IBM

Firewall For AIX Reference

Version 3.1.1

SC31-8418-00

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Note: Before using this information and the product it supports, be sure to read the general information under "Notices" on page 171.

Second Edition (July 1997)

This edition applies to the IBM Firewall licensed program. This is a major revision, which replaces the previous editions, SC31-8279 and SC31-8280.

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About This Book

This book is intended as a reference for network or system security administrators who install, administer, and use the IBM Firewall Version 3.1.1 on an AIX/6000. To use client programs such as Telnet or FTP, please see the IBM Firewall User's Guide for your TCP/IP client programs.

Prerequisite Knowledge

It is important that you have a sound knowledge of TCP/IP and network administration before you install and configure the IBM Firewall. Because you will set up and configure a firewall that controls the access in and out of your network, you must first understand how the network operates. Especially, you need to understand the basics of IP addresses, fully qualified names, and subnet masks.

What Is New in This Release

The IBM Firewall offers a rich variety of functions.

Java-based Graphical User Interface

In addition to the command line and SMIT interfaces, the IBM Firewall can be administered through a Java**-based graphical user interface (known as the configuration client). The configuration client allows an administrator to perform remote configuration and administration. To ensure confidentiality and integrity the remote configuration connection can be authenticated using any of several mechanisms and encrypted using Secure Sockets Layer (SSL).

Secure Remote Login

An encrypted secure login is provided for remote IPSEC Windows 95 Clients and for configuration clients through the version 2 Secure Sockets Layer (SSL) technology. The supported SSL cipher specifications for both clients are:

- RC2,MD5,Export=06 with a session key size of 40 bits
- RC4,MD5,Export=03 with a session key size of 40 bits

Enterprise Firewall Management

Enterprise Firewall Management (EFM) provides the means to manage a group of remote firewalls from a single site. This is accomplished by creating an enterprise firewall server that maintains all the configuration files for all of the firewalls. All data is encrypted as it is sent. Access to the enterprise firewall is through the configuration client. An administrator can clone a firewall to create a new one and replicate configuration files to create or update another firewall.

Network Security Auditor

Network Security Auditor is a tool that checks your network for security holes or configuration errors. You will want to periodically verify that the firewall has not been modified in a way that creates a security vulnerability.

By periodically running the Network Security Auditor, you can make sure nothing has changed, especially after you put the firewall on-line.

Secure Remote Client

The Secure Remote Client is software that is installed on a client PC or an AIX workstation offering secure communication. Data sent between a PC and the firewall is encrypted with the 56-bit Data Encryption Standard (DES) and is authenticated. Also because the Secure Remote Client follows IPSec standards, it is interoperable with non-IBM firewalls.

The Secure Remote Client does not tie you to a specific Point-to-Point Protocol (PPP) server. The TCP/IP address that is assigned by your PPP server is irrelevant. You can change PPP server and TCP/IP addresses and it does not affect the operation of the Secure Remote Client. Other vendors are sensitive to the specific TCP/IP address and if you change the address, you must reconfigure your client.

Report Utilities

Report Utilities generates files of administrative information that are organized and formatted for easy mapping to relational database tables. These tables help the firewall administrator analyze:

- General usage of the firewall
- Errors in the firewall process
- Attempts at unauthorized access to the secured network

The format of the firewall log record is generally not readable. Using the report utilities, the administrator can create a readable text file of the messages. Additionally, tabulated files can be generated and imported into tables in a relational database system, such as DB2/6000 or DB2/2. The administrator can then use the Structure Query Language (SQL), or other tools like IBM's Visualizer or Query Management Facility to query the data and generate reports.

Logging Enhancements

Real Time Log Monitor notifies the administrator of a detected threshold condition on a real time basis.

Log Viewer is a tool for viewing logs from the configuration client.

Alerts viewer provides a view of the alerts through an easy to read formatted screen.

Mail

The IBM Firewall now supports its own Safemail mail gateway . Sendmail 8.7.X has been dropped from the firewall.

Password Rules

Password rules for the firewall now match AIX password rules. The administrator sets passwords to expired, thus requiring users to change passwords on the first use.

Transparent Proxy

Transparent proxy provides easy access from the secure side of the firewall (your private network) to the nonsecure side of the firewall. You can telnet or FTP transparently through the IBM Firewall. Transparent proxies require no firewall authentication, therefore users of transparent proxies do not have to be defined as firewall proxy users.

Filter Enhancements

The filter rules have been enhanced to allow for time-of-day, day, and date selection. For example, you can specify:

```
permit ftp to IP address between 8:00am and 6:00pm
```

Or you can restrict the filter validity to a particular day or set of days.

Filter rules allow IP addresses for interfaces (versus secure/nonsecure) to better support multiple interfaces.

Filter storage allocation has been changed from static to dynamic. This allocates less storage than currently required for 512 rules, while allowing the storage to dynamically grow as filters are added.

The filter rules now support Hostname. The filter process has been modified to accept hostnames in addition to IP addresses. The DNS will be contacted to determine the IP address for the first occurence of a hostname in the filter file. If contact can not be established with the DNS, a firewall file will be checked to use a predefined IP address for the hostname. The file will automatically be updated when the IP address for the host changes at the Domain Name Server.

Host Address Pricing

Firewall licenses are offered on a tiered basis with the price based upon the number of concurrent sessions.

When you purchased the IBM Firewall, you purchased a license for a certain number of hosts. The IBM Firewall tracks the number of unique hosts (IP addresses) and determines when the purchased number of hosts has been exceeded. When the limit has been exceeded, all overflow addresses are logged in the `local4` facility. The following types of messages are displayed in the log file when the limit has been exceeded:

```
License file has been deleted, license limit 50 has been loaded.
License limit xxx has been read and loaded.
Host xxx exceeds the allowable number of licenses.
```

Concurrent Sessions

TCP and UDP sessions are tracked. There is a maximum of concurrent active TCP and UDP sessions. Once the threshold for each type of session is reached, no additional sessions are allowed unless a grace period had been configured. Sessions that are not allowed can be optionally logged. This function is only available to EFM firewalls.

SNMP

The Simple Network Management Protocol (SNMP) , which is widely used in the TCP/IP environment for network management, can also be used to monitor IBM Firewall server status and generate traps. There are a significant number of SNMP managers existing in customer environments that can be used to monitor the resources and components without introducing the overhead of a management framework and requiring new application programs. Therefore, using SNMP with the IBM Firewall is a natural extension of management of IBM Firewall servers.

HTTP Proxy

A Hypertext Transfer Protocol proxy efficiently handles browser requests and responses through the firewall. Filter rules permit or deny HTTP transactions.

HACMP

The IBM Firewall continues to provide protection in the event of a hardware failure. Firewall operations are automatically shifted to a backup system. The technology for maintaining business critical applications is called High Availability Cluster Multi Processor (HACMP) for AIX version 4.2. It is the leading high availability technology for UNIX. If a hardware failure occurs, a backup system takes over within seconds to maintain network availability.

You can find more information on HACMP at URL:

http://hawww.ak.munich.ibm.com/HACMP/HA-FW/HA-FW.html.

SP Support

Necessary changes are implemented to support the AIX/6000 SP processor. Installation and hardening steps are enhanced for SP configuration requirements.

Default User

A default firewall user, **fwdfuser**, is created during installation. If a user attempting to login is not defined to the firewall, the firewall will authenticate the user with the authentication method defined for **fwdfuser**. This feature supports any user-defined authentication method.

Administration Enhancements

You do not need to be user root to perform administrative functions. Any user designated as a firewall administrator can perform administrative functions. These functions are customizable. You can limit an administrator's authority over specific functions, such as administering proxy users.

Stronger Encryption Support

The IBM Firewall enables an export version of DES. This encryption is available in addition to the currently supported CDMF.

AIX 4.1.5 and 4.2 Support

AIX 4.1.5 and 4.2 are supported, exclusive of the AIX Common Desktop Environment.

IBM Firewall Installable Units

The IBM Firewall separate installable components are:

- FW
  - Base IBM Firewall
  - IBM Firewall Common Libraries and Catalogs
  - IBM Firewall Remote Configuration Client
  - IBM Firewall Report Generation Utilities
- Netscape.NAV
  - Netscape Navigator**
- ipsec
  - IPSec Client
- nsauditor
  - Network Security Auditor
  - Network Security Auditor HTML Interface
- sva
  - System View Agent for AIX
  - System View Agent for AIX SNMP Mapper

For directions on how to install the Windows 95 secure remote client, refer to the *IBM Firewall User's Guide* for more information.

To install the PDF version of this manual and the *IBM Firewall Reference* download the following files from the :xph.fwbooks:exph. directory on the IBM Firewall CDROM to your workstation:

- `fwuser.pdf`
- `fwref.pdf`

Use the Adobe Acrobat** Reader to view these books. If you do not have the Adobe Acrobat Reader installed, you can go to the Adobe Web Site at: :hp2.www.adobe.com/prodindex/acrobat/:ehp2. to learn more about the Adobe Acrobat Reader and to get a copy.

Entering IP Addresses

When you configure your firewall, you will be asked to enter IP addresses. You should enter a complete dotted-decimal IP address, with all 4 octets, in the format:

```
nnn.nnn.nnn.nnn
```

where each `nnn` is a set of three numbers in the range 000–255.

How to Access Online Help

When using the configuration client to configure or administer the IBM Firewall, you can click on the Help button to get online help for the menu you are using.

Where to Find More Information

For additional information about security on the Internet, see the Bibliography.

Additional information about the IBM Firewall can be found on the firewall home page at URL:

http://www.ics.raleigh.ibm.com/firewall.

How to Call IBM for Service

The IBM Support Center provides you with telephone assistance in problem diagnosis and resolution. You can call the IBM Support Center at any time; you will receive a return call within eight business hours (Monday–Friday, 8:00 a.m.–5:00 p.m., local customer time). The number to call is 1-800-237-5511.

Outside the United States or Puerto Rico, contact your local IBM representative or your authorized IBM supplier.

Chapter 1. Using the IBM Firewall Command Line Interface

This chapter discusses commands and command parameters that you can use from an IBM Firewall command line.

The following information applies to the commands:

- The commands listed in this book use the following syntax:
  - *underlined* indicates this is customer entered data.
  - [] indicates a parameter is optional.
  - {} indicates the user has a choice of parameters.
- All parameters use a `keyword=value` format.
- If a parameter has multiple values the values should be within double quotes and be delimited by blank spaces, for example:

  `(secaddr="11.22.33.1 11.22.33.2")`
- Do not include spaces inside any parameter unless it is within double quotes.
- If you omit one or more required parameters, the command-line utility lists missing parameters.
- If an invalid value for a parameter is entered, the command-line utility reports this error.
- Some of the firewall daemons (services) dynamically update their behavior when their configuration files change. Some require an explicit instruction. An `update` subcommand is provided for those daemons that require an instruction.
- Only firewall administrators can execute programs from the command line. Where appropriate, the executables will set userid to superuser before performing tasks.
- The configuration client must be used for all filter configuration. Unlike Version 2.2, a text editor cannot be used to modify a configuration.
- Because of the complexity and file interdependencies, **do not directly edit any filter configuration files**.

Commands

The commands are organized into these categories:

- Enterprise Firewall Manager
- Network Address Translation
- Domain Name Services
- Users
- Adapters
- Filters
- Log File Management
- Miscellaneous Commands

Enterprise Firewall Manager

Enterprise Firewall Manager (EFM) allows for selective management of all configuration files.

To download configuration files for requested functions to the specified firewall use **fwtransfer**.

```
fwtransfer cmd=transfer
        type=changed
        firewallname=FirewallName
        service=[all |"DNS sendmail networkobj traffic NAT
                 VPN pagersup interface logmonitor proxyadmin
                 logfacility secagree SNMP"]
```

type=changed Downloads configuration files for requested services if a change has been made to the file since the last time the file was downloaded.

firewallname=*Firewallname* The name of the firewall.

service=[all |"DNS sendmail networkobj traffic NAT VPN pagersup interface logmonitor proxyadmin logfacility secagree SNMP"] Specifies services. The default is all.

The secagree service type also includes session limit changes.

To download configuration files for requested functions to the specified firewall for specified services use **fwtransfer**.

```
fwtransfer cmd=transfer
        type=select
        firewallname=FirewallName
        service=[all |"DNS sendmail networkobj traffic NAT
                 VPN pagersup interface logmonitor proxyadmin
                 logfacility secagree SNMP"]
```

type=select Forces the download of configuration files for specified services.

firewallname=*Firewallname* The name of the firewall.

service=[all |"DNS sendmail networkobj traffic NAT VPN pagersup interface logmonitor proxyadmin logfacility secagree SNMP"] Specifies services. The default is all. The secagree service type also includes session limit changes.

To return a list of functions that have been modified since the last time configuration files were downloaded for the firewall use **fwtransfer**. The administrator can also use this command to confirm changes prior to initiating the download command.

```
fwtransfer cmd=list
        type=changed
        firewallname=FirewallName
```

cmd=list Returns a list of functions that have been modified since the last time configuration files were downloaded for the firewall

type=changed Lists the functions that have had configuration file changes.

firewallname=*Firewallname* The name of the firewall.

To read the EFM's security agreement record for the specified firewall and get a list of functions that can be administered at the EFM, use **fwmanager**.

```
fwmanager cmd=list
        type=secagree
        firewallname=FirewallName
```

cmd=list Lists each function in the security agreement and indicates whether the EFM or the managed firewall can configure that function.

type=secagree the security agreement.

firewallname=*Firewallname* The name of the firewall.

To activate configuration files previously downloaded to the managed firewall, use **fwact**.

```
fwact firewallname=FirewallName
           service=[all |"DNS sendmail networkobj traffic
                   NAT VPN pagersuup interface logmonitor
                   proxyadmin logfacility secagree SNMP"]
```

firewallname=*Firewallname* The name of the firewall.

service=[all |"DNS sendmail networkobj traffic NAT VPN pagersup interface logmonitor proxyadmin logfacility secagree SNMP"] Specifies services. The default is all. The secagree service type also includes session limit changes.

Network Address Translation

Network address translation (NAT) provides a solution to the IP address depletion problem by allowing addresses inside your secured IP network to be reused by any other IP network.

The NAT configuration file controls the translation of IP addresses in a secured IP address space to IP addresses in an unsecured IP address space. The NAT configuration file can contain up to 512 of the following entries:

- Reserve Registered Addresses - A reserve registered address entry defines a set of registered IP addresses that can be used for outbound connections.
- Translate Secured IP Addresses - A translate secured IP address entry defines a set of secured network addresses that require NAT to perform IP address translation. By default, the network address translator performs address translation on all secured IP addresses.
- Exclude Secured IP Addresses - An exclude secured IP address entry defines a set of secured network addresses that does not require NAT to perform IP address translation. By default, the network address translator performs address translation on all secured IP addresses unless the address is within the range specified by an exclude secured IP addresses entry.
- MAP Secured IP Address - A map secured IP address entry defines a one-to-one mapping from a secured IP address to a registered IP address. This one-to-one IP address mapping allows external application clients, such as FTP or Telnet clients, to set up TCP sessions with server machines that reside within the secured network.

```
fwnat cmd=list | update | verify |shutdown | startlog | stoplog
```

Performs the indicated operations:

fwnat cmd=list lists current NAT configuration

fwnat cmd=update refreshes the NAT engine

fwnat cmd=verify syntax-checks the configuration

fwnat cmd=shutdown stops all address translation

fwnat cmd=startlog starts logging each translated packet

fwnat cmd=stoplog stops logging each translated packet

To add a reserve entry to the NAT configuration use **type=reserve**:

```
fwnat cmd=add | change
        type=reserve
        addr=Addr
        mask=Mask
        [timeout=minutes]
```

type=reserve adds a `reserve` entry

addr=*Addr* IP address that identifies a range of registered IP addresses added to the registered address pool

mask=*Mask* adds a range of IP addresses to the registered address pool

timeout=*minutes* the number of minutes an address translation can remain idle before NAT can free the registered IP address

To add a translate entry to the NAT configuration use **type=translate**:

```
fwnat cmd=add | change
        type=translate
        addr=Addr
        mask=Mask
```

type=translate adds a `translate` entry

addr=*Addr* IP address that identifies a range of secured IP addresses that require translation.

mask=*Mask* identifies a range of IP addresses

To add an exclude entry use **type=exclude**:

```
fwnat cmd=add | change
        type=exclude
        addr=Addr
        mask=Mask
```

type=exclude adds an `exclude` entry

addr=*Addr* IP address that identifies a range of registered IP addresses excluded from the registered address pool

mask=*Mask* identifies a range of IP addresses

To add a map entry to the NAT configuration use **type=map**:

```
fwnat cmd=add | change
      type=map
      secaddr=SecureAddr
      remaddr=RegisteredAddr
```

type=map adds a `map` entry

secaddr=*SecureAddr* IP address that should be translated into a specified registered address

remaddr=*RegisteredAddr* Registered address into which the specified secure address should be translated

Domain Name Services

The Domain Name Service (DNS) provides full domain name service to hosts inside the secure network while providing minimal information to hosts outside the secure network. Three domain name servers are required to accomplish this:

- One at the firewall
- One inside the secure network
- One outside the secure network.

See the *IBM Firewall User's Guide* for more information.

Note:

1. The x.x.x.x is an IP address in its dotted decimal format.
2. The value for the secaddr and remaddr parameters can be a single IP address or a list of IP addresses. If a list of IP addresses is specified, the list should be space delimited and contained within double quotes.
3. Duplicate addresses are detected and flagged as an error.
4. The first time DNS is configured, `fwdns cmd=change` creates the new file. The firewall will always have exactly one DNS configuration record. The values may be empty. The change subcommand is sufficient to change any or all of the values in the DNS record.

```
fwdns cmd=list | change
```

Performs the indicated operations:

cmd=list lists current DNS configuration

cmd=change changes the DNS configuration entry and creates the new file

To change the DNS configuration entry:

```
fwdns cmd=change
    secdomain=SecureDomainName
    secaddr=x.x.x.x | "x.x.x.x  x.x.x.x  x.x.x.x"
    remaddr=x.x.x.x | "x.x.x.x  x.x.x.x  x.x.x.x"
```

secdomain=*SecureDomainName* domain name of your internal, secure network

secaddr=*SecureDNSaddr[,...]* IP address of your secure domain name servers

remaddr=*NonSecureDNSaddr[,...]* IP address the domain name servers outside your secured network that are provided by your Internet connection service provider.

Users

```
fwuser cmd=add|change
username=LoginName
[fullname="UsersRealName"]
[password={yes|no}]
[pwdvalue=Password]
[level={proxy|admin}]
[secshell=SecureShell]
[remshell=NonSecureShell]
[loclogin=LocalLoginAuthentication]
[secftp=SecureFTPauthentication]
[remftp=NonSecureFTPauthentication]
[secauth=SecureTelnetAuthentication]
[remauth=NonSecureTelnetAuthentication]
[secip=SecureIPSecClientAuthentication]
[remip=NonSecureIPSecClientAuthentication]
[secadmin=SecureAdminAuthentication]
[remadmin=NonSecureAdminAuthentication]
[key="SecureNet Key Code"]
[warntime=IdleWarningTime]
[disctime=IdleDisconnectTime]
[histexpire=HistoryExpiration]
[histsize=HistorySize]
[loginretries=LoginRetries]
[maxage=MaxAge]
[maxexpired=MaxExpiredAge]
[maxrepeats=MaxRepeatChars]
[minalpha=MinAlphaChars]
[mindiff=MinDifferentChars]
[minlen=MinLength]
[minother=MinNonAlphaChars]
[pwdwarntime=PasswordWarnTime]
[modeallowed=host|none]
[fg_all={yes|no}]
[fg_addrtrans={yes|no}]
[fg_dns={yes|no}]
[fg_interfaces={yes|no}]
[fg_logmonitor={yes|no}]
[fg_logs={yes|no}]
[fg_mail={yes|no}]
[fg_netobjs1={yes|no}]
[fg_netobjs2={yes|no}]
[fg_pagers={yes|no}]
[fg_proxyserver={yes|no}]
[fg_server={yes|no}]
[fg_user={yes|no}]
[fg_snmp={yes|no}]
[fg_traffic={yes|no}]
[fg_vpn={yes|no}]
```

Adds a new user or modifies one or more attributes of an existing firewall user. All parameters either have default values or are unnecessary in certain circumstances. For `cmd=add`, default values will be stored; for `cmd=change`, the existing values will be preserved.

Fundamental Parameters

username Login name for this user. Must be a valid AIX login name.

fullname User's full name, or some other brief (one-line) information pertaining to this user. If spaces are to be included in this value, the value must be enclosed in double-quotes.

password Indicates if a user will be prompted for a password. By default, you will be prompted if any authentication method is specified or allowed to default to password.

pwdvalue Used mostly for script programming, the pwdvalue parameter allows the value of a parameter to be specified on the command line. Note that this value is entered in clear text and is in no way obscured from eavesdroppers. There is no default.

level The default value is proxy, which indicates that the user being created is a simple proxy user. Administration function groups and administration authentications do not apply to proxy users.

Login Shells

secshell Shell to use for telnet logins from a secure interface. Valid values are /bin/restrict.sh, /bin/csh, /bin/ksh, /bin/bsh, and /bin/oneact.sh. The default is /bin/restrict.sh.

remshell Shell to use for telnet logins from a nonsecure interface. Valid values are /bin/restrict.sh, /bin/csh, /bin/ksh, /bin/bsh, and /bin/oneact.sh. The default is /bin/restrict.sh.

Authentications

loclogin Authentication method to use for logins from the local console. Valid values are deny, none, password, sdi, and user_defined. The default is deny.

secftp Authentication method to use for FTP logins from a secure interface. Valid values are deny, none, password, snk, sdi, and user_defined. The default is deny.

remftp Authentication method to use for FTP logins from a nonsecure interace. Valid values are deny, none, password, snk, sdi, and user_defined. The default is deny.

secauth Authentication method to use for telnet logins from a secure interface. Valid values are deny, none, password, snk, sdi, and user_defined. The default is deny.

remauth Authentication method to use for telnet logins from a nonsecure interface. Valid values are deny, none, password, snk, sdi, and user_defined. The default is deny.

secip Authentication method to use for Remote IPSec Client logins from a secure interface. Valid values are deny and password. The default is deny.

remip Authentication method to use for Remote IPSec Client logins from a nonsecure interface. Valid values are deny and password. The default is deny.

secadmin Authentication method to use for Firewall Configuration Client logins from a secure interface. Valid values are deny, none, password, sdi, and user_defined. The default is deny.

remadmin Authentication method to use for Firewall Configuration Client logins from a nonsecure interface. Valid values are deny, none, password, sdi, and user_defined. The default is deny.

key Key used to authenticate the user's Digital Pathways' SecureNet Key card. Because this value must contain spaces, it must be enclosed in double quotes.

Idle Proxy Parameters

warntime Idle time in minutes after which the fwidleout command will warn this user about a forthcoming disconnection.

disctime Idle time in minutes after which the fwidleout command will disconnect this user. Disctime should be greater than warntime.

Password Rule Parameters

histexpire Defines the period of time (in weeks) that a user cannot reuse a password. The value is an integer string. The valid values are 0 - 52. The value of 0 indicates no time limit is set. The default value is 26.

histsize Defines the number of previous passwords a user cannot reuse. The value is an integer string. The valid values are 0 - 20. The default value is 10.

loginretries Defines the number of unsuccessful login attempts allowed after the last successful login before the system locks the account. The value is an integer string. The valid values are 0 - 20. The default value is 10. A zero or negative value indicates that no limit exists. Once the user's account is locked, the user will not be able to log in until the system administrator resets the user's unsuccessful_login_count attribute in the /etc/security/lastlog file to be less than the value of login retires. To do this, enter the following,

```
chsec -f /etc/security/lastlog -s username -a |unsuccessful_login_count
```

maxage Defines the maximum age (in weeks) of a password. The password must be changed by this time. The value is an integer string. The valid values are 0 - 52. The value of 0 indicates no maximum age. The default is 13.

maxexpired Defines the maximum time (in weeks) beyond the maxage value that a user can change an expired password. After this defined time, only an administrative user can change the password. The value is an integer string. The valid values are -1 - 26. If the maxexpired attribute is 0, the password expires when the maxage value is met. If the maxage attribute is 0, the maxexpired attribute is ignored. The default is 3.

maxrepeats Defines the maximum number of times a character can be repeated in a new password. The valid values are 0 - 8, but a value of 0 is meaningless. The value of 8 indicates that there is not a maximum number. The default is 2.

minalpha Defines the minimum number of alphabetic characters that must be in a new password. The value is an integer string. The valid values are 0 - 8. The value of 0 indicates no minimum number. The default is 4.

mindiff Defines the minimum number of characters required in a new password that were not in the old password. The value is an integer string. The valid values are 0 - 8. The value of 0 indicates no minimum number. The default is 3.

minlen Defines the minimum length of a password. The value is an integer string. The valid values are 0 - 8. The value of 0 indicates no minimum number. The default is 8.

minother Defines the minimum number of non-alphabetic characters that must be in a new password. The value is an integer string. The valid values are 0 - 8. The value of 0 indicates no minimum number. The default is 1.

pwdwarntime Defines the number of days before the system issues a warning that a password change is required. The value is an integer string. The valid values are 0 - 30. A zero or negative value indicates that no message is issued. The value must be less than the difference of the maxage and minage attributes. Values greater than this difference are ignored and a message is issued when the minage value is reached.

