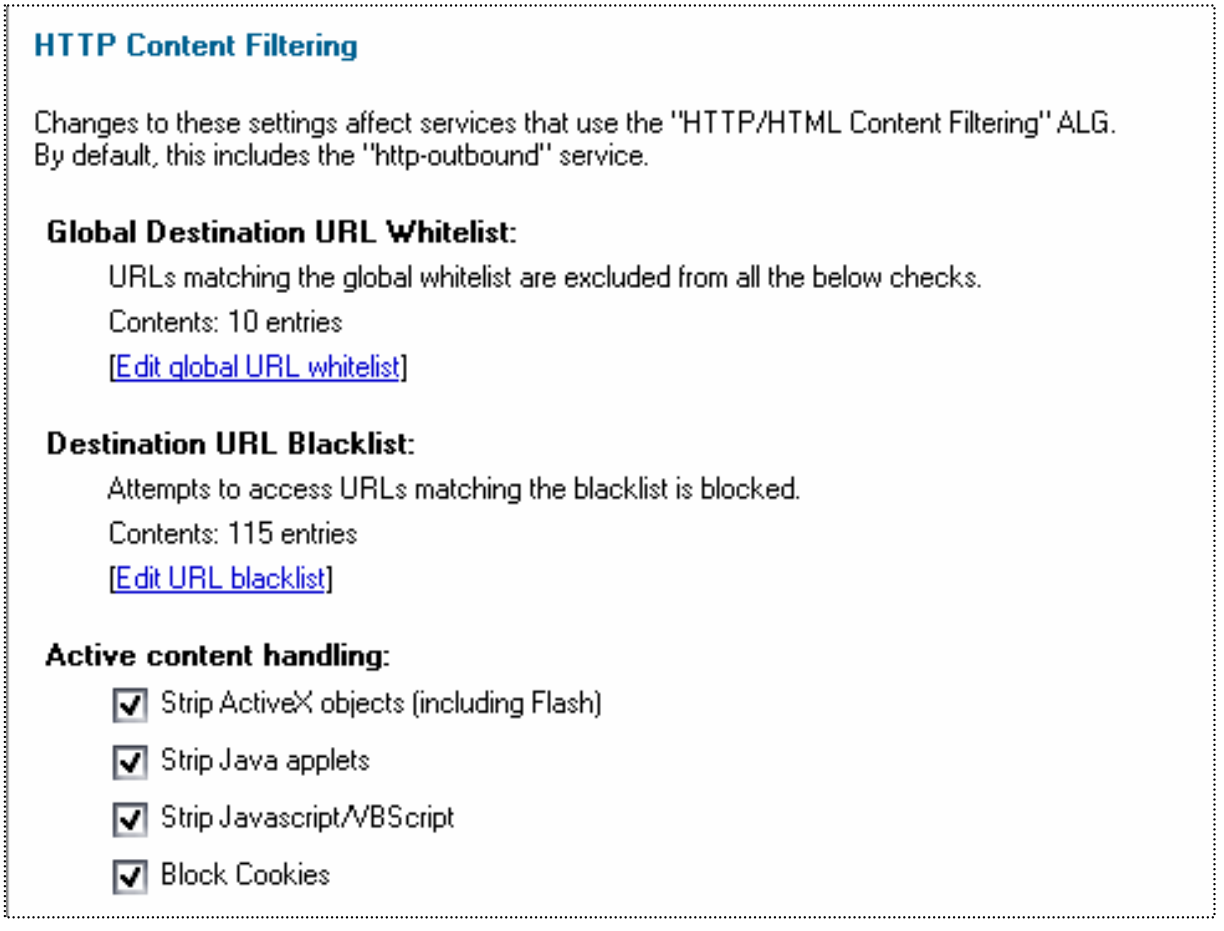
6. Click ***Activate*** and wait for the firewall to restart.

This example will allow *all* traffic from the client to the main office network. To get a more secure solution read the **Settings for the Main office** part of **A more secure LAN-to-LAN VPN solution** section in this chapter.

Content filtering

To enable content filtering, follow these steps:

1. Update the content filtering settings, ***Firewall->Content Filtering***:



Select what content that should be filtered out. ActiveX, Java applets, JavaScript/VBScript and cookies can be blocked or filtered out. Note that some web pages don't work very well if these options are enabled.

Pages that are safe or trusted can be added to the whitelist by clicking **Edit global URL whitelist**. To enable all subdomains of eg google.com (eg gmail.google.com) and all possible pages on that site, enter ***.google.com/*** in this list. This will allow for example www.google.com/about.html and gmail.google.com.

In the same way servers can be blocked by adding them to the blacklist. Click **Edit global URL blacklist** and add the sites that should be blocked. File extensions can also be blocked. If you for example don't want users to be able to download executable files add ***.exe** in this list.

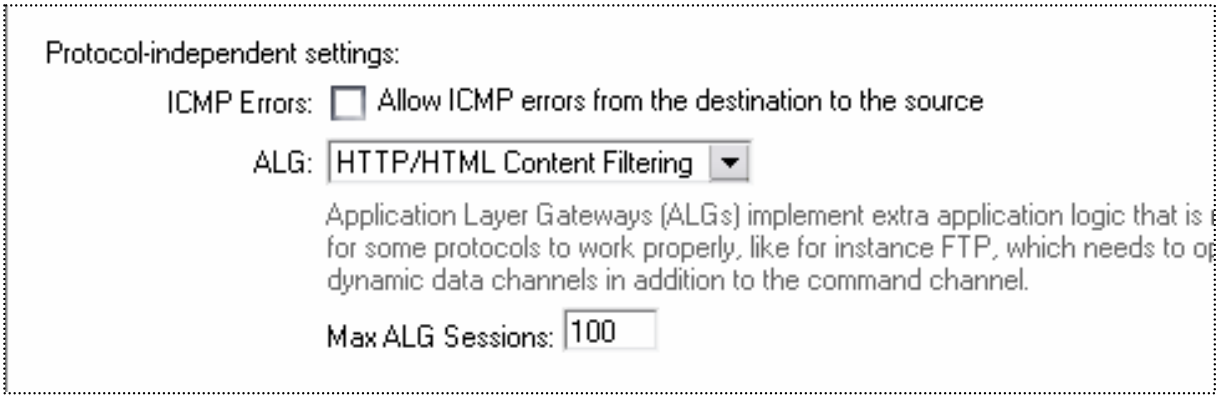
2. Make sure the http-outbound service exists and is using the HTTP ALG,

Firewall->Services:

Find the **http-outbound** service in the list and click ***Edit***. If there is no service with that name you will have to create one by clicking ***Add new*** at the bottom of the list.

