D-Link DFL-1100

Network Security Firewall

Manual

October 7, 2004

D-Link

Building Networks for People

Contents

Introduction

The NETDEFEND DFL-1100 provides four 10/100MB Ethernet network interface ports: Internal/LAN, External/WAN, a DMZ port and a port that can be configured as a High Availability Sync port or as an ETH4 port. It also provides an easily operated Web interface 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**
- **High Availability**
- **Bandwidth Management**
  NETDEFEND DFL-1100 features an extensive Traffic Shaper for bandwidth management.
- **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 such as Admin or Read-Only User.

Introduction to Firewalls

A firewall is a device that sits between your computer and the Internet and 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 LANs 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. LANs can be connected over large areas. A collection of LANs 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 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 setup for your needs.

LEDs & Hardware Connections

WAN, LAN, DMZ & ETH4/Sync: Ethernet Link port indicators, Green. The Act LED flickers when the ports are sending or receiving data.

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

Status: System status indicators, flashes to indicate an active system. If the LED has a solid light please contact technical support.

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

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

Internal Ports (LAN): Use this port to connect to the internal network of 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).

ETH4/Sync Port: Use this port as an extra LAN or DMZ port, or when using High Availability as the Sync interface.

Package Contents

Contents of Package:

- **D-Link NETDEFEND DFL-1100 Firewall**
- Manual and CD
- Power cord
- Installation Guide – Mini Manual
- CAT5 - Straight-through
- CAT5 - Crossover

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

System Requirements

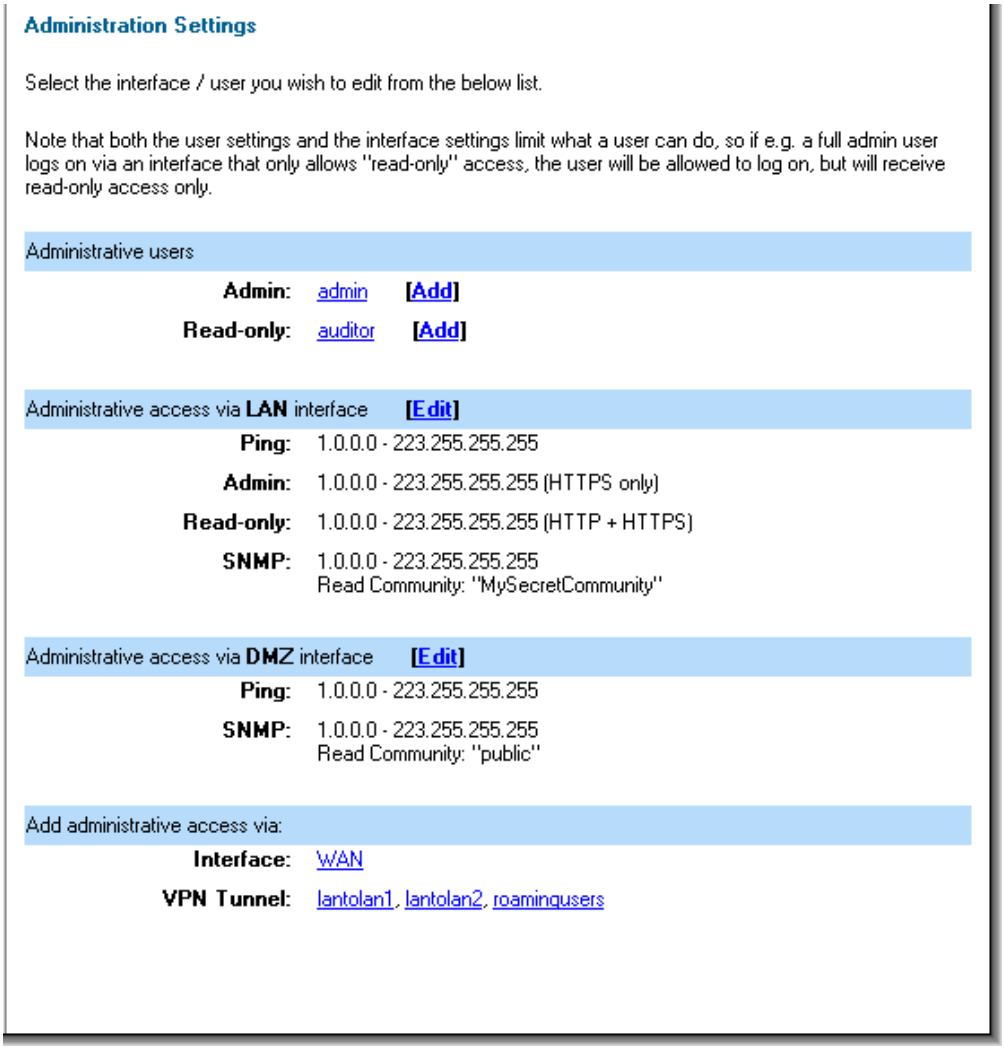
- Computer with a Windows, Macintosh, or Unix based operating system with an installed Ethernet adapter
- Internet Explorer or Netscape Navigator, version 6.0 or above, with JavaScript enabled.

Important Note about Managing the D-Link NETDEFEND DFL-1100

When a change is made to the configuration, a new icon named **Activate Changes** will appear. When all changes have been made, click **Activate Changes** on the **Activate Configuration Changes** page. The DFL-1100 will save the configuration, reload it, and the new changes will take effect. For the change to become permanent, the admin needs to login again. This needs to be done before the configurable timeout has been reached; this can be set on the **Activate Configuration Changes** page, by choosing the time from the dropdown menu.

Administration Settings

Administrative Access



Ping – If enabled, specifies who can ping the interface IP of the NETDEFEND DFL-1100. The default setting allows anyone to ping the interface IP.

Admin – If enabled allows all users with admin access to connect to the DFL-1100 and change the configuration, which can be **HTTPS** or **HTTP and HTTPS**.

Read-Only – If enabled allows all users with read-only access to connect to the DFL-1100 and look at the configuration, which can be **HTTPS** or **HTTP and HTTPS**.

SNMP – Specifies if SNMP should be allowed or not on the interface, the DFL-1100 supports read-only access.

Add ping access to an interface

Follow these steps to add ping access to an interface.

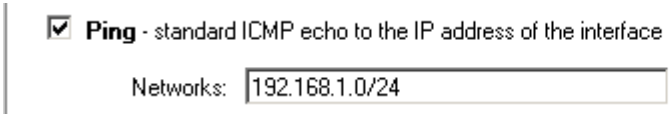
Step 1. Click on the interface to which you would like to add ping access.

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 **Apply** to apply the setting, or click **Cancel** to discard the changes.

Example:



Add Admin access to an interface

To add admin access to an interface, click on that interface. Only users with administrator rights can login on interfaces where admin access only is enabled.

Follow these steps to add admin access to an interface.

Step 1. Click on the interface to which you would like to add admin access.

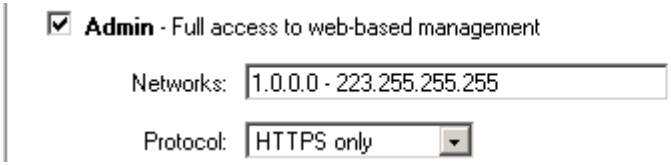
Step 2. Enable the **Admin** checkbox.

Step 3. Specify what networks are allowed to access 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 protocol used to access the DFL-1100 from the dropdown menu, either HTTP and HTTPS (Secure HTTP) or only HTTPS.

Click **Appl**y to apply the setting or click **Cancel** to discard the changes.

Example:



Add Read-only access to an interface

Note that if you have read-only access enabled on an interface, all users will 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.

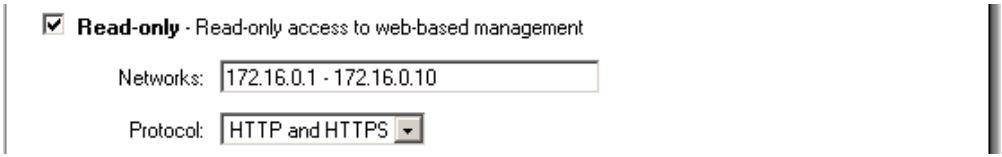
Step 2. Enable the **Read-only** checkbox.

Step 3. Specify which networks are allowed to access 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 protocol used to access the DFL-1100 from the dropdown menu, both HTTP and HTTPS (Secure HTTP), or only HTTPS.

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

Example:



Enable SNMP access to an interface

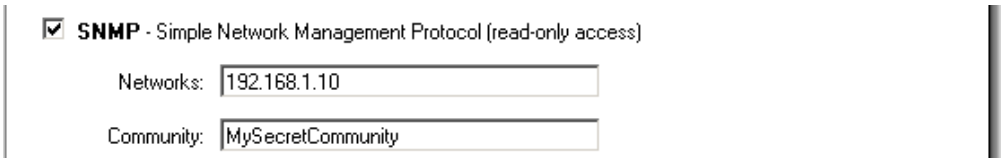
Follow these steps to add read-only SNMP access to an interface.

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

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

Step 3. Specify what network addresses are allowed to receive SNMP Traps, 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-1100.

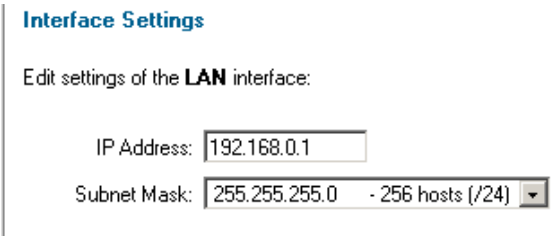


Click the **Apply** button to apply the setting, or click **Cancel** to discard the changes.

System

Interfaces

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



Change the IP of the LAN, DMZ or ETH4 interface

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

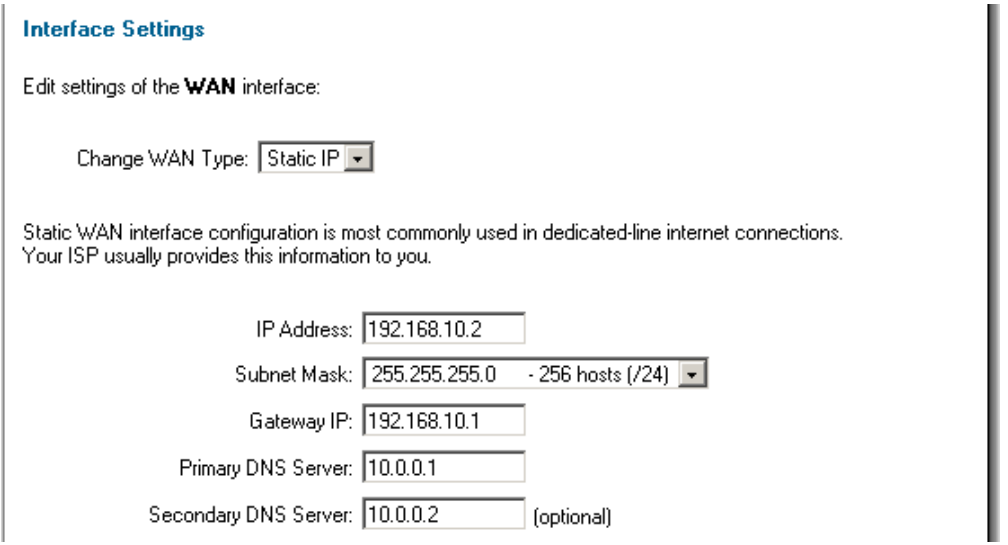
Step 1. Choose which interface to view or change under the Available interfaces list.