Administration Functional Groups

modeallowed indicates the login modes allowed:

- none–User is not allowed to login to the firewall configuration server
- efm–Administrator may login in EFM mode (only ***administrators***.)
- host–Administrator can login to the firewall configuration server host mode only.
- both–Administrator may login in either EFM mode or Host mode (only ***administrators***.)

fg_all Enter yes if this administrator is allowed to administer all aspects of the firewall. The default is no.

fg_act Enter yes if this administrator is allowed to activate changes on a managed firewall. The default is no.

fg_addrtrans Enter yes if this administrator is allowed to administer Network Address Translation. The default is no.

fg_deact Enter yes if this administrator is allowed to deactivate services on a managed firewall. The default is no.

fg_dist Enter yes if this administrator is allowed to transmit configuration changes to a managed firewall. The default is no.

fg_dns Enter yes if this administrator is allowed to administer Domain Name Services. The default is no.

fg_interfaces Enter yes if this administrator is allowed to define firewall interfaces. The default is no.

fg_logmonitor Enter yes if this administrator is allowed to administer Log Monitor thresholds. The default is no.

fg_logs Enter yes if this administrator is allowed to administer Log Facilities. The default is no.

fg_mail Enter yes if this administrator is allowed to administer the firewall mail gateway. The default is no.

fg_netobjs1 Enter yes if this administrator is allowed to perform basic administration of Network Objects. The default is no.

fg_netobjs2 Enter yes if this administrator is allowed to perform advanced administration of Network Objects. The default is no.

fg_pagers Enter yes if this administrator is allowed to administer Pager Setup. The default is no.

fg_proxyserver Enter yes if this administrator is allowed to configure the firewall proxy daemons. The default is no.

fg_user Enter yes if this administrator is allowed to administer Firewall users. The default is no.

fg_secag Enter yes if this administrator is allowed to administer a managed Firewall's Security Agreement. The default is no.

fg_sesslfm Enter yes if this administrator is allowed to administer a managed Firewall's session limits. The default is no.

fg_snmp Enter yes if this administrator is allowed to administer SNMP managers and subagent. The default is no.

fg_traffic Enter yes if this administrator is allowed to administer Traffic Control. The default is no.

fg_vpn Enter yes if this administrator is allowed to administer Virtual Private Networks. The default is no.

To lists all attributes of all firewall users or of a single specified firewall user:

```
fwuser cmd=list
       [username=username]
       [type={short|long}]
```

type={short|long} The default for type is long if you use a username. If you do not use a username, the default is short.

To remove a user from the firewall:

```
fwuser cmd=delete
       username=username
```

Adapters

```
fwadapter cmd=list
          [addr=AdapterAddress]
```

addr=*AdapterAddress* Lists all adapters attached to this machine and identifies each as being either a secure or a nonsecure adapter. If the optional *addr* parameter is specified, only that adapter is listed.

```
fwadapter cmd=change
          addr=AdapterAddress
          state={secure|nonsecure}
```

addr=*AdapterAddress* Address of the adapter to change.

state={secure|nonsecure} Sets the secure/nonsecure state of the adapter answering to the specified IP address.

Filters

The firewall command line does not provide an interface to modify the filter configuration. See the *IBM Firewall User's Guide* for more information on setting up the configuration. The firewall does provide a command line interface to control the configuration that was built with the configuration client.

```
fwfilters cmd=update | verify | list | shutdown | startlog | stoplog
```

Performs the indicated operations:

fwfilter cmd=update rebuilds the configuration and activates that rule set.

fwfilter cmd=verify performs a "test build" of the configuration but does not activate any changes.

fwfilter cmd=list lists the most recently built configuration

fwfilter cmd=shutdown deactivates the filters mechanism

fwfilter cmd=startlog logs selected traffic to the `local4` log

fwfilter cmd=stoplog stops the firewall filter logging

Log File Management

Log file management manages the size of your log and archive files.

The fwlog command adds, modifies and deletes records in the file **/etc/syslog.conf** and optionally also in the log-file-management config file.

```
fwlog cmd=add
      facility=Facility
      priority=Priority
      logfile=LogFileName
      [arcfile=ArchiveFileName
      logtime=DaysToKeepInLog
      arctime=DaysToKeepInArchive
      workspace=workspace directory]
```

Valid values for facility:

- local4
- local1
- mail
- syslog
- *

Valid values for priority:

- debug
- info
- notice
- warning
- err
- crit

- alert
- emerg

The logfile parameter indicates where the syslog entries should be sent. Valid values for logfile are:

- A fully qualified file name (starting with a '/' character), indicating the file to which the log entries should be written
- A host name prefixed with an '@' sign
- A user name on the firewall or a comma-delimited list of user names on the firewall.

Note: Files identified for local1 or local4 should be different from each other and different from the files for any other log facility if firewall features will be used to process these files.

It is important that ONLY local4 messages appear in files input to report utilities. No other facility should be directed to the same file as local4 or local1.

The arcfile, logtime, arctime, and workspace parameters are optional, and are only valid when the logfile parameter specifies a file name. All four parameters must be specified if any are specified.

The arcfile parameter must contain a fully qualified path name indicating the file that archived syslog records will be sorted. A valid arcfile name must end in **.a**.

The logtime parameter indicates how many days a syslog entry will remain in the logfile before being moved to the archive file.

The arctime parameter indicates how many days a syslog record will remain in the archive file before being purged.

The workspace parameter specifies a directory the archiving program should use for temporary work files when archiving syslog files.

```
fwlog cmd=change
        index=Index
        [facility=Facility]
        [priority=Priority]
        [logfile=LogFileName]
        [arcfile=ArchiveFileName]
        [logtime=DaysToKeepInLog]
        [arctime=DaysToKeepInArchive]
        [workspace=WorkspaceDirectory]
```

If a change, particularly the initial instance, fails to create a syntactically correct log file (for example, the log file that was created has missing fields), a warning is issued and the Firewall will not log data. If you have a crontab running, remove the crontab entry.

`fwlog` will maintain both the `syslog.conf` and the log-file-management config file. To perform logging but no archiving, only the `facility`, `priority`, and `logfile` parameters are required. To disable log archival once it's started, blank out the archive, logtime, and arctime parameters. If you have crontab running, remove the crontab entry.

```
fwlog cmd=list
```

Lists the current log-file configuration data.

```
fwlog cmd=delete
      index=index of entry to delete
```

Deletes the syslog entry specified by the index number returned for the entry on the fwlog cmd=list command.

Miscellaneous Commands

```
fwfschk
[cmd={-? | -&| -u| -f}]
```

Invokes the File System Integrity Checker. See “Testing the Firewall Ports Using fwice” on page 72 for more information. This utility is run from a crontab see Appendix G, “The Crontab Command” on page 167 for more information.

fwfschk –? usage

fwfschk –& logs output

fwfschk –u updates database

fwfschk –f forces the update to the database

```
fwice
[hosts=HostsFileName]
      [services=ServicesFileName]
      [results=ResultsFileName]
```

Invokes fwice to test the firewall's filter rules.

```
fwlogmgmt -1 or fwlogmgmt -a
```

Invokes the logfile archiver to maintenance Log facilities that have been configured for archiving.

Chapter 2. Using Report Utilities

This chapter discusses using the report utilities of the IBM Firewall. The primary purpose of the report utilities is to generate tabulated files of administrative information from local4 log files.

The utilities also allow the administrator to create a readable text file of the local4 messages. Tabulated text files can be generated and imported into tables in a database system, such as DB2/6000 or DB2/2 . The administrator can then use the Structured Query Language (SQL) or other tools like IBM's Visualizer or Query Management Facility to query the data and generate reports.

In addition to processing the firewall log file, the administrator can use the utilities to process the AIX su log file (usually **/var/adm/sulog**). This file contains information about attempted uses of the AIX su command. Logged-in users use the AIX su command to switch to a different user ID, potentially acquiring greater authority. Both successful and unsuccessful attempts are logged. The result of processing the su log file is a tabulated file that can be imported into a database system.

Report utilities consist of the following programs and files:

fwar2asc	Program to extract firewall log files from an archive library
fwlogtxt	Program to generate full-text messages from a firewall log file
fwlogtbl	Program to generate database import files, in DEL (delimited) format, from a firewall log and an su log
fwschema.ddl	File of SQL Data Definition Language (DDL) statements, suitable for defining the database tables
fwimport.dat	File of DB2 import statements, suitable for importing the DEL files into the database tables
fwqrysmp.dml	File of SQL Data Manipulation Language (DML) statements, suitable for generating sample reports

To use the report utilities, you should have some knowledge of relational databases and the use of an appropriate relational database product.

The DDL and DML files are specific to the DB2 family, but can be modified for use with other database management systems. DEL format files can be readily imported (loaded) into DB2/6000, DB2/2, and other database and file systems. Their simple format should allow conversion to other formats, if necessary.

Report Utilities Usage

This information explains how to use report utilities from the command line and SMIT. Refer to the *IBM Firewall for AIX User's Guide* for information on using the report utilities from the configuration client.

To view the firewall log file from the command line, use the **fwlogtxt** utility. See “Generating Messages from the Firewall Log File” on page 16 for more information.

To view the firewall log file in SMIT, select the Create Expanded Text Message File option. See “The SMIT Layout Panel” on page 22 for more information.

To generate reports based on log information:

1. Install the relational database product.
2. Create an empty database.
3. Create empty Firewall Log Tables in the database.
4. To produce the tabulated files, run **fwlogtbl** from the command line or select the Create Tabulated Text Manager File from SMIT.
5. Import the resulting files to populate the database tables with log data.
6. Produce reports by running SQL statements or SQL programs.

Note: The first three steps need to be done once, while the remaining steps are repeated each time new log data is available.

IBM Firewall Log Format

Each entry of the firewall log file has the format:

```
Date Time firewall_name:year;pid:msg_num; msg_ID;var_1;...;var_n;
```

where

- The first three fields, **date, time, and firewall-name** are added by syslog.
- **year** is the four-character year.
- **pid** is the AIX process ID to which the entry applies.
- **msg_num** is a sequential integer which the Report Utilities use to access the appropriate, translated message text from the fw_log.cat file.
- **msg_ID** is the external number of the message (such as ICA0001e).
- **var_1-n** represent the values of message variables, where **n** is the number of variables in the message definition.

Note: Do not direct other syslog records to the same file as the Firewall log. Such records will not conform to the format required by the report utilities and results are not predictable.

Generating Messages from the Firewall Log File

Use the command **fwlogtxt** to generate readable messages from the entries of a firewall log file.

The parameters include:

input Input is standard AIX input from a firewall log file

output Output is standard AIX output

fwlogtxt syntax

```
fwlogtxt
```

Example:

```
fwlogtxt < fw961031.log >logtxt.out
fwlogtxt < fw961031.log | grep ICA31
tail -f /var/adm/messages | fwlogtxt
```

There are no parameters for fwlogtxt; it takes information from the standard input and puts results to the standard output.

Note that the second example filters the output to show full text of only those messages that start with 'ICA31'. Additional of filtering can be done using standard AIX facilities or user-provided scripts/programs. The third example of invocation (tail -f) permits dynamic monitoring of an active log and could also be filtered.

Extracting Firewall Log Files

Use the command **fwar2asc** to extract the named files from an archive library file into an ASCII file. The resulting ASCII file can be used as an input for both fwlogtxt and fwlogtbl. The archive library file is assumed to be in the format generated by Log File Management (the fwlogmgmt command). That is, the archived logs are compressed and end in '.Z'

fwar2asc syntax

```
fwar2asc [-f OutFile] ArchiveFile LogName
```

Example:

```
fwar2asc -f myFwLog myFwLogs.a 961113fwLog.Z
fwar2asc myFwLogs.a 961113fwLog.Z
```

-f **-f** is AIX syntax.

OutFile Specifies the directory and file name of the output ASCII file. The default directory is the current directory. The default file name is the same as the value of the LogName parameter, but without terminating '.Z'.

ArchiveFile Specifies the directory and file name of the input archive library file.

LogName Specifies the name of the log file the user wants to extract from the archive library file. This will most likely end in '.Z' since the archived logs are compressed.

Generating Database Import Files

Use the command **fwlogtbl** to create, write over, or append to the tabulated files from which the user can populate the database tables for report generation.

The parameters include:

input Firewall log file, for example one extracted from a log archive library file using fwar2asc

-w, -a, and -su are parameter options

output File names:

a_alert.tbl
f_rule.tbl
f_info.tbl
f_match.tbl
f_stat.tbl
nat_info.tbl
p_info.tbl
p_ftp.tbl
p_http.tbl
p_info.tbl
p_login.tbl
p_stat.tbl
server_info.tbl
session.tbl
s_ftp.tbl
s_info.tbl
ssl_info.tbl
su.tbl
t_cntxt.tbl
t_policy.tbl
t_stat.tbl

In addition to producing the *.tbl files, fwlogtbl will write a message to standard out the first time it encounters any ICA message number it is not prepared to map to the database from each log it processes.

fwlogtbl syntax

```
fwlogtbl  -w [-d OutDir]  [-su]LogName
           |
          -a
```

Example:

```
fwlogtbl -a  -d /u/tai/fw/reports  fw961031.log
```

-w Specifies that the existing output file should be replaced. If the file does not exist, fwlogtbl creates it.

-a Specifies that the file generated should be appended to the existing output file. If the file does not exist, fwlogtbl creates it.

-d **-d** Identifies the output directory.

OutDir Specifies the directory in which all the output files are to be stored. If no directory is specified, the output files will be stored in the current directory.

-su Specifies that the LogName is the name of an AIX su log file.

Logname Specifies an AIX su log file or a firewall log file.

The output file names are predefined but can be copied or renamed after running fwlogtbl. The output files have delimited ASCII (DEL) file format, with no character string delimiters, and use semicolon (;) as the column delimiters.

For more information on messages, see Appendix A, “Messages” on page 75.

Using a Database with Report Utilities

This section describes files provided with the firewall for creating the database, importing information into the database, and querying reports. If you have DB2 , the db2 command can be used with these files. (Functions similar to the db2 command may exist in other database managers. The files may require alteration to be used with such functions.)

To run the db2 command, you must have DB2 installed and an 'instance' defined. (See the DB2 install documentation.) Initially, you must use DB2's create database command to create an empty database. (We suggest calling it 'fwlog'.) To do this, type at the command line:

```
db2 create database fwlog
```

You must then connect to fwlog:

```
db2 connect to fwlog
```

The -vf options of the db2 command can then be used as follows:

```
db2 -vf fwschema.ddl > schema.out
db2 -vf fwimport.dat > import.out
db2 -vf fwqrysmp.dml > report.out
```

These steps are described in the following sections. In each case, the user should carefully check the standard output (redirected to a file in each of the examples). For import, it is also necessary to check the .msg file produced by each individual import statement.

Your PATH environment variable should include /usr/lpp/FW/sample.

Creating the Tables

The example **db2-vf fwschema.ddl** creates all the tables and indexes needed. Issue this command once, preferably soon after installing the firewall. The current user ID at the time this example is run will be the creator ID of the tables. This ID may need to be used as a table name qualifier (such as creatorid.tableName) in later SQL statements, unless they are run under the creator's ID. Thus, if not using the creator's ID, the user will need to edit the fwimport.dat and fwqrysmp.dml files to place the creator ID in front of each table name.

The **fwschema.ddl** file (/usr/lpp/FW/sample/fwschema.ddl) contains the DDL statements to create the database tables needed to accept records from the tabulated files created by **fwlogtbl**. You should look at schema.out to determine if your operation was successful. The statements can be used as is or can be modified to work with various database systems. (Users should not change table and column names.)

Importing the data

The example **db2 –vf fwimport.dat** loads data from all the DEL files into the tables created by the **db2-vf fwschema.ddl** example.

The fwimport.dat file (/usr/lpp/FW/sample/fwimport.dat) contains sample statements for importing the data from the *.tbl files into the DB2 database. As mentioned in “Creating the Tables” on page 19, if the user of the imports is not the creator of the tables, the creator ID must be placed in front of each table name.

Each import statement produces information in standard out and additional information in a tblname.msg file, where tblname is specific to each import statement. The user should check both forms of output to determine if the import was successful. When running all the import statements in this file with a program such as db2, the user should direct standard out to a file, then check that file and each of the .msg files. Each one of the import commands produces a separate .msg file. Also, the user should re-issue the db2 -vf ... command whenever they have a new log to reflect in the database.

When importing large log files you may receive SQL error codes with descriptions indicating the need for more memory or disk space. For example, the message may be `insufficient heap space` or `transaction log space`. These errors require adjustment of the parameter settings for the database product or for the fwlog database. See the DB2 documentation for more information. A temporary alternative to adjusting the DB2 parameter settings is to split large logs or large tabulated files into smaller files.

Running Sample Queries

The **db2 -vf fwqrysmp.dml** example runs the sample queries. The fwqrysmp.dml file (/usr/lpp/FW/sample/fwqrysmp.dml) contains sample SQL statements that can provide useful report data, based on some of the query requirements. You can build on these examples to create your own reports. As mentioned in “Creating the Tables” on page 19, if the user of the imports is not the creator of the tables, the creator ID must be placed in front of each table name.

When running queries from the command line, DB2 allocates the maximum space it might need for each output column. This can result in a report that is difficult to read. You may achieve more satisfactory results by requesting fewer columns in each query or by imbedding these query statements in a program where you can better control the presentation.

User Interface into Report Utilities

Report Utilities are installed as part of firewall install. They can also be separately installed and run on a non-firewall host. The configuration client can be used to run report utilities on a firewall. On a non-firewall, you will use SMIT or the command line.

Using the Reports with SMIT

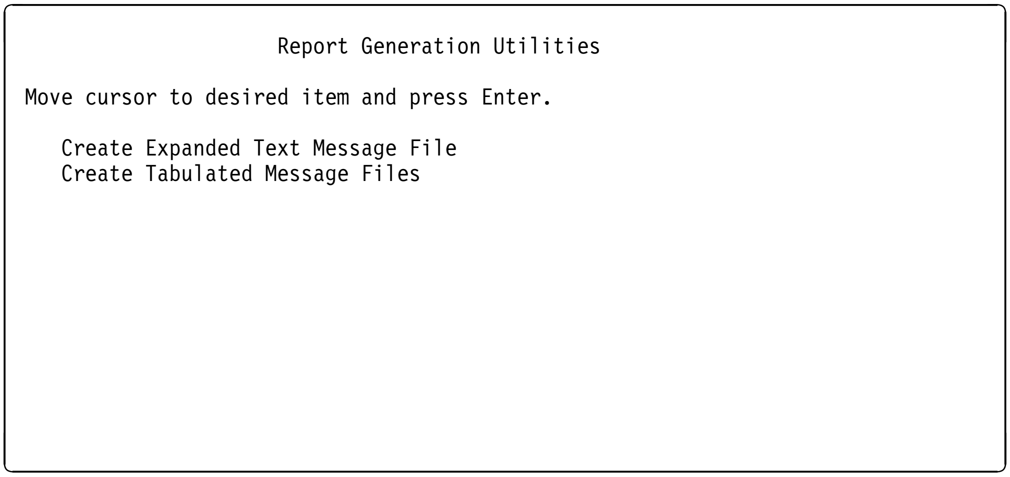
This diagram illustrates the sequence leading to the panels for a firewall machine.

```
         ---------------------------------
         |         Main SMIT panel        |
         ---------------------------------
                           |
                           |
                           V
         ---------------------------------
         |  Internet Connection Firewall  |
         ---------------------------------
                           |
                           |
                           V
                  -----------------
                  |  System Logs   |
                  -----------------
                           |
                           |
                           V
             --------------------------------
             | Report Generation Utilities  |
             --------------------------------
                |                   |
                |                   |
                V                   V
            ---------------------------------
            |Selection of File  in Archive  |
            ---------------------------------
                |                   |
                |                   |
                V                   V
----------------------------   ---------------------------
|Expanded Text Message File|   | Tabulated Message Files |
----------------------------   ---------------------------
```

This is the sequence leading to the panels in a non-firewall machine.

```
          ---------------------------------
         |         Main SMIT panel         |
         ---------------------------------
                           |
                           |
                           V
             --------------------------------
             | Report Generation Utilities  |
             --------------------------------
                |                   |
                |                   |
                V                   V
            ---------------------------------
            |Selection of File  in Archive  |
            ---------------------------------
                |                   |
                |                   |
                V                   V
----------------------------   ---------------------------
|Expanded Text Message File|   | Tabulated Message Files |
----------------------------   ---------------------------
```

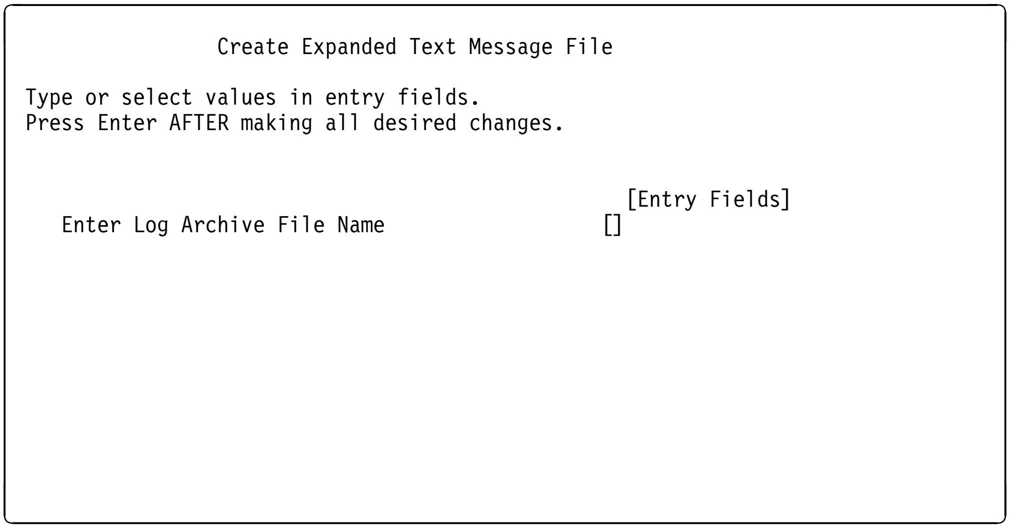
The SMIT Layout Panel



```
                     Report Generation Utilities

Move cursor to desired item and press Enter.

   Create Expanded Text Message File
   Create Tabulated Message Files
```

Figure 1. The selection of Report Utility Type

The panel in figure 2 requests the name of a log archive. See figure 3 for usage of this information. A similar panel appears if Create Tabulated Message Files was selected.

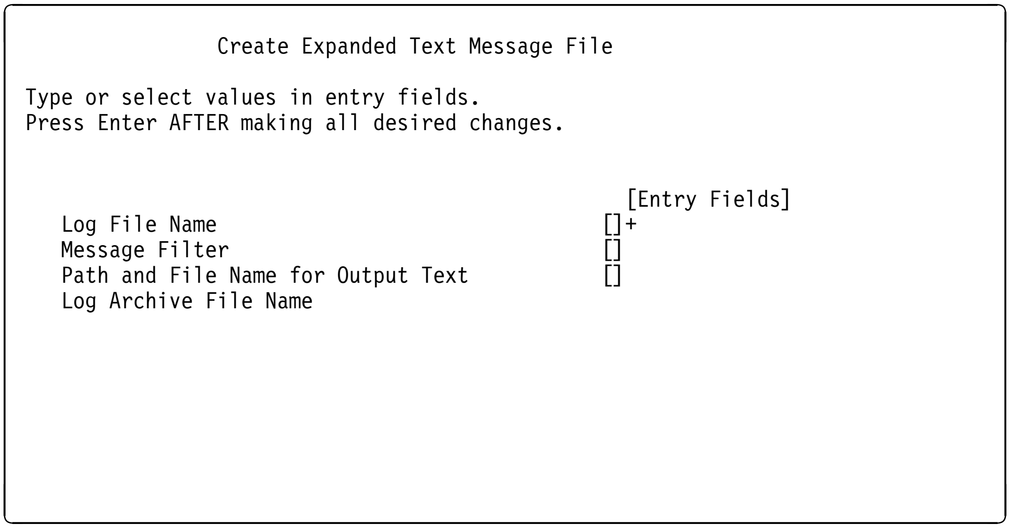


```
                Create Expanded Text Message File

Type or select values in entry fields.
Press Enter AFTER making all desired changes.


                                                  [Entry Fields]
   Enter Log Archive File Name                  []
```

Figure 2. The field for Log Archive File Name entry

The list for Log File Name field will be the list of names extracted from the Log Archive named on the preceding panel and shown at the bottom of this one. The names will end in .Z, since they have been compressed by the fwlogmgmt command. If no Log Archive name was given on the preceding panel, the list will show names of all files in the directory SMIT was started from. It is assumed that these are not compressed files. The Message Filter is used to select a subset of the log messages (which have an ICA prefix). The default filter is all messages in the log (ICA). A filter of ICA3 would select all messages related to SOCKS. A filter of ICA3012 would show the text of only that one message. The Default Output File is standard output.