TCP / UDP Service should be selected and protocol should be set to **TCP**.

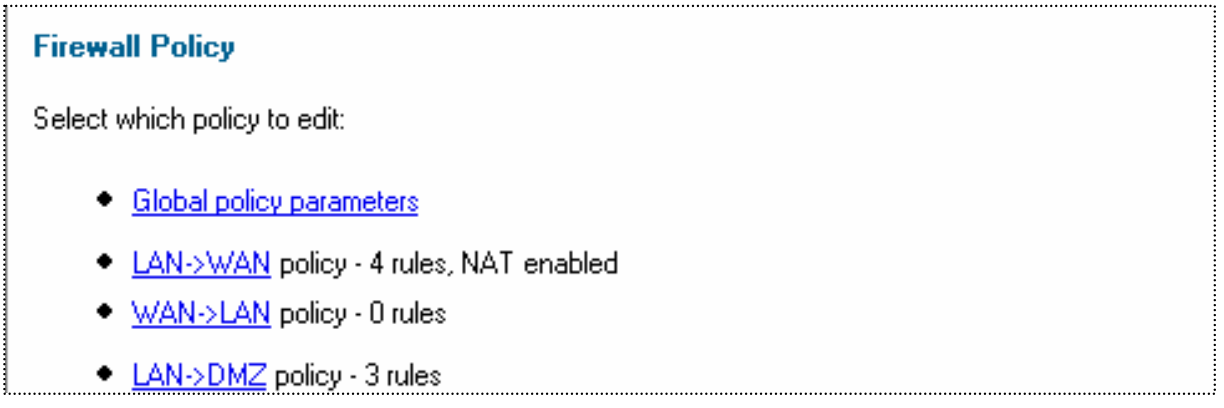
Set destination port to **80**.



Select **HTTP/HTML Content Filtering** in the ALG dropdown.

Click ***Apply***

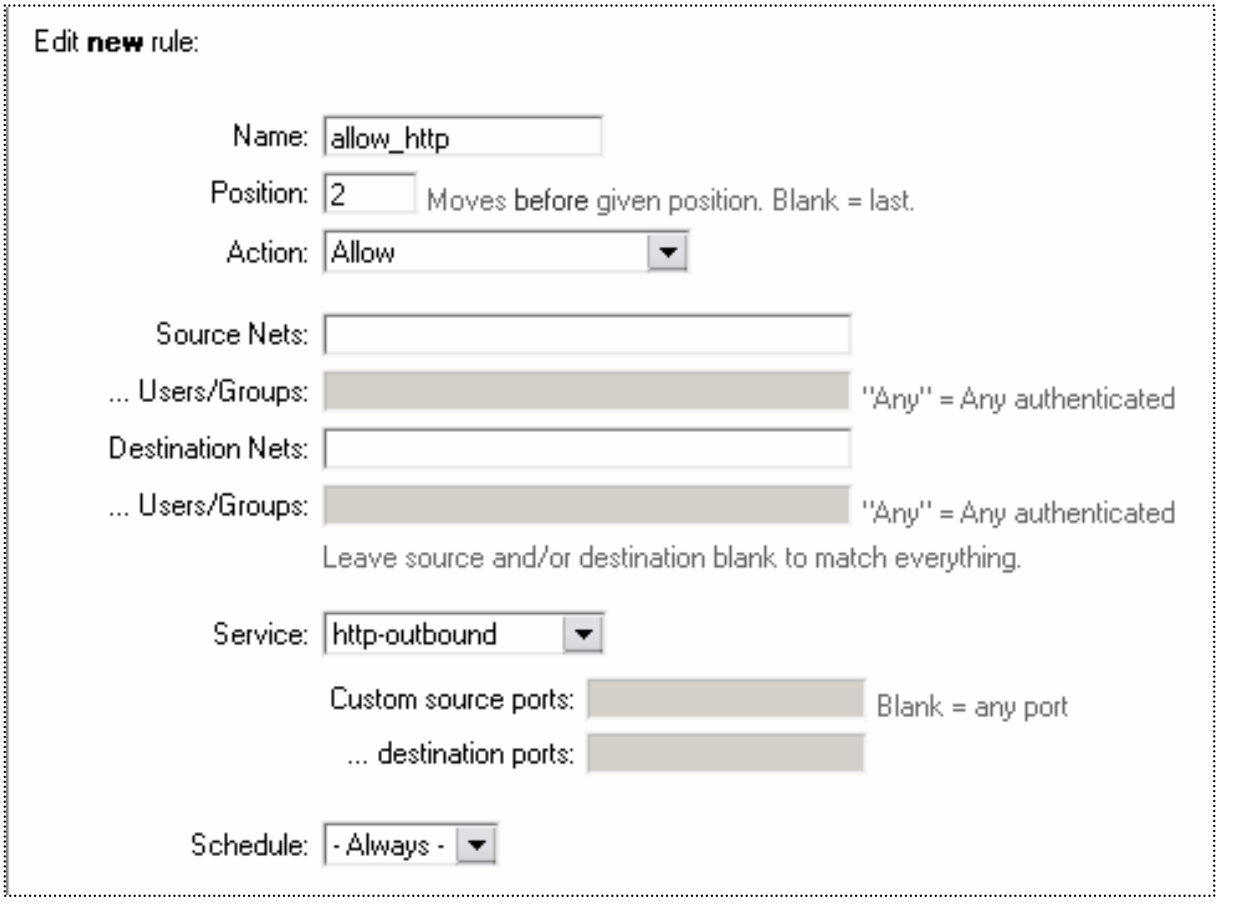
3. Now add a policy rule that uses this service, ***Firewall->Policy***:



Click ***LAN->WAN***

Click ***Add new***

4. Edit the new policy we just created



Name the rule **allow_http**

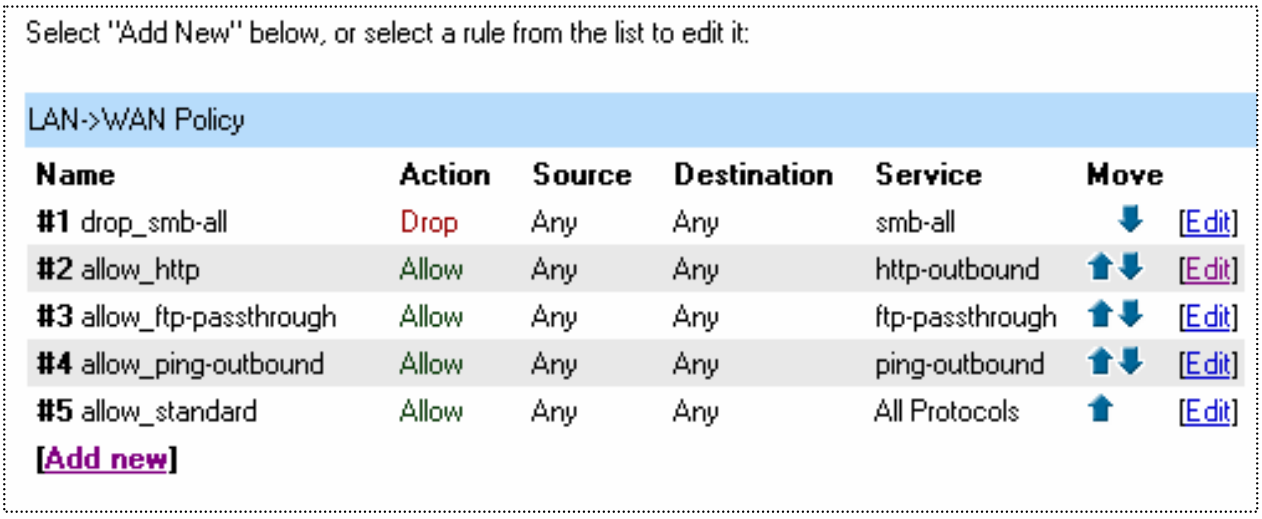
Enter position **2**

Select action **Allow**

Select service **http-outbound**

Select schedule **Always**

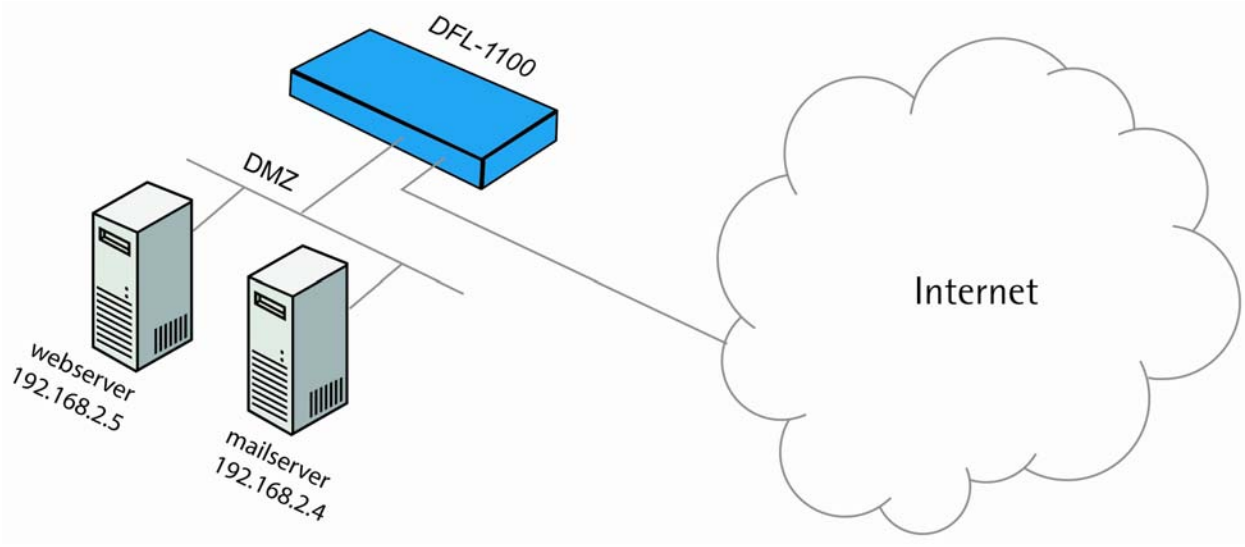
Click ***Apply***



The new policy should now be added to position two in the list (if not, it can be moved to the right position by clicking on the up and down arrows).

5. Click ***Activate*** and wait for the firewall to restart.

Intrusion detection and prevention



Intrusion detection and prevention can be enabled for both policies and port mappings. In this example we are using a port mapping. The policy setup is quite similar.