Step 2. Fill in the IP address of the **LAN**, **DMZ** or **ETH4** interface. These are the addresses that will be used to ping the firewall, remotely control it, use as a gateway for the internal hosts or DMZ hosts.

Step 3. Choose the correct subnet mask of this interface from the dropdown menu.

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

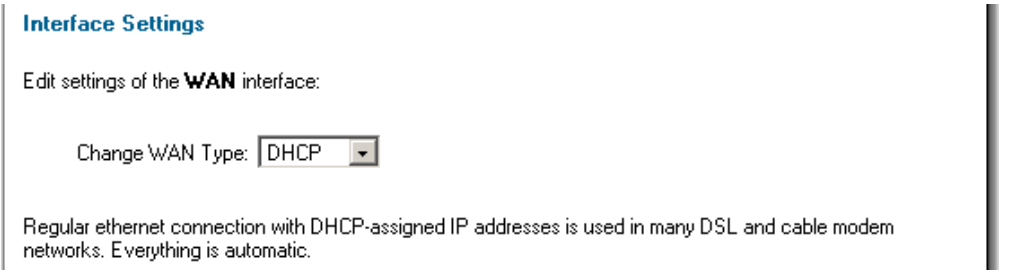
WAN Interface Settings – Using Static IP



If you are using **Static IP** you must fill in the IP address information provided to you by your ISP. All fields are required except the Secondary DNS Server. The numbers displayed in these fields are used only as examples.

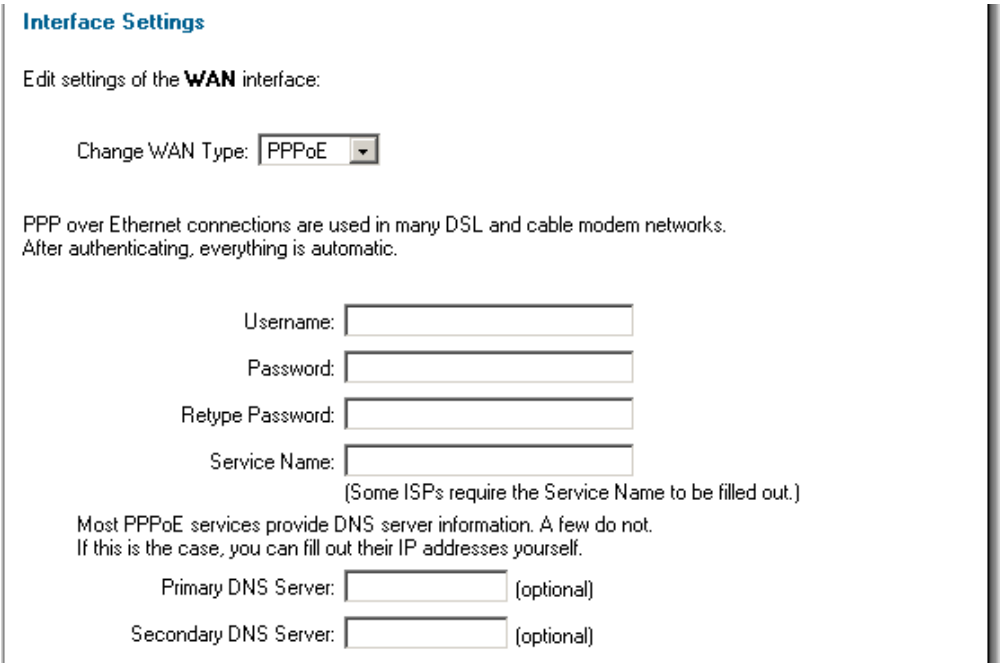
- **IP Address** – The IP address of the **WAN** interface. This is the address that may be used to ping the firewall, remotely control it, and as a source address for dynamically translated connections.
- **Subnet Mask** – Network and subnet identifier.
- **Gateway IP** – Specifies the IP address of 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 the fields.

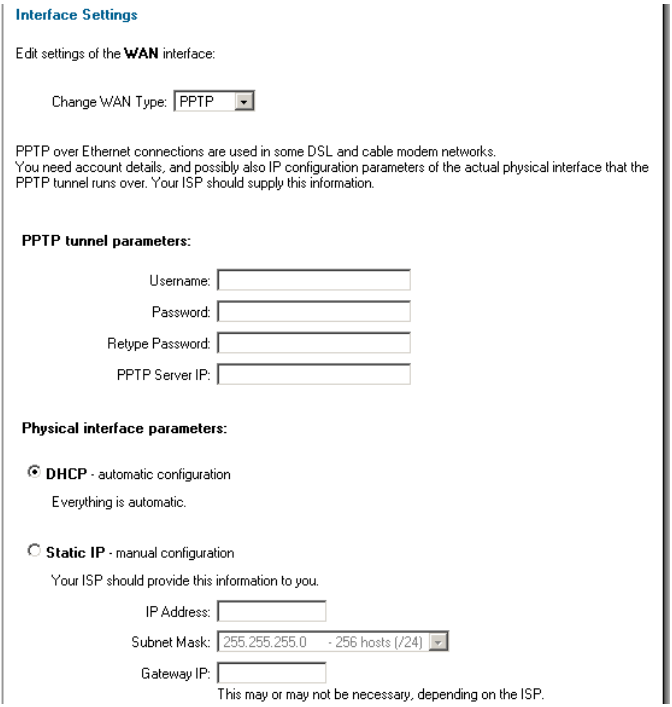
WAN Interface Settings – Using PPPoE



Use the following procedure to configure the NETDEFEND DFL-1100 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. Please enter 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 will need your account details, and you may also need the IP configuration parameters of the actual physical interface of the PPTP tunnel. Your ISP will supply you with this information.

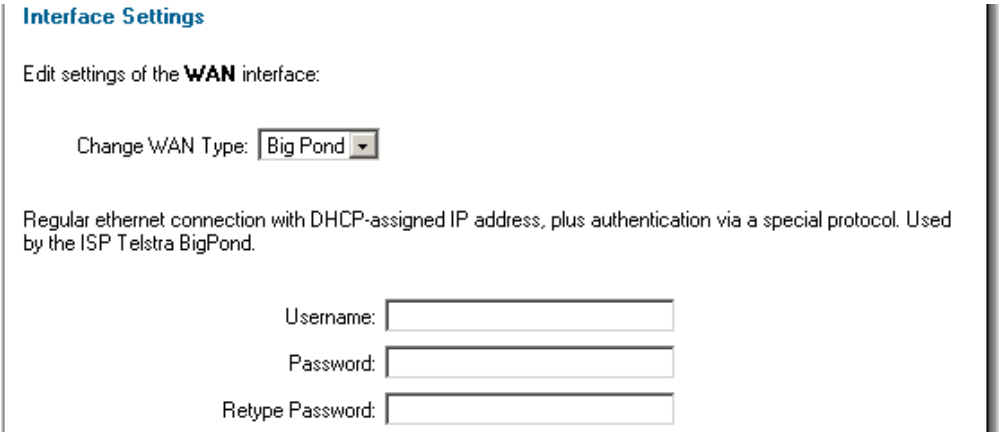
- **Username** – The login or username supplied to you by your ISP.
- **Password** – The password supplied to you by your ISP.
- **PPTP Server IP** – The IP address of the PPTP server that connects to the NETDEFEND DFL-1100.

Before PPTP can be used to connect to your ISP, the physical (WAN) interface parameters need to be supplied. It's possible to use either **DHCP** or **Static IP** depending on the type of ISP used. This information will be supplied by your ISP.

If you are using static IP, please enter the following information.

- **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 access the Internet.

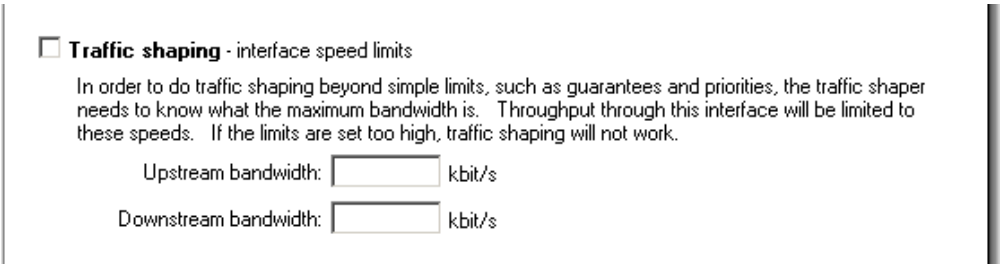
WAN Interface Settings – Using BigPond



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.

Traffic Shaping

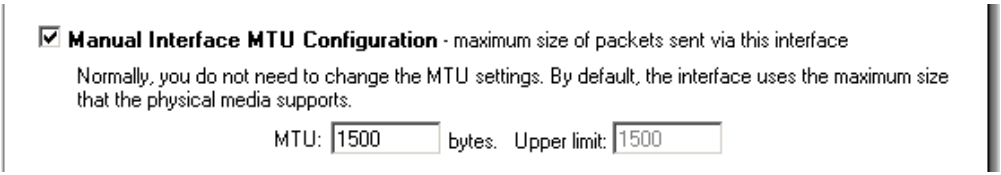


When **Traffic Shaping** is enabled, and the correct maximum up and downstream bandwidth is specified, it's possible to control which policies have the highest priority when large amounts of data are moving through the NETDEFEND DFL-1100. For example, the policy for the web server might be given higher priority than the policies for most employees' computers.

You can use traffic shaping to guarantee the amount of bandwidth available through the firewall for a policy; this will ensure that there is enough bandwidth available for a high-priority service. You can also use traffic shaping to limit the amount of bandwidth available through the firewall for a policy; in this way, you can keep less important services from using bandwidth needed for more important services.

Note: If the limit is set too high, i.e. higher then your Internet connection, the traffic shaping will not work at all.

MTU Configuration



To improve the performance of your Internet connection, you can adjust the maximum transmission unit (MTU) of the packets that the NETDEFEND DFL-1100 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-1100 and the Internet. If the packets the DFL-1100 sends are larger, they get broken up or fragmented, which could slow down transmission speeds.

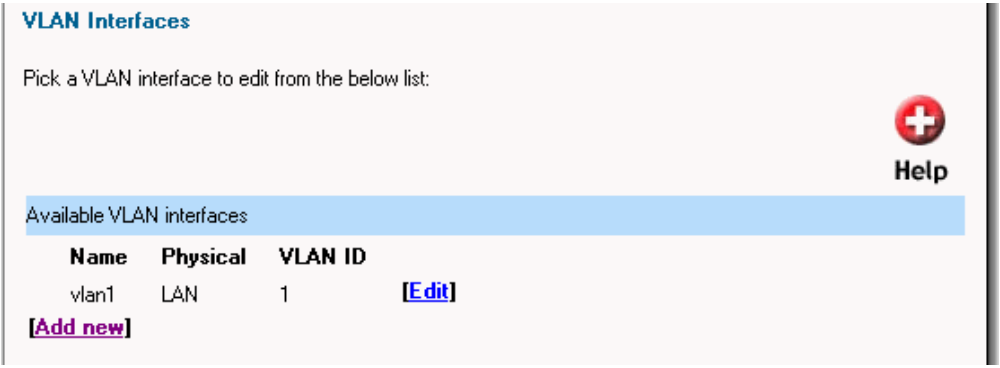
Trial and error is the only sure way of finding the optimal MTU, but there are some guidelines that can help. For example, the MTU of many PPPoE connections is 1480, so if you connect to the Internet via PPPoE, you might want to set the MTU size between 1400 and 1480. DSL modems may also have small MTU 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 **Apply** to apply the setting, or click **Cancel** to discard the changes.