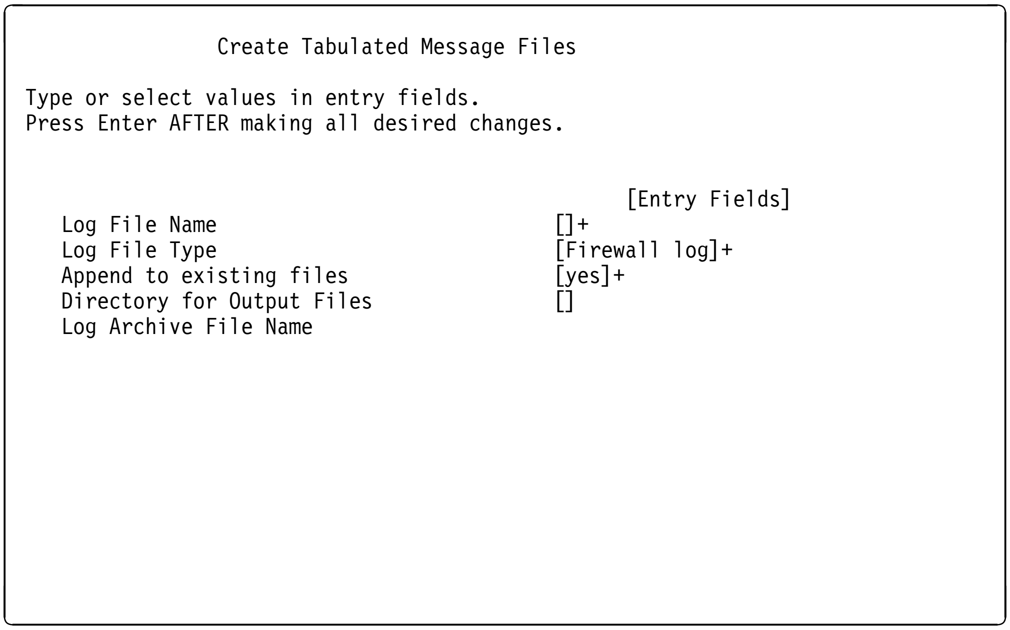
For more information, see Appendix A, “Messages” on page 75.



```
                 Create Expanded Text Message File

 Type or select values in entry fields.
 Press Enter AFTER making all desired changes.


                                                    [Entry Fields]
    Log File Name                                 []+
    Message Filter                                []
    Path and File Name for Output Text            []
    Log Archive File Name
```

Figure 3. The fields for "Create Expanded Text Message File"

See the description of the Create Expanded Text Message File panel for details about the list for Log File Name field. The Default for Directory for Output Files is the current directory



```
                 Create Tabulated Message Files

 Type or select values in entry fields.
 Press Enter AFTER making all desired changes.


                                                    [Entry Fields]
    Log File Name                             []+
    Log File Type                             [Firewall log]+
    Append to existing files                  [yes]+
    Directory for Output Files                []
    Log Archive File Name
```

Figure 4. The fields for "Create Tabulated Message Files"

The SQL Tables

This section defines the layout of the SQL tables.

Each Firewall log message or system SU log message is mapped to one of the following SQL tables:

```
ADMIN_ALERT
FILTER_INFO
FILTER_MATCH
FILTER_ACTIVE_RULE
FILTER_STATUS
NAT_INFO
PAGER_INFO
PROXY_FTP
PROXY_HTTP
PROXY_INFO
PROXY_LOGIN
PROXY_STATUS
SERVER_INFO
SESSION
SOCKS_FTP
SOCKS_INFO
SSL_INFO
SU
TUNNEL_CONTEXT
TUNNEL_POLICY
TUNNEL_STATUS
```

You should not change the table and column names.

Indexes

A log record representing a particular firewall event should appear only once in the database. If an administrator imports the same tabulated file multiple times or if another tabulated file derived from the same log file is imported, a log record could appear more than once.

To help avoid this problem, the database definition sample file, fwschema.dll, defines a unique index on each of the tables using these three fields:

- Filename of the log file that was the source of this record (LOG_FILE)
- The line number of this record in that log file (LINE_NUM)
- The repetition number for this line, based on the syslog 'last message repeated n times' message (REPEAT_NUM)

This index prevents you from loading the same line number from the same named file more than once. This, combined with careful management of your log file names, should prevent duplication of log events in your database.

Adding other indexes to your database may enhance performance of your most common queries. Consult your database documentation for more information.

Table descriptions

This section maps firewall log messages to tables and columns and points to information you may wish to query for your reports. All messages that are mapped to a particular table are listed in the note at the end of the table. Messages that provide data for particular columns are listed in that column's description.

For more information on firewall log messages, see Appendix A, “Messages” on page 75.

In the Data Type column in the following descriptions, 'int' implies SMALLINT column type for DB2; 'long int' implies DB2 INTEGER type. A date-time Data Type implies DB2 TIMESTAMP. In the timestamp, the microseconds value will always be "000000".

If a description is marked "required", this means a value must be specified to enter the record in the table.

The three columns that serve as the unique index are omitted from these table definitions because their definitions are identical and there is usually no reason to query them.

Table 1 (Page 1 of 2). ADMIN_ALERT. This table contains messages related to intrusion alerts from the a_alert.tbl file.

Column	Data Type	Short Description
DATE_TIME	date_time	Date and time for the action (required)
FIREWALL	char(100)	Fully qualified name of the firewall machine (required)
PID	int	Process ID (required)
MSG_NUM	int	Message number (required)

Table 1 (Page 2 of 2). ADMIN_ALERT. This table contains messages related to intrusion alerts from the a_alert.tbl file.

Column	Data Type	Short Description
USERID	char(8)	User ID (ICA0001, ICA0002, ICA0003, ICA0004, ICA2001, ICA2002, ICA2003, ICA2026, ICA2043, ICA2068, ICA3001, ICA3012, ICA3018)
ACTION	char(7)	"connect" (ICA3012) or "bind" (ICA3018)
NUM_COUNT	int	Number of authentication failures (ICA0001, ICA0002, ICA0003); number of log entries for TAG_MSG_NUM (ICA0004); number of days for (ICA9000)
TAG_MSG_NUM	char (8)	Tag message number (ICA0004)
SRC_IP	char(15)	Source IP address (ICA2001, ICA2028, ICA2079, ICA3012, ICA3018)
DST_IP	char(15)	Destination IP address (ICA2028, ICA2079, ICA3012, ICA3018)
AUTH_METHOD	char(20)	Authentication Method (ICA2002)
NETWORK	char(25)	Network name (ICA2001, ICA2002)
HOST_NAME	char(100)	Host name (ICA0003, ICA2002)
TIMEOUT_SEC	int	Time out seconds (ICA2026)
CONN_USERID	char(8)	Socks connect user name (for ICA3001)
APPLICATION	char(10)	Application name - "telnet", "ftp", ... (ICA3012)

Note: Related Messages: ICA0001 ICA0002 ICA0003 ICA0004 ICA0005 ICA0006 ICA0007 ICA0008 ICA0009 ICA0010 ICA0011 ICA0012 ICA0013 ICA0014 ICA0015 ICA0016 ICA0017 ICA0018 ICA0019 ICA0020 ICA0021 ICA0022 ICA1010 ICA2001 ICA2002 ICA2003 ICA2020 ICA2026 ICA2028 ICA2037 ICA2040 ICA2042 ICA2043 ICA2079 ICA3001 ICA3012 ICA3018 ICA9000 ICA9001

Table 2. FILTER_ACTIVE_RULE. This table contains active FILTER rules from the f_rule.tbl file.

Column	Data Type	Short Description
DATE_TIME	date_time	Date and time for the action (required)
FIREWALL	char(100)	Fully qualified name of the firewall machine (required)
PID	int	Process ID (required)
MSG_NUM	int	Message number (required)
RULE_NUM	int	Rule number (required)
RULE	char(150)	Rule (required)

Note: Related Message: ICA1037

Table 3. FILTER_INFO. This table contains error or general information messages related to FILTERS from the f_info.tbl file.

Column	Data Type	Short Description
DATE_TIME	date_time	Date and time for the action (required)
FIREWALL	char(100)	Fully qualified name of the firewall machine (required)
PID	int	Process ID (required)
MSG_NUM	int	Message number (required)
RULE_NUM	int	Filter rule number (ICA1005)
ERROR_NUM	int	System Error number -- AIX errno (ICA1007, ICA1008, ICA1009, ICA1011 ICA1013, ICA1015, ICA1021, ICA1023, ICA1024) Text corresponding to this error number is obtainable via the _strerror function.
LOAD_PATH	char(100)	Kernel extension load path (ICA1011, ICA1012)
DVC_DRV	char(25)	Device driver (ICA1021)
TERM_SIG	char(25)	Termination signal (ICA1260)
FILE_NAME	char(100)	File name (ICA1024)
RC	int	Internal firewall return code (ICA1019)

Note: Related Messages: ICA1001 ICA1002 ICA1003 ICA1005 ICA1007 ICA1008 ICA1009 ICA1011 ICA1012 ICA1013 ICA1014 ICA1015 ICA1016 ICA1017 ICA1019 ICA1021 ICA1022 ICA1023 ICA1024 ICA1200 ICA1260

Table 4 (Page 1 of 2). FILTER_MATCH. This table contains the filter rules matched from the f_match.tbl file.

Column	Data Type	Short Description
DATE_TIME	date_time	Date and time for the action (required)
FIREWALL	char(100)	Fully qualified name of the firewall machine (required)
PID	int	Process ID (required)
MSG_NUM	int	Message number (required)
RULE_NUM	int	Rule number (required)
ACTION	char(6)	Rule type: permit, deny, etc.
DIRECTION	char(8)	Direction the packet was traveling inbound or outbound (required)
SRC_IP	char(15)	IP address of the sender(required)
DST_IP	char(15)	IP address of the recipient(required)

Table 4 (Page 2 of 2). FILTER_MATCH. This table contains the filter rules matched from the f_match.tbl file.

Column	Data Type	Short Description
PROTOCOL	char(7)	High-level protocol (required) For example, UDP, IPIP, ICMP, TCP or TCP/ACK
SRC_PORT	int	• IP Packet type for ICMP • Resource protocol port number for others (required)
DST_PORT	int	• IP Packet code for ICMP • Destination protocol port number for others (required)
ROUTING	char(5)	Routing affiliation of the packets: route or local (required)
INTERFACE	char(10)	Interface type: secure or non-secure (required)
FRAGMENT	char(8)	Identifies if the packet is fragment or non-fragment (required)
TUNNEL_ID	int	Tunnel ID (required)
ENCRYPTION	char(7)	Encryption algorithm DES_CBC or CDMF or none
BYTES	long int	Length of the specific packet (required)
Note: Related Message: ICA1036		

Table 5. FILTER_STATUS. This table contains information on status changes of filters from the f_stat.tbl file.

Column	Data Type	Short Description
DATE_TIME	date_time	Date and time for the action (required)
FIREWALL	char(100)	Fully qualified name of the firewall machine (required)
PID	int	Process ID (required)
MSG_NUM	int	Message number (required)
DAEMON	char(25)	Filter logging daemon (ICA1004), such as /usr/sbin/fwlogd.
VERSION	int	Version number (ICA1004, ICA1033)
RELEASE	int	Release number (ICA1004, ICA1033)
PACKET_LOGGING	char(8)	Status of packet logging (ICA1035) enabled or disabled
Note: Related Messages: ICA1004 ICA1032 ICA1033 ICA1034 ICA1035. The details of the filter rule updates(ICA1032) can be obtained from FILTER_ACTIVE_RULE table.		

Table 6. NAT_INFO. This table contains Network Address Translation message information from the nat_info.tbl file.

Column	Data Type	Short Description
DATE_TIME	date_time	Date and time for the action (required)
FIREWALL	char(100)	Fully qualified name of the firewall machine (required)
PID	int	Process ID (required)
MSG_NUM	int	Message number (required)
VERSION	int	NAT Version number (ICA9033)
RELEASE	int	NAT Release number (ICA9033)
IP	char(15)	IP address (ICA9035, ICA9036)
Note: Related Messages: ICA9032, ICA9033, ICA9034, ICA9035, ICA9036		

Table 7 (Page 1 of 2). PAGER_INFO. This table contains information related to the paging feature of the Firewall, from the pgr_info.tbl file, for those pager messages that are mapped to the database.

Column	Data Type	Short Description
DATE_TIME	date_time	Date and time for the action (required)
FIREWALL	char(100)	Fully qualified name of the firewall machine (required)
PID	int	Process ID (required)
MSG_NUM	int	Message number (required)
USERID	char(8)	User ID (ICA4036, ICA4174, ICA4175)
ERROR_NUM	int	System Error number - AIX errno
PROGRAM	char(25)	Program name (ICA4000)
SIGNAL	int	Termination signal (ICA4000)
ID	int	Identifier (ICA4036)
PRIORITY	int	Priority (ICA4036)
PERIOD	int	Period (ICA4036)
RETRY_COUNT	int	Number of retries (ICA4036)
FROM_ENTRY	char(15)	Function name (ICA4036)
HOST_NAME	char(100)	Host name (ICA4174, ICA4175)
MESSAGE_TEXT	char(250)	Text of the page (ICA4036)
SERVICE	char(25)	Service name (ICA4017)
SOCKET	int	Socket number (ICA4017)

Table 7 (Page 2 of 2). PAGER_INFO. This table contains information related to the paging feature of the Firewall, from the pgr_info.tbl file, for those pager messages that are mapped to the database.

Column	Data Type	Short Description
FILENAME	char(100)	Filename (ICA4154)
Note: Related Messages: ICA4000 ICA4001 ICA4007 ICA4017 ICA4036 ICA4154 ICA4168 ICA4174 ICA4175		

Table 8. PROXY_FTP. This table contains FTP action information from FTP sessions from the p_ftp.tbl file.

Column	Data Type	Short Description
DATE_TIME	date_time	Date and time for the action (required)
FIREWALL	char(100)	Fully qualified name of the firewall machine (required)
PID	int	Process ID (required)
MSG_NUM	int	Message number (required)
USERID	char(8)	User ID (required)
SRC_IP	char(15)	IP Address of the User (required)
DST_IP	char(15)	IP address of the remote machine (required)
ACTION	char(5)	File transfer action. put or get (required)
FILE_NAME	char(100)	File name
BYTES	long int	Amount of data transfered.
SID	long int	Unique session id (required)
Note: Related Message: ICA2075		

Table 9. PROXY_HTTP. This table contains HTTP action information from Proxy sessions from the p_http.tbl file.

Column	Data Type	Short Description
DATE_TIME	date_time	Date and time for the action (required)
FIREWALL	char(100)	Fully qualified name of the firewall machine (required)
PID	int	Process ID (required)
MSG_NUM	int	Message number (required)
STATUS	int	Status (required)
SRC_IP	char(15)	IP Address of the User (required)
REQUEST	char(250)	Content of the HTTP request (required)
BYTES	long int	Amount of data transfered.
Note: Related Message: ICA2099		

Table 10. PROXY_INFO. This table contains error or general information messages related to PROXY from the p_info.tbl file.

Column	Data Type	Short Description
DATE_TIME	date_time	Date and time for the action (required)
FIREWALL	char(100)	Fully qualified name of the firewall machine (required)
PID	int	Process ID (required)
MSG_NUM	int	Message number (required)
USERID	char(8)	User ID (ICA2018, ICA2019, ICA2057, ICA2058)
ERROR_NUM	int	System Error number - AIX errno (ICA2005, ICA2006, ICA2009, ICA2029, ICA2035, ICA2038, ICA2039, ICA2052, ICA2054, ICA2055, ICA2056, ICA2057, ICA2058, ICA2059, ICA2063, ICA2064, ICA2065, ICA2066, ICA2067, ICA2068, ICA2069, ICA2069, ICA2070, ICA2071, ICA2074, ICA2110, ICA2111, ICA2113, ICA2114, ICA2115, ICA2118, ICA2119, ICA2121, ICA2122, ICA2123, ICA2124) Text for errno (AIX System Errors) is obtainable via the _strerror function.
OPTION_VAL	char(20)	Option flag or parm value (ICA2014, ICA2015, ICA2049, ICA2050)
TIME	char(15)	Invalid time interval (ICA2044)
RC	int	Internal Firewall return code (ICA2007, ICA2030, ICA2031, ICA2033, ICA2034, ICA2054, ICA2057, ICA2058, ICA2065, ICA2120)
INVOC_NAME	char(20)	Invocation name for socket or port at time system error occurred (ICA2055, ICA2056)
AUDIT_TYPE	char(7)	Unknown audit-type (7 hex digits) (ICA2004)
HOST_NAME	char(100)	Host name (ICA2106, ICA2107, ICA2126)
FILE_NAME	char(100)	File name (ICA2029, ICA2030, ICA2072)
LINE_NUM	int	Line number (ICA2029, ICA2030)
PROTOCOL	char(25)	Invalid protocol name (ICA2112, ICA2116)
CUSTOMIZED_ATTR	char(25)	Line number (ICA2105, ICA2106, ICA2125)
ODM_ERR_NUM	int	Error number from Object Data Manager (ICA2102, ICA2103, ICA2104, ICA2105, ICA2107, ICA2108, ICA2109,ICA2125)

Note: Related Messages: ICA2004 ICA2005 ICA2006 ICA2007 ICA2009 ICA2014 ICA2015 ICA2018 ICA2019 ICA2023 ICA2029 ICA2030 ICA2031 ICA2032 ICA2033 ICA2034 ICA2035 ICA2038 ICA2039 ICA2044 ICA2045 ICA2046 ICA2047 ICA2048 ICA2049 ICA2050 ICA2051 ICA2052 ICA2053 ICA2054 ICA2055 ICA2056 ICA2057 ICA2058 ICA2059 ICA2060 ICA2061 ICA2062 ICA2063 ICA2064 ICA2065 ICA2066 ICA2067 ICA2068 ICA2069 ICA2070 ICA2071 ICA2072 ICA2073 ICA2074 ICA2100 ICA2102 ICA2103 ICA2104 ICA2105 ICA2109 ICA2110 ICA2111 ICA2112 ICA2113 ICA2114 ICA2115 ICA2116 ICA2117 ICA2118 ICA2119 ICA2120 ICA2121 ICA2122 ICA2123 ICA2124 ICA2125 ICA2126 ICA2127

Table 11. PROXY_LOGIN. This table contains information (primarily regarding authentication) about successful PROXY logins from the p_login.tbl file.

Column	Data Type	Short Description
DATE_TIME	date_time	Date and time for the action (required)
FIREWALL	char(100)	Fully qualified name of the firewall machine (required)
PID	int	Process ID (required)
MSG_NUM	int	Message number (required)
USERID	char(8)	User ID (required)
APPLICATION	char(10)	Application name which can be one of: • telnet (ICA2024)or ftp (ICA2025)(required)
AUTH_METHOD	char(15)	Authentication method (required)
NETWORK	char(25)	Network (secure/nonsecure - may have additional info also) (required)
HOST_NAME	char(100)	Host name (required)

Note: Related Messages: ICA2024 ICA2025

Table 12. PROXY_STATUS. This table contains PROXY status information from the p_stat.tbl file.

Column	Data Type	Short Description
DATE_TIME	date_time	Date and time for the action (required)
FIREWALL	char(100)	Fully qualified name of the firewall machine (required)
PID	int	Process ID (required)
MSG_NUM	int	Message number (required)
USERID	char(8)	User ID (ICA2008, ICA2016, ICA2021)
SRC_IP	char(15)	Source IP address (ICA2000, ICA2008, ICA2010, ICA2011, ICA2012, ICA2013, ICA2141)
DST_IP	char(15)	Destination IP address (ICA2000, ICA2010, ICA2011, ICA2012, ICA2013)
REMOTE_HOST	char(100)	Remote host name (from perspective of firewall machine) (ICA2021, ICA2022, ICA2027)

Note: Related Messages: ICA2000 ICA2010 ICA2011 ICA2012 ICA2013 ICA2016 ICA2021 ICA2022 ICA2027 ICA2097 ICA2098 ICA2141 ICA2163 ICA2164 ICA2165

Table 13. SERVER_INFO. This table contains information about Configuration Server status and activities from the srv_info.tbl file.

Column	Data Type	Short Description
DATE_TIME	date_time	Date and time for the action (required)
FIREWALL	char(100)	Fully qualified name of the firewall machine (required)
PID	int	Process ID (required)
MSG_NUM	int	Message number (required)
USERID	char(8)	User ID (ICA9003, ICA9004)
ERROR_NUM	int	System Error number – AIX errno (ICA9008, ICA9009) Text for errno (AIX System Errors) is obtainable with the strerror function.

Note: Related Messages: ICA9003 ICA9004 ICA9005 ICA9006 ICA9007 ICA9008 ICA9009 ICA9010 ICA9011 ICA9012 ICA9013 ICA9014 ICA9015

:

Table 14 (Page 1 of 2). SESSION. This table contains SOCKS and PROXY session start/stop information from the session.tbl file.

Column	Data Type (length)	Short Description
DATE_TIME	date_time	Date and time for the action (required)
FIREWALL	char(100)	Fully qualified name of the firewall machine (required)
PID	int	Process ID (required)
MSG_NUM	int	Message number (required)
USERID	char(8)	User ID (required)
SERVICE_TYPE	char(10)	Service type which can be one of: • socks, proxy (required)
APPLICATION	char(10)	Application name - telnet, ftp, ... (required)
SRC_IP	char(15)	IP Address of the User (required)
DST_IP	char(15)	IP address of the remote machine (required)
SESSION_EVENT	char(5)	• begin when a session is established. • end when a session is terminated. (required)
BYTES	long int	Amount of data transfered during the session. If the row is for PROXY, this column is only for ftp.
SID	long int	Unique session identifier, generated by the Firewall, based on clock time.

Table 14 (Page 2 of 2). SESSION. This table contains SOCKS and PROXY session start/stop information from the session.tbl file.

Column	Data Type (length)	Short Description

Note:

Related Messages:

- Socks Session Start: ICA3011
- Socks Session Stop: ICA3015
- Proxy Telnet Session Start: ICA2036
- Proxy Telnet Session Stop: ICA2077
- Proxy FTP Session Start: ICA2041
- Proxy FTP Session Stop: ICA2076

Details of Socks FTP session actions are in SOCKS_FTP table. Details of Proxy FTP session actions are in PROXY_FTP.

Table 15. SOCKS_FTP. This table contains SOCKS FTP action information from FTP sessions from the s_ftp.tbl file.

Column	Data Type	Short Description
DATE_TIME	date_time	Date and time for the action (required)
FIREWALL	char(100)	Fully qualified name of the firewall machine (required)
PID	int	Process ID (required)
MSG_NUM	int	Message number (required)
USERID	char(8)	User ID (required)
SRC_IP	char(15)	IP Address of the User (required)
DST_IP	char(15)	IP address of the remote machine (required)
DATA_BIND	char(5)	• 'start' when data bind is established.(ICA3010) • 'stop' when data bind is terminated.(ICA3014) (required)
BYTES	long int	Amount of data transfered.

Note: Related Messages: ICA3010 ICA3014

Table 16 (Page 1 of 2). SOCKS_INFO. This table contains error or general information messages related to SOCKS from the s_info.tbl file.

Column	Data Type	Short Description
DATE_TIME	date_time	Date and time for the action (required)

Table 16 (Page 2 of 2). SOCKS_INFO. This table contains error or general information messages related to SOCKS from the s_info.tbl file.

Column	Data Type	Short Description
FIREWALL	char(100)	Fully qualified name of the firewall machine (required)
PID	int	Process ID (required)
MSG_NUM	int	Message number (required)
USERID	char(8)	User ID (ICA3044, ICA3045, ICA3046, ICA3047, ICA3049)
ACTION	char(7)	"connect" (ICA3044, ICA3049) or "bind" (ICA3046, ICA3047)
ERROR_NUM	int	System Error number - AIX errno (ICA3013, ICA3019, ICA3031, ICA3032, ICA3040, ICA3044, ICA3101, ICA3102, ICA3103, ICA3104, ICA3106, ICA3107, ICA3108, ICA3122, ICA3124, ICA3125, ICA3126, ICA3128)
SRC_HOST	char(25)	Source host name (ICA3019, ICA3035)
DST_HOST	char(25)	Destination host name (ICA3016, ICA3045)
SRC_IP	char(15)	Source address (ICA3042, ICA3043, ICA3044, ICA3045, ICA3046, ICA3047, ICA3049)
DST_IP	char(15)	Destination address (ICA3044, ICA3045, ICA3046, ICA3047, ICA3049)
LINE_NUM	int	Line number (ICA3022, ICA3023, ICA3024, ICA3025, ICA3026, ICA3109, ICA3110, ICA3111, ICA3112, ICA3115, ICA3116, ICA3117, ICA3118, ICA3119, ICA3120); or Number of lines (ICA3113)
EXEC_STATUS	int	Exec status (ICA3027)
CMD	char(36)	Command, such as login (ICA3027, ICA3039, ICA3042, ICA3044, ICA3048) note: for ICA3042, the command is in hexadecimal format
FILE_NAME	char(100)	File name (ICA3030, ICA3032, ICA3105, ICA3109, ICA3110, ICA3111, ICA3112, ICA3113, ICA3114, ICA3115, ICA3116, ICA3117, ICA3118, ICA3119, ICA3120)
APPLICATION	char(10)	Application name telnet, ftp.... (ICA3044, ICA3045, ICA3049)
VERSION	char(10)	Socks version number in hex (ICA3043)

Note: Related Messages: ICA3013 ICA3016 ICA3017 ICA3019 ICA3022 ICA3023 ICA3024 ICA3025 ICA3026 ICA3027 ICA3030 ICA3031 ICA3032 ICA3033 ICA3035 ICA3039 ICA3040 ICA3041 ICA3042 ICA3043 ICA3044 ICA3045 ICA3046 ICA3047 ICA3048 ICA3049 ICA3052 ICA3101 ICA3102 ICA3103 ICA3104 ICA3105 ICA3106 ICA3107 ICA3108 ICA3109 ICA3110 ICA3111 ICA3112 ICA3113 ICA3114 ICA3115 ICA3116 ICA3117 ICA3118 ICA3119 ICA3120 ICA3121 ICA3122 ICA3123 ICA3124 ICA3125 ICA3126 ICA3127 ICA3128

Table 17. SSL_INFO. This table contains information about SSL status and activities from the ssl_info.tbl file.