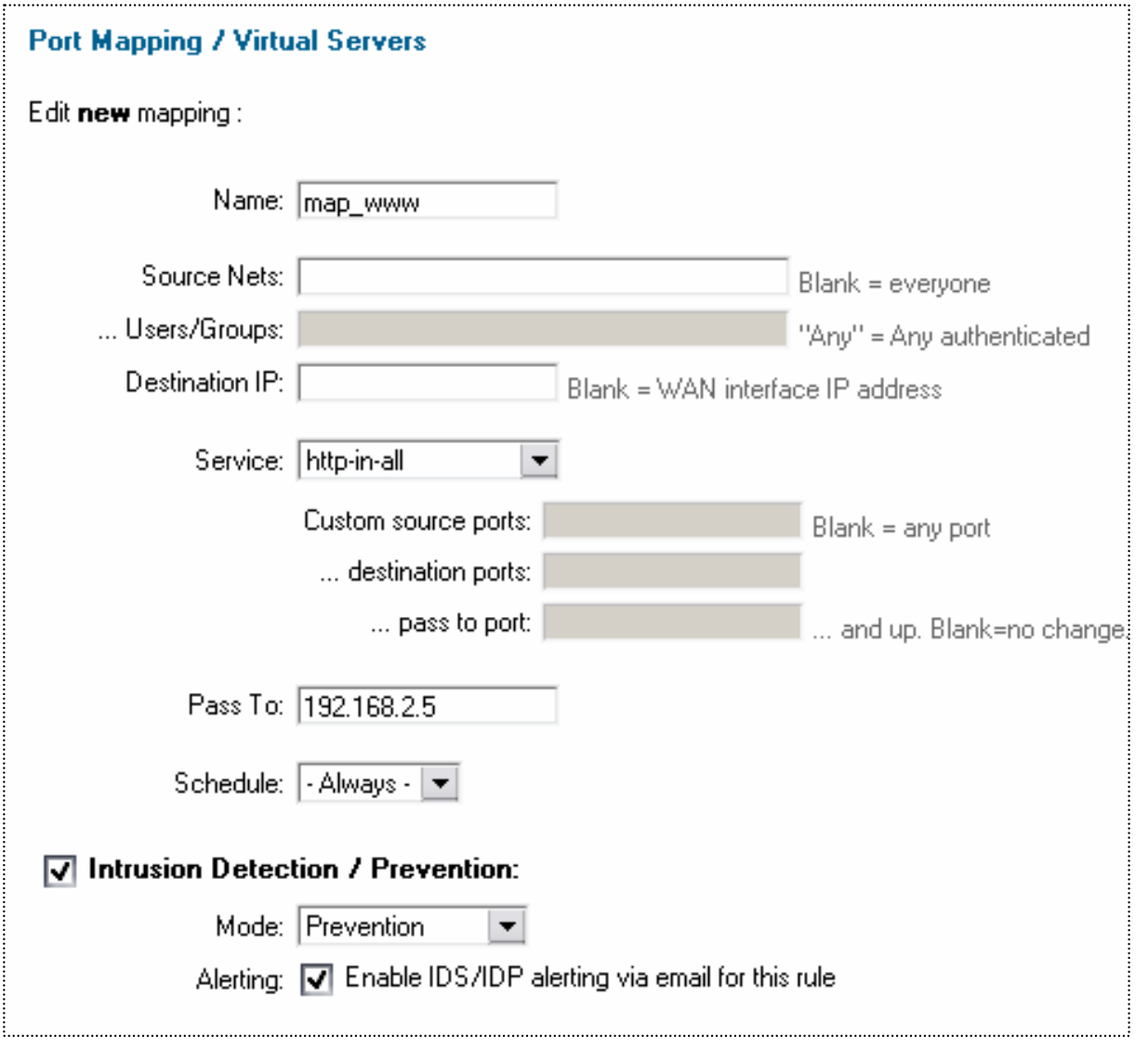
In this example a mail server with IP 192.168.2.4 and a web server with IP 192.168.2.5 is connected to the DMZ interface on the firewall.

To set up intrusion detection and prevention to a web server on the DMZ net, follow these steps:

1. Create a Port mapping for the web server, ***Firewall->Port Mapping***:

Under **Configured mappings**, click ***Add new***

2. Set up the newly created port mapping:



Name the rule **map_www**

Select service **http-in-all**

Enter pass to IP: **192.168.2.5** (the IP of the web server)

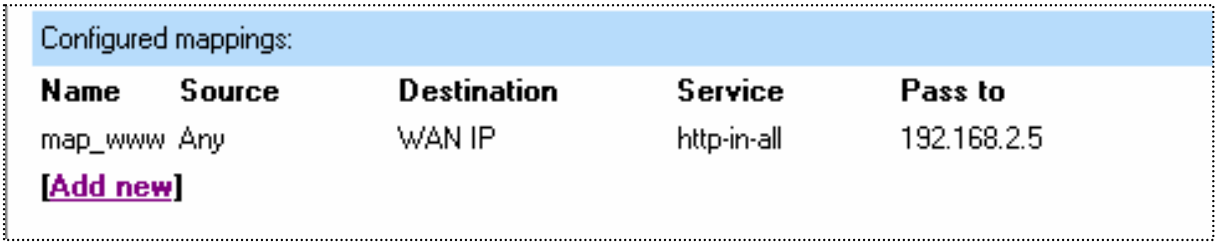
Check the **Intrusion detection / prevention** option

Select mode **Prevention**

Enable email alerting by checking the **Alerting** box

Click ***Apply***

The new mapping is now in the list.



3. Setup email server and enable alerting, ***System->Logging***:

Check **Enable E-mail alerting for IDS/IDP events**

Select sensitivity **Normal**

Enter SMTP server IP (email server): **192.168.2.4**

Enter sender: **idsalert@examplecompany.com**

Enter E-mail address 1: **webmaster@examplecompany.com**

Enter E-mail address 2: **steve@examplecompany.com**

Click ***Apply***

4. Click ***Activate*** and wait for the firewall to restart.

When attacks are stopped by the firewall it will listed in the logs. Since we enabled email alerting in this example, emails will also be sent to the users **webmaster** and **steve**.

In this example we used the **prevention** mode. This means that the firewall will block all attacks. In **Inspection only** mode nothing will be blocked, the firewall will only log the attacks and send email alerts (if that is enabled).

Appendixes

Appendix A: ICMP Types and Codes

The Internet Control Message Protocol (ICMP) has many messages that are identified by a “type” field; many of these ICMP types have a "code" field. Here we list the types with their assigned code fields.