VLAN

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



Add a new VLAN

Follow these steps to add a new VLAN.

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

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

Step 3. Choose the interface for the VLAN from the dropdown menu.

Step 4. Specify the 801.2Q VLAN ID.

Step 5. Fill in the IP address of the **VLAN** interface. This is the address that will be used to ping the firewall, remotely control it and be used as a gateway for hosts on the VLAN.

Step 6. Choose the correct subnet mask of this interface from the dropdown menu.

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

Remove a VLAN

Follow these steps to add or remove a VLAN.

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

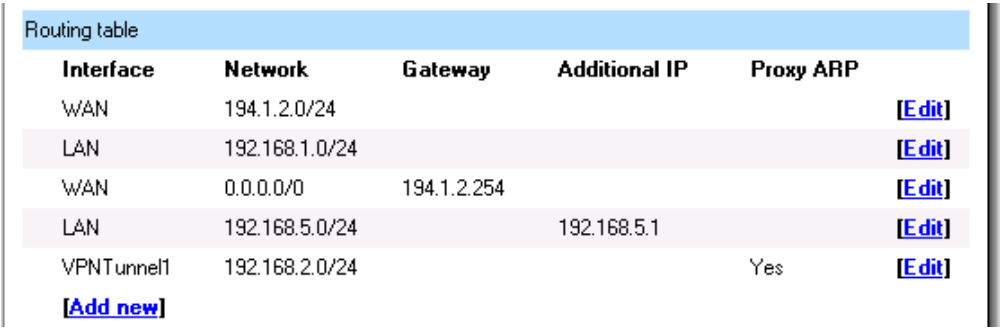
Step 2. Click **Edit** next to the VLAN you would like to remove.

Step 3. Select **Delete this VLAN**.

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

Routing

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



The Routing configuration section shows the firewall's routing table. DFL-1100 has an easy to use interface.

Interface – Specifies the interface through which packets will be sent.

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 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 create 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 through from the dropdown menu.

Step 4. Specify the network and subnet mask.

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

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

Remove a Static Route

Follow these steps to remove a route.

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

Step 2. Click **Edit** at the route you would like to remove.

Step 3. Select **Delete this route**.

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

High Availability

D-Link High Availability works by adding a back-up firewall to your existing firewall. The back-up firewall has the same configuration as the primary firewall. It will stay inactive, monitoring the primary firewall, until it deems that the primary firewall is no longer functioning, at which point it will go active and assume the active role in the cluster. When the other firewall comes back up, it will assume a passive role, monitoring the now active firewall.

What High Availability will do for you

D-Link High Availability will provide a redundant, state-synchronized firewalling solution. This means that the state of the active firewall, i.e., the connection table and other vital information, is continuously copied to the inactive firewall. When the cluster fails over to the inactive firewall, it knows which connections are active, and communication may continue to flow uninterrupted.

The failover time is typically about one second; well in the scope for the normal TCP retransmit timeout, which is normally over one minute. Clients connecting through the firewall will merely experience the failover procedure as a slight burst of packet loss, and, as TCP always does in such situations, retransmit the lost packets within a second or two, and go on communicating.

What High Availability will NOT do for you

Adding redundancy to your firewall setup will eliminate one of the single points of failure in your communication path. However, it is not a panacea for all possible communication failures.

Typically, your firewall is far from the only single point of failure. Redundancy for your routers, switches, and your Internet connection are also issues that need to be addressed.

D-Link High Availability clusters will not create a load-sharing cluster. One firewall will be active, and the other will be inactive.

Multiple back-up firewalls cannot be used in a cluster. Only two firewalls, a "master" and a "slave", are supported.

As is the case with all other firewalls supporting stateful failover, the D-Link High Availability will only work between two D-Link DFL-1100 Firewalls. As the internal workings of different firewalls, and, indeed, different major versions of the same firewall, can be radically different, there is no way of communicating "state" to something which has a completely different comprehension of what "state" means.

IP Addresses explained

For each cluster interface, there are three IP addresses:

- Two "real" IP addresses; one for each firewall. These addresses are used to communicate with the firewalls themselves, i.e., for remote control and monitoring. They should not be associated in any way with traffic flowing through the cluster; if either firewall is inoperative, the associated IP address will simply be unreachable.
- One "virtual" IP address; shared between the firewalls. This is the IP address to use when configuring default gateways and other routing related matters. It is also the address used by dynamic address translation, unless the configuration explicitly specifies another address.

There is not much to say about the real IP addresses; they will act just like firewall interfaces normally do. You can ping them or remote control the firewalls through them if your configuration allows it. ARP queries for the respective addresses are answered by the firewall that owns the IP address, using the normal hardware address, just like normal IP units do.

Note: You must have a static IP address to use HA.

The shared IP address and the failover mechanism

Both firewalls in the cluster know about the shared IP address. ARP queries for the shared IP address, or any other IP address published via the ARP configuration section or through Proxy ARP, will be answered by the active firewall.

The hardware address of the shared IP address, and other published addresses for that matter, is not related to the hardware addresses of the firewall interfaces. Rather, it is constructed from the cluster ID, on the following form: 10-00-00-C1-4A-nn, where nn is the Cluster ID configured in the Settings section.

As the shared IP address always has the same hardware address, there will be no latency time in updating ARP caches of units attached to the same LAN as the cluster when failover occurs.

When a firewall discovers that its peer is no longer operational, it will broadcast a number of ARP queries for itself, using the shared hardware address as sender address, on all interfaces. This causes switches and bridges to re-learn where to send packets destined for the shared hardware address in a matter of milliseconds.

Hence, the only real delay in the failover mechanism is detecting that a firewall is no longer operational.

The activation messages (ARP queries) described above are also broadcast periodically to ensure that switches won't forget where to send packets destined for the shared hardware address.

Cluster heartbeats

A firewall detects that its peer is no longer operational when it can no longer hear "cluster heartbeats" from its peer.

Currently, a firewall will send five cluster heartbeats per second.

When a firewall has "missed" three heartbeats, i.e., after 0.6 seconds, it will be declared inoperative.

Cluster heartbeats have the following characteristics:

- The source IP is the interface address of the sending firewall
- The destination IP is the shared IP address
- The IP TTL is always 255. If a firewall receives a cluster heartbeat with any other TTL, it is assumed that the packet has traversed a router, and hence cannot be trusted at all.
- It is an UDP packet, sent from port 999, to port 999.
- The destination MAC address is the ethernet multicast address corresponding to the shared hardware address, i.e., 11-00-00-C1-4A-nn. Link-level multicasts were chosen over normal unicast packets for security reasons. Using unicast packets would have meant that a local attacker could fool switches to route the heartbeats somewhere else, causing the peer firewall to never hear the heartbeats.

The synchronization interface

Both firewalls are connected to each other by a separate synchronization connection; the fourth port is dedicated solely for this purpose when the firewalls are configured as HA.

The active firewall continuously sends state update messages to its peer, informing it of connections that are opened, connections that are closed, state and lifetime changes in connections, etc. The configuration is also transferred between the nodes using the synchronization connection.

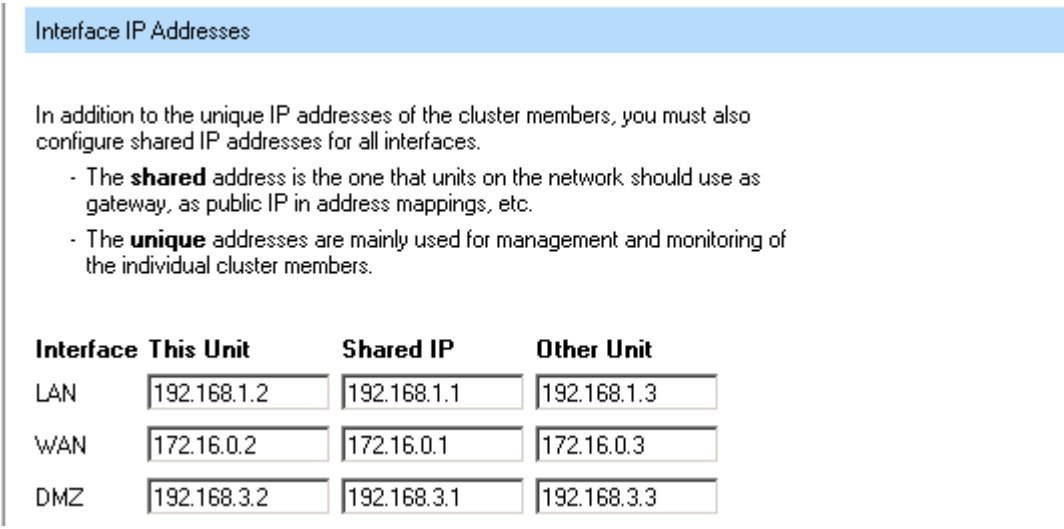
When the active firewall ceases to function, for whatever reason and for even a short time, the cluster heartbeat mechanism described above will cause the inactive firewall to go active. Since it already knows about all open connections, communication can continue to flow uninterrupted.

Setting up a High Availability cluster

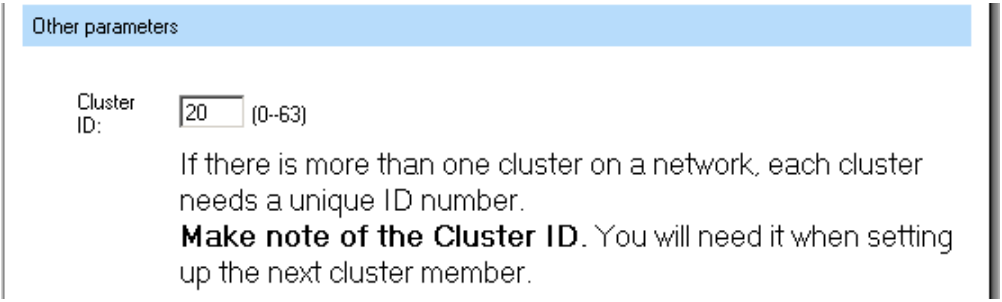
First of all, the two DFL-1100s need to be setup so that you can manage them over the web interface. In this example the two units are configured as follows, the master DFL-1100 will be configured with 192.168.1.2 on its internal interface, and the slave DFL-1100 with 192.168.1.3. Later when the setup of the HA is done, the virtual or shared IP will be 192.168.1.1 on the LAN, this is the IP that clients on that network will use as gateway.

When both units are configured with the two individual IPs they should be connected with a crossover cable between the fourth interfaces on each unit, this interface (ETH4) will not be available to use as an extra DMZ or LAN interface when running HA.

Login to the master firewall and click on **System** in the menu bar, and then click **HA** below it; in this screen you will click on **Configure additional HA parameters**. This will show the screen below; here you will fill in each Unit's own IP and the shared IP on each interface. **This Unit** means the master firewall, the one you should be configuring at the moment. **Other Unit** is the slave firewall, the other DFL-1100.



You also need to configure the Cluster ID of the cluster, this has to be a number between 0 and 63, which must be the same on both firewalls in the cluster. This must be unique to your LAN, if you are running more then one cluster.