Column	Data Type	Short Description
DATE_TIME	date_time	Date and time for the action (required)
FIREWALL	char(100)	Fully qualified name of the firewall machine (required)
PID	int	Process ID (required)
MSG_NUM	int	Message number (required)
Client_IP	char(15)	IP address of the client
Note: Related Messages: ICA5015 ICA5022 ICA5023 ICA5028 ICA5029 ICA5036 ICA5039 ICA5060 ICA5063 ICA5082 ICA5120		

Table 18. SU. This table contains details about SU activities from the su.tbl file.

Column	Data Type	Short Description
DATE_TIME	date_time	Date and time for the action (required) Because AIX does not record the year in the su log file, the year portion of the DATE_TIME column is set to either the current year or the previous year, based on the month/day settings (if month/day is later than current month/day, assume it is last year.)
FROM_USERID	char(8)	User ID. (required)
TO_USERID	char(8)	User ID. (required)
LOGIN_STATUS	char(7)	Status of login attempt: success or failure (required)

Table 19 (Page 1 of 2). TUNNEL_CONTEXT. This table contains active TUNNEL context specifications from the t_cntxt.tbl file.

Column	Data Type	Short Description
DATE_TIME	date_time	Date and time for the action (required)
FIREWALL	char(100)	Fully qualified name of the firewall machine (required)
PID	int	Process ID (required)
MSG_NUM	int	Message number (required)
TUNNEL_ID	long int	Tunnel ID (required)
SRC_IP	char(15)	Source IP address (required)
DST_IP	char(15)	Destination IP address (required)

Table 19 (Page 2 of 2). TUNNEL_CONTEXT. This table contains active TUNNEL context specifications from the t_cntxt.tbl file.

Column	Data Type	Short Description
ENCRYPTION	char(7)	Encryption algorithm DES_CBC or CDMF
Note: Related Message : ICA1040 ICA1043		

Table 20. TUNNEL_POLICY. This table contains TUNNEL policy statememts from the t_policy.tbl file.

Column	Data Type	Short Description
DATE_TIME	date_time	Date and time for the action (required)
FIREWALL	char(100)	Fully qualified name of the firewall machine (required)
PID	int	Process ID (required)
MSG_NUM	int	Message number (required)
POLICY	char(60)	Policy statement read from fwpolicy file (required)
Note: Related Message: ICA1040		

Table 21. TUNNEL_STATUS. This table contains information on status changes of TUNNELS from the t_stat.tbl file.

Column	Data Type	Short Description
DATE_TIME	date_time	Date and time for the action (required)
FIREWALL	char(100)	Fully qualified name of the firewall machine (required)
PID	int	Process ID (required)
MSG_NUM	int	Message number (required)
SESSION_SCKT	long int	Session socket port (for ICA1038)
MASTER_SCKT	long int	Master socket port (for ICA1038)
TUNNEL_ID	long int	Tunnel ID deleted (for ICA1041)
Note: Related Messages: ICA1038 ICA1039 ICA1041 ICA1042 • The details of the policy defined(ICA1039) can be obtained from TUNNEL_POLICY table. • The details of the tunnel context defined(ICA1042) can be obtained from TUNNEL_CONTEXT table.		

Chapter 3. Providing Your Own Authentication Methods

This chapter gives you information on providing your own authentication methods .

There are two methods for user-supplied authentication:

1. Using executables fwuserpt and fwuserau, which authenticates a user based on a response to a single prompt.
2. Using the functions fwprompt, fw_tn_authenticate, and fw_ftp_authenticate, which authenticates a user based on responses to one or more prompts. This method is known as user-supplied iteration because the prompting is an iterative process.

You can use either method but not both. If fwuserpt and fwuserau are present in /usr/bin, then method 1 is used.

User-Supplied Authentication

To use user-supplied authentication as an authentication method, the firewall administrator must provide two executables: **fwuserpt** and **fwuserau**. The fwuserpt code provides the text that will prompt the user for an authentication token. The fwuserau code authenticates the user based on the response to the prompt.

If you choose the user-supplied authentication method for a firewall proxy user, the IBM Firewall takes these actions when that user logs on :

- Prompts the user for a user name.
- Invokes **fwuserpt** passing the user name as the input parameter.
- **fwuserpt** executes a `printf` statement to display a prompt to the user.
- Receives the printf string and displays it on the user console.
- Reads the user response, which may be multiple tokens on a single line.
- Invokes **fwuserau** passing the User Name and all the tokens read from the user terminal.
- Accepts or rejects the user based on the return code from **fwuserau**.

FWUSERPT and FWUSERAU Specifications

The executables, **fwuserpt** and **fwuserau** reside in `/usr/bin`. These subroutines are supported when compiled in an AIX machine compatible with the version of the firewall the subroutines are intended to run on. Once executed, the ownership is transferred to root.

fwuserpt takes user name as the input. It performs a database lookup or calculation and outputs a string using a printf statement. For example, if John is the user, **fwuserpt** can create one of the following as output:

- Please enter your secret code for authentication
- Secret code is required for John
- Secret code corresponding to 1345 is required for John. (1345 is a string associated with John.)

The return codes for **fwuserpt** and **fwuserau** are zero if successful and non-zero if unsuccessful.

The input to **fwuserau** are the user name and the strings of 'password' supplied by the user. If the password consists of a sequence of strings as in the case of Secure Key, they are in argv[2], argv[3], argv[4], argv[5] and so on.

The string **fwuserpt** issues with printf must not contain any special character like '\n' or '\r', otherwise, the result is unpredictable. It must contain a fflush statement after printf. The **fwuserau** must not contain any print statements, otherwise, the result is unpredictable.

Example of fwuserpt and fwuserau

The following is an example of **fwuserpt** and **fwuserau** with authentication performed.

Compile the following and name the output file **fwuserpt**.

```
int main (int argc, char **argv)
   {char *user = NULL;  /* name of user to be authenticated */
   user = argv [1];
   if (user == NULL)
   {return 1;}
   /* Note, if you cannot validate the userid, return
   1 and fwuserau will not be called */
   printf ("User Supplied auth invoked. Please supply your password.");
   (void) fflush(stdout);
   return 0;}
```

Compile the following and name the output file **fwuserau**.

```
int main(int argc, char **argv)
   {char *user = NULL;  /* name of user to be authenticated*/
   user = argv[1];
   if (user == NULL)
   {return 1;}
   /* retrieve the authentication token from
   argv[2], argv[3], etc depending on the
   interface, ie, the number of tokens the user is expected to
   input at the prompt and validate the user.
   return 0 if successful.
   return 1 if unsuccessful*/}
```

Secure Key as an Example of User-Supplied Authentication

Sample code using Secure Key as an example of user- supplied authentication is provided in the `/usr/lpp/FW/sample` directory. These files are:

- makefile.ex
- fwuserpt.c
- fwuserau.c.

These files have been used to test our user-supplied authentication API code and are provided as is.

User-Supplied Iteration Support

User-supplied iteration enables you to require multiple responses from a user attempting to logon, instead of just one prompt and one reply.

This user-supplied authentication method provides support for iterating through a loop during authentication for telneting. So, for example you can have telnet do a looping instead of doing just one prompt and one reply from users.

The following diagram depicts the user-supplied support for telnet :

```
Client                            Server(test99)
telnet test99
               login
     ------------------------------>

               prompt user
     <------------------------------


               user reply
     ------------------------------>

           enter your new credential
     <------------------------------

               user reply
     ------------------------------>

           re-enter new credential
     <------------------------------

               user reply
     ------------------------------>

               login OK or not OK
     <------------------------------
```

The following diagram depicts the user-supplied support for ftp :

```
Client                            Server(test99)
ftp test99
               login
     ------------------------------>

               prompt user
     <------------------------------


               user reply
     ------------------------------>

               OK or not OK
     <------------------------------
```

The following sections explain how to accomplish iterative prompting.

Library Requirements

You must supply the library functions that the Firewall invokes. The name of the shared library file is **fwuser.o**. This file must reside in /usr/lib. In addition, **fwuser.exp** must be present in /usr/lib. This library must contain the following functions:

- fw_prompt
- fw_tn_authenticate
- fw_ftp_authenticate

Note: Iteration does not apply to FTP; however, FTP authentication is supported.

During installation of the IBM Firewall, copies of **fwuser.o** and **fwuser.exp** are installed in /usr/lib. If a copy of **fwuser.o** already exists in /usr/lib, it will not be replaced during installation.

When you invoke the IBM- supplied **fwuser.o**, a message reminding you to supply your own version of user-written authentication is put into the local4 log.

The IBM- supplied **fwuser.o** denies authentication for FTP and telnet.

Details of fw_prompt

fw_prompt authenticates the user using FTP.

fw_prompt prompts the user for the returned string, ***password***, for example.

fw_prompt verifies that a name is authorized in the database and displays messages to the user.

fw_prompt takes two arguments, a pointer to username (characters) and ret_code. ret_code is a pointer to a data structure called **fw_ret_struct** which is defined in **fwuser.h**. **fwuser.h** can be found in the /usr/lpp/FW/sample subdirectory.

In the argument ret_code, the req_rsp_code is set to FW_AUTH_REQ (request for prompt for username).

- **fw_prompt** uses the username to compute a prompt in the form of a string and puts it in ret_code->return_str to be displayed to the user.
- ret_code->return_str must not contain any special character like '\n'.
- If verification of username is successful, **fw_prompt** puts a string in ret_code->return_str to be displayed to user and sets the req_rsp_code to be FW_AUTH_OK. Setting req_rsp_code to anything else means the authentication failed.

Following is an example of the function for fw_prompt. This can be found in /usr/lpp/FW/sample/fwprompt.c.

```
#include <stdio.h>
#include <stdlib.h>
#include "fwuser.h"


int fw_prompt (char *username, struct fw_ret_struct *ret_code)
{
  strcpy(ret_code->return_str, "Please enter password");
  ret_code->req_rsp_code = FW_AUTH_OK;
  return FW_AUTH_OK;
}
```

Details of fw_tn_authenticate

fw_tn_authenticate authenticates the user using telnet.

fw_ftp_authenticate is the function that authenticates a user using FTP.

fw_tn_authenticate takes three arguments:

- a pointer to username
- a pointer to response
- a pointer to a data structure called ret_code.

ret_code, also called **fw_ret_struct**, is defined in **fwuser.h**. The description of the various arguments are:

- **username** always points to a NULL terminated string or user ID of the user.
- **response** points to a NULL terminated string or NULL.

If **response** points to NULL and the req_rsp_code is set to FW_AUTH_REQ, this is the first time **fw_tn_authenticate** is called for the user specified by the username. For example, when a telnet session is initiated, before any prompt is displayed, **fw_tn_authenticate** is called with response set to NULL and req_rsp_code set to FW_AUTH_REQ,

The ret_code is used to pass information back and forth betweeen the Firewall and fw_tn_authenticate.

Ret_code can have these values:

FW_AUTH_REQ The initial setting; indicates the first call to fw_tn_authenticate

FW_AUTH_OK The user has been verified; authentication is successful. fw_tn_authenticate is not called again.

FW_AUTH_FAILED The user has not been verified. fw_tn_authenticate is not called again for that user. The user is rejected.

FW_AUTH_MISSING fwuser is missing and authentication will fail.

If ret_code is set to anything other than these values, fw_tn_authenticate is called again. You should define a code, such as FW_AUTH_INIT, to indicate authentication is continuing and fw_tn_authenticate should be called again.

The **return_str** is the string Firewall will display to the user for response. This **return_str** must NOT contain any special characters like '\n'.

For example, if an authentication uses a sequence of passwords defined by the user, the user can define FW_AUTH_CONT_REQ as 3 and FW_AUTH_INIT_REQ as 2 and put these in **fwuser.h**. When **fw_tn_authenticate** is first called, the second parameter is set to NULL and req_rsp_code is set to FW_AUTH_REQ. Then **fw_tn_authenticate** can put a string like "Enter the initial code" in the return_str and set req_rsp_code to be FW_AUTH_INIT_REQ.

When **fw_tn_authenticate** is called again, the second parameter will point to a string of response and the req_rsp_code will be FW_AUTH_INIT_REQ. If further input from the user is needed, **fw_tn_authenticate** can put "enter your second response" and set the req_rsp_code to FW_AUTH_CONT_REQ. When **fw_tn_authenticate** is called again, the second parameter will point to the second reponse given by the user and the req_rsp_code will be FW_AUTH_CONT_REQ.

If **fw_tn_authenticate** is satisfied with the response, **fw_tn_authenticate** will set req_rsp_code to FW_AUTH_OK and return FW_AUTH_OK.

If **fw_tn_authenticate** is not satisfied with the user response, it will set req_rsp_code to be FW_AUTH_FAILED and return.

Here is an example of **fw_tn_authenticate** that implements the above scenario. In this example, the user is first asked to enter "password" and the second authentication asks the user to enter the changed "password".

```
/* This is an example of two iteration authentications. It first asks user to input
a response and based on the response, asks the user for a second reponse
for authentication */
#include <stdio.h>
#include <stdlib.h>
#include "fwuser.h"
int fw_tn_authenticate (char *username, char *response, struct fw_ret_struct *ret_code)
{
  if (username == NULL) {
    return FW_AUTH_FAILED;
  }
  if (ret_code == NULL)  {
    return FW_AUTH_FAILED;
  }
  memset(ret_code->return_str, 0x00, sizeof(ret_code->return_str));
  if ((response == NULL) &&;amp; (ret_code->req_rsp_code == FW_AUTH_REQ)) {
    ret_code->req_rsp_code = FW_AUTH_INIT_REQ;
    strcpy(ret_code->return_str, "Please enter password");
    return FW_AUTH_OK;
  }
  else {
    switch (ret_code->req_rsp_code) {
      case FW_AUTH_INIT_REQ:
        if (strcmp(response, "password") == 0) {
          ret_code->req_rsp_code = FW_AUTH_CONT_REQ;
          strcpy(ret_code->return_str, "Please enter password");
          return FW_AUTH_OK;
        } else {
          ret_code->req_rsp_code = FW_AUTH_FAILED;
          return FW_AUTH_FAILED;
        } /* endif */
        break;
      /* put other case statement defined in fwuser.h */
      case FW_AUTH_CONT_REQ:
        if (strcmp(response, "password") == 0) {
          ret_code->req_rsp_code = FW_AUTH_OK;
        }
        else {
          ret_code->req_rsp_code = FW_AUTH_FAILED;
        }
        return FW_AUTH_OK;
      /* put other case statement defined in fwuser.h */
      default:
        ret_code->req_rsp_code = FW_AUTH_FAILED;
        return FW_AUTH_FAILED;
        break;
    }   /* switch */
  }
  return FW_AUTH_FAILED;
}
```

Details of fw_ftp_authenticate

fw_ftp_authenticate authenticates the user using FTP.

The argument taken by **fw_ftp_authenticate** is identical to that of **fw_tn_authenticate**. It can only return FW_AUTH_FAILED or FW_AUTH_OK. Any value other than FW_AUTH_OK in req_rsp_code will fail.

If the authentication is successful, the value in req_rsp_code must be set to FW_AUTH_OK and the returned value of the function is FW_AUTH_OK. Returning non-zero by the function or setting req_rsp_code to be anything other than

FW_AUTH_OK means authentication failed. This file can be found in /usr/lpp/FW/sample/fwauthen.c.

Following is an example of **fw_ftp_authenticate**.

```
/*
 * The following is an example of user authentication. It uses a
 * two stage authentication method. This procedure is provided as
 * is. The first time this procedure is invoked, it asks the user    to respond with "password".
 * If the user responds properly, it asks the user
 * to repsond with "changed password". If the user responds properly, then
 * the user is authenticated. Otherwise, the authentication fails.
 * FW_AUTH_INIT_REQ and FW_AUTH_CONT_REQ are user defined constants that
 * are defined in fwuser.h. The IBM Firewall does not use
 * these two constants. The constants are defined in fwuser.h.
 * The IBM Firewall uses (and user must not redefine) FW_AUTH_FAILED, FW_AUTH_OK and FW_AUTH_REQ.
 * The fwuser.o that is being installed was not compiled using this program.
 */

#include <stdio.h>
#include <stdlib.h>
#include "fwuser.h"


int fw_tn_authenticate (char *username, char *response, struct fw_ret_struct *ret_code)
{

  if (username == NULL) {
    return FW_AUTH_FAILED;
  }
  if (ret_code == NULL)  {
    return FW_AUTH_FAILED;
  }

  memset(ret_code->return_str, 0x00, sizeof(ret_code->return_str));
  if ((response == NULL) &&;amp; (ret_code->req_rsp_code == FW_AUTH_REQ)) {
    ret_code->req_rsp_code = FW_AUTH_INIT_REQ;
    /*
      In here, the program makes a computation or database lookup
      for username. It then comes up with a prompt for the user to
      enter the reponse. In this example, the user is asked to
      enter 'password' as a string. It can be changed to
      'please enter your password' or 'please enter your code'
      or any appropriate message to prompt the user for response.
    */
       strcpy(ret_code->return_str, "Please enter password");
       return FW_AUTH_OK;
       }
       else {
       switch (ret_code->req_rsp_code) {
       case FW_AUTH_INIT_REQ:/*
       The program is checking the response to see if it is valid.*/
       if (strcmp(response, "password") == 0) {
       ret_code->req_rsp_code = FW_AUTH_CONT_REQ;/*
       In this example, the first reponse from the user is valid and the user
       is asked to enter the'changed password'. If the administrator,
       after looking up the user's credential, determines that the
       password has expired, a prompt requesting user change the
       password can be issued.
    */
         strcpy(ret_code->return_str, "Please enter changed password");
          return FW_AUTH_OK;
        } else {
          ret_code->req_rsp_code = FW_AUTH_FAILED;
          return FW_AUTH_FAILED;
        }
        break;
      /* put other case statement defined in fwuser.h */
      case FW_AUTH_CONT_REQ:
        /*
          Computation is done to check the validity of the response.
        */
        if (strcmp(response, "changed password") == 0) {
          ret_code->req_rsp_code = FW_AUTH_OK;
          return FW_AUTH_OK;
        }
        else {
          ret_code->req_rsp_code = FW_AUTH_FAILED;
          return FW_AUTH_FAILED;
        }
      /* put other case statement defined in fwuser.h */
      default:
        ret_code->req_rsp_code = FW_AUTH_FAILED;
        return FW_AUTH_FAILED;
        break;
    }   /* switch */
  }
  return FW_AUTH_FAILED;
}


/* The following procedure is called after user responses to fwprompt. */
/* It only check to see if the response is password                    */

int fw_ftp_authenticate (char *username, char *response, struct fw_ret_struct *ret_code)
{

  if (username == NULL)  return FW_AUTH_FAILED;
  if (response == NULL)  return FW_AUTH_FAILED;

  /* checking the validity of the response based on the return */
  if (strcmp(response, "password") == 0) {
    ret_code->req_rsp_code = FW_AUTH_OK;
    return FW_AUTH_OK;
  }
  else {
    ret_code->req_rsp_code = FW_AUTH_FAILED;
    return FW_AUTH_FAILED;
  }
}
```

Sample Makefile for fwuser.o

Following is an example of a makefile for making **fwuser.o**. In this example, fwauthen.c contains **fw_tn_authenticate** and **fw_ftp_authenticate**. **fwprompt.c** contains **fw_prompt**. Call this makefile Makefile.lib. This information can be found in/usr/lpp/FW/sample/Makefile.lib.

```
CDEBUGFLAGS=

LDFLAGS=
CDEBUGFLAGS=

HASSTDLIB=-DHASSTDLIB

LIB=fwuser.o
LIBOBJS=fwauthen.o fwprompt.o

CFLAGS=$(CDEBUGFLAGS) $(HASSTDLIB)

all:   $(LIB)


$(LIB):  $(LIBOBJS)
        cc $(HASSTDLIB) -o fwuser.o $(LIBOBJS) -bE:fwuser.exp -bM:SRE -e _t

fwauthen.o:     fwauthen.c      fwuser.h
fwprompt.o:     fwprompt.c fwuser.h
```

fwuser.o can be obtained by executing the following command after renaming fwuser.exp.df to fwuser.exp:

- make -f Makefile.lib

The sample files Makefile.lib, fwuser.h, fwauthen.c and fwprompt.c are in /usr/lpp/FW/sample. A copy of fwuser.exp.df is also in /usr/lpp/FW/sample.

```
 ]> --> /* -- BEGIN COPYRIGHT -- *  *  *
IBM Firewall for AIX - Version 3 Release 1.0  *  *
5765-C16
(C) Copyright IBM Corp. 1994, 1997  *
All Rights Reserved  *
Licensed Material - Property of IBM  *  *
US Government Users Restricted Rights -  *
Use, duplication or disclosure restricted by GSA ADP
Schedule Contract  *
with IBM Corp.  *  *
-- END COPYRIGHT -- */


/*  * The following is the header file needed to compile
fwauthen.c and  * fwprompt.c.
This procedure is provided as is.  *
Users must not change the definition of FW_AUTH_FAILED,
FW_AUTH_OK and  *
FW_AUTH_REQ.
However, users can add some other definitions which are  *
relevant to the user's authentication method.
FW_AUTH_INIT_REQ and  *
FW_AUTH_CONT_REQ are added and are referenced by fwauthen.c
in the  *
sample given.
*/#ifndef _H_FWUSER_ #define _H_FWUSER_
   #define FW_AUTH_OK        0
/* Authentication successful,        */                              /* put in ret_req_cod
  #define FW_AUTH_REQ       1  /*
Requests authentication.          */                              /* Do NOT redefine this
  #define FW_AUTH_INIT_REQ  2
/* Used by fw_tn_authenticate.       */                              /* Can be redefined b
  #define FW_AUTH_CONT_REQ  3
/* Used by fw_tn_authenticate.       */                              /* Can be redefined b
  #define FW_NO_DISP_RSP 0x01
/* If opt for no Response:           */                              /* set this in sec_rc
  #define FW_AUTH_MISSING  98
/* Set if fwuser.o was not modified  */                              /* for user supplied
  #define FW_AUTH_FAILED   99
/* Authentication failed.            */                              /* Do NOT redefine th
/* Examples of additional return codes to be defined for use with    fw_tn_authenticate.
  #define FW_AUTH_UPDATE    4
  #define FW_AUTH_CHANGE    5
/* struct fw_ret_struct {   int     req_rsp_code;
/* Request / response code */
 int     sec_rc;
/* Reserved for future use           */
 char    return_strŸ254¨;
/* return string to be displayed for */                              /* user.
 #endif /* _H_FWUSER_ */

               End of file
```

To compile the sample files, rename fwuser.exp.df to fwuser.exp.

Migration

If both of the files /usr/bin/fwuserau and /usr/bin/fwuserpt are present, the functions in /usr/lib/fwuser.o will not be called. If you want to use the functions in fwuser.o, fwuserau or fwuserpt must be removed or renamed.

Chapter 4. Using Network Management with the IBM Firewall

This chapter describes how to use the Simple Network Management Protocol (SNMP).

SNMP is an open application protocol used in a TCP/IP environment for managing network functions. This chapter assumes familiarity with SNMP. The IBM Firewall uses the Management Information Base (MIB) and the SNMP Subagent to monitor the status of servers (INETD, FWPAGERD, FWMAILD, NAMED, PHTTPD, and SOCKD) and critical log records.

Management information is the abstraction of managed resources. These resources are defined as managed objects. The collection of managed objects is called a MIB. The MIB acts as the information store of the definition and specification of SNMP managed objects. The SNMP Subagent is a program or process that handles a specific portion of the MIB. The MIB registers with the SNMP agent so the agent knows where to send requests for the variables requested.

The SNMP agent performs all management operations as inspections or alterations of managed objects. The management operations are **get** or **getnext**. However, the firewall subagent does not support **set**.

The subagent can also emit unsolicited messages through "traps".

To set up SNMP traps:

1. Edit the /etc/snmpd.conf file

   There is a line in this file that defines where the traps are sent. It looks like this:

   ```
   trap   public   1.23.456.78   1.2.3   fe

   where

   community name is public
   IP address of the manager to receive the trap is 1.23.456.78
   view=1.2.3
   traps to be blocked
   ```

   The last field (fe) indicates what traps you want to block:

   ```
   fe    block no traps (1111 1110)
   7e    block coldStart trap (0111 1110)
   be    block warmStart trap (1011 1110)
   3e    block coldStart trap and warmStart trap (0011 1110)
   ```

   There are many coldStart traps that are issued when SNMP starts. The mask of 7e may be used to block the coldStart traps.

2. Modify this trap line to point to an SNMP Manager address as follows:

   ```
   trap   public   9.67.128.41  1.2.3  fe
   ```

3. The SNMP manager administrator sets up an SNMPTRAP listener application on the machine at the address specified on the trap statement in the /etc/snmpd.conf file.

4. When any of the six monitored servers changes states from Running to Not Running or vice versa, a trap is sent to the address defined in the trap statement in the /etc/snmpd.conf file on the Firewall machine.

Note: Only one trap statement is allowed. If more than one trap statement is added, there is no error message on startup, but only the first trap definition entry specifications are used.

These are servers and codes received when a trap is received on the manager and monitored by the Firewall SUBAGENT. (For example, 69 6E 65 74 64 is not running.) The numerical codes are the ASCII representation of the server names.

```
Not Running     6E 6F 74 20 52 75 6E 6E 49 62 67
Running         6E 49 6E 47
                                                    Not Running
INETD           69 6E 65 74 64                        /    /
FWPAGERD        66 77 70 61 67 65 72 64               /    /
FWMAILD         66 77 6D 61 69 6C 64                  /    /
NAMED           6E 61 6D 61 64                        /    /
PHTTPD          70 68 74 74 70 64                     /    /
SOCKD           73 6F 63 66 64                        /    /
```

The subagent monitors the local4 log facility for -e, -i, and -w alert messages of emergency warning or information levels, and notifies the SNMP daemon of these alerts. A local4 log facility of at least information priority should be created.