Type	Name	Code	Description	Reference
0	Echo Reply	0	No Code	RFC792
3	Destination Unreachable	0	Net Unreachable	RFC792
		1	Host Unreachable	RFC792
		2	Protocol Unreachable	RFC792
		3	Port Unreachable	RFC792
		4	Fragmentation Needed and Don't Fragment was Set	RFC792
		5	Source Route Failed	RFC792
		6	Destination Network Unknown	RFC792
		7	Destination Host Unknown	RFC792
		8	Source Host Isolated	RFC792
		9	Communication with Destination Network is Administratively Prohibited	RFC792
		10	Communication with Destination Host is Administratively Prohibited	RFC792
		11	Destination Network Unreachable for Type of Service	RFC792
		12	Destination Host Unreachable for Type of Service	RFC792
		13	Communication Administratively Prohibited	RFC1812
		14	Host Precedence Violation	RFC1812
		15	Precedence cutoff in effect	RFC1812
4	Source Quench	0	No Code	RFC792

5	Redirect	0	Redirect Datagram for the Network (or subnet)	RFC792
		1	Redirect Datagram for the Host	RFC792
		2	Redirect Datagram for the Type of Service and Network	RFC792
		3	Redirect Datagram for the Type of Service and Host	RFC792
8	Echo	0	No Code	RFC792
9	Router Advertisement	0	Normal router advertisement	RFC1256
		16	Does not route common traffic	RFC2002
10	Router Selection	0	No Code	RFC1256
11	Time Exceeded	0	Time to Live exceeded in Transit	RFC792
		1	Fragment Reassembly Time Exceeded	RFC792
12	Parameter Problem	0	Pointer indicates the error	RFC792
		1	Missing a Required Option	RFC1108
		2	Bad Length	RFC792
13	Timestamp	0	No Code	RFC792
14	Timestamp Reply	0	No Code	RFC792
15	Information Request	0	No Code	RFC792
16	Information Reply	0	No Code	RFC792
17	Address Mask Request	0	No Code	RFC950
18	Address Mask Reply	0	No Code	RFC950
30	Traceroute			RFC1393
31	Datagram Conversion Error			RFC1475
40	Photuris			RFC2521
		0	Bad SPI	RFC2521
		1	Authentication Failed	RFC2521
		2	Decompression Failed	RFC2521
		3	Decryption Failed	RFC2521
		4	Need Authentication	RFC2521
		5	Need Authorization	RFC2521

Source: http://www.iana.org/assignments/icmp-parameters

Appendix B: Common IP Protocol Numbers

These are some of the more common IP Protocols, for all follow the link after the table.

Decimal	Keyword	Description	Reference
1	ICMP	Internet Control Message	RFC792
2	IGMP	Internet Group Management	RFC1112
3	GGP	Gateway-to-Gateway	RFC823
4	IP	IP in IP (encapsulation)	RFC2003
5	ST	Stream	RFC1190, RFC1819
6	TCP	Transmission Control	RFC793
8	EGP	Exterior Gateway Protocol	RFC888
17	UDP	User Datagram	RFC768
47	GRE	General Routing Encapsulation	
50	ESP	Encapsulation Security Payload	RFC2406
51	AH	Authentication Header	RFC2402
108	IPComp	I IP Payload Compression Protocol	RFC2393
112	VRRP	Virtual Router Redundancy Protocol	
115	L2TP	Layer Two Tunneling Protocol	

Source: http://www.iana.org/assignments/protocol-numbers

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D-Link provides this limited warranty for its product only to the person or entity who originally purchased the product from D-Link or its authorized reseller or distributor.

Limited Hardware Warranty: D-Link warrants that the hardware portion of the D-Link products described below ("Hardware") will be free from material defects in workmanship and materials from the date of original retail purchase of the Hardware, for the period set forth below applicable to the product type ("Warranty Period") if the Hardware is used and serviced in accordance with applicable documentation; provided that a completed Registration Card is returned to an Authorized D-Link Service Office within ninety (90) days after the date of original retail purchase of the Hardware. If a completed Registration Card is not received by an authorized D-Link Service Office within such ninety (90) period, then the Warranty Period shall be ninety (90) days from the date of purchase.

Product Type	Warranty Period
Product (excluding power supplies and fans)	One (1) Year
Power Supplies and Fans	One (1) Year
Spare parts and spare kits	Ninety (90) days

D-Link's sole obligation shall be to repair or replace the defective Hardware at no charge to the original owner. Such repair or replacement will be rendered by D-Link at an Authorized D-Link Service Office. The replacement Hardware need not be new or of an identical make, model or part; D-Link may in its discretion may replace the defective Hardware (or any part thereof) with any reconditioned product that D-Link reasonably determines is substantially equivalent (or superior) in all material respects to the defective Hardware. The Warranty Period shall extend for an additional ninety (90) days after any repaired or replaced Hardware is delivered. If a material defect is incapable of correction, or if D-Link determines in its sole discretion that it is not practical to repair or replace the defective Hardware, the price paid by the original purchaser for the defective Hardware will be refunded by D-Link upon return to D-Link of the defective Hardware. All Hardware (or part thereof) that is replaced by D-Link, or for which the purchase price is refunded, shall become the property of D-Link upon replacement or refund.

Limited Software Warranty: D-Link warrants that the software portion of the product ("Software") will substantially conform to D-Link's then current functional specifications for the Software, as set forth in the applicable documentation, from the date of original delivery of the Software for a period of ninety (90) days ("Warranty Period"), if the Software is properly installed on approved hardware and operated as contemplated in its documentation. D-Link further warrants that, during the Warranty Period, the magnetic media on which D-Link delivers the Software will be free of physical defects. D-Link's sole obligation shall be to replace the non-conforming Software (or defective media) with software that substantially conforms to D-Link's functional specifications for the Software. Except as otherwise agreed by D-Link in writing, the replacement Software is provided only to the original licensee, and is subject to the terms and conditions of the license granted by D-Link for the Software. The Warranty Period shall extend for an additional ninety (90) days after any replacement Software is delivered. If a material non-conformance is incapable of correction, or if D-Link determines in its sole discretion that it is not practical to replace the non-conforming Software, the price paid by the original licensee for the non-conforming Software will be refunded by D-Link; provided that the non-conforming Software (and all copies thereof) is first returned to D-Link. The license granted respecting any Software for which a refund is given automatically terminates.