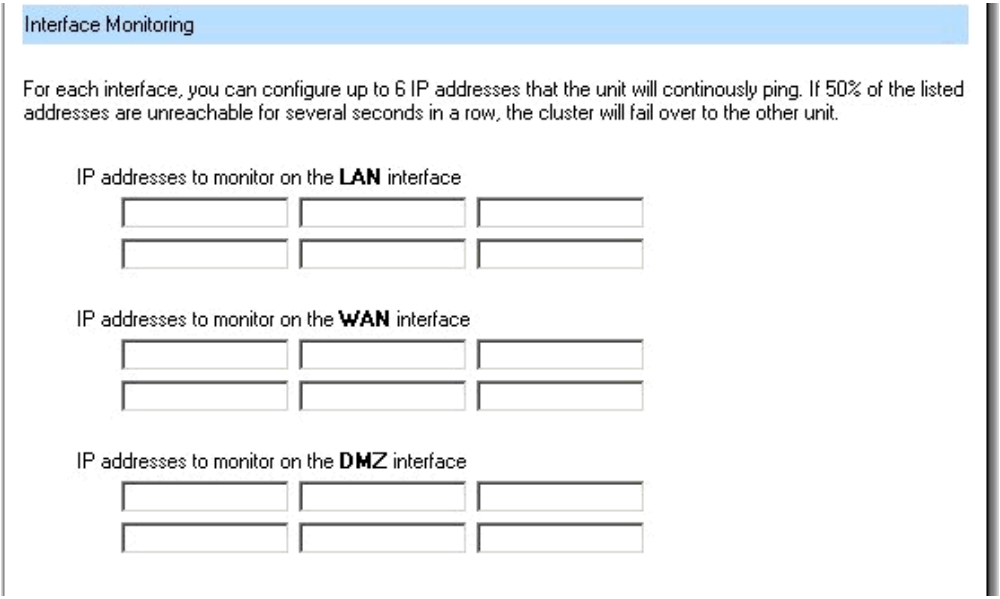


When this is done click **Apply**.

Now login to the slave firewall and go to **System** > **HA**; in this screen you will click on **Receive configuration from first unit**. This will show the screen below; here you will fill in the cluster ID configured on the first unit. When you click **Apply** the unit should transfer the configuration from the first unit, and your HA cluster should be operating.

Interface Monitoring

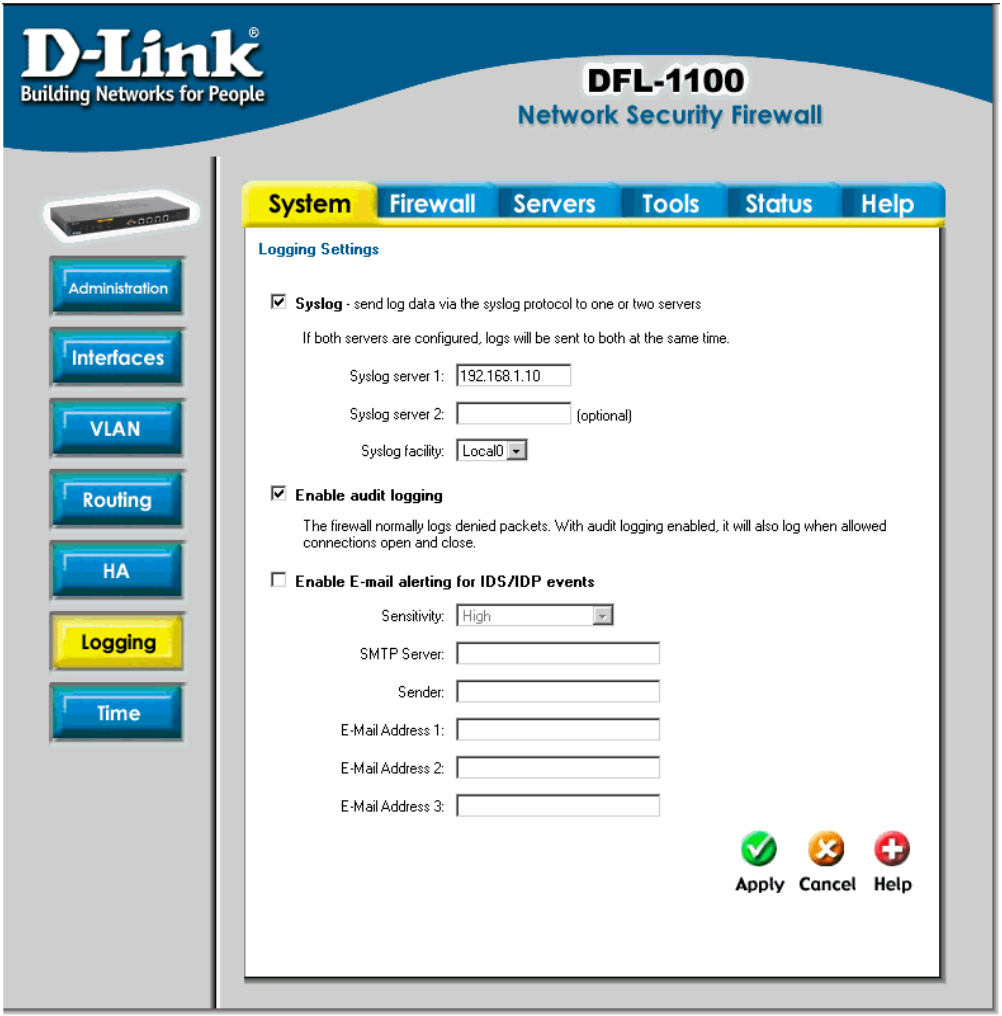
When HA is configured it's possible to configure something called Interface Monitoring, this is used to monitor up to 6 IP addresses on each segment (LAN/WAN or DMZ) of the DFL-1100 cluster. If 50% of the listed addresses are unreachable for several seconds, the active node will failover and the other unit will become active.



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 NETDEFEND DFL-1100 provides several options for logging its activity. The D-Link DFL-1100 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 NETDEFEND DFL-1100 specifies a number of events that can be logged. Some of these events, such as, startup and shutdown events, are mandatory, and will always generate log entries. Other events, such as opening and closing allowed connections, can be

configured to generate log entries. 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 **Apply** to apply the setting, or click Cancel to discard the changes.

Enable Audit Logging

To start auditing all traffic through the firewall, follow the steps below and the firewall will start logging all traffic through 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 **Apply** to apply the setting, or click Cancel to discard the changes.

Enable E-mail alerting for IDS/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.

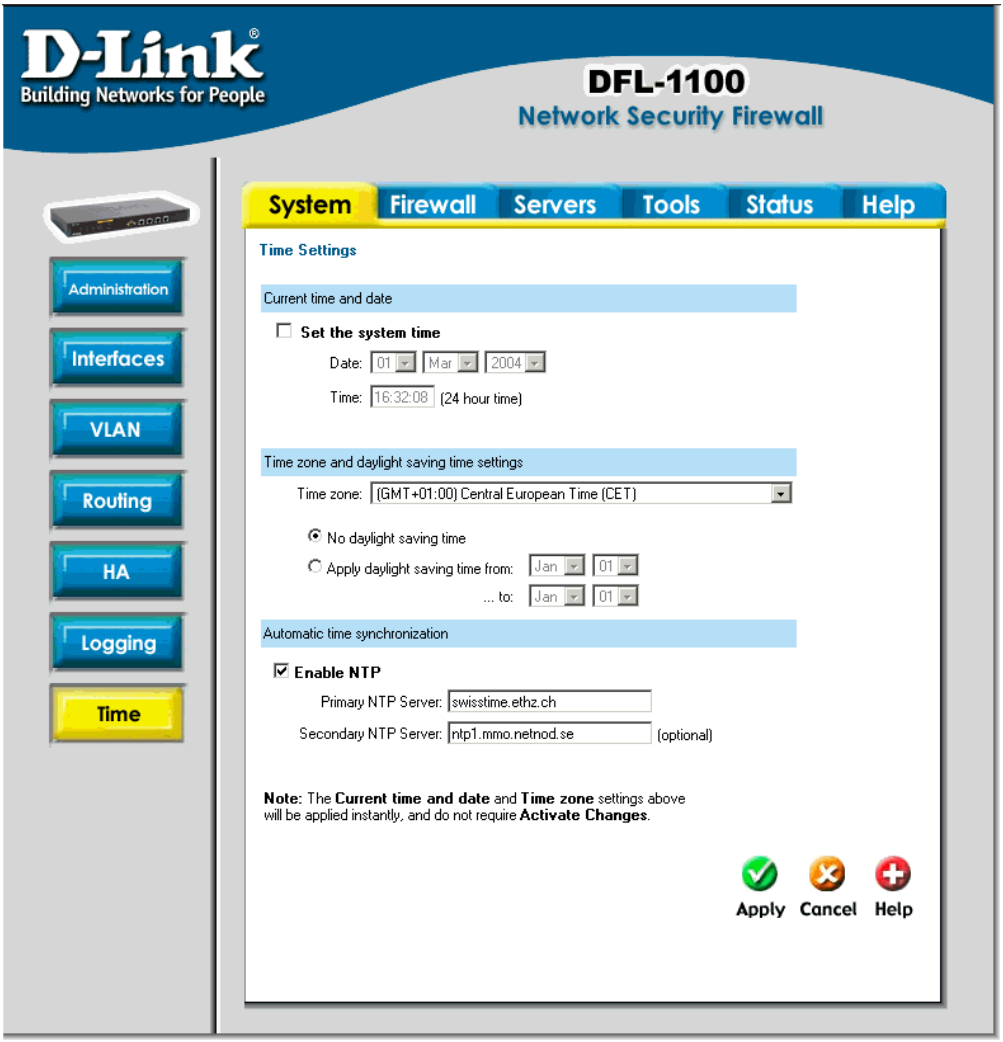
Step 3. In the **SMTP Server** field, fill in the SMTP server to which the DFL-1100 should send email.

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

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

Time

Click on **System** in the menu bar, and then click **Time**. 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 manually.



Changing the time zone

Follow these steps to change the time zone.

Step 1. Choose the correct time zone in the dropdown menu.

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

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

Setting time and date manually

Follow these steps to set the system time manually.

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 **Apply** to apply the setting, or click **Cancel** to discard the changes.

Firewall

Policy

The Firewall Policy configuration section is very important. These policies are the primary filters that are configured to allow or disallow certain types of network traffic through the firewall. The policies also regulate how bandwidth management (traffic shaping) is applied to traffic flowing through the WAN interface of 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-1100 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 a comma**,** 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 a comma, 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 filter.

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 will be all ports, 0-65535. The http service, for instance, uses 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-1100 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 protects the networks behind the DFL-1100 by dropping the traffic. To notify of the attacks, the IDS sends an email to the system administrators, if email alerting has been configured. D-Link updates the attack database periodically. Signatures are available for download at http://support.dlink.com. There are two modes that can be configured, either **Inspection Only** or **Prevention. Inspection Only** will only inspect the traffic. If the DFL-1100 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, an email alert will be sent.

Traffic Shaping

The simplest way to obtain quality of service in a network, seen from a security as well as a functionality perspective, is to have the components in the network, not the applications, be responsible for network traffic control in well-defined choke points.

Traffic shaping works by measuring and queuing IP packets, in transit, with respect to a number of configurable parameters. Differentiated rate limits and traffic guarantees based on source, destination and protocol parameters can be created; much the same way firewall policies are implemented.

There are three different priorities when configuring the traffic shaping, **Normal**, **High** and **Critical**.