SNMP trappable events

```
    ICA0001e  Threshold conditions for authentication failures
              have been satisfied
    ICA0002e  Threshold conditions for detecting a specific log
              message have been satisfied
    ICA0003e  Threshold conditions for authentication failures
              from any specific host have been satisfied
    ICA0004e  Threshold conditions for detecting a specific log
              message have been satisfied
    ICA0012e  Daemon is abending or received terminate signal.
              Previous log messages would provide detail.
    ICA1010i  The /usr/sbin/fwlogd daemon must be started under
              root authority
    ICA2001e  A user, without an account, attempted to use ftp
              proxy from the network
    ICA2002e  Firewall is unable to authenticate the indicated
              username using the specified authentication method
    ICA2026i  Connection attempt timed out for specified user.
              Potential network routing problem or remote host
              is not available
    ICA2043i  Authentication type for this user is 'password'
              and no password was found.
    ICA3001e  Real user is ident username,not socks connect username
    ICA3012w  refused -- Connect from ser(real_user)@src_addr
              to dst_addr (application)
    ICA9000i  Internet Connection IBM Firewall (FW) evaluation
              expires in number of days
```

SystemView Agent and SystemView Mapper are installed before the SNMP subagent can be invoked.

Note: The hostname must be known to itself. The /etc/hosts should have an entry of itself.

An SNMP manager is refreshed when an SNMP manager is added or deleted from the IBM Firewall.

If the filter is active, start an SNMP manager by:

1. Creating an object of the network manager with IP address.
2. Assuming there is an object for this firewall.
3. Creating a service to permit an SNMP query.
4. Creating a connection between the firewall interface and the manager.

The user must define filter rules to enable traps to go through the firewall.

A default.config file is shipped upon new installation. During the installation, no filter is activated. A pre-defined SNMP filter can be selected. If no permit on the filter rules is selected, all SNMP traffic is denied. If traffic does not match a permit rule or a denied rule, the traffic is denied.

Neither the SNMP daemon network agent (snmpd) or the SNMP firewall subagent is started during installation. Later when the subagent is started through the configuration client or SMIT and the firewall is brought down abruptly, rebooting the firewall starts the subagent automatically using the operational values given in the `/etc/security/fwsubagt.cfg` . If this file is missing, default values are used and `/etc/security/fwsubagt.cfg` is created.

Only the root authority can make changes to the Firewall Manager or starting subagent.

SNMP - Management Information Base (MIB)

See Appendix C, “SNMP Management Information Base (MIB)” on page 129 for more information on the MIB.

Chapter 5. Using the Make Key File Utility (MKKF)

MKKF is used to create public-private key pairs and certificate requests, receive certificate requests into a key ring, and manage keys in a key ring.

You cannot have a secure SSL network connection until you have:

- Configured your server for SSL
- Created a key for secure communications
- Received a certificate
- Been designated as a trusted root on your server
- Stashed your key file password

You need to use MKKF to create the initial server key, key ring file, and certificate request. MKKF is also used to receive the initial certificate into a key ring and stash your key file password.

Creating a keyfile

You can create a key file for the firewall machine that can be used for both IPSEC and the configuration server.

Since the key file must be owned by the root username, you should run this utility logged on as root.

Note: Do not give any other user or group ownership of the key file.

1. Go to the /etc/security directory and start the key utility by entering

   ```
   # mkkf

   MKKF Key Manager
   Copyright IBM Corp. 1996
   All Rights Reserved
   ```

2. Create a new key ring file.

   ```
   Key Ring Menu
   Currently Selected Key Ring: (none)

   N - Create New Key Ring File
   O - Open Key Ring File
   X - Exit

   Enter a command: n
   ```

   Enter 'n' as shown above to create a new key file.

   You will be prompted for a file name to use for the key file. You can use any filename, but it must end in .kyr. By default, the firewall looks for a file named fwkey.kyr.

   Enter a name for the key ring file, or press ENTER to accept the default of **fwkey.kyr**

MKKF will create a new key file and display the key ring menu. Note that the key file will be listed as the currently selected key ring.

3. Create a new key and certificate request.

```
Key Ring Menu
Currently Selected Key Ring: fwkey.kyr

N - Create New Key Ring File
O - Open Key Ring File
S - Save Key Ring File
A - Save Key Ring as Another File
P - Set Password for Key Ring File
C - Create Stash File for Key Ring File
R - Receive a Certificate into a Key Ring File
W - Work with Keys and Certificates
X - Exit

Enter a command: w
```

Enter 'w',as shown above, to go to the Key menu.

```
Key Menu
Currently Selected Key Ring: fwkey.kyr
Selected Key Entry: (none)

L - List/Select a key to work with
C - Create a New Key and Certificate Request
I - Import a key from an Armored key file
X - Exit this menu

Enter a command: c
```

Enter 'c', as shown above, to create a new key.

Before a key can be stored in a key file, the key file must be password protected. MKKF will prompt you to enter a password to use to protect the key file. The password will not display when you type it. MKKF will also ask if the password should expire. Enter 'n' as shown below:

Note: ***underlined*** indicates an example of text entered by the user.

```
Enter password to use for the key file: password
Enter the password again for verification: password
Should the password expire?
Enter Y for yes or N for no:
n
Password successfully set.
Press ENTER to continue
```

MKKF will prompt you for the type of key to create.

```
Choose Certificate Type Menu
S - Server Certificate
L - Low Assurance
C - Cancel

Enter a command: s
```

Enter 's', as shown above, to create a Server Certificate. MKKF will generate an empty certificate:

```
Compose Secure Server Certificate Menu

Current Certificate Information
Key Name: (none)
Key Size: 0
Server Name: (none)
Organization: (none)
Organization Unit: (none)
City/Locality: (none)
State/Province: (none)
Postal Code: (none)
Country: (none)

M - Modify the Certificate Fields
R - Ready To Create Key and Certificate Request
C - Cancel

Enter a command: m
```

Enter 'm' to modify the empty certificate. You will be prompted to enter information about the new certificate:

- Enter a name to use. This name can be any string and is used only by the MKKF utility:

  ```
  Enter a name to use for the key entry:

  Firewall Key
  ```

- Enter the size of the key. The IBM Firewall ships only the exportable version of MKKF. The maximum key size is 512.

  ```
  1:   508
  2:   512
  Enter the number corresponding to the key size you want:

  2
  ```

- Enter the fully qualified TCP/IP host name for the Firewall (For example, jupiter.raleigh.ibm.com):

  ```
  Enter the server's fully qualified TCP/IP domain name or press
  Enter by itself to leave the field blank

  jupiter.raleigh.ibm.com
  ```

- Enter an organization name to associate with the certificate. (For example, the company name):

  ```
  Enter Organization Name for the certificate
  or press ENTER by itself to leave the field blank.

  AAA Inc.
  ```

- Enter the organizational unit name. (For example, a department name):

```
Enter Organizational Unit Name for the certificate
or press ENTER by itself to leave the field blank.

Network Security Products
```

- Enter a city where the certificate will be used:

  ```
  Enter Locality/City Name for the certificate
  or press ENTER by itself to leave the field blank.

  RTP
  ```

- Enter a state or province.

  Note: Due to the specifications for certificates, this field must be a minimum of three characters, so two letter state abbreviations are not valid.

  ```
  Enter State/Province Name for the certificate
  or press ENTER by itself to leave the field blank.
  State/Province must be at least three characters long.

  N.C.
  ```

- Enter a postal code to associate with the certificate. (This is the same thing as a zip code):

  ```
  Enter Postal Code for the certificate
  or press ENTER by itself to leave the field blank.

  27709
  ```

- Enter a two letter country code:

  ```
  Enter Country Code for the certificate
  or press ENTER by itself to leave the field blank.
  Country code must be exactly two characters long.

  US
  ```

After MKKF has collected all the information from you, the certificate will be displayed:

```
Compose Secure Server Certificate Menu

Current Certificate Information
Key Name: Firewall Key
Key size: 512
Server Name: jupiter.raleigh.ibm.com
Organization: AAA Inc.
Organizational Unit: Network Security Products
City/Locality: RTP
State/Province N.C.
Postal Code: 27709
Country: US

M - Modify the Certificate Fields
R - Ready To Create Key and Certificate Request
C - Cancel

Enter a command: r
```

If there are any mistakes in the certificate information, you can enter 'm' to make corrections. If the information is correct, enter 'r' to create the new key and its associated key file.

MKKF will prompt you for a file to store the certificate. You can use any file name, but a good convention to follow is to use the same base name as the key file and add .cert as the extension:

```
Enter file to store the certificate request in:
fwkey.cert
Creating Private Key...
Private key was successfully created.
Creating certificate request...
certificate request was successfully created
Adding new key to key file.
The new key and certificate request were created successfully.
Press ENTER to continue
```

4. Make the newly created key the default.

   After the key and certificate have been created, the Key menu will be displayed. The newly created key will be listed as the Selected Key Entry:

```
Key Menu
Currently Selected Key Ring: fwkey.kyr
Selected Key Entry:  Firewall Key

L - List/Select a Key To Work With
S - Show Information about Selected Key
D - Delete Selected key
C - Create a New Key and Certificate Request
I - Import a Key From an Armored Key File
E - Export Selected Key To an Armored Key File
F - Make Selected Key the Default Key for this Key Ring
U - Unmark Selected Key's Trusted Root Status
R - Create A Certificate Request for Selected Key
X - Exit This Menu

Enter a command: f
```

You must make the newly created key the default key in the key file. Enter 'f' as shown in the previous example. You will be prompted to confirm the action:

```
Key Menu
Currently selected key: Firewall Key
Are you sure you want to make this key the default?
Enter Y for yes or N for No:
y
Key was made the default key.
Press ENTER to continue
```

After the key has been marked as the default, the Key Menu is displayed:

```
Key menu
Currently Selected Key Ring: fwkey.kyr
Selected Key Entry: Firewall Key

L - List/Select a Key To Work With
S - Show Information about Selected Key
D - Delete Selected key
C - Create a New Key and Certificate Request
I - Import a Key From an Armored Key File
E - Export Selected Key To an Armored Key File
F - Make Selected Key the Default Key for this Key Ring
U - Unmark Selected Key's Trusted Root Status
R - Create A Certificate Request for Selected Key
X - Exit This Menu

Enter a command: x
```

Exit the Key menu by entering 'x'.

5. Receive the certificate into the key ring file.

   The Key Ring menu will be displayed:

```
Key Ring Menu
Currently Selected Key Ring: fwkey.kyr

N - Create New Key Ring File
O - Open Key Ring File
S - Save Key Ring File
A - Save Key Ring as Another File
P - Set Password for Key Ring File
C - Create Stash File for Key Ring File
R - Receive a Certificate into a Key Ring File
W - Work with Keys and Certificates
X - Exit

Enter a command: r
```

Note: Since the firewall does not use SSL for authentication purposes, your certificate does not have to be signed by a certificate authority.

```
Enter file name or press ENTER for Cert.txt.
fwkey.cert
This is a self-signed certificate. Add it to the key file?
Enter Y for yes or N for no:
y
Certificate added to key ring.
Press ENTER to continue
```

6. Create a stash file for the key file.

   After the certificate has been added to the key ring, the Key Ring Menu is displayed:

```
Key Ring Menu
Currently Selected Key Ring: fwkey.kyr

N - Create New Key Ring File
O - Open Key Ring File
S - Save Key Ring File
A - Save Key Ring as Another File
P - Set Password for Key Ring File
C - Create Stash File for Key Ring File
R - Receive a Certificate into a Key Ring File
W - Work with Keys and Certificates
X - Exit

Enter a command: c
```

   You need to create a stash file for the key file. Enter 'c' as shown in the previous example. MKKF will use the same base name as the key file name and .sth as the extension:

```
Stashed password file saved to fwkey.sth
Press ENTER to continue
```

   After the stash file has been created, the Key Ring Menu is displayed:

```
Key Ring Menu
Currently Selected Key Ring: fwkey.kyr

N - Create New Key Ring File
O - Open Key Ring File
S - Save Key Ring File
A - Save Key Ring as Another File
P - Set Password for Key Ring File
C - Create Stash File for Key Ring File
R - Receive a Certificate into a Key Ring File
W - Work with Keys and Certificates
X - Exit

Enter a command: x
```

   Your key file is now ready to be used. Enter 'x' as shown above to exit MKKF and enter 'y' to save changes to your key file as shown:

```
Key ring file has been changed. Save?
Enter Y for yes or N for no:
y
Key ring saved to fwkey.kyr
Press ENTER to continue
#
```

7. Check the file permission.

   After exiting the MKKF, check the file permissions on your key file, stash file and certificate file.

   For security reasons, these files should be owned by root. If the files are not owned by root, change the owner using this command:

   ```
   #ls -l fwkey*
   -rw-r--r-- 1 root security 1025 Mar 18 10:01 fwkey.cert
   -rw------ 1 root security 3682 Mar 18 10:10 fwkey.kyr4
   -rw------ 1 root security  129 Mar 18 10:09 fwkey.sth
   ```

   After creating the keyfile, you must specify the key file name in the configuration server parameter file.

   Edit the file /etc/security/rcsfile.cfg and look for the line that starts 'sslfile =' and modify it so the file name it lists matches the fully qualified path name of the keyfile you just created.

   If you are using SSL encryption for the configuration server, you also need to modify the line that starts 'encr=none' and modify it to be 'encr=ssl'.

   Note: This line does not have to be changed if you are using the key file only for IP SEC.

Chapter 6. Troubleshooting and Testing

This chapter tells you how to troubleshoot some of the common problems encountered when setting up and configuring a firewall. It also tells you how to test the firewall ports using the `fwice` command.

If you are having problems, first create a local4 log debug priority to increase the information sent to your logs. See “Log File Management” on page 11 for more information.

Initial Setup

Filter support fails

Problem Explanation This problem is caused by not rebooting the firewall after installation.

```
Error on open/dev/ipsp_poif: A file or directory in the path
name does not exist.
Filter support verification failed.
Socket creation call failed:
A file or directory in the path name does not exist.
```

Recommended Action Reboot your firewall and retry the procedure.

Routing Problems

The IBM Firewall provides a feature on the Security Policy panel entitled "Test IP Routing", which can be useful for debugging routing problems. Enable this checkbox, activate your Connection configuration, and enable Connection Rules Logging. Then examine your local4 log to view detailed information about all packets flowing through your firewall.

Perform these tests first using IP addresses, then using host names. If your traffic routes properly using addresses but not using names, see “DNS Problems” on page 66 for more information.

Cannot ping nonsecure hosts from the Firewall

Problem Explanation Your network interface is not configured properly.

Recommended Action See your AIX documentation.

Problem Explanation Your connection to the nonsecure network is not configured properly.

Recommended Action Contact your Service Provider for assistance.

Cannot ping secure hosts from the Firewall

Problem Explanation If your secure network is isolated behind a router, your firewall must have a static route to that router. Use `netstat -rn` to verify static routing:

```
netstat -rn
```

The output should be as follows for Protocol Family 2:

```
Destination  Gateway          Flags     ....
default      nrr.nrr.nrr.nrr  UG
nnn.nnn.nnn  nnn.nnn.nnn.nnn  U
sss.sss.sss  sss.sss.sss.sss  U
ss1.ss1.ss1  srr.srr.srr.srr  UG
127          127.0.0.1        U
```

nrr.nrr.nrr.nrr represents your router to the internet and is the default route. The default route is a static route (Flag=UG).

nnn.nnn.nnn represents your nonsecure domain. This is an interface route (Flag=U).

nnn.nnn.nnn.nnn represents your nonsecure interface.

sss.sss.sss represents your secure domain. This is an interface route (Flag=U).

sss.sss.sss.sss represents your secure interface.

ss1.ss1.ss1 represents a subdomain on the secure side of your network and srr.srr.srr.srr represents the router to that subdomain. This is a static route (Flag=UG).

127.0.0.1 is the loopback or localhost. This is an interface route (Flag=U).

Figure 5. Sample output from netstat -rn.

You should have an interface route for each interface and your default route should point to the router on the nonsecure side of the Firewall.

Recommended Action Use SMIT to add a static route to your router.

Problem Explanation The subnet mask on your secure interface or the host you are trying to contact may be incorrect.

Recommended Action Use SMIT or your client's configuration utilities to correct the mask settings.

Cannot ping nonsecure hosts from secure hosts (or vice-versa)

Problem Explanation Each router adjacent to the Firewall must contain a static route specifying the Firewall as the gateway for destination networks beyond the Firewall.

Recommended Action Contact the router's administrator.

Problem Explanation If your secure network uses addresses which are not registered and routable on the nonsecure network, including private addresses as specified in RFC 1597, packets will not be routed back to the sender.

Recommended Action Use a client with a registered address. The Firewall's NAT feature may be used for TCP and UDP traffic, but NAT will not translate addresses in ICMP packets like ping.

DNS Problems

The firewall DNS resolves names by querying the secure name server. The secure name server resolves all names in the secure network. The secure name server forwards requests for nonsecure names to the firewall name server. The firewall name server queries the nonsecure name server to resolve the request.

Here are some examples to lead you through each step of this method using the `nslookup` utility in order to isolate the problem. In these examples, we will use the following placeholders:

www.ibm.com represents an arbitrary hostname on the nonsecure network

nns.nns.nns.nns represents the address of the nonsecure name server

sns.sns.sns.sns represents the address of the secure name server

host.secure.company.com represents the name of an arbitrary host inside your secure network

127.0.0.1 represents the loopback address on your Firewall.

These values can be obtained from the "Domain Name Services" panel in the Configuration Client. You will need these values as you work through these exercises.

Note: The `nslookup` command requires the additional dot following the hostname to prevent `nslookup` from appending your secure domain name.

DNS has not been configured yet

Problem Explanation You have not configured your Firewall's DNS facilities.

Recommended Action Complete the "Domain Name Services" panel.

File permissions do not allow the specified action

Problem Explanation Firewall traffic control is not permitting the DNS packets to flow.

Recommended Action Go to the "Security Policy" panel, turn on the "Permit DNS Queries" checkbox and reactivate your traffic control.

nslookup www.ibm.com. nns.nns.nns.nns fails

Problem Explanation The nonsecure name server is not using the indicated address or is not configured properly.

Recommended Action Contact your DNS service provider for a valid name server address.

nslookup www.ibm.com. 127.0.0.1 fails

Problem Explanation `named` may not be running. Use `ps -ef|grep named` and look for `/usr/sbin/named`.

Recommended Action Restart your TCPIP services.

Problem Explanation Your loopback adapter may be down. Use `netstat -in`; if there are asterisks behind the entry for `ln0`, loopback is down.

Recommended Action Use `ifconfig lo0` up to restart your loopback adapter.

nslookup host.secure.company.com.sns.sns.sns.sns fails

Problem Explanation Your secure name server is down.

Recommended Action Restart your name server.

nslookup www.ibm.com.sns.sns.sns.sns fails

Problem Explanation Your secure name server is not configured properly to interact with the IBM Firewall.

Recommended Action Refer to the IBM Firewall User's Guide, Chapter 5 "Secure Name Server" for configuration requirements.

Configuration Client

Server not responding

Problem Explanation SSL encryption may not be configured properly.

Recommended Action Ensure that SSL is selected in the client's logon panel. Verify that encr=ssl is coded in /etc/security/rcsfile.cfg and the keyfile and stash file are configured as described in The IBM Firewall User's Guide, Chapter 3, "Setting UP the Configuration Server and the Configuration Client"

Problem Explanation The Firewall's configuration server may be disabled.

Recommended Action Ensure that `/etc/inetd.conf` contains the line

```
ibmfwrcs stream tcp nowait root /usr/sbin/ibmfwrcs ibmfwrcs
```

and restart your TCP subsystems.

Problem Explanation The Firewall's configuration server may be monitoring a nonstandard port.

Recommended Action Examine `/etc/services` and ensure that it contains the line `ibmfwrcs 1014/tcp`. If you want to use the server on a different port, edit `ibmfwrcs 1014/tcp` accordingly and ensure that you specify the new port in the client's logon panel.

Problem Explanation The Firewall's traffic control may not be permitting communications to and from the Configuration Server. This only affects Configuration Clients running on a remote host.

Recommended Action Code a connection between the machine running the Configuration Client and the Firewall. The Configuration Client should be the source of the the connection and the Firewall the destination. Regenerate and activate your changes. See the *IBM Firewall User's Guide* for more information.

Problem Explanation The Configuration Server may not be configured to permit logins from a remote host.

Recommended Action Ensure that `/etc/security/rcsfile.cfg` contains the line `local=no`.

Unable to log on to the Config Server

Problem Explanation Each username authenticated at the Firewall may be configured to use any of several authentication methods. `DENY` is used to prohibit the use of a particular service to that user.

Recommended Action Examine the Secure Administration and NonSecure Administration fields of the username being used. These fields are only valid for Administrators, not for Firewall users.

Problem Explanation When connecting from a remote host, you get the message `Remote logins are not allowed for this account. Authentication failed`. After responding correctly to the authentication challenge, the AIX `rlogin` parameter for this account is set to `FALSE`. This happens most frequently when using the `root` username and Firewall Administrators have this parameter set to `TRUE`.

Recommended Action Due to security concerns, it is **not recommended** that you change the root's `rlogin` setting to `TRUE`. Log onto the configuration client from the Firewall console using root. Then create a Firewall Administrator and use that ID for your remote configuration needs. Root should only be used when necessary to perform AIX administration.

Traffic Control Filters

Filters are damaged and contact to the manager is lost.

Problem Explanation The connection is lost between the firewall and the managed firewall.

Recommended Action

1. Logon locally to the managed firewall with the root password.
2. Select the /etc/security/ directory.
3. Copy fwconns.cfg.BAK to fwconns.cfg.

   This will put a working copy of the filter connection file in place to be activated. If problems exist other than results of adding a bad rule, you may have to copy all of fw*.cfg.BAK to the corresponding cfg file.
4. Edit secag.cfg and change the following two lines:
   a. Traffic: EFM to Traffic: host
   b. VPN: EFM to VPN: host
5. Bring up the Firewall GUI and login as root in Host mode.
6. Bring up connection activation window under Traffic Control on the GUI. Regenerate the Connection Rules from this panel. This will recreate and activate a working set of filters.
7. Bring up the Virtual Privatge Network window under Traffic Control. Chose the EFM Manager. Activate this VPN to allow the manager to regain a connection to the managed firewall.
8. From the EFM manager, force the security agreement to be transmitted and activated to the managed firewall.
9. Fix the problem that caused the connection to be lost. Transmit and activate the corrected filters.

Changes to fwfilters.cfg are lost

Problem Explanation In previous releases of the IBM Firewall, filters were configured by direct edits to the `/etc/security/fwfilters.cfg` file. In the IBM Firewall V3R1, the Configuration Client provides an object-oriented interface which constructs this file on your behalf. Any edits made directly to this file will be overwritten when the Configuration Client is used to make any changes.

Recommended Action Rebuild the configuration and perform the necessary changes using the Configuration Client. See the *IBM Firewall User's Guide* for more information.

Changes made to Connections do not take effect

Problem Explanation Changes made to any of the Traffic Control components do not take effect immediately. All changes must be activated. This includes the Security Policy panel under System Administration.

Recommended Action Use the Connection Activation panel to regenerate and activate your configuration.

Proxy Servers

No data transmitted

Problem Explanation The Firewall's Traffic Control must be configured to permit packets to flow to and from the proxy process, not directly through the Firewall.

Recommended Action Configure each half of the proxy connection as described in the IBM Firewall User's Guide, Chapter 7 " Examples of Services".

Use the predefined services whenever possible, particularly with FTP traffic.

Cannot connect to the desired host

Problem Explanation If data is flowing to and from the proxy but the host cannot be contacted, your client may not be properly resolving hostnames.

Recommended Action Ensure that "Permit DNS Queries" is enabled on the "Security Policy" panel and your connection configuration has been activated. See “DNS Problems” on page 66 for more information.

Problem Explanation Each username being authenticated at the Firewall by the Telnet or FTP proxies may be configured to use any of several authentication methods. `DENY` is used to prohibit the use of a particular proxy to that user.

Recommended Action Examine the user account's authentication settings in the Users panel on the Configuration Client.

Idle telnet proxy users are not being timed out

Problem Explanation Idle proxy user timeout happens based on a command entered into the AIX crontab.

Recommended Action Code the appropriate crontab entry. See Appendix G, “The Crontab Command” on page 167 for more information.

Win 95 Remote IPSec Client

Unexpected characters received when using telnet

Problem Explanation When connected to any host over a dialed PPP connection, not only when using the secure connection, unexpected characters are received. Some telnet clients handle the PPP protocols improperly.

Recommended Action Get another telnet client and retry the procedure.

Report Utilities

Failure on system call: ar -vt ...

Problem Explanation The archive utility is sensitive about file names. A valid archive file name ends with `.a` and must by fully qualified. Empty files are allowed, but the file must exist.

Recommended Action Provide the fully qualified name of an existing archive file.

An error occurred while accessing the file: ...

Problem Explanation The above error may be seen after using any of the following commands:

```
db2 -vf fwschema.dll > schema.out
db2 -vf fwimport.dat > import.out
db2 -vf fwqrysmp.dml > sample.out
```

Recommended Action Provide fully qualified filenames for the .ddl, .dat, or .dml file.