What You Must Do For Warranty Service:

Registration Card. The Registration Card provided at the back of this manual must be completed and returned to an Authorized D-Link Service Office for each D-Link product within ninety (90) days after

the product is purchased and/or licensed. The addresses/telephone/fax list of the nearest Authorized D-Link Service Office is provided in the back of this manual. FAILURE TO PROPERLY COMPLETE AND TIMELY RETURN THE REGISTRATION CARD MAY AFFECT THE WARRANTY FOR THIS PRODUCT.

Submitting A Claim. Any claim under this limited warranty must be submitted in writing before the end of the Warranty Period to an Authorized D-Link Service Office. The claim must include a written description of the Hardware defect or Software nonconformance in sufficient detail to allow D-Link to confirm the same. The original product owner must obtain a Return Material Authorization (RMA) number from the Authorized D-Link Service Office and, if requested, provide written proof of purchase of the product (such as a copy of the dated purchase invoice for the product) before the warranty service is provided. After an RMA number is issued, the defective product must be packaged securely in the original or other suitable shipping package to ensure that it will not be damaged in transit, and the RMA number must be prominently marked on the outside of the package. The packaged product shall be insured and shipped to D-Link, 17595 Mt. Herrmann Street Fountain Valley, CA 92708 USA, with all shipping costs prepaid. D-Link may reject or return any product that is not packaged and shipped in strict compliance with the foregoing requirements, or for which an RMA number is not visible from the outside of the package. The product owner agrees to pay D-Link's reasonable handling and return shipping charges for any product that is not packaged and shipped in accordance with the foregoing requirements, or that is determined by D-Link not to be defective or non-conforming.

What Is Not Covered:

This limited warranty provided by D-Link does not cover:
Products that have been subjected to abuse, accident, alteration, modification, tampering, negligence, misuse, faulty installation, lack of reasonable care, repair or service in any way that is not contemplated in the documentation for the product, or if the model or serial number has been altered, tampered with, defaced or removed; Initial installation, installation and removal of the product for repair, and shipping costs; Operational adjustments covered in the operating manual for the product, and normal maintenance; Damage that occurs in shipment, due to act of God, failures due to power surge, and cosmetic damage; and Any hardware, software, firmware or other products or services provided by anyone other than D-Link.

Disclaimer of Other Warranties:

EXCEPT FOR THE LIMITED WARRANTY SPECIFIED HEREIN, THE PRODUCT IS PROVIDED "AS-IS" WITHOUT ANY WARRANTY OF ANY KIND INCLUDING, WITHOUT LIMITATION, ANY WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NON-INFRINGEMENT. IF ANY IMPLIED WARRANTY CANNOT BE DISCLAIMED IN ANY TERRITORY WHERE A PRODUCT IS SOLD, THE DURATION OF SUCH IMPLIED WARRANTY SHALL BE LIMITED TO NINETY (90) DAYS. EXCEPT AS EXPRESSLY COVERED UNDER THE LIMITED WARRANTY PROVIDED HEREIN, THE ENTIRE RISK AS TO THE QUALITY, SELECTION AND PERFORMANCE OF THE PRODUCT IS WITH THE PURCHASER OF THE PRODUCT.

Limitation of Liability: TO THE MAXIMUM EXTENT PERMITTED BY LAW, D-LINK IS NOT LIABLE UNDER ANY CONTRACT, NEGLIGENCE, STRICT LIABILITY OR OTHER LEGAL OR EQUITABLE THEORY FOR ANY LOSS OF USE OF THE PRODUCT, INCONVENIENCE OR DAMAGES OF ANY CHARACTER, WHETHER DIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL (INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF GOODWILL, WORK STOPPAGE, COMPUTER FAILURE OR MALFUNCTION, LOSS OF INFORMATION OR DATA CONTAINED IN, STORED ON, OR INTEGRATED WITH ANY PRODUCT RETURNED TO D-LINK FOR WARRANTY SERVICE) RESULTING FROM THE

USE OF THE PRODUCT, RELATING TO WARRANTY SERVICE, OR ARISING OUT OF ANY BREACH OF THIS LIMITED WARRANTY, EVEN IF D-LINK HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. THE SOLE REMEDY FOR A BREACH OF THE FOREGOING LIMITED WARRANTY IS REPAIR, REPLACEMENT OR REFUND OF THE DEFECTIVE OR NON-CONFORMING PRODUCT.

GOVERNING LAW: This Limited Warranty shall be governed by the laws of the state of California. Some states do not allow exclusion or limitation of incidental or consequential damages, or limitations on how long an implied warranty lasts, so the foregoing limitations and exclusions may not apply. This limited warranty provides specific legal rights and the product owner may also have other rights which vary from state to state.

Wichtige Sicherheitshinweise

1. Bitte lesen Sie sich diese Hinweise sorgfältig durch.
2. Heben Sie diese Anleitung für den spätern Gebrauch auf.
3. Vor jedem Reinigen ist das Gerät vom Stromnetz zu trennen. Vervenden Sie keine Flüssig- oder Aerosolreiniger. Am besten dient ein angefeuchtetes Tuch zur Reinigung.
4. Um eine Beschädigung des Gerätes zu vermeiden sollten Sie nur Zubehörteile verwenden, die vom Hersteller zugelassen sind.
5. Das Gerät is vor Feuchtigkeit zu schützen.
6. Bei der Aufstellung des Gerätes ist auf sichern Stand zu achten. Ein Kippen oder Fallen könnte Verletzungen hervorrufen. Verwenden Sie nur sichere Standorte und beachten Sie die Aufstellhinweise des Herstellers.
7. Die Belüftungsöffnungen dienen zur Luftzirkulation die das Gerät vor Überhitzung schützt. Sorgen Sie dafür, daß diese Öffnungen nicht abgedeckt werden.
8. Beachten Sie beim Anschluß an das Stromnetz die Anschlußwerte.
9. Die Netzanschlußsteckdose muß aus Gründen der elektrischen Sicherheit einen Schutzleiterkontakt haben.
10. Verlegen Sie die Netzanschlußleitung so, daß niemand darüber fallen kann. Es sollete auch nichts auf der Leitung abgestellt werden.
11. Alle Hinweise und Warnungen die sich am Geräten befinden sind zu beachten.
12. Wird das Gerät über einen längeren Zeitraum nicht benutzt, sollten Sie es vom Stromnetz trennen. Somit wird im Falle einer Überspannung eine Beschädigung vermieden.
13. Durch die Lüftungsöffnungen dürfen niemals Gegenstände oder Flüssigkeiten in das Gerät gelangen. Dies könnte einen Brand bzw. Elektrischen Schlag auslösen.
14. Öffnen Sie niemals das Gerät. Das Gerät darf aus Gründen der elektrischen Sicherheit nur von authorisiertem Servicepersonal geöffnet werden.
15. Wenn folgende Situationen auftreten ist das Gerät vom Stromnetz zu trennen und von einer qualifizierten Servicestelle zu überprüfen:

a – Netzkabel oder Netzstecker sint beschädigt.
b – Flüssigkeit ist in das Gerät eingedrungen.
c – Das Gerät war Feuchtigkeit ausgesetzt.
d – Wenn das Gerät nicht der Bedienungsanleitung ensprechend funktioniert oder Sie mit Hilfe dieser Anleitung keine Verbesserung erzielen.
e – Das Gerät ist gefallen und/oder das Gehäuse ist beschädigt.
f – Wenn das Gerät deutliche Anzeichen eines Defektes aufweist.

16. Bei Reparaturen dürfen nur Orginalersatzteile bzw. den Orginalteilen entsprechende Teile verwendet werden. Der Einsatz von ungeeigneten Ersatzteilen kann eine weitere Beschädigung hervorrufen.
17. Wenden Sie sich mit allen Fragen die Service und Repartur betreffen an Ihren Servicepartner. Somit stellen Sie die Betriebssicherheit des Gerätes sicher.
18. Zum Netzanschluß dieses Gerätes ist eine geprüfte Leitung zu verwenden, Für einen Nennstrom bis 6A und einem Gerätegewicht gr ßer 3kg ist eine Leitung nicht leichter als H05VV-F, 3G, 0.75mm2

einzusetzen.

Trademarks

Copyright Statement

CE Mark Warning

This is a Class B product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures

Warnung!

Dies ist in Produkt der Klasse B. Im Wohnbereich kann dieses Produkt Funkstoerungen verursachen. In diesem Fall kann vom Benutzer verlangt werden, angemessene Massnahmen zu ergreifen.

Advertencia de Marca de la CE

Este es un producto de Clase B. En un entorno doméstico, puede causar interferencias de radio, en cuyo case, puede requerirse al usuario para que adopte las medidas adecuadas.

Attention!

Ceci est un produit de classe B. Dans un environnement domestique, ce produit pourrait causer des interférences radio, auquel cas l`utilisateur devrait prendre les mesures adéquates.

Attenzione!

Il presente prodotto appartiene alla classe B. Se utilizzato in ambiente domestico il prodotto può causare interferenze radio, nel cui caso è possibile che l`utente debba assumere provvedimenti adeguati.

FCC Warning

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-Reorient or relocate the receiving antenna.
-Increase the separation between the equipment and receiver.
-Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
-Consult the dealer or an experienced radio/ TV technician for help.

VCCI Warning

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づくクラスＢ情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。

取扱説明書に従って正しい取り扱いをして下さい。

D-Link Offices

AUSTRALIA **D-LINK AUSTRALIA**
1 Giffnock Ave,North Ryde, NSW 2113, Australia
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TOLL FREE: 1800-177-100 (Australia), 0800-900900 (New Zealand)
E-MAIL: support@dlink.com.au, info@dlink.com.au URL: www.dlink.com.au

BENELUX **D-LINK BENELUX**
Fellenoord 130, 5611 ZB Eindhoven, The Netherlands
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E-MAIL:info@dlink-benelux.nl, info@dlink-benelux.be URL: www.dlink-benelux.nl/, www.dlink-benelux.be/

CANADA **D-LINK CANADA**
#2180 Winston Park Drive, Oakville, Ontario, L6H 5W1 Canada
TEL: 1-905-829-5033 FAX: 1-905-829-5095 FREE CALL: 1-800-354-6522
E-MAIL: techsup@dlink.ca URL: www.dlink.ca FTP: ftp.dlinknet.com

CHILE **D-LINK SOUTH AMERICA**
Isidora Goyeechea 2934 of 702, Las Condes, Santiago – Chile S.A.
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REPAIR LINE: 00800-7250-8000
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10F, 8-8-15 Nishi-Gotanda, Shinagawa-ku, Tokyo 141, Japan
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mailto:mail@dlink.ru , Web: www.dlink.ru

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TEL: 27(0)126652165 FAX: 27(0)126652186
E-MAIL: attie@d-link.co.za URL: www.d-link.co.za

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TEL: 886-2-2910-2626 FAX: 886-2-2910-1515
E-MAIL: dssqa@tsc.dlinktw.com.tw URL: www.dlinktw.com.tw

U.K. **D-LINK EUROPE**
4th Floor, Merit House, Edgware Road, Colindale, London, NW9 5AB, U.K.
TEL: 44-20-8731-5555 FAX: 44-20-8731-5511
E-MAIL: info@dlink.co.uk URL: www.dlink.co.uk

U.S.A. **D-LINK U.S.A.**
17595 Mt. Herrmann Street
Fountain Valley, CA 92708 USA
TEL: 1-714-885-6000 FAX: 1-866-743-4905 INFO LINE: 1-877-453-5465
E-MAIL: tech@dlink.com, support@dlink.com URL: www.dlink.com

Registration Card

Print, type or use block letters.

Your name: Mr./Ms_____

Organization: _____ Dept. _____

Your title at organization: _____

Telephone: _____ Fax: _____

Organization's full address: _____

_____

Country: _____

Date of purchase (Month/Day/Year): _____

Product Model	Product Serial No.	* Product installed in type of computer (e.g., Compaq 486)	* Product installed in computer serial No.

(* Applies to adapters only)

Product was purchased from:

Reseller's name: _____

Telephone: _____ Fax: _____

Reseller's full address: _____

_____

_____

Answers to the following questions help us to support your product:

1. Where and how will the product primarily be used?

☐Home ☐Office ☐Travel ☐Company Business ☐Home Business ☐Personal Use

2. How many employees work at installation site?

☐1 employee ☐2-9 ☐10-49 ☐50-99 ☐100-499 ☐500-999 ☐1000 or more

3. What network protocol(s) does your organization use ?

☐XNS/IPX ☐TCP/IP ☐DECnet ☐Others_____

4. What network operating system(s) does your organization use ?

☐D-Link LANsmart ☐Novell NetWare ☐NetWare Lite ☐SCO Unix/Xenix ☐PC NFS ☐3Com 3+Open
☐Banyan Vines ☐DECnet Pathwork ☐Windows NT ☐Windows NTAS ☐Windows '95
☐Others_____

5. What network management program does your organization use ?

☐D-View ☐HP OpenView/Windows ☐HP OpenView/Unix ☐SunNet Manager ☐Novell NMS
☐NetView 6000 ☐Others_____

6. What network medium/media does your organization use ?

☐Fiber-optics ☐Thick coax Ethernet ☐Thin coax Ethernet ☐10BASE-T UTP/STP
☐100BASE-TX ☐100BASE-T4 ☐100VGAnyLAN ☐Others_____

7. What applications are used on your network?

☐Desktop publishing ☐Spreadsheet ☐Word processing ☐CAD/CAM
☐Database management ☐Accounting ☐Others_____

8. What category best describes your company?

☐Aerospace ☐Engineering ☐Education ☐Finance ☐Hospital ☐Legal ☐Insurance/Real Estate ☐Manufacturing
☐Retail/Chainstore/Wholesale ☐Government ☐Transportation/Utilities/Communication ☐VAR
☐System house/company ☐Other_____

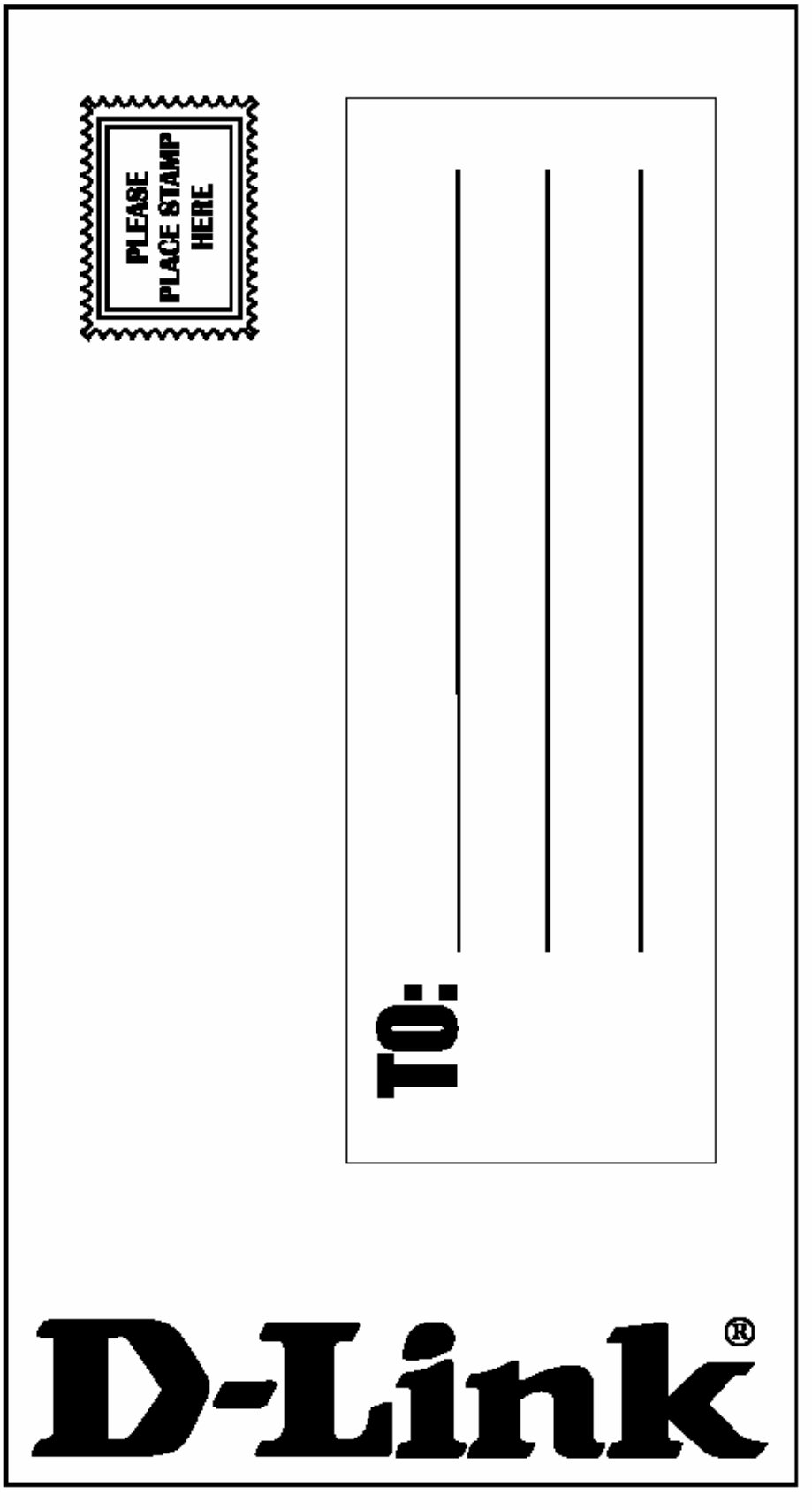
9. Would you recommend your D-Link product to a friend?

☐Yes ☐No ☐Don't know yet

10.Your comments on this product?

_____

_____


PLEASE
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HERE
TO:
D-Link®