Limit works by limiting the inbound and outbound traffic to the specified speed. This is the maximum bandwidth that can be used by traffic using this policy. Note, however, that if you have other policies using **limit**, which in total comprises more then your total Internet connection, and have configured the traffic limits on the WAN interface, this limit is sometimes lowered, to allow traffic with higher priorities to have precedence.

By using **Guarantee**, you can use a policy of minimum bandwidth. This will only work if the traffic limits for the WAN interface are configured correctly.

Policy Routing

Normal routing can be said to be a simple form of policy based routing; the "policy" is the routing table, and the only data that can be filtered on is the destination IP address of the packet. What is commonly referred to as policy based routing, is, simply put, an extension of what fields of the packet we look at to determine the routing decision. In the DFL-1100, each rule in the firewall policy can specify its own routing decision; in essence, we route according to the source and destination IP addresses *and* ports.

Policy based routing can for example be used to route certain protocols through transparent proxies such as web caches and anti-virus scanners, without adding another point of failure for the network as a whole. It’s very important to know that the proxy must support this also for it to work.

There are two ways to configure Policy Routing; both include specifying the Gateway to send the traffic over. The first one, **Redirect via routing (make gateway next hop),** will just reroute the traffic to the given gateway as if it was just another router. The second mode, **Via address translation (change destination IP)**, will change the destination IP, in the IP header, and then pass the packet on to the gateway. This is used, for example, in transparent squid-proxy setups.

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 a comma, 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 a comma, 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 create a custom service.

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

Step 4. If using Traffic shaping, fill in that information, if not, skip this step.

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

Change order of policy

Follow these steps to change the order of a policy.

Step 1. Choose the policy list.

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

Step 3. Change the number in the **Position** to the new position. After the apply button is clicked the policy will be moved to the new position.

Click **Apply** to apply the chang,e or click **Cancel** to discard the changes.

Delete policy

Follow these steps to delete a policy.

Step 1. Choose the policy list.

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

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

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

Configure Intrusion Detection

Follow these steps to configure IDS on a policy.

Step 1. Choose the policy.

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

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

Configure Intrusion Prevention

Follow these steps to configure IDP on a policy.

Step 1. Choose the policy.

Step 2. Click on **Edit**.

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 **Apply** to apply the change, or click **Cancel** to discard the changes.

Port mapping / Virtual Servers

The Port mapping / Virtual Servers configuration section is where you can configure virtual servers, like Web servers. It's also possible to regulate how bandwidth management, traffic shaping, is applied to traffic flowing through the WAN interface of the firewall. It is also possible to use Intrusion Detection / Prevention and Traffic shaping on Port mapped services. Since this is done in the same way as policies, please 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 a comma, 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 service.

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

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

Step 4. If using Traffic shaping, fill in that information, if not skip, this step.

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

Delete mapping

Follow these steps to delete a mapping.

Step 1. Choose the mapping list (WAN, LAN or DMZ)

Step 2. Click on **Edit**.

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

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

Administrative users

Click on **Firewall** in the menu bar, and then click **Users** below it. This will show all the users. The first section is the administrative users.

The first column shows the access levels, *Administrator* and *Read-only*. An *Administrator* user can add, edit and remove rules, change settings of the DFL-1100 and so on. The *Read-only* user can only look at the configuration. The second column shows the users in each access level.

Add Administrative User

Follow these steps to add a new administrative user.

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

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

Step 3. Specify the password for the new user.

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

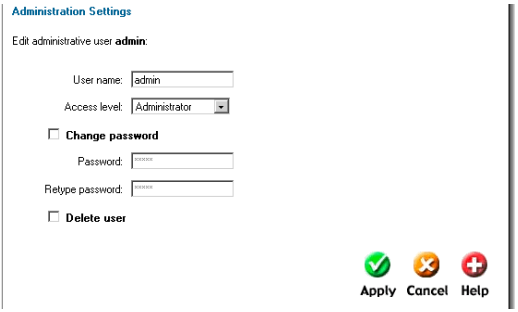
Note: The user name and password should be at least six characters long. The user name and password can contain numbers (0-9) and upper and lower case letters (A-Z, a-z). Special characters and spaces are not allowed.

Change Administrative User Access level

To change the access level of a user, click on the user name and you will see the following screen. From here you can change the access level by choosing the appropriate level from the drop-down menu.

Access levels

- **Administrator** – the user can add, edit and remove rules and change all settings.
- **Read-only** – the user can only look at the configuration of the firewall.
- **No Admin Access** – Used for authentication purposes.



Follow these steps to change Administrative User Access level.

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

Step 2. Choose the appropriate level from the drop-down menu.

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

Change Administrative User Password

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

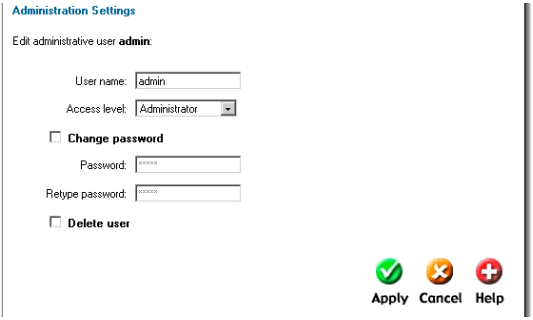
Follow these steps to change the Administrative User password.

Step 1. Click on the user.

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

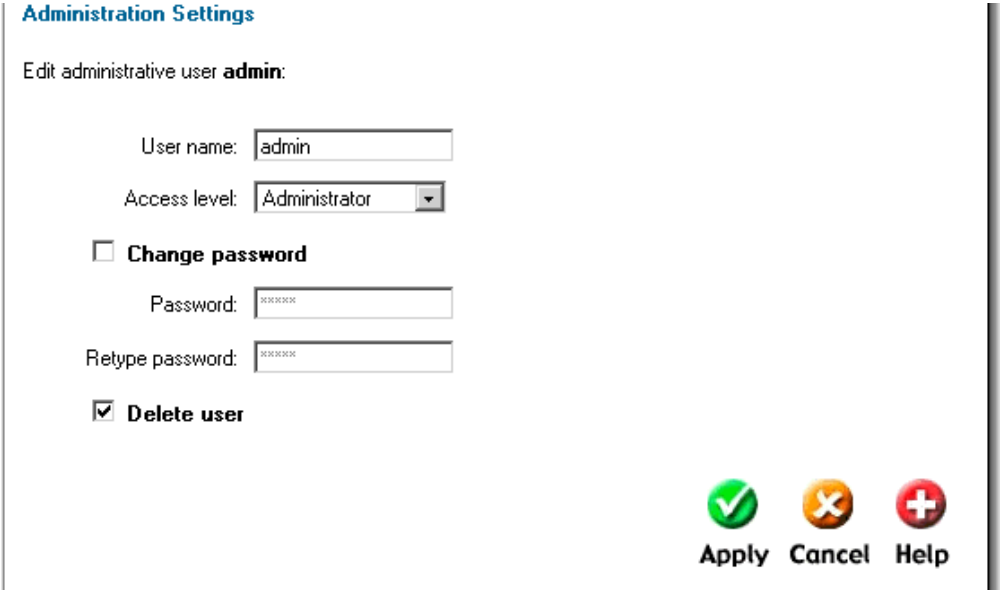
Step 3. Enter the new password twice.

Click **Apply** to apply the setting, or click **Cancel** to discard the 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 Administrative User



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

Follow these steps to delete an Administrative User.

Step 1. Click on the user.

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

Click **Apply** 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. Do not delete your currently logged in user name.

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 users must first be authenticated. The DFL-1100 can either verify the user against a local database, or pass along the user information to an external authentication server. This server will verify the user and the given password, and transmit the results back to the firewall. If the authentication is successful, the DFL-1100 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 do not require user authentication unaffected.

The DFL-1100 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-1100 RADIUS Support

The DFL-1100 can use the RADIUS server to verify users against the 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-1100 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 DFL-1100 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.

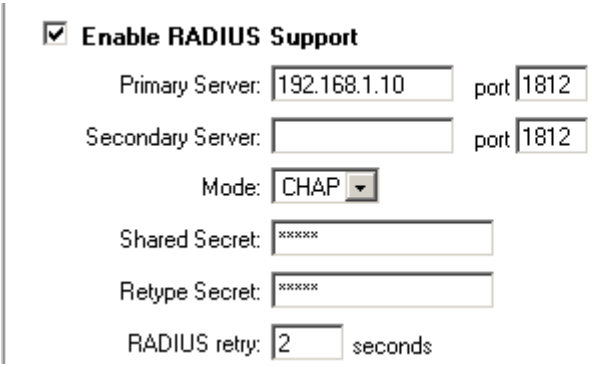
Step 2. Specify if HTTP and HTTPS or only HTTPS should be used for the login.

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.

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

Enable RADIUS Support



Follow these steps to enable RADIUS support.

Step 1. Enable the checkbox for RADIUS Support.

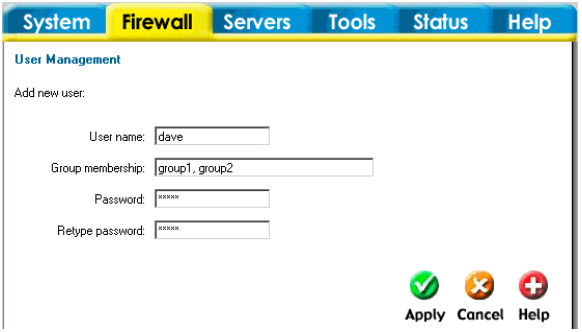
Step 2. Fill in up to two RADIUS servers.

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

Step 3. Specify the shared secret for this connection.

Click **Apply** to apply the setting, or click **Cancel** to discard the 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 the **User name;** make sure you are not trying to add one that already exists.

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

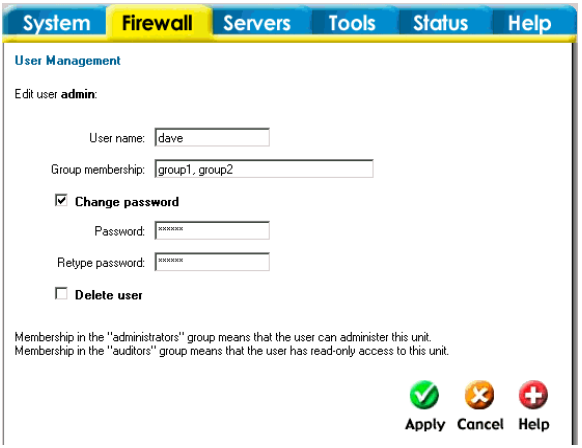
Step 3. Specify the password for the new user.

Click **Apply** to apply the setting, or click **Cancel** to discard the 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 the user name and you will see this screen.



Follow these steps to change a user's password.

Step 1. Click on the user.

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

Step 3. Enter the new password twice.

Click **Apply** 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.