Log Management

fwlogmgmt -l fails

Problem Explanation `fwlogmgmt -l` may generate this error message:

```
ar: 0707-106 Internal error while reading the fixed header
of archive file /foobar.a"ar" of "foobar.Z" failed in
/foobar.a

Check disk space.
```

This indicates insufficient disk space in either the working directory or the destination directory.

Recommended Action Remove the empty archive file which was created but not filed. Then increase the amount of disk space available, using the chfs command if necessary. See the AIX documentation for chfs information.

Log archival never happens

Problem Explanation The fwlogmgmt command is intended to run as an AIX cron job. If the crontab has not been updated with this command, logs will not be archived automatically.

Recommended Action Add the fwlogmgmt command to the AIX crontab. See Appendix G, "The Crontab Command" on page 167 for more information.

Testing the Firewall Ports Using fwice

This section tells you how to test the Firewall ports using fwice. When you installed the IBM Firewall, you also installed a set of test programs that you can run from workstations inside or outside the secure network to test how well the IBM Firewall protects your network. Fwice gives information on every port.

Use the fwice command to test the ports on your Firewall host to see if they are responding from inside and outside the secure network. To use fwice, you need two files:

- The hosts file contains a list of host names, one for each Firewall host you want to test.
- The ports file contains a list of the ports on those hosts that you want to test.

Running fwice might generate an ICA2000e message error. This might trigger a threshold violation from your log monitor facility.

The hosts file

Here is a sample entry in a hosts file:

```
124.8.7.4 test7.okla.norm.edu
```

If you do not supply a hosts file, /etc/hosts is used.

The services file

In the services file, each line has the format:

```
function   port_no   protocol
```

or

```
function   port_no/protocol
```

If you do not supply a services file, the standard /etc/services on your system is used.

The results file

The fwice command stores its results in the results file you supply. If you do not supply one, the file./results is used. Heere is a sample entry of the ./results file.

```
9.67.96.243 tcp 7 (echo) is alive and listening.
No connection to 9.67.96.243 on udp 7 (echo)
9.67.96.243 tcp 9 (discard) is alive and listening.
No connection to 9.67.96.243 on udp 9 (discard)
No connection to 9.67.96.243 on tcp 11 (systat)
9.67.96.243 tcp 13 (daytime) is alive and listening.
No connection to 9.67.96.243 on udp 13 (daytime)
No connection to 9.67.96.243 on tcp 15 (netstat)
No connection to 9.67.96.243 on tcp 17 (qotd)
9.67.96.243 tcp 19 (chargen) is alive and listening.
No connection to 9.67.96.243 on udp 19 (chargen)
No connection to 9.67.96.243 on tcp 20 (ftp-data)
```

Appendix A. Messages

This appendix gives you the following information about the IBM Firewall messages :

- How the messages are formatted
- The messages' severity levels
- The messages and their explanations

Message Tag

ICA The first 3 fixed bytes.

xxxx A number in the range 0000 – 9999.

a An indicator of severity. Messages are classified by severity level.

- i – info
- w– warning
- e – error
- s – severe

The numbers 0000 – 9999 are further classified into the following categories:

- 0000 – 0999 Intrusion Alarm
- 1000 – 1999 Filters
- 2000 – 2999 Proxy
- 3000 – 3999 Socks
- 4000 – 4999 Pager
- 5000 – 8999 Available
- 9000 – 9999 General/Others

Messages

ICA0001 ALERT - *count* **authentication failures.**

Explanation: Threshold conditions for authentication failures have been satisfied.

ICA0002 ALERT - *count* **authentication failures for user** *user_name*.

Explanation: Threshold conditions for detecting a specific log message have been satisfied.

ICA0003 ALERT - *count* **authentication failures from host** *host IP address*.

Explanation: Threshold conditions for authentication failures from any specific host have been satisfied.

ICA0004 ALERT - Tag *message_id* **with** *count* **log entries.**

Explanation: Threshold conditions for detecting a specific log message have been satisfied.

ICA0005 Log monitor - out of memory.

Explanation: Process ran out of memory.

ICA0006 Log monitor - failure accessing services file: *errno*

Explanation: Could not find entry for fwlogmond in /etc/services.

ICA0007 Log monitor - socket creation failed: *errno*

Explanation: Could not open socket - see error message.

ICA0008 Log monitor - bind() failed: *errno*

Explanation: Could not bind socket - see error message.

ICA0009 Could not open threshold definition file: *errno*

Explanation: Problem accessing threshold definition file - see error message.

ICA0010 Log monitor - fatal read error: *errno*

Explanation: Problem reading from socket - see error message.

ICA0011 Could not get status of threshold definition file: *errno*

Explanation: Problem accessing threshold definition file - see error message.

ICA0012 Log monitor daemon shutting down.

Explanation: Daemon is abending or received terminate signal. Previous log messages would provide detail.

ICA0013 Log monitor caught terminate signal.

Explanation: Daemon received terminate signal and will shut down.

ICA0014 Starting log monitor daemon.

Explanation: Daemon has been started.

ICA0015 Could not create daemon for log monitor: *errno*

Explanation: Daemon creation failed - see error message.

ICA0016 Could not open *process id file* **- daemon may already be active.**

Explanation: Daemon could not open process id file.

ICA0017 Could not write process id (*process id***) to** *file***.**

Explanation: Daemon could not write process id to the file.

ICA0018 Log monitor - empty read.

Explanation: Received packet with no data - discarded.

ICA0019 Log monitor - short read. Tag discarded.

Explanation: Received packet with not enough data - discarded.

ICA0020 Log monitor - misformatted ICA tag.

Explanation: Received packet with misformatted data - discarded.

ICA0021 Log monitor - misformatted authentication data.

Explanation: Received packet with misformatted data - discarded.

ICA0022 Invalid syntax in threshold definition file (*invalid entry***).**

Explanation: The indicated entry in the threshold file is syntactically incorrect.

ICA1001 Unable to create file with process id

Explanation: Filter logging daemon encountered an error when writing the file fwlogd.pid.

User Response: Check the system where directory /etc/security resides. Possible out-of-space condition exists.

ICA1002 Communications with cfgfilt program not possible

Explanation: Due to the fwlogd.pid file not being created, communication between the fwlogd daemon and the cfgfilt application (required for filter control) is not possible.

User Response: Check the system where directory /etc/security resides. Possible out-of-space condition exists.

ICA1003 Continuing with logging daemon initialization

Explanation: The fwlogd daemon will continue start-up processing.

ICA1004 Filter logging daemon */usr/sbin/fwlogd* **(level** *version***.***release***) initialized at** *time* **on** *date*

Explanation: The IP packet logging daemon has been started. If packet logging is enabled, daemon fwlogd will write the required records to the syslog, local4, file.

ICA1005 Suppressed logging of *filter_rule_no* **packet message(s) due to buffer overflow**

Explanation: The fwlogd daemon filter log buffer has overflowed. A packet for the specified filter rule cannot be logged.

User Response: Check the log. Your firewall may be under a deny-of-service attack or you may be logging messages that are not required. For example, broadcast messages should have a deny rule with log control set to no (l=n) to prevent filling up the log.

ICA1007 Unable to fork child process: *errno*

Explanation: During startup of /usr/sbin/fwlogd daemon, the indicated system error was encountered.

User Response: Based on the error displayed, take corrective action.

ICA1008 Error return from setpgrp routine: *errno*

Explanation: During startup of /usr/sbin/fwlogd daemon, the indicated system error was encountered.

ICA1009 Unable to fork second child process: *errno*

Explanation: During startup of /usr/sbin/fwlogd daemon, the indicated system error was encountered.

ICA1010 This daemon must run with root authorization

Explanation: The /usr/sbin/fwlogd daemon must be started under root authority.

User Response: Restart with root authority.

ICA1011 sysconfig call to query kernel extension *load_path* **failed:** *errno*

Explanation: During startup of /usr/sbin/fwlogd daemon, the indicated system error was encountered.

ICA1012 AIX kernel extension *netinet* **not loaded cannot continue**

Explanation: The **netinet** device driver does not contain filter support.

User Response: Install the Firewall code. Potentially, the code has been installed but the *reboot* has not been performed.

ICA1013 Socket creation call failed: *errno*

Explanation: During startup of /usr/sbin/fwlogd daemon, the indicated system error was encountered.

ICA1014 AIX netinet device driver not at required level

Explanation: The netinet device driver and fwlogd daemon are not the same level.

User Response: Resolve the conflict. Possible reboot required after installing new Firewall level.

ICA1015 Error on ioctl() call (SIOCGFWLOG): *errno*

Explanation: During startup of /usr/sbin/fwlogd daemon, the indicated system error was encountered.

ICA1016 Cannot get current deferred log queue

Explanation: Additional information associated with immediately preceding log message.

ICA1017 Error return from SIOCGFWLOG ioctl() call

Explanation: During startup of /usr/sbin/fwlogd daemon, the indicated system error was encountered.

ICA1019 Unexpected error exit with rc *internal_fw_return_code*

Explanation: During startup of /usr/sbin/fwlogd daemon, the indicated error was encountered.

ICA1021 Error on open */dev/ipsp_poif***:** *errno*

Explanation: The indicated device driver has not been installed.

User Response: If the Firewall code has been installed, check the /tmp/rc/net.out file for possible error messages.

ICA1022 Filter support verification failed

Explanation: Due to error ICA1021e, filter support cannot be verified.

ICA1023 Error on ioctl() call (SIOCGFWLVL): *errno*

Explanation: During startup of /usr/sbin/fwlogd daemon, the indicated system error was encountered.

User Response: Verify the correct level of the Firewall netinet device driver has been installed and the machine has been rebooted since the installation.

ICA1024 Error writing file */etc/security/fwlogd.pid***:** *errno*

Explanation: Due to the indicated system errno, fwlogd was unable to write the specified file.

User Response: Correct the indicated problem and restart the filter logging daemon.

ICA1032 Filter rules updated at *time* **on** *date*

Explanation: IP packet filtering rules have been updated.

ICA1033 Filter support (level *version***.***release***) initialized at** *time* **on** *date*

Explanation: Firewall filter support has been initialized.

ICA1034 Filter support deactivated at *time* **on** *date*

Explanation: IP packet filtering now using default filter rules.

ICA1035 Status of packet logging set to *enabled/disabled* **at** *time* **on** *date*

Explanation: Status of packet logging has changed. Message indicates current state with time stamp.

ICA1036 *#:rule_no R: rule_type direction: interface s:src_addr d: dst_addr p: protocol tag: scr_port/icmp_type tag: dst_port/icmp_code r:routed/local a: secure/non_secure f:yes/no T:tunnel_id e:C/D/n l:packet_length*

Explanation: Log record indicating a processed IP packet and the corresponding filter rule it matched. For this record to be written, the matched filter rule must have log control set to *yes*. If the IP packet which matched this rule is a fragment, the ports/icmp type/code information appears for the header packet but is shown as zero for packets other than the header packet.

ICA1037 *#:rule_no action src_addr src_mask dst_addr dst_mask protocol logical_op value logical_op value interface_type routing directionl= log_control f=fragment_controlt= tunnel_ID enc_alg auth_alg*

Explanation: When filters rules are updated, the activated rules are written to the log. This log message describes one of the activated rules.

ICA1038 Session Key engine started, using session socket port:*port_no* **and master socket port:***port_no*

Explanation: Encryption tunnel started using specified UDP port numbers, as defined in /etc/services.

ICA1039 Policy being (re)defined as:

Explanation: Policy cache being (re)defined using file /etc/security/fwpolicy. Following lines show the new policy cache.

ICA1040 >Policy statement: *tunnel_origin tunnel_end tunnel_ID encrypt_flag/authenticate_flag*

Explanation: Line logged was read from the /etc/security/fwpolicy file.

ICA1041 Context specification deleted for tunnel:*tunnel_ID*

Explanation: The tunnel context, for the listed ID, is no longer operational.

ICA1042 The following tunnel context specification(s) is defined:

Explanation: Tunnel context specifications are being defined, as listed on the following log records.

ICA1043 >tunnel_ID:*number***, src_addr:***IP_address***, dst_addr:***IP_address***, encryption:** *algorithm*

Explanation: Message lists specific attributes of activated tunnel context.

ICA1044 Host Counter Warning: IP(*IP Address***) Overlimit**

Explanation: There are too many secure hosts try to connect with firwall machine

System Action: pass connections

ICA1045 TCP Overlimit: *IP Address***(***Port***)->***IP Address***(***Port***) rejected**

Explanation: There are too many TCP sessions through firwall machine

System Action: reject connections

ICA1046 UDP Overlimit: *IP Address***(***Port***)->***IP Address***(***Port***) rejected.**

Explanation: There are too many UDP sessions through firwall machine

System Action: reject connections

ICA1047 Grace Period Warning : too many TCP sessions,*IP Address***(***Port***)->***IP Address***(** *Port***) passed**

Explanation: There are too many TCP sessions through firwall machine

System Action: pass connections

ICA1048 Grace Period Warning : too many UDP sessions,*IP Address***(***Port***)->***IP Address***(** *Port***) passed**

Explanation: There are too many UDP sessions through firwall machine

ICA1049 Invalid ipsec package: s:%1$s d:%2$s protocol:%3$s spi:%4$s
ICA1200 Terminating logging daemon due to above errors

Explanation: Due to errors recorded prior to this message, fwlogd daemon is terminating.

System Action: IP filter logging will not be activated.

User Response: Correct indicated errors and restart /usr/sbin/fwlogd.

ICA1260 Filter logging daemon terminating at *time* **on** *date* **due to receipt of** *termination* **signal**

Explanation: The fwlogd daemon received the indicated termination signal and is stopping.

ICA1305 \"unknown\"

Explanation: In formatting an IP packet for syslog, a record was found with an unknown protocol specification. Protocols IP, ICMP, TCP, UDP and IPSP are the recognized protocols. Note IPSP is IBM's designation for the encrypted packets passed through a tunnel.

ICA2000 New FTP session to *IP_address* **from** *IP_address* **(non-secure site).**

Explanation: Starting a new FTP session from non-secure site.

ICA2001 Authentication failed for user *name* **(unknown) from** *net FTP***:***IP_address***.**

Explanation: A user, without an account, attempted to use FTP proxy from the network.

User Response: See your firewall administrator to set up a proxy account.

ICA2002 Authentication failed for user *name* **with** *authentication method* **from** *network***:** *host name***.**

Explanation: Firewall is unable to authenticate the indicated user name using the specified authentication method.

User Response: See your Firewall administrator.

ICA2003 No shells configured for *user name***.**

Explanation: The identified user attempted a proxy login and no login shell has been defined.

User Response: See your Firewall administrator to correct this user login profile.

ICA2004 Unknown audit event of 0x*hex_value* **received.**

Explanation: An unknown audit request was received by the module tcpip_audit.c.

ICA2005 Error writing to client: *errno***.**

Explanation: Unable to communicate with client; see logged system message.

ICA2006 ptelnetd: auditproc: *errno***.**

Explanation: Indicated error returned by telnet audit process. System files might be corrupted.

ICA2007 ptelnetd: panic state=*value***.**

Explanation: Unknown error detected. System files might be corrupted.

ICA2008 Non-firewall user *name* **from :***IP_address* **telneted in.**

Explanation: A user, without a firewall account, attempted to use telnet proxy.

System Action: Assume Generic Authentication used.

ICA2009 /bin/login: *errno***.**

Explanation: Fatal error during system login. See indicated system error message.

ICA2010 Connect to *IP_address* **from** *IP_address* **(non-secure).**

Explanation: Successful connection between indicated IP addresses through the non-secure interface.

ICA2011 Connect to *IP_address* **from** *IP_address* **(secure).**

Explanation: Successful connection between indicated IP addresses through the secure interface.

ICA2012 New FTP session to *IP_address* **from** *IP_address* **(secure site).**

Explanation: Starting a new FTP session.

ICA2013 New Telnet session to *IP_address* **from** *IP_address***.**

Explanation: New telnet session established.

ICA2014 Option *value* **not supported.**

Explanation: The indicated flag is not supported, see preceding message.

ICA2015 Option -*value* **not supported.**

Explanation: The indicated flag is not supported, see preceding message.

ICA2016 Remote user-id \"*name***\".**

Explanation: FTP connection request for indicated user.

ICA2018 SNK not found for user *name***.**

Explanation: SecureNetKey value was not found for indicated user_ID.

User Response: See your Firewall administrator for possible login configuration problem.

ICA2019 SNK not read properly for user *name***.**

Explanation: SecureNetKey value was not readable as octal digits for indicated user_ID.

User Response: See your Firewall administrator for possible login configuration problem.

ICA2020 /usr/bin/fwuserau or /usr/bin/fwuserpt does not exist.

Explanation: Authentication using user-supplied authentication method is aborted.

System Action: Authentication is aborted.

User Response: Make sure that /usr/bin/fwuserau and /usr/bin/fwuserpt exist and the owner is the root. If the executable does not exist, user should make an executable using a compiler compatible with the operating system of the firewall and name it /usr/bin/fwuserau or /usr/bin/fwuserpt.

ICA2021 Trying to connect to remote host *name* **with user-id** *name***.**

Explanation: Trying to establish a new FTP connection.

ICA2022 Trying to connect to remote host *name***.**

Explanation: Trying to establish a new FTP connection.

ICA2023 Usage: ptelnetd [-n] [-s].

Explanation: Unknown flag specified when starting the ptelnet daemon.

User Response: Use only flags -n and/or -s.

ICA2024 User *name* **successfully authenticated using** *method* **authentication from** *network***:** *host name***.**

Explanation: FW authenticated the indicated user name using the specified authentication method.

ICA2025 User *name* **logged in using** *method* **authentication from** *network* **:***host name***.**

Explanation: FTP user logged in.

ICA2026 User *name* **timed-out after** *n* **seconds at** *current time***.**

Explanation: Connection attempt timed out for specified user. Either there is a potential network routing problem or the remote host is not available.

ICA2027 Connection from *remote host* **at** *time***.**

Explanation: Net FTP connection established to Firewall.

ICA2028 FTP connection attempt to *IP_address* **from** *IP_address* **refused. This machine does not support FTP from non-secure site.**

Explanation: Generally indicates an attempt to establish an FTP connection to Firewall across the nonsecure interface.

System Action: Reject the connection.

ICA2029 System error with errno = - **in** *in* **line** *line***.**

Explanation: The system call encountered a problem while executing a system call.

System Action: System execution halted.

User Response: Get the log, find out the meaning of errno and try to resolve the problem. If cannot be resolved, contact IBM service.

ICA2030 Function call with return code = - **in** *in* **line** *line***.**

Explanation: The function call encounters a problem.

System Action: Error returned

User Response: get the log, find out the meaning of return code try to resolve the problem. If cannot be resolved, contact IBM service.

ICA2031 sdi function call creadcfg() rc = -**.**

Explanation: The function call encounters a problem.

System Action: Error returned

User Response: Consult the *SDI Reference* for explanation.

ICA2032 Lost connection.

Explanation: Lost FTP connection.

User Response: Reestablish session.

ICA2033 sdi function call sd_init rc = -.

Explanation: The function call encountered a problem.

System Action: Error returned

User Response: Consult the *SDI Reference* for explanation.

ICA2034 sdi function call sd_check rc = -.

Explanation: The function call encounters a problem.

System Action: Error returned

User Response: Consult the *SDI Reference* for explanation.

ICA2035 setsockopt(): *errno***.**

Explanation: System error on setsockopt call.

ICA2036 Telnet Session *session id* **started for user** *user id* **(***source IP addr***:***dest IP addr***).**

Explanation: Message generated at the start of each Telnet session. A session begins when userid, source IP and destination IP are all known to the firewall. The session ID is a unique identifier generated by the firewall.

ICA2037 User fwdfuser or fwdpuser tried to login, is not allowed.

Explanation: fwdfuser and fwdpuser are reserved users and should not be used.

System Action: Login is refused.

User Response: The administrator should investigate who is using this user.

ICA2038 ttloop: peer died: *errno***.**

Explanation: Error occurred while flushing the network output buffer. Appears that peer process has died.

ICA2039 ttloop: read: *errno***.**

Explanation: Error occurred while flushing the network output buffer.

ICA2040 Authentication set to password or none is not allowed for user ID fwdfuser.

Explanation: fwdfuser is a reserved user ID and should not use password or n none as the authentication method.

System Action: Login is refused.

User Response: The administrator should change the authentication method for user ID fwdfuser.

ICA2041 FTP session *session id* **started for** *user id* **(***source IP addr***:***dest IP addr***).**

Explanation: Message generated at the start of each FTP session. A session begins when userid, source ip and destination ip are all known to the firewall. The session id is a unique identifier generated by the firewall.

ICA2042 req_rsp_code is incorrectly set to FW_AUTH_REQ.

Explanation: fw_tn_authenticate is not allowed to set req_rsp_code to FW_AUTH_REQ.

System Action: Abort the authentication.

User Response: Change fw_tn_authenticate, make the library fwuser.o again, and put it into the Firewall.

ICA2043 Could not get password for ***user_name*****.**

Explanation: Authentication type for this user is 'password' and no password was found.

User Response: See your Firewall administrator.

ICA2044 Incorrect time (*value*) specified for -t.

Explanation: The time value shown contains characters outside the numeric range of 0 to 9 or exceeds the maximum allowed value.

ICA2045 Option -T not supported on firewall.

Explanation: Indicated option is not supported.

ICA2046 Option -k not supported on firewall.

Explanation: Indicated option is not supported.

ICA2047 Option -s not supported on firewall.

Explanation: Indicated option is not supported.

ICA2048 Option -u not supported on firewall.

Explanation: Indicated option is not supported.

ICA2049 Unknown flag -*value* ignored.

Explanation: Indicated flag was specified and is not recognized.

ICA2050 Unknown parm ***value*****.**

Explanation: Indicated value, specified as an option, is not recognized.

ICA2051 adapt_addr conversion error on address.

Explanation: IP address shown is not valid.

User Response: The file /etc/security/fwsecadpt.cfg might be corrupted. Remove the file, reconfigure your secure interface(s), and reinitialize the filters.

ICA2052 afopen failed to open /etc/security/login.cfg: ***errno*****.**

Explanation: Unable to authenticate user; open error on indicated file.

ICA2053 Could not open secure interface file.

Explanation: A secure interface has not been configured.

User Response: If a secure interface should be defined, use Firewall commands/GUI panels to define the secure interface(s).

ICA2054 enduserdb rc=*value*, *errno*.

Explanation: Received indicated system error code when attempting to retrieve user login profile information.

User Response: See your Firewall administrator to verify your login account.

ICA2055 getpeername() (*invocation name*): *errno*.

Explanation: System error when FTP daemon attempted to get socket name.

ICA2056 getsockname() (*invocation name*): *errno*.

Explanation: System error when FTP daemon attempted to get port name.

ICA2057 getuser non-secure shell rc=*value* for *user_ID*, *errno*.

Explanation: Received indicated system error code when attempting to retrieve shell name for connection from nonsecure side of Firewall.

User Response: See your Firewall administrator to set a shell for your user login profile.

ICA2058 getuser secure shell rc=*value* for *user_ID*, *errno*.

Explanation: Received indicated system error code when attempting to retrieve shell name for connection from secure side of Firewall.

User Response: See your Firewall administrator to set a shell for your user login profile.

ICA2059 ioctl(): *errno*

Explanation: System error on ioctl() call for SIOCSPGRP.

ICA2060 ptelnetd: ftok for shared memory failed.

Explanation: Unable to allocate shared memory segment.

User Response: Contact the Firewall administrator.

ICA2061 ptelnetd: shmat for shared memory failed.

Explanation: Unable to allocate shared memory segment.

User Response: Contact the Firewall administrator.

ICA2062 ptelnetd: shmget for shared memory failed.

Explanation: Unable to allocate shared memory segment.

User Response: Contact the Firewall administrator.

ICA2063 setsockopt() (SO_DEBUG): *errno*.

Explanation: Indicated error message returned from system call 'setsockopt'.

ICA2064 setsockopt() (SO_KEEPALIVE): *errno*.

Explanation: Indicated error message returned from system call 'setsockopt'.

ICA2065 setuser rc=*value*, *errno*.

Explanation: Received a bad return code on a system call for the indicated reason.

ICA2066 signal(): *errno***.**

Explanation: System error when FTP daemon attempted to establish signal handler.

ICA2067 Fatal pFTPd initialization error - bind(): *errno*

Explanation: pFTPd server initialization failed, daemon terminated.

User Response: Correct the indicated system problem and restart pFTPd. The most likely cause of this error is another FTP daemon already listening on the standard FTP port (21).

ICA2068 Fatal pFTPd initialization error - listen(): *errno*

Explanation: pFTPd server initialization failed, daemon terminated.

User Response: Correct the indicated system problem and restart pFTPd.

ICA2069 Fatal pFTPd error - main accept(): *errno*

Explanation: pFTPd server main routine failed, daemon terminated.

User Response: Correct the indicated system problem and restart pFTPd.

ICA2070 Fatal pFTPd initialization error - socket(): *errno*

Explanation: pFTPd server initialization failed, daemon terminated.

User Response: Correct the indicated system problem and restart pFTPd.

ICA2071 PFTPd error - spawn(): *errno*

Explanation: Attempt to spawn child to handle a FTP request failed.

ICA2072 FTP configuration file (*filename***) is not available.**

Explanation: FTP daemon attempted to open the specified FTP configuration file but it either does not exist or could not be opened.

System Action: FTP daemon processing uses the default configuration

User Response: None, unless the file should exist, in which case it should be created or moved to the location specified in the message.

ICA2073 Unable to obtain storage for FTP language table.

Explanation: Storage required to represent a REPLYLANGUAGE statement in the FTP configuration file could not be obtained.