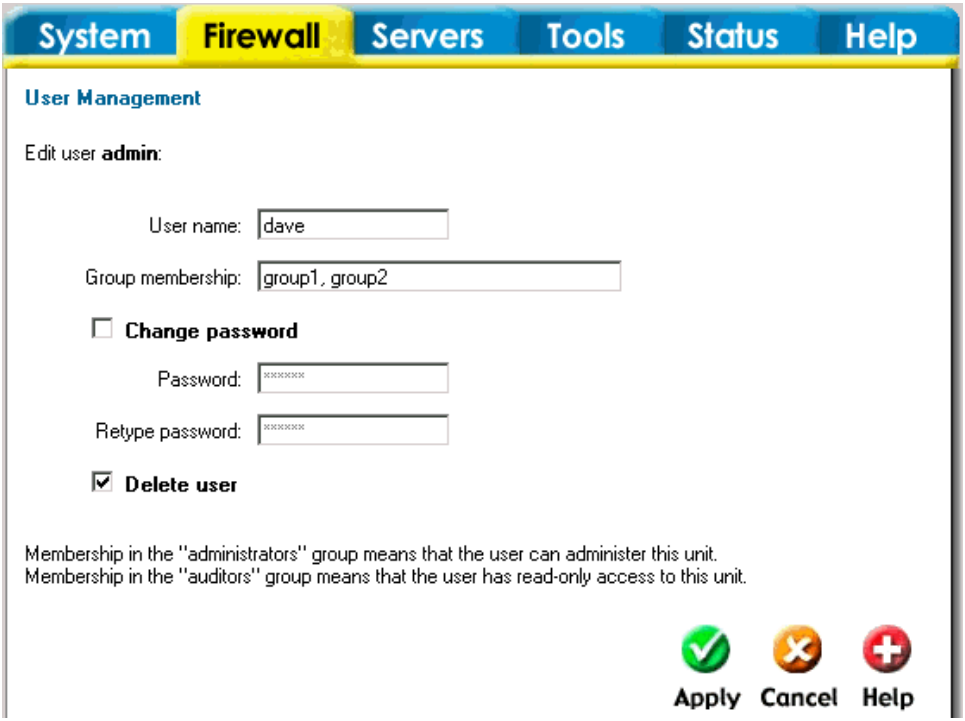
Follow these steps to delete a user.

Step 1. Click on the user.

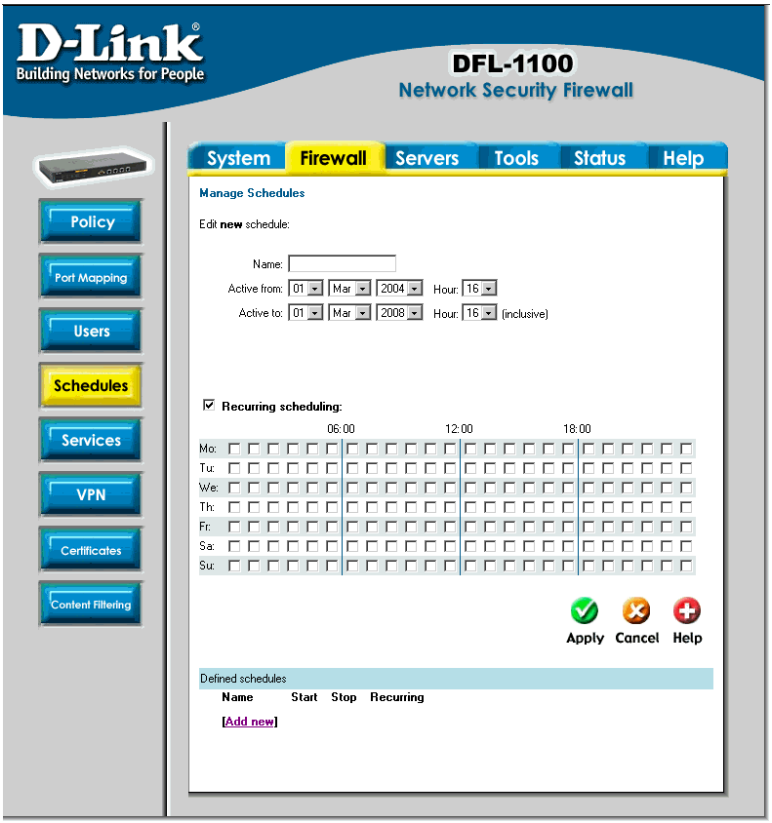
Step 2. Enable the **Delete user** checkbox.

Click **Apply** to apply the setting, or click **Cancel** to discard the 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-1100 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-1100 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 a new recurring schedule.

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

Step 2. Enable the checkbox named **Recurring scheduling**.

Step 3. Use the checkboxes to set the times this schedule should be active.

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

Add new one-time schedule

Follow these steps to add new one-time schedule.

Step 1. Go to Firewall>Schedules, and choose **Add new**.

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

Step 3. Use the checkboxes to set the times this schedule should be active inside the specified timeframe.

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

Services

A service is basically a definition of a specific IP protocol with corresponding parameters. The service http, for instance, is defined as the use of TCP protocol with a 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, uses 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>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 **Apply** to apply the change, or click **Cancel** to discard the changes.

Adding other IP Protocols

When the desired type of 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>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 **Apply** to apply the change, or click **Cancel** to discard the 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> Service and choose **New**.

Step 2. Enter a Name for the service group 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 **Apply** to apply the change, or click **Cancel** to discard the 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. Allowing any inbound ICMP message to have those error messages forwarded is generally not a good idea.

To solve this problem, DFL-1100 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, the DFL-1100 filters 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-1100 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-1100 supports two Application Layer Gateways, one is used to manage the FTP protocol and the other one is an HTTP Content Filtering ALG. For detailed information about how to configure the HTTP Application Layer Gateway, please see the Content Filtering chapter.

VPN

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.

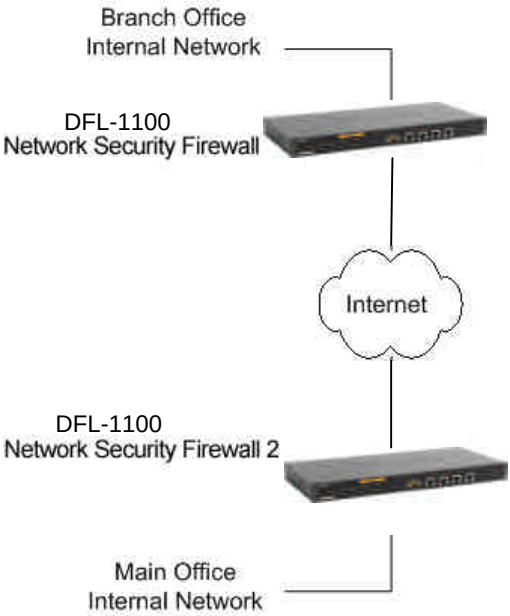
An IPSec based VPN, such as the DFL-1100 VPN, is made up of two parts:

- 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.

IPSec VPN between two networks



In the following example users on the main office internal network can connect to the branch office internal network or vice versa. Communication between the two networks takes place in an encrypted VPN tunnel that connects the two DFL-1100 Network Security Firewalls 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-1100 to protect a branch office and a small main office. Both of these DFL-1100s 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 VPN Tunnel

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

Step 1. Go to Firewall>VPN and choose **Add new**.

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 the 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-1100 as Remote Net, also specify the external IP of the other DFL-1100; this can be an IP or a DNS name.

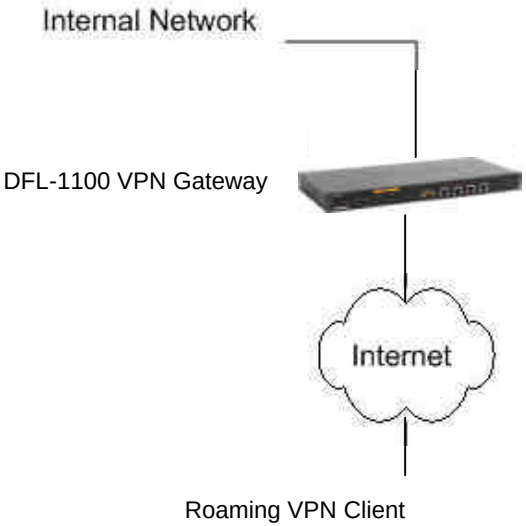
Click the **Apply** button below to apply the change or click **Cancel** to discard changes.

Repeat this on the firewall on the other site.

IPSec 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-1100 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 Tunnel

Follow these steps to add a roaming user's tunnel.

Step 1. Go to Firewall >VPN and choose **Add new**.

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 the 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.

VPN – Advanced Settings

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

Limit MTU

With 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 (768-bit), 2 (1024-bit) or 5 (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-1100.

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 (CA)

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-1100 HTTP content filtering can be configured to scan all HTTP content protocol streams for URLs or for Web page content. If a requested URL is on the URL block list, the DFL-1100 will block that Web page.

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 filtering 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.

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

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 through a policy using a service with the HTTP ALG.

Active content handling

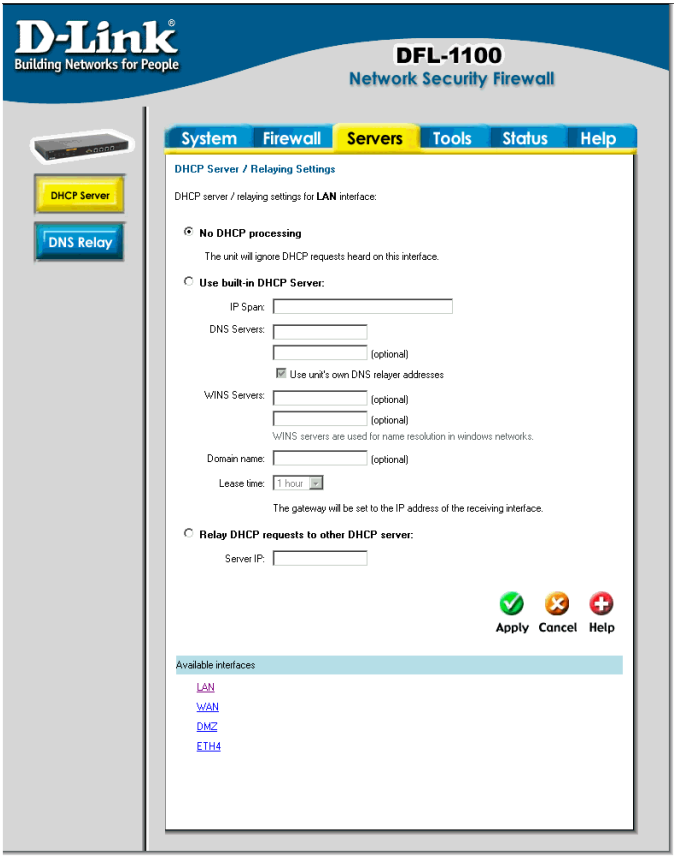
Active content handling can be enabled or disabled by checking the checkbox before each type you would like to strip. For example, to strip ActiveX and Flash, enable the checkbox named Strip ActiveX objects. It’s possible to strip ActiveX, Flash, Java, JavaScript and VBScript. It’s also possible to block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

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

Servers

DHCP Server Settings

The DFL-1100 contains a DHCP server; DHCP (Dynamic Host Configuration Protocol) is a protocol that lets network administrators automatically assign IP numbers to computers on a network. The DFL-1100 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-1100 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-1100 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-1100 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.

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-1100 can assign.

Step 4. Enter the DNS servers that the DHCP server will assign 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 that the DHCP server will assign to the clients.

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

Step 7. Choose the time period during which the DHCP server will give out leases before the client will 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 address 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 in which you wish to disable the DHCP server or relayer.