System Action: Processing continues.

User Response: Increase the region size or reduce the entries in the configuration file.

ICA2074 Processing complete for FTP config statement: *configuration statement*

Explanation: FTP has processed the indicated configuration statement.

System Action: Processing continues.

User Response: None

ICA2075 FTP for *user id* **(***source IP addr***:***dest IP addr***),** *operation file name***,** *numbytes* **bytes. sid:** *session id***.**

Explanation: Message generated for each file transfer on open FTP sessions. The sid is a unique identifier generated by the firewall at session start.

ICA2076 FTP Session *session id* **ended for** *user id* **(***source IP address***:***dest IP addr***),** *duration* **seconds,** *numbytes* **bytes.**

Explanation: Message generated at the end of each FTP session. The sid is a unique identifier generated by the firewall at session start.

ICA2077 Telnet Session *session id* **ended for** *user id* **(***source IP address***:***dest IP addr***),** *numbytes* **bytes.**

Explanation: Message generated at the end of each Telnet session. The sid is a unique identifier generated by the firewall at session start.

ICA2078 Disconnected proxy user *user* **- idle for** *time* **minutes.**

Explanation: User's session has exceeded maximum allowable idle time.

ICA2079 Attention - Unauthorized connection attempt to *IP_address* **from** *IP_address***.**

Explanation: Generally indicates an attempt to establish a connection to Firewall across the non-secure interface.

System Action: Reject the connection.

ICA2080 Syntax error (*reason***) near column** *column* **in FTP configuration file line** *line***:** *configuration statement*

Explanation: The FTP configuration statement at the given line is in error. The reason for the error and the location where the error was detected is provided.

System Action: Statement is ignored.

User Response: Correct the statement in the FTP configuration file.

ICA2081 No message catalog given by FTP configuration statements is usable.

Explanation: Attempts to open the message catalogs given by the REPLYLANGUAGE FTP configuration statements failed. No client message catalog can be used.

System Action: Client message catalog is forced to the English language in the C directory.

User Response: Ensure that there are catalog files in each of the directories associated with the language directories in the FTP configuration REPLYLANGUAGE statements. Also check that the NLSPATH environment variable is correctly set to allow substitution of both the sub-directory from the LANG environment variable (%L) and the catalog name (%N).

ICA2082 Unable to set FTP LANG environment variable to *sub-directory***, reason:** *reason*

Explanation: A system error (given by the reason) occurred when the FTP daemon was trying to change the setting of the LANG environment variable to the sub-directory specified.

System Action: Processing continues. Recovery may generate other messages.

User Response: Use the reason given to determine if this is a system error or programming error.

ICA2083 Unable to open FTP client message catalog in directory: *sub-directory*, **reason:** *reason*

Explanation: FTP daemon could not open the message catalog in the given sub-directory. The reason given is the errno returned from catopen().

System Action: Processing continues. Recovery may generate other messages.

User Response: Ensure that there is a catalog in the directory associated with the language directory provided. Check that the NLSPATH environment variable is correctly set to allow substitution of both the sub-directory (%L) and the catalog name (%N).

ICA2084 Forcing FTP client message catalog to English via the C sub-directory.

Explanation: Due to previously listed errors, the FTP daemon has forced the client message catalog to the English language using the C sub-directory.

System Action: If the language can be forced to the C message catalog processing continues. If it can not, the program exits.

User Response: Correct the error from the previous messages. If the program also existed, create the message catalog in the C sub-directory and set the NLSPATH environment variable correctly.

ICA2085 Telnet Session ended for pid *Process id* **(***source IP address***).**

Explanation: Message generated at the end of each Telnet session.

ICA2086 Misconfigured user file; user *user* **with no key (***key***).**

Explanation: FTPd found requested user in user file, but could not find key - misconfigured user file.

User Response: use Firewall commands/smit panels to correct this problem.

ICA2087 FTPd could not find the specified user *user* **in the user config file.**

Explanation: the username specified has not been configured or the user.cfg file is corrupt.

User Response: use Firewall commands/smit panels to correct this problem.

ICA2088 FTPd could not open user configuration file.

Explanation: FTPd made a call to fopen which failed because it could not open the user config file.

User Response: Make sure the user config file (user.cfg by default) is availible; use Firewall commands/smit panels

ICA2089 Authorization type from user file (*Authorization type***) did not match any entries in table (struct tab2 authtab[]).**

Explanation: The authorization type of the specified user (returned from user.cfg) does not match any supported types (such as deny,none,snk,sdi,password,etc.)

User Response: Check user.cfg file integrity or configuration; use Firewall commands/smit panels to correct this problem.

ICA2090 Authentication failed for user '*user name***' from** *client ip* **because KEY=DENY in the user.cfg file.**

Explanation: Authentication failed due to user.cfg file specifications set by the Firewall administrator.

User Response: See your Firewall administrator.

ICA2091 User '*user name*' not allowed to FTP to the non-secure port (*firewall ip*).

Explanation: User tried to FTP into the firewall server via a non-secure port (nsp) - all nsp users must have their 'fwnsFTP' key properly configured to a valid authorization type (in the user.cfg file).

User Response: Check user.cfg file integrity or configuration; use Firewall commands/smit panels to correct this problem.

ICA2092 Internal Error: nt_gwauth() failed.

Explanation: nt_gwauth() normally returns one of three values (AUTHENTICATED,NOT_AUTHENTICATED or DENY) in this

ICA2093 User '%1$s' not allowed to FTP to the secure port (%2$s).

Explanation: User tried to FTP into the firewall server via a secure port (sp) - all sp users must have their 'fwsFTP' key properly configured to a valid authorization type (in the user.cfg file).

User Response: Check user.cfg file integrity or configuration; use Firewall commands/smit panels to correct this problem.

ICA2094 Login Failed: expected format: "PASS <password>" after: "USER <*user name*>"; received *invalid cmd*.

Explanation: Authentication failed because the FTP client did not send the expected format (PASS 'password' per RFC959)

User Response: Type "user <username>"; enter correct password. See your Firewall administrator.

ICA2095 Login Failed: (via method *auth method*) failed authentication of user '*user name*' from *client ip* (client site).

Explanation: Authentication failed due to an invaild input (by client for specified authentication type) - such as user entered invalid password, snk key, etc.

User Response: See your Firewall administrator.

ICA2096 Authenticated: (via method *auth method*) successful authentication of user '*user name*' from *client ip* (client site).

Explanation: Authentication succeeded

ICA2097 httpd --> Starting HTTP proxy server version *HTTP Proxy Version*.

Explanation: HTTP Proxy for WWW access starting.

ICA2098 httpd --> Shutting down HTTP proxy server.

Explanation: HTTP Proxy for WWW access shutting down.

ICA2099 httpd --> Status: <*HTTP Status code*> from client <*IP address*>, who requested <\" *HTTP GET request*\"> for <*number of bytes*> bytes.

Explanation: Status of client HTTP request for some file thru the proxy.

ICA2100 Socket address equals zero.

Explanation: An invalid destination address was found in the local request.

ICA2101 Socket address family error: ***sin_family_type*****.**

Explanation: An invalid address family type was found in the local request.

ICA2102 Error initializing odm: ***odmerrno*****.**

Explanation: An odm_initialize() error occurred for ODM (Object Data Manager).

ICA2103 Error setting odm default path: ***odmerrno*****.**

Explanation: An odm_set_path() error occurred for ODM (Object Data Manager). object class, OCSvhost.

ICA2104 Error locking odm database: ***odmerrno*****.**

Explanation: An odm_lock() error occurred for ODM (Object Data Manager).

ICA2105 Error opening odm object *Customized_Attribute***:** ***odmerrno*****.**

Explanation: An odm_open_class() error occurred for ODM (Object Data Manager).

ICA2106 Error searching odm object *OCS_virtual_host***:** ***odmerrno*****.**

Explanation: An odm_get_first() error occurred for ODM (Object Data Manager). object class, OCSvhost.

ICA2107 Error closing odm object *OCS_virtual_host***:** ***odmerrno*****.**

Explanation: An odm_close_class() error occurred for ODM (Object Data Manager). object class, OCSvhost.

ICA2108 Error unlocking odm database: ***odmerrno*****.**

Explanation: An odm_unlock() error occurred for ODM (Object Data Manager).

ICA2109 Error terminating odm: ***odmerrno*****.**

Explanation: An odm_terminate() error occurred for ODM (Object Data Manager).

ICA2110 Error getting server by name: ***errno*****.**

Explanation: An getservbyname() error occured. The host Login Monitor service, lm, is not specified properly in the /etc/services file.

ICA2111 byname() error: ***errno*****.**

Explanation: An gethostbyname() error occured. The host machine name is not specified properly in /etc/hosts.

ICA2112 Invalid protocol name: ***protocol_name*****.**

Explanation: The protocol name specified in the ODM object class, OCSvhost, is is not supported.

ICA2113 Error opening socket to LM: ***errno*****.**

Explanation: A socket() error occurred to host machine where the Login Monitor resides.

ICA2114 Error binding local address: ***errno*****.**

Explanation: A bind() error using the local address for this OCS node.

ICA2115 Error connecting socket to LM: ***errno*****.**

Explanation: A connect() error occurred to the host machine where the Login Monitor resides.

ICA2116 Protocol type error: ***protocol_type*****.**

Explanation: The virtual terminal protocol type used to communicate with the host Login Monitor is invalid.

ICA2117 Malloc error on LM message.

Explanation: A malloc() error occurred when dynamically allocating space for the variable-length Login Monitor message.

ICA2118 Error transmitting msg to LM: ***errno*****.**

Explanation: A send() error occurred when sending Login Monitor a request to open the correct host device.

ICA2119 Error receiving msg from LM: ***errno*****.**

Explanation: A recv() error occurred when Login Monitor returns an acknowledgement.

ICA2120 Status error from LM: ***status*****.**

Explanation: The acknowledgement from Login Monitor indicates that host device was NOT successfully opened.

ICA2121 Error opening OCS administration device: ***errno*****.**

Explanation: The OCS administration device was not successfully opened.

ICA2122 Failed coverting IP address to TBM ID: ***errno*****.**

Explanation: ioctl() OCS_GET_TBMID error occurred. ioctl command OCS_GET_TBMID failed on the OCS administration device.

ICA2123 Error Connectting TBM determined by rlogin: ***errno*****.**

Explanation: ioctl() OCS_IS_TBM_CONNECTED error occurred. ioctl command OCS_IS_TBM_CONNECTED failed on the OCS administration device.

ICA2124 No host nodes are connected: ***errno*****.**

Explanation: There are no host nodes connected to this OCS node from the list of possible host nodes.

ICA2125 Error getting list for ODM(Object Data Manager): ***Customized_Attribute*****:** ***odmerrno*****.**

Explanation: An odm_get_list() error occurred for ODM object class, CuAt(Customized Attribute).

ICA2126 No OCS host node name associated with: ***hostnode_to_connect*****.**

Explanation: The CuAt(Customized Attribute) entry was found but there was no hostnode/ocsnode match.

ICA2127 Malloc error on Host array.

Explanation: A malloc() error occurred when dynamically allocating space for the array of possible host names.

ICA2128 User (unknown) from *client ip* **(client site) attempted a command '***invalid command***' before authentication.**

Explanation: A user attempted actions before entering in username and password for authentication - users must first be authenticated before any further processing may continue.

User Response: Please login with USER and PASS

ICA2129 gethostbyname (*invocation name***):** *errno*

Explanation: System error when FTPd attempted to get host information corresponding to the host name.

ICA2130 User (*username***) from** *client ip* **(client site) attempted a command '***invalid command***' .**

Explanation: Specified user attempted invalid command.

User Response: Only commands USER, QUOTE SITE and QUIT are allowed until you specify "quote site destination".

ICA2131 Authentication failed for user '*user name***' from** *client ip* **because of an error in the user.cfg file.**

Explanation: Authentication failed due to a user.cfg file specifications set by the Firewall administrator (check previous logs).

User Response: See your Firewall administrator.

ICA2132 User '*user***' from ip** *client ip* **(client site) attempted the invalid command '***invalid command***' .**

Explanation: The user attempted an invalid command. The only valid commands at this point are SITE,USER, and QUIT.

ICA2133 Error: *function* **call failed in** *instance***:***line* **(WSAGetLastError() =** *WSAGetLastError***):** *errno*

Explanation: General error message; check logs

ICA2134 Notice: FTPd: connect() (in *instance***) could not reach** *IP* **(WSAGetLastError() =** *WSAGetLastError***):** *errno* **.**

Explanation: Connect() could not find the requested address; check WSAGetLastError result.

User Response: double-check your address - may be DNS or network error

ICA2135 Data transfer completed: Received *bytes* **bytes (from** *source IP***); sent** *bytes* **bytes (to** *destination IP***).**

Explanation: This information reflects a single data transfer during a particular FTP session.

ICA2136 Error: CreateThread() failed in *instance***:** *errno***.**

Explanation: FTPd could not create a thread

ICA2137 Data connection established; server: *source ip* **client:** *destination ip***.**

Explanation: Successful data connection.

ICA2138 Insufficient memory: pFTPd: malloc(*bytes***) returned NULL in function** *instance***.**

Explanation: Unable to allocate enough memory - malloc returned NULL.

ICA2139 LogonUser() failed: *reason***.**

Explanation: The Windows NT (SAM) API LogonUser (for password authentication) failed due to specified reason(s).

User Response: Contact the Firewall administrator.

ICA2141 FTP session to *IP_address* **from** *IP_address* **terminates.**

Explanation: The FTP session to firewall terminates no matter if quote site to the destination.

ICA2142 fw_tn_authenticate authenticated *userid* **successfully.**

Explanation: fw_tn_authenticate has authenticated the specified user ID.

System Action: Login is successful.

ICA2143 fw_tn_authenticate authentication for *userid* **failed.**

Explanation: fw_tn_authenticate cannot authenticate the specified user ID.

System Action: Login is refused.

User Response: If fw_tn_authenticate has any logging facilities, then the administrator n should look at the log file to determine the cause.

ICA2144 fw_tn_authenticate did not return successfully.

Explanation: The value returned by fw_tn_authenticate is not zero. The function n fw_tn_authenticate might be missing.

System Action: Login is refused.

User Response: Look at fw_tn_authenticate carefully to see if it ever returns n a non-zero value and correct it if it occurs. If that is the case, make the n library fwuser.o again and put it into the Firewall.

ICA2145 The system returned return code *rc* **in file** *filename* **at line** *linenumber***.**

Explanation: A system call failed. The library fwuser.o might be absent.

System Action: Authentication is aborted.

User Response: Make sure that /usr/lib/fwuser.o is present. If it is, n contact your IBM representative.

ICA2146 The IBM-supplied fwuser.o has not been replaced.

Explanation: You are using the IBM-supplied fwuser.o because you have not n replaced it with your own fwuser.o.

System Action: Authentication is aborted.

User Response: You should write and compile your own authentication if you n defined any user to use User-Supplied authentication. The IBM-supplied n fwuser.o denies access to all non-AIX and non-Firewall users.

ICA2147 fwtelnet: user *user id* **started a transparent telnet session from** *source IP addr* **(secure side) to** *dest IP addr***.**

Explanation: Message generated at the start of each transparent proxy session (fwtelnet).A session begins when userid, source ip and destination ip are all known to the firewall. Only session started from secure side is allowed.

System Action: allow the transparent telnet.

ICA2148 Attention -- Unauthorized connection attempt for user *user id* **from** *source IP addr* **(nonsecure side) to** *dest IP addr***, is not allowed.**

Explanation: Generally indicates an attempt to establish a connection to Firewall across the non-secure interface.

System Action: Reject the connection.

User Response: You should telnet from secure side using transparent proxy.

ICA2149 fwtelnet: a LOGIN_ADAPTER_ERROR occured while starting a transparent telnet session from *source IP addr* **to** *dest IP addr***.**

Explanation: A LOGIN_ADAPTER_ERROR occured when calling q_check_secure(0).

System Action: Reject the connection.

User Response: check the secure adapter.

ICA2150 PFTPd error - *failing function***: return code = 0x***function return code*

Explanation: The pFTPd server detected an error in the indicated function. The daemon terminates.

User Response: Correct the indicated system problem and restart pFTPd.

ICA2151 ogin refused.

Explanation: This message is to be displayed to user who tries to login but not allowed.

ICA2152 wlogin: write to *device* **failed.**

Explanation: Cannot write to the device.

ICA2153 wlogin: read from *device* **failed.**

Explanation: Cannot read to the device.

ICA2154 rror in *portname* **with** *reason***.**

Explanation: This Firewall encountered a problem.

ICA2155 PFTPd error - *failing function***:** *system error message*

Explanation: The pFTPd server detected an error in the indicated function. The daemon terminates.

User Response: Correct the indicated system problem and restart pFTPd.

ICA2156 Attention -- User *user id* **tried to use transparent FTP from NONSECURE side** *source IP addr* **to** *dest IP addr* **, was not allowed.**

Explanation: Generally indicates an attempt to establish a connection to Firewall across the non-secure interface.

System Action: Reject the connection.

User Response: You should FTP from secure side using transparent proxy.

ICA2157 User *user id* **from** *source IP addr* **is not allowed to use transparent proxy to** *dest IP addr***.**

Explanation: Generally indicates an attempt to establish a connection to Firewall while transparent proxy is not configured.

System Action: Reject the connection.

User Response: turn fwtpproxy FTP = on

ICA2158 Option *value* **was specified incorrectly.**

Explanation: Indicated flag was specified incorrectly.

ICA2159 Timeout value not specified for -t option.

Explanation: A timeout value must be supplied for the -t option.

ICA2160 Password changed for user *user ID* **from** *network* **:***host name***.**

Explanation: An FTP user has successfully changed his password in the password database.

System Action: None

User Response: None

ICA2161 User *user ID* **attempted login using expired password from** *network* **:***host name***.**

Explanation: An FTP user attempted to establish a connection to the Firewall using an expired password.

System Action: The FTP login validation fails and the user is returned to the FTP command shell.

User Response: The user must attempt to validate again through the FTP USER command or by re-establishing the FTP connection and passing the password string of the form "old_password/new_password/new_password".

ICA2162 Password change failure for user *user ID* **from** *network* **:***host name***.**

Explanation: An FTP user attempted to change his password and the password validation routine failed. The possible reasons for the failure include:

ICA2163 Fwmaild started.

Explanation: Starting fwmaild.

ICA2164 Fwmaild stop.

Explanation: stopping fwmaild.

ICA2165 Interrupted telnet session.

Explanation: Telnet session is ending, but it cannot retrieve its session information from the pipe. The session was probably interrupted during startup by the client, thus the session was not fully initialized.

ICA3001 Real user is *ident user name*, **not** *socks connect user name*

Explanation: Possible security breach attempt; user name not authenticated.

ICA3006 *count* **bytes from** *client*, *count* **bytes from** *server*

Explanation: Message indicating number of bytes transferred between the sockd daemon and its respective client and server hosts.

ICA3010 connected -- Bind from *user*(*real_user*)@*src_addr* **for** *dst_addr* **(** *destination port***)**

Explanation: Connection established.

ICA3011 connected -- Connect from *user*(*real_user*)@*src_addr* **to** *dst_addr* **(** *application***)**

Explanation: Successful socket connection to external network.

ICA3012 Connection refused -- Connect from *user*(*real_user*)@*src_addr* **to** *dst_addr* **(** *application***)**

Explanation: Remote host refused connection.

ICA3013 select() *errno*

Explanation: System error.

ICA3014 Connection terminated -- Bind from *user*(*real_user*)@*src_addr* **for** *dst_addr* **(** *destination port***).(***count* **bytes from** *client*, *count* **bytes from** *server***)**

Explanation: Connection terminated; see log message.

ICA3015 terminated -- Connect from *user*(*real_user*)@*src_addr* **to** *dst_addr* **(** *destination host***).(***count* **bytes from** *client*, *count* **bytes from** *server***)**

Explanation: Connection to server terminated; see log message.

ICA3016 Cannot find appropriate interface to communicate with *destination host*

Explanation: File /etc/sockd.route does not contain routing information for the specified destination host.

ICA3017 Cannot execute shell command for pid *sockd process*

Explanation: Sockd daemon unable to execute a /bin/sh command.

User Response: Verify the /bin/sh shell is available on the system.

ICA3018 refused -- Bind from *user*(*real_user*)@*src_addr* **for** *dst_addr*

Explanation: Remote host refused connection.

ICA3019 Error in GetDst() from host *socks_src_name*: *errno*

Explanation: Error in resolving destination address for requested connection.

ICA3022 Invalid ?= field at line *line number*

Explanation: Invalid entry found in /etc/sockd.conf file.

ICA3023 Invalid comparison at line *line number*

Explanation: Invalid entry found in /etc/sockd.conf file.

ICA3024 Invalid entry at line *line number*

Explanation: Invalid entry found in /etc/sockd.route file.

ICA3025 Invalid permit/deny field at line *line number*

Explanation: Invalid entry found in /etc/sockd.conf file.

ICA3026 Invalid port number at line *line number*

Explanation: Invalid entry found in /etc/sockd.conf file.

ICA3027 Shell Command Failed (*exec status***) for \"***cmd***\"**

Explanation: Displayed shell command failed.

User Response: Verify shell processor is available on the system.

ICA3030 Unable to open config file (*/etc/sockd.conf***)**

Explanation: Open request against indicated file failed.

ICA3031 Unable to open routing file (*/etc/sockd.route***):** *errno*

Explanation: Open request against indicated file failed.

User Response: See your Firewall administrator. A default file was provided during Firewall installation.

ICA3032 Unable to open userfile (*user name file***):** *errno*

Explanation: The filename specified for *=userlist on a permit rule could not be found.

ICA3033 Unexpected result from Validate()

Explanation: Identd verification of the user name was specified. Identd responded with unexpected result.

ICA3035 Cannot connect to identd on *client host*

Explanation: Identd verification of the user name was specified. Identd does not respond.

ICA3039 Error -- shell command \"*cmd***\" contains no alphanumeric characters.**

Explanation: Invalid shell command; see log message.

ICA3040 Error -- shell_cmd fork() *errno*

Explanation: Sockd daemon unable to switch to child process via 'fork()'.

ICA3041 Error -- unable to get client address.

Explanation: Error return from 'getpeername()' call.

User Response: Check routing and DNS configuration.

ICA3042 Error -- undefined command (0x*hex-command-received***) from host** *client address*

Explanation: Invalid command received from client application.

User Response: Possible client configuration problem or mismatch on client and Firewall support level.

ICA3043 Error -- wrong version (0x*hex-version-number***) from host** *client address***.**

Explanation: Firewall supports socks version 4.2.

User Response: Possible client configuration problem or mismatch on client and Firewall support level.

ICA3044 Failed -- Connect from *user***(***real_user***)***@src_addr* **to** *dst_addr* **(** *application***). Error code:** *command causing failure errno***.**

Explanation: Connection request failed.

ICA3045 Failed -- Bind from *user***(***real_user***)***@src_addr* **for** *dst_addr***. Error: connected to wrong host** *dst_name* **(***dst_port (application)***).**

Explanation: Bind request failed.

ICA3046 Failed -- Bind from *user***(***real_user***)***@src_addr* **for** *dst_addr***. Error code:** *command causing failure errno***.**

Explanation: Bind request failed.

ICA3047 Timed-out -- Bind from *user***(***real_user***)***@src_addr* **for** *dst_addr*

Explanation: Connection timed out.

ICA3048 Shell command too long: *command***...**

Explanation: The command to be executed, from the /etc/sockd.conf file, is too long.

ICA3049 Timed-out -- Connect from *user***(***real_user***)***@src_addr* **to** *dst_addr* **(** *application***)**

Explanation: Connection timed out; see log message.

ICA3050 *matched sockd.conf filter rule*

Explanation: Filter rule from the /etc/sockd.conf file which matched the socks connection.

ICA3051 AIX sockd_route() cannot find interface for *remote address***.**

Explanation: Could not find interface route information.

ICA3052 Error setting userid to "nobody".

Explanation: Could not set userid of the child sockd process to "nobody".

ICA3053 Error on popen(AIX route script): *system error message*

Explanation: Failure running script to find routing information.

ICA3054 Fatal memory allocation failure in AIX sockd_route().

Explanation: Memory allocation failure trying to gather routing information.

ICA3055 Fatal error AIX sockd_route() parsing for first space in: *input line*

Explanation: Error parsing system route information.

ICA3056 Fatal error AIX sockd_route() parsing for second space in: *input line*

Explanation: Error parsing system route information.

ICA3057 Fatal error in AIX sockd_route() reading route script output: *system error message*

Explanation: Error reading script output.

ICA3058 Error on popen(AIX adapter script): *system error message*

Explanation: Failure running script to find interface information.

ICA3101 Sockd error sending data - select(): *system error message*

Explanation: (SOCKS422) Error while sending data.

ICA3102 Sockd error sending data - write(): *system error message*

Explanation: (SOCKS422) Error while sending data.

ICA3103 Sockd error receiving data - select(): *system error message*

Explanation: (SOCKS422) Error while receiving data.

ICA3104 Sockd error receiving data - read(): *system error message*

Explanation: (SOCKS422) Error while receiving data.

ICA3105 Cannot create process id file *filename***.**

Explanation: (SOCKS422) Process id file creation/write failed.

ICA3106 Sockd failed to fork child: *system error message*

Explanation: (SOCKS422) Attempt to fork child to handle a SOCKS request failed.

ICA3107 Set inbound socket SO_LINGER option failed: *system error message*

Explanation: (SOCKS422) not critical

ICA3108 Set outbound socket SO_LINGER option failed: *system error message*

Explanation: (SOCKS422) not critical

ICA3109 Invalid entry at line *line number* **in file** *filename***.**

Explanation: (SOCKS422) Incorrect configuration entry syntax.

ICA3110 Illegal interface field at line *line number* **in file** *filename***.**

Explanation: (SOCKS422) Incorrect configuration entry syntax.

ICA3111 Illegal destination IP at line *line number* **in file** *filename***.**

Explanation: (SOCKS422) Incorrect configuration entry syntax.

ICA3112 Illegal destination mask at line *line number* **in file** *filename***.**

Explanation: (SOCKS422) Incorrect configuration entry syntax.

ICA3113 Parsed *number of lines* **lines in file** *filename***.**

Explanation: (SOCKS422) Incorrect configuration entry syntax.

ICA3114 No valid lines found in file *filename***.**

Explanation: (SOCKS422) Configuration file empty, or incorrect syntax.

User Response: Correct the indicated configuration file.

ICA3115 Invalid 'permit/deny' field at line *line number* **in file** *filename***.**

Explanation: (SOCKS422) Incorrect configuration entry syntax.

ICA3116 Invalid '?=' field at line *line number* **in file** *filename***.**

Explanation: (SOCKS422) Incorrect configuration entry syntax.

ICA3117 Illegal source IP at line *line number* **in file** *filename***.**

Explanation: (SOCKS422) Incorrect configuration entry syntax.

ICA3118 Illegal source mask at line *line number* **in file** *filename***.**

Explanation: (SOCKS422) Incorrect configuration entry syntax.

ICA3119 Invalid comparison at line *line number* **in file** *filename***.**

Explanation: (SOCKS422) Incorrect configuration entry syntax.

ICA3120 Invalid port number at line *line number* **in file** *filename***.**

Explanation: (SOCKS422) Incorrect configuration entry syntax.

ICA3121 Received SIGUSR1 - dumping socks configuration.

Explanation: (SOCKS422) Signal to dump active configuration to log file, following this message.

ICA3122 Sockd could not fork daemon: *system error message*

Explanation: (SOCKS422) Fork to initialize sockd daemon failed.

User Response: Correct the indicated system problem and restart sockd.

ICA3123 Sockd server starting.

Explanation: (SOCKS422) Sockd has successfully initialized and is awaiting connections.

ICA3124 Fatal sockd initialization error - bind(): *system error message*

Explanation: (SOCKS422) Sockd server initialization failed, daemon terminated.

User Response: Correct the indicated system problem and restart sockd.

ICA3125 Fatal sockd initialization error - listen(): *system error message*

Explanation: (SOCKS422) Sockd server initialization failed, daemon terminated.

User Response: Correct the indicated system problem and restart sockd.

ICA3126 Fatal sockd error - main accept(): *system error message*

Explanation: (SOCKS422) Sockd server main routine failed, daemon terminated.

User Response: Correct the indicated system problem and restart sockd.

ICA3127 Sockd server received terminate signal.

Explanation: root or nobody killed the process, daemon terminated.

User Response: Restart sockd if the administrator so desires (type "sockd").

ICA3128 Fatal sockd initialization error - socket(): *system error message*

Explanation: Sockd server initialization failed, daemon terminated.

User Response: Correct the indicated system problem and restart sockd.

ICA3129 Fatal sockd initialization error - *failing function***:** *system error message*

Explanation: Sockd server initialization failed in the indicated function, daemon terminated.

User Response: Correct the indicated system problem and restart sockd.

ICA3130 Sockd error - *failing function***:** *system error message*

Explanation: The sockd server detected an error in the indicated function. The daemon continues, but connections may be refused or terminated.

User Response: If the problem persists, stop sockd, correct the indicated system problem and restart sockd.

ICA3131 Error reading *file name***. Previously cached data will be used.**

Explanation: The file could not be read or contained incorrect data. A previous message should describe the problem. Sockd will continue to operate with cached data from the previous version of the file.

User Response: Correct the error in the indicated file.

ICA3132 Unknown flag -*value***.**

Explanation: The indicated flag is not recognized, daemon terminated.

User Response: Correct the syntax and restart sockd.

ICA3133 Unknown parameter *value***.**

Explanation: The indicated parameter is not recognized, daemon terminated.

User Response: Correct the syntax and restart sockd.

ICA3134 Conflicting options *option1* **and** *option2***.**

Explanation: The indicated options cannot be specified together, daemon terminated.

User Response: Correct the syntax and restart sockd.

ICA3135 Sockd error - *failing function***: return code = 0x***function return code*

Explanation: The sockd server detected an error in the indicated function. The daemon terminates.

User Response: Correct the indicated system problem and restart sockd.

ICA3700 WinSocket initialization error : *WinSocket error*

Explanation: Error occured when initializing WinSocket.

User Response: Correct the indicated system problem and restart sockd.

ICA4000 *program* **- Warning: Received signal** *signal***, terminating**

Explanation: Termination due to receipt of signal.

ICA4001 STOP *program* **as PID** *processId*

Explanation: Informational message.

ICA4002 Temporary ID

Explanation: Informational message.

ICA4003 Problem with child process *processId***.**

Explanation: Could not create a child process.

ICA4004 Fatal Error. Killing fwpagerd on signal *signal***.**

Explanation: Signal handler.

ICA4005 No fwpagerd daemon running, *program* **not found.**

Explanation: Could not send a page because the daemon was not active.

ICA4006 No fwpagerd daemon running with process ID *processId***.**

Explanation: Could not find the process Id of the daemon process.

ICA4007 START *program* **as PID** *processId*

Explanation: Informational message.

ICA4008 Cannot set sigignore for SIGPIPE.

Explanation: Failure while setting up to ignore the broken pipe signal.

ICA4009 Cannot set sigset for SIGCHILD.

Explanation: Failure while setting up to catch a dying child signal.

ICA4010 Cannot set termination process.

Explanation: Failure while setting signal to catch termination process.

ICA4011 Cannot open socket.

Explanation: Failure while opening socket.

ICA4012 Cannot set sigset for SIGTERM.

Explanation: Failure while setting up to catch SIGTERM and SIGINT signals.

ICA4013 Cannot set socket reuse option.

Explanation: Failure while setting socket reuse option.

ICA4014 Cannot set socket linger option.

Explanation: Failure while setting socket linger option.

ICA4015 Cannot bind the socket to the port.

Explanation: Failure while binding the socket to the port.

ICA4016 Cannot set listen on socket.

Explanation: Failure while setting up to listen on socket.

ICA4017 Service *servName* **using TCP socket** *socket***.**

Explanation: Informational msg.

ICA4018 Function call select() failed.

Explanation: Internal function call failure.

ICA4019 Severe error from new_work().

Explanation: Internal severe error from new_work routine.

ICA4020 Error(*program***): Could not write to stream socket:** *socket*

Explanation: Possible system error.

User Response: Check socket usage.

ICA4021 Problem receiving response.

Explanation: Problem receiving response from modem.

User Response: Check modem connections and the initialization string.

ICA4022 Request successful.

Explanation: Informational message.

ICA4023 Request failed.

Explanation: Request to send page has failed.

ICA4024 Error(*program***): Priority out of range (***minpri* **-** *maxpri***).**

Explanation: Incorrect priority range.

User Response: Correct priority range. Valid values are from -1 through 5.

ICA4025 Error(*program*): Address must be in the form of ID@carrier when -n option is used.

Explanation: Incorrect command usage syntax.

User Response: Correct the command syntax.

ICA4026 Error(*program*): Unknown host *hostname*

Explanation: Could not resolve hostname.

User Response: Check hostname.

ICA4027 Error(*program*): Could not open stream socket : *errno*

Explanation: Could not create a new socket.

ICA4028 Error(*program*): Could not set socket options : *errno*

Explanation: Could not set socket linger option.

ICA4029 Error(*program*): Could not connect to *host* **:** *errno***.**

Explanation: Could not connect to the host.

User Response: Check serial port configuration and existence of device driver file.

ICA4030 Error(*program*): Could not write to stream socket : *errno***.**

Explanation: Could not write to the stream socket.

ICA4031 Problem receiving response. Condition of message unknown.

Explanation: Problem receiving response from modem.

ICA4032 Message sent successfully to queue.

Explanation: Informational message. Message has been sent to queue.

ICA4033 Message failed. No message(s) sent.

Explanation: Could not send the message onto the pager queue.

ICA4034 *date* **Failed (ID** *ID* **Pri** *priority* **Secs** *period* **Tries** *retryCount***) [** *fromEntry***]** *personName***:** *mesage***.**

Explanation: The page could not be sent.

ICA4035 Cannot re-queue message *mesg* **from** *program* **to** *person***.**

Explanation: Could not send into paging queue.

ICA4036 SUCCEEDED (ID *ID* **Pri** *priority* **Secs** *period* **Tries** *retryCount***) [** *fromEntry***]** *personName***:** *mesage***.**

Explanation: The page is sent successfully.

ICA4037 DUMPED to *dumpFile* **(ID** *ID* **Pri** *priority* **Secs** *period* **Tries** *retryCount***) [** *fromEntry***]** *personName***:** *mesage***.**

Explanation: Pages that are not sent immediately are dumped to a file to be tried later.

ICA4038 Cannot write to dump file *dumpFile*.

Explanation: Dump file cannot be written into.

User Response: Check file system permissions.

ICA4039 IpcKey: 0x*IpcKey*

Explanation: Informational message.

ICA4040 Retry time of *retryTime* minutes exceeded.

Explanation: Failed to initialize modem after the specified minutes.

User Response: Check initialization string.

ICA4041 Found alphanumeric message for numeric pager.

Explanation: Numeric pagers cannot contain alphanumeric data.

User Response: Correct using the user interface menu.

ICA4042 Person cannot receive pages.

Explanation: Pager is probably not activated.

User Response: Check pager for activation.

ICA4043 Carrier *carrier* does not exist.

Explanation: Carrier specified does not exist.

User Response: Correct using the user interface menu.

ICA4044 Carrier *carrier* does not have a DTMF phone number.

Explanation: Carrier specified does not have the DTMF phone number.

User Response: Correct using the user interface menu.

ICA4045 Pager number *pagerNumber* is too long for carrier's maximum of *carrLen*.

Explanation: Pager number is too long for carrier's maximum.

User Response: Use another shorter pager number less than that of the carrier's maximum.

ICA4046 Pager number *pagerNumber* is too long for default length of *defaultCarrLen*.

Explanation: This message occurs when the default length is too less.

User Response: Correct using the user interface menu. Increase default length.

ICA4047 Problem at line *lineNumber* of modem file *ModemfilePathname*.

Explanation: Modem definition file contains an invalid character.

User Response: Correct using the user interface menu.

ICA4048 Cannot open modem on device /dev/*deviceName*.

Explanation: Could not open modem on specified device.

User Response: Check or re-configure serial port. Check device.

ICA4049 Modem open on /dev/*deviceName***.**

Explanation: Modem has been successfully detected on the serial port.

ICA4050 Cannot set modem characteristics.

Explanation: Failed while trying to set modem characteristics.

User Response: Check modem initialization string.

ICA4051 Cannot initialize modem after *numInitTries* **retries.**

Explanation: Modem could not be initialized.

User Response: Check modem initialization string and serial port configuration.

ICA4052 Cannot dial pager number *pagerNumber*

Explanation: Pager number cannot be dialed.

User Response: Check pager number validity.

ICA4053 Cannot hangup modem.

Explanation: Cannot hangup modem.

User Response: Check modem initialization string and hangup command used.

ICA4054 Cannot dial message *message*

Explanation: Cannot dial message.

ICA4055 Problem at line *lineNumber* **in modem file** *filename***.**

Explanation: Invalid modem definition file.

User Response: Correct using the user interface menu.

ICA4056 Cannot dial carrier *carrier***'s DTMF number (***DTMFnumb***).**

Explanation: DTMF number may have been changed or is incorrect for this carrier.

User Response: Correct using the user interface menu.

ICA4057 Cannot transmit block.

Explanation: Failed while trying to transmit block.

User Response: Check carrier parameters using the user interface menu.

ICA4058 No response to transmitted block.

Explanation: Could not get a response from the carrier after transmitting block.

User Response: Check carrier parameters using the user interface menu.

ICA4059 Cannot receive response to message delivery.

Explanation: Could not get a response from the carrier after message delivery.

User Response: Check carrier parameters using the user interface menu.

ICA4060 Cannot transmit pager ID.

Explanation: Cannot transmit pager id.

User Response: Check pager number and carrier parameters using the user interface menu.

ICA4061 Cannot transmit end <CR> of automatic mode request.

Explanation: Cannot transmit end <CR> of automatic mode request.

User Response: Check carrier parameters using the user interface menu.

ICA4062 Cannot transmit automatic mode request.

Explanation: Cannot transmit automatic mode request signal.

User Response: Check carrier parameters using the user interface menu.

ICA4063 Failed to receive go-ahead from carrier *carrier* **after** *numTries* **retries.**

Explanation: Carrier may be busy at this time.

User Response: Check carrier parameters using the user interface menu and try later.

ICA4064 Communications error during prompt with carrier *carrier***.**

Explanation: Communications error may occur for a number of reasons. Try again later.

User Response: Check carrier parameters using the user interface menu and try later.

ICA4065 Cannot receive response to logon.

Explanation: Modem cannot receive response to logon.

User Response: Check modem initialization string and carrier parameters.

ICA4066 Carrier *carrier* **did not respond to logon attempt.**

Explanation: Carrier did not respond to logon attempt.

User Response: Check carrier parameters using the user interface menu and try later.

ICA4067 Carrier *carrier* **said** *receiveDataString***.**

Explanation: Carrier transmitted back some error message or busy message.

User Response: Check carrier parameters using the user interface menu and try later.

ICA4068 Carrier *carrier* **forced a disconnect during logon.**

Explanation: Carrier forced a disconnect during logon.

User Response: Check carrier parameters using the user interface menu.

ICA4069 Dumping messages to carrier *carrier* **caused by** *ConnectRetryMax* **retry loops.**

Explanation: If carrier is busy, the program dumps pages and tries later.

ICA4070 Skipping messages to carrier *carrier* **caused by** *maxTotalTries* **session connect tries.**

Explanation: Carrier cannot be contacted after a number of tries.

User Response: Check carrier parameters and try again later.

ICA4071 Error(*program*): Cannot allocate memory for carrier retry: *errno*.

Explanation: Possible system or memory allocation errors.

ICA4072 Error(*program*): Cannot add to carrier retry list: *errno*.

Explanation: Carrier possibly may not exist.

User Response: Check carrier validity and try again.

ICA4073 Data connection to carrier *carrier* at *phoneNumber* failed after *retryCount* retries.

Explanation: Data connection has failed.

User Response: Check modem connections and carrier paramters using the user interface menu.

ICA4074 ID prompt from carrier *carrier* was not received after *numTries* retries.

Explanation: Carrier failed to response with an ID or acknowledgement prompt.

User Response: Make sure carrier uses the TeleAlphanumeric Protocol.

ICA4075 Communications error during logon with carrier *carrier*.

Explanation: Communications error could occur for a number of reasons.

User Response: Check carrier parameters using the user interface menu.

ICA4076 Maximum logon attempts to carrier *carrier* exceeded.

Explanation: Carrier has failed to respond within the specified attempts.

User Response: Check carrier parameters and try again later.

ICA4077 Message go-ahead not received from carrier *carrier*.

Explanation: Carrier has failed to response with a go-ahead prompt.

User Response: Check carrier parameters and try again later.

ICA4078 Cannot create blocks.

Explanation: Carrier could not create blocks for transmission.

User Response: Check carrier parameters using the user interface menu.

ICA4079 Carrier *carrier* did not respond to message delivery.

Explanation: Carrier had trouble delivering the message.

User Response: Check carrier parameters using the user interface menu.

ICA4080 Carrier *carrier* forced a disconnect during message delivery.

Explanation: Carrier forced a disconnect during message delivery.

User Response: Check carrier parameters and modem initialization string.

ICA4081 Carrier *carrier* rejected message or Pager ID.

Explanation: Carrier rejected the pager message or pager id.

User Response: Check validity of pager id, activation of pager and carrier parameters.

ICA4082 Communications error during message delivery to carrier *carrier*.

Explanation: Communications errors could occur for a number of reasons.

User Response: Check carrier parameters using the user interface menu.

ICA4083 Failed to receive confirmation from carrier *carrier* after *maxTries* retries.

Explanation: This message occurs if the carrier is busy or cannot establish a connection.

User Response: Check carrier parameters using the user interface menu and try again after a few minutes.

ICA4084 Cannot transmit <EOT>.

Explanation: Modem cannot transmit <EOT>.

User Response: Check modem connections and initialization string.

ICA4085 Cannot receive response to <EOT>.

Explanation: Modem cannot receive response to <EOT>.

User Response: Check modem connections and initialization string.

ICA4086 Carrier *carrier* did not respond to <EOT>.

Explanation: Carrier cannot respond to transmitted data.

User Response: Check carrier validity and modem connections.

ICA4087 Carrier *carrier* responded with data unacceptable error because of contents.

Explanation: Carrier cannot respond to transmitted data.

User Response: Check carrier parameters using the user interface menu.

ICA4088 Cannot open defaults file *defaultPathname*.

Explanation: The modem defaults file may not exist or has incorrect permissions.

User Response: Check file for existence and permissions.

ICA4089 Incomplete defaults file *defaultPathname*.

Explanation: The modem defaults file has missing data.

User Response: Correct using the user interface menu.

ICA4090 Invalid outside line number in defaults file *defaultPathname* at line *lineNumber*.

Explanation: Carrier database file has an invalid outside line number.

User Response: Clean the carrier database file.

ICA4091 Invalid baud rate value in defaults file *defaultFile* at line *lineNumber*.

Explanation: Carrier database file has an invalid baud rate.

User Response: Clean the carrier database file.

ICA4092 Invalid data bit value in defaults file *defaultFile* at line *lineNumber*.

Explanation: Carrier database file has an invalid data bit value.

User Response: Clean the carrier database file.

ICA4093 Invalid parity value in defaults file *defaultFile* **at line** *lineNumber***.**

Explanation: Carrier database file has an invalid parity value.

User Response: Clean the carrier database file.

ICA4094 Invalid stop bit value in defaults file *defaultFile* **at line** *lineNumber***.**

Explanation: Carrier database file has an invalid stop bit value.

User Response: Clean the carrier database file.

ICA4095 Unrecognized tag *tag id* **in defaults file** *defaultFile* **on line** *lineNumber***.**

Explanation: Carrier database file has an invalid tag.

User Response: Clean the carrier database file.

ICA4096 Incorrect number of parameters.

Explanation: Informational message.

ICA4097 Error(*program***): Cannot create carrier list. Memory problems.**

Explanation: Possible system or memory problems.

ICA4098 Error(*program***): Errors in paging carrier file** *carrierFile***.**

Explanation: Carrier database file has some invalid data.

User Response: Check the carrier database file for invalid tags.

ICA4099 Error(*program***): Cannot get IPC token** *errno***.**
ICA4100 Error(*program***): Cannot create retry list. Possible memory problems.**

Explanation: Possible system error or memory problems.

ICA4101 Error(*carrier***): Cannot create queue, page_q_err:** *pageQErr***.**
ICA4102 Error(*program***): Cannot setup signal catch for SIGTERM/SIGINT:** *errno***.**

Explanation: Possible system error.

ICA4103 Error(*program***): Cannot set modem characteristics for carrier** *carrier***.**

Explanation: Could not set up the modem.

User Response: Check serial port configuration and initialization string.

ICA4104 Missing tag *tag* **for carrier** *carrier***.**

Explanation: Missing modem information. A tag could be baud rate, outside line, etc..

User Response: Check modem configuration file for invalid characters.

ICA4105 Carrier *carrier* **must have at least one phone number listed.**

Explanation: Carrier must contain the phone number.

User Response: Add the phone number using the user interface menu.

ICA4106 Cannot open file *CarrierFileName***.**

Explanation: Carrier database file must exist.

User Response: If not already present, create one using the user interface menu.

ICA4107 Line *lineNumber* too long.

Explanation: Line in carrier database file is too long.

User Response: Check carrier database file for invalid line.

ICA4108 Unknown tag at line *lineNumber*.

Explanation: Unknown tag exists in carrier database file.

User Response: Check carrier database file for invalid tag.

ICA4109 Invalid sequence at line *lineNumber*.

Explanation: Invalid sequence exists in carrier database file.

User Response: Check carrier database file for invalid sequence.

ICA4110 Carrier *carrier* is not valid and is being skipped.

Explanation: Carrier cannot be used for paging purposes.

User Response: Check validity of carrier.

ICA4111 Cannot add carrier to list.

Explanation: Carrier cannot be added to list.

User Response: Check carrier validity and phone numbers.

ICA4112 Carrier name is missing or too long on line *lineNumber*.

Explanation: Carrier name is missing.

User Response: Add carrier using the user interface menu.

ICA4113 Cannot allocate new paging carrier: *carrier*.

Explanation: Carrier cannot be allocated to list.

User Response: Check carrier validity and phone numbers.

ICA4114 Value on line *lineNumber* is too long.

Explanation: Encountered a line that is too long in carrier database file.

User Response: Cleanup the long line in carrier database file.

ICA4115 Duplicate tag *tag* on line *lineNumber* ignored.

Explanation: Encountered a duplicate tag.

User Response: Remove the duplicate tag from carrier database file.

ICA4116 Value on line *lineNumber* does not exist.

Explanation: Encountered a blank field.

User Response: Use the user interface to add a value in blank field.

ICA4117 Value must be either Y, Yes, N or No on line *lineNumber*.

Explanation: This field requires either a Y, Yes, N or No.

User Response: Use the user interface to add or change valid data.

ICA4118 Value must be greater than 0 on line *lineNumber***.**

Explanation: This field must be positive.

User Response: Change value using the user interface to a positive value.

ICA4119 Invalid value on line *lineNumber***.**

Explanation: Encountered an invalid value on specified line.

User Response: Change value using the user interface menu.

ICA4120 Carrier is not valid and is being skipped.

Explanation: Encountered an invalid carrier.

User Response: Add a valid carrier using the user interface menu.

ICA4121 Cannot add carrier to list.

Explanation: Cannot add carrier to the paging list.

User Response: Check carrier validity.

ICA4122 Duplicate tag *tag* **on line** *lineNumber* **ignored.**

Explanation: Encountered a duplicate tag in a carrier stanza.

User Response: Cleanup the carrier stanza containing duplicate values.

ICA4123 Error(*program***): Could not get IPC token:** *errNo*

Explanation: Program could not get IPC token.

ICA4124 Error(*program***): Error** *pageqErr* **while reading queue.**

Explanation: Program could not read queue.

ICA4125 *count* **Queue entries.**

Explanation: Informational message.

ICA4126 Message with ID *id* **deleted.**

Explanation: Informational message.

ICA4127 ID *id* **not in queue.**

Explanation: Informational message.

ICA4128 Error(*program***): Error** *pageqErr* **while attempting to delete ID** *id***.**

Explanation: Tried to delete an ID of the queue.

ICA4129 Key is: *entryKey* **content is** *@ ptr***:** *ptr***.**

Explanation: Informational message.

ICA4130 Modem Characteristics:

Explanation: Modem initialization information.

ICA4131 **Name:** *modemName*

Explanation: Modem initialization information.

ICA4132 **Init:** *initString*

Explanation: Modem initialization information.

ICA4133 **Command mode:** *command*

Explanation: Modem initialization information.

ICA4134 **Command terminator: 0x***terminator*

Explanation: Modem initialization information.

ICA4135 **Dial:** *dial*

Explanation: Modem initialization information.

ICA4136 **Dial pause:** *pause*

Explanation: Modem initialization information.

ICA4137 **Dial #:** *diallb*

Explanation: Modem initialization information.

ICA4138 **Dial *:** *dialstar*

Explanation: Modem initialization information.

ICA4139 **Hangup:** *hangup*

Explanation: Modem initialization information.

ICA4140 **Valid command response:** *validCommandresp*

Explanation: Modem initialization information.

ICA4141 **Valid connect:** *validConnect*

Explanation: Modem initialization information.

ICA4142 **Echo:** *echo*

Explanation: Modem initialization information.

ICA4143 **Modem debug record: PUTS(***id***) txd->** *outStr*

Explanation: Modem handshaking information.

ICA4144 **Modem debug record: PUTC(***id***) txd->** *outStr*

Explanation: Modem handshaking information.

ICA4145 **Modem debug record: GET rxd-> %1$s**

Explanation: Modem handshaking information.

ICA4146 Modem debug record: INPUT(%1$s

Explanation: Modem handshaking information.

ICA4147 Modem debug record:) rxd->

Explanation: Modem handshaking information.

ICA4148 Modem debug record: WAITFOR(%1$s

Explanation: Modem handshaking information.

ICA4149 Could not unblock child signal.

Explanation: Unblocks the SIGCHLD signal.

ICA4150 Could not block the child signal.

Explanation: Blocks the SIGCHLD signal.

ICA4151 Warm start file *filePathname* **does not exist.**

Explanation: Informational message.

ICA4152 Cannot open warm start file *filePathname*

Explanation: Informational message.

ICA4153 Line is too long in warm start file *filePathname***.**

Explanation: The warm start file contains some invalid characters.

ICA4154 Warm start file *filePathname* **has data that is not being used.**

Explanation: Informational message.

ICA4155 Warm start file *filePathname* **is empty.**

Explanation: Informational message.

ICA4156 Line *lineNumber* **of warm start file** *filePathname* **has bad addressee** *address***, ignored.**

Explanation: Warm start file has some invalid characters. Informational message.

ICA4157 Line *