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

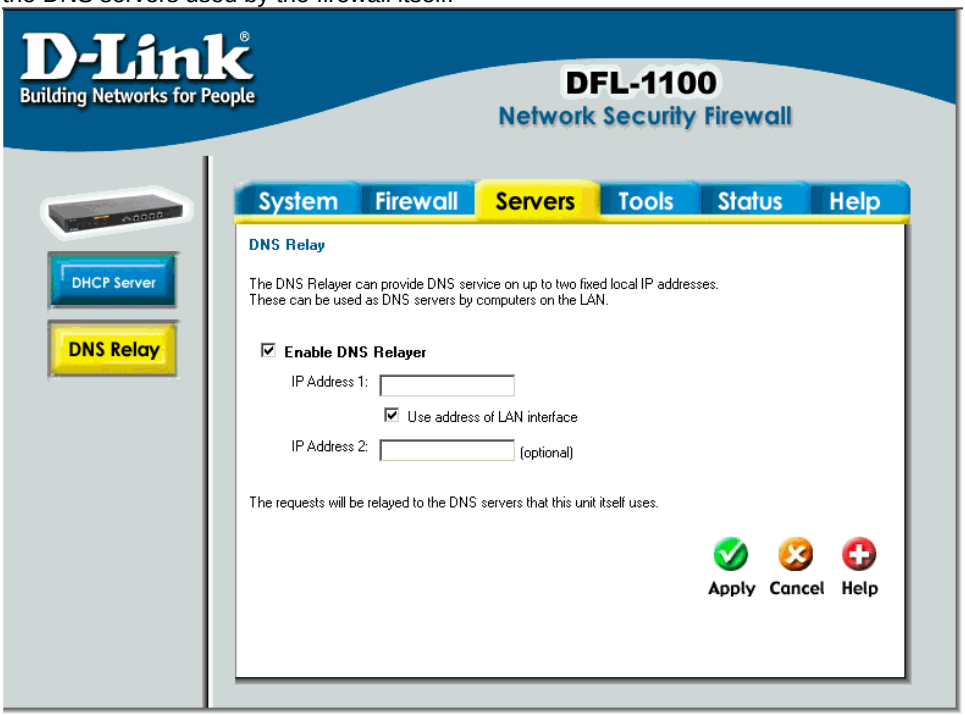
Step 1. Choose the LAN interface from the Available interfaces list.

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-1100 contains a DNS relayer that 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-1100 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

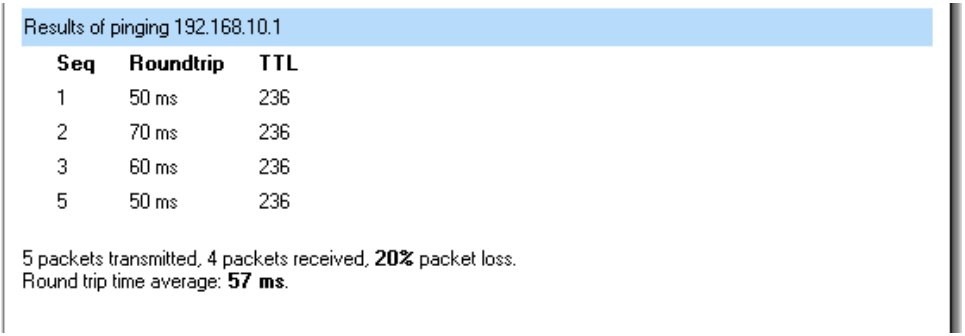
Ping

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, and 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 were 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** (requires 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 the 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 using this function.

Add Dynamic DNS Settings

Follow these steps to enable Dynamic DNS.

Step 1. Go to Tools and DynDNS.

Step 2. Choose the Dynamic DNS service you would like to use, and fill in the needed information, username and password in all cases and domains except 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, the system administrator can download the configuration file into the local disc as a backup. System Administrators can restore the firewall's configuration file with the one stored on the hard drive.

Exporting the DFL-1100'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.

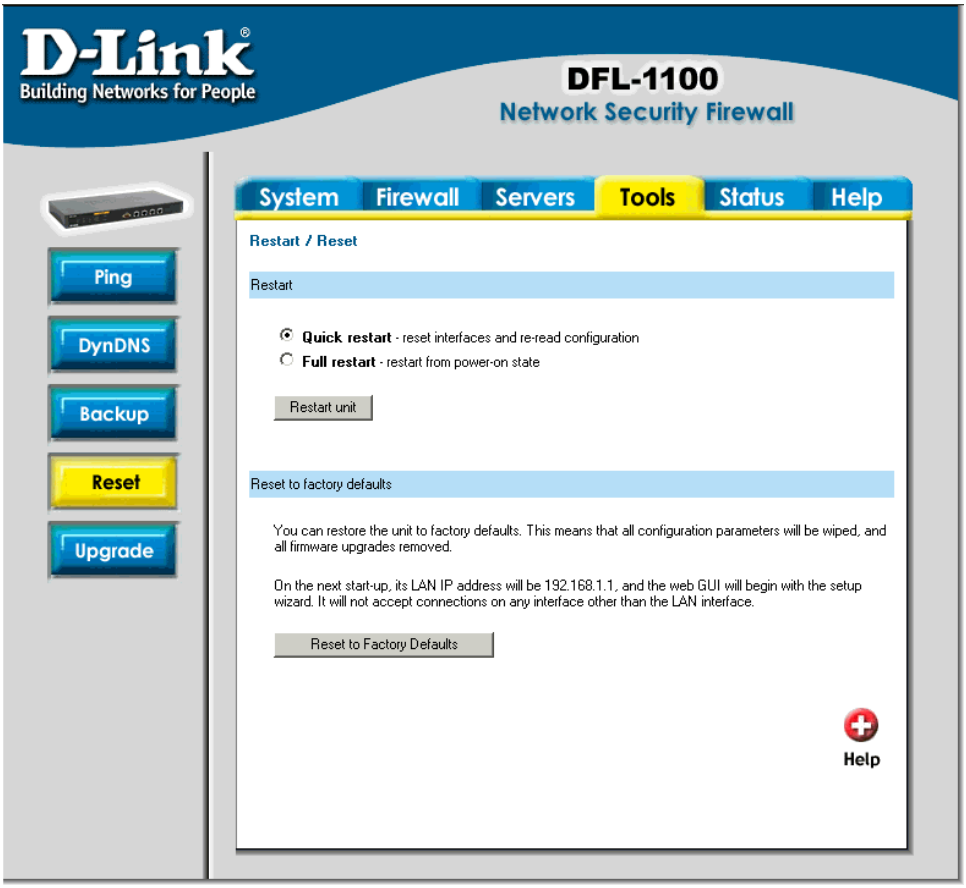
Restoring the DFL-1100's Configuration

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 that 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-1100

Follow these steps to restart the DFL-1100.

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 may change the DFL-1100 firmware version to a lower version (if it has been upgraded).

This procedure deletes all of the changes that you have made to the DFL-1100 configuration and reverts the system to its original configuration including resetting interface addresses.

Follow these steps to reset the DFL-1100 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-1100 if a backup of the device has been done.

Upgrade

The DFL-1100'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 from D-Link. After having the newest version of software, please store it on the hard disk, then connect to the firewall's configuration utility, 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 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 configuration utility, 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**.

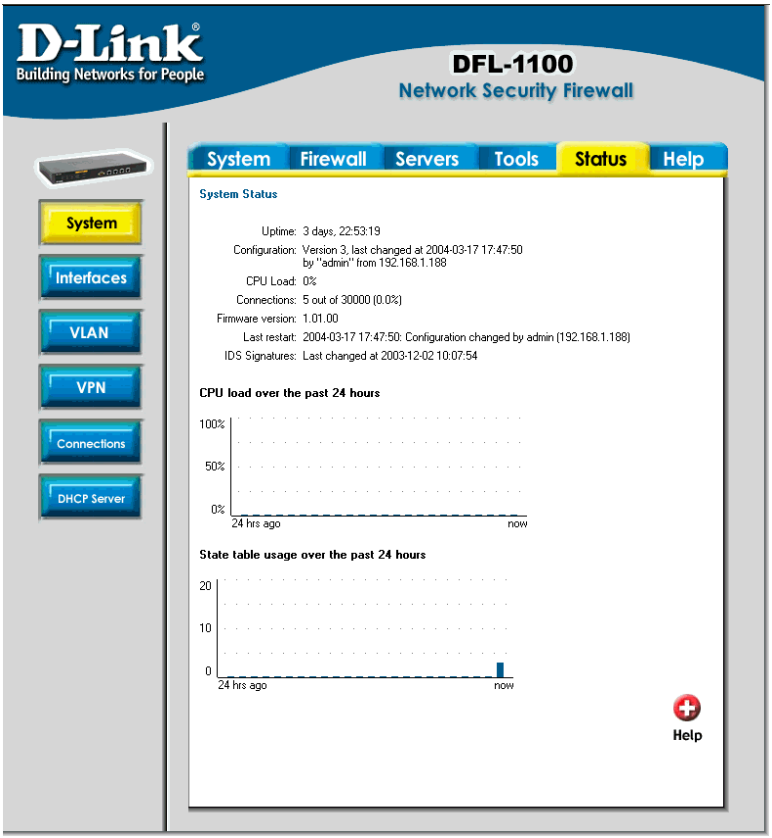
Status

In this section, the DFL-1100 displays the status information about the Firewall.

The 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 information about the DFL-1100.



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

CPU Load – Percentage of CPU used.

Connections – Number of current connections through 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-1100. 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.

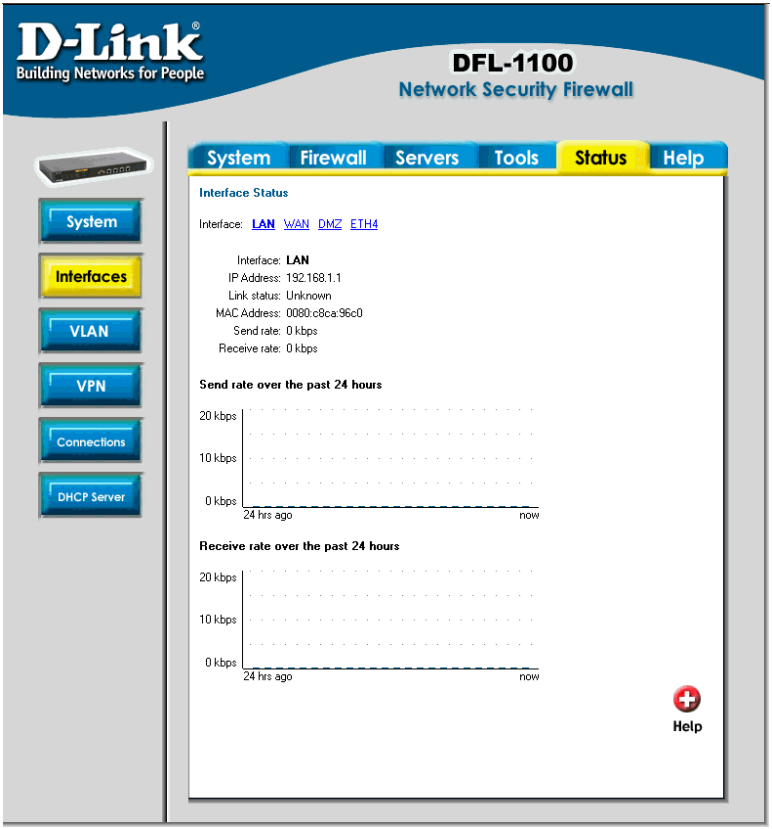
IP Address – IP address of the interface.

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.

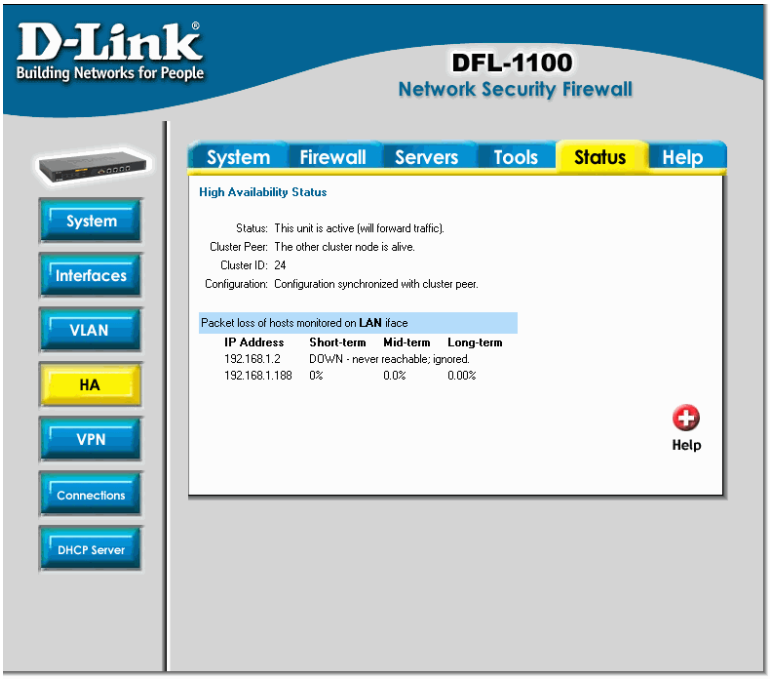
Receive rate – Current amount of traffic received trough the interface.



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

HA

Click on **Status** in the menu bar, and then click **HA** below it. A window will appear providing information about the HA Cluster configured in the DFL-1100.



Status - Status of the cluster, will show if the unit is active or inactive.

Cluster Peer - Status of the other unit in the cluster.

Cluster ID - ID used for this cluster

Configuration – Status of the configuration synchronization, if both peers are using the same configuration or if it's in the process of being synchronized.

VLAN

Click on **Status** in the menu bar, and then click **VLAN** below it. A window will appear providing information about the virtual interfaces configured in the DFL-1100.

VLAN Interface – Name of the virtual interface shown.

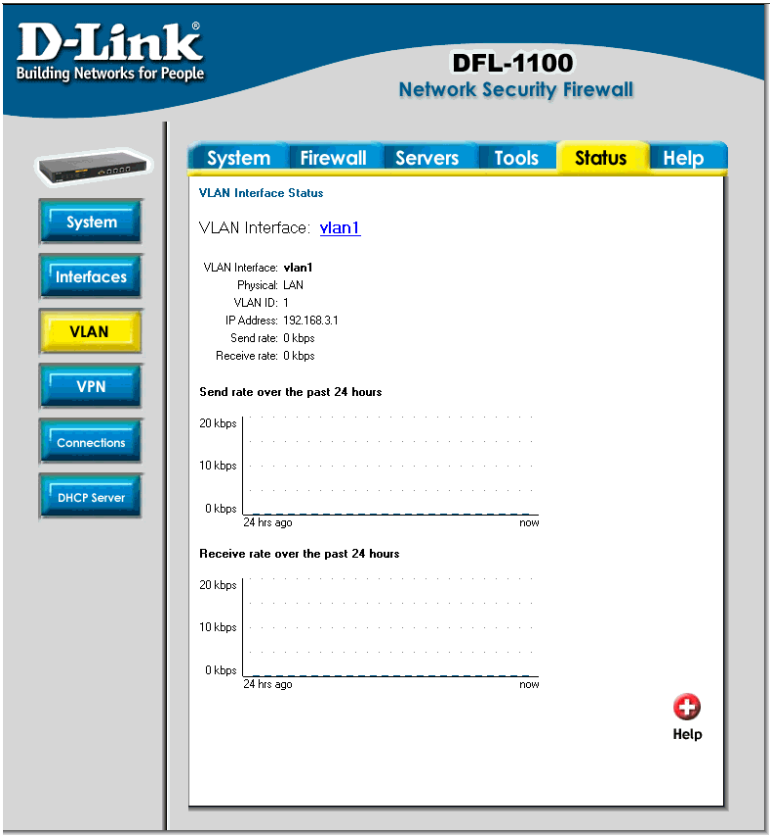
VLAN ID – ID assigned to the VLAN.

IP Address – IP address of the virtual interface.

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

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

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



VPN

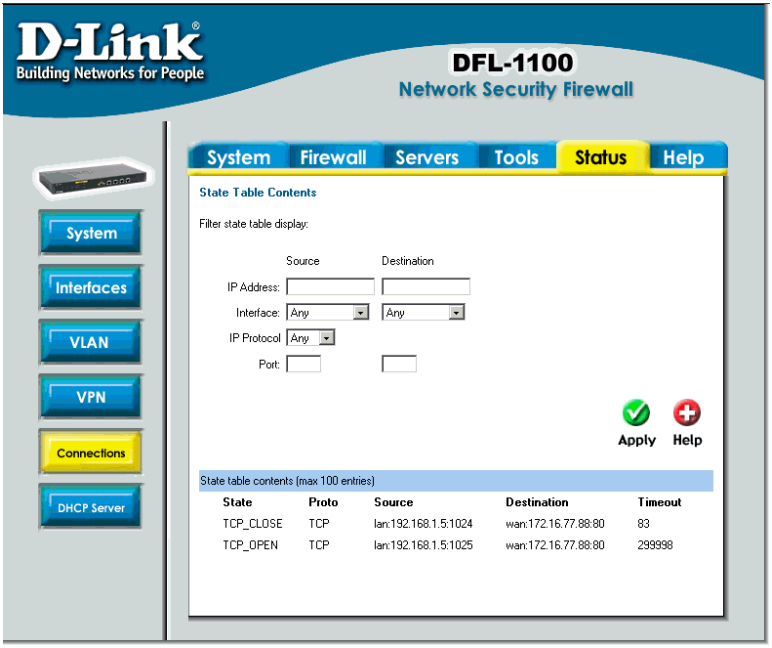
Click on **Status** in the menu bar, and then click **Interfaces** below it. A window will appear providing information about the VPN connections in the DFL-1100. By default, information about the first VPN tunnel will be shown. Click on that VPN tunnel's name to view it.

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

In this example a tunnel named **Roaming VPN** 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.



Shown are 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

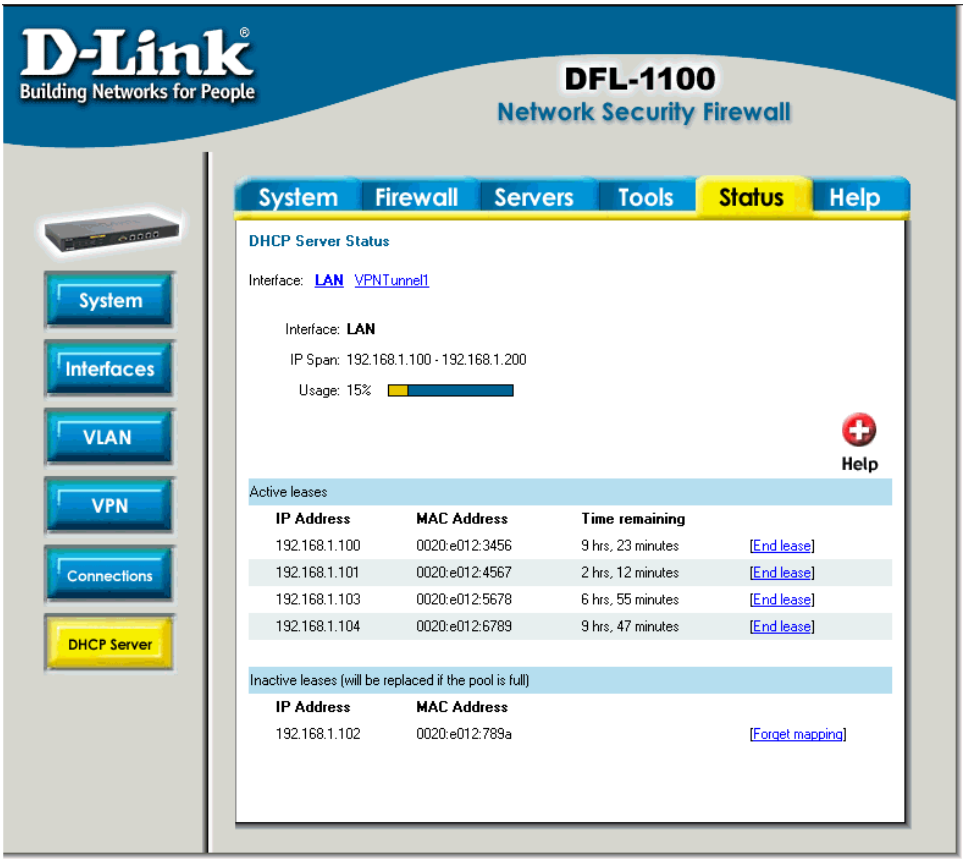
UDP - The connection is a UDP connection

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

The **Source** and **Destination** columns shows the IP and Port interfaces of the source and destination.

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 shown. To view 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 – Displays how much of the IP range is given out to DHCP clients.

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

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

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-1100 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 through 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.

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

Limited Warranty

Subject to the terms and conditions set forth herein, D-Link Systems, Inc. ("D-Link") provides this Limited warranty for its product only to the person or entity that originally purchased the product from:

- D-Link or its authorized reseller or distributor and
- Products purchased and delivered within the fifty states of the United States, the District of Columbia, U.S. Possessions or Protectorates, U.S. Military Installations, addresses with an APO or FPO.

Limited Warranty: D-Link warrants that the hardware portion of the D-Link products described below will be free from material defects in workmanship and materials from the date of original retail purchase of the product, for the period set forth below applicable to the product type ("Warranty Period"), except as otherwise stated herein.

1-Year Limited Warranty for the Product(s) is defined as follows:

- Hardware (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 during the Warranty Period at no charge to the original owner or to refund at D-Link's sole discretion. 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 have an identical make, model or part. D-Link may in its sole discretion 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. Repaired or replacement Hardware will be warranted for the remainder of the original Warranty Period from the date of original retail purchase. 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 retail purchase of the Software for a period of ninety (90) days ("Warranty Period"), provided that 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 or to refund at D-Link's sole discretion. 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. Software will be warranted for the remainder of the original Warranty Period from the date or original retail purchase. 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.

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Submitting A Claim: The customer shall return the product to the original purchase point based on its return policy. In case the return policy period has expired and the product is within warranty, the customer shall submit a claim to D-Link as outlined below:

- The customer must submit with the product as part of the claim 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. Do not include any manuals or accessories in the shipping package. D-Link will only replace the defective portion of the Product and will not ship back any accessories.
- The customer is responsible for all in-bound shipping charges to D-Link. No Cash on Delivery ("COD") is allowed. Products sent COD will either be rejected by D-Link or become the property of D-Link. Products shall be fully insured by the customer and shipped to **D-Link Systems, Inc., 17595 Mt. Herrmann, Fountain Valley, CA 92708**. D-Link will not be held responsible for any packages that are lost in transit to D-Link. The repaired or replaced packages will be shipped to the customer via UPS Ground or any common carrier selected by D-Link, with shipping charges prepaid. Expedited shipping is available if shipping charges are prepaid by the customer and upon request.

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.

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FCC Statement: **This equipment has been tested and found to comply with the limits for a Class B 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 communication. 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.

For detailed warranty outside the United States, please contact corresponding local D-Link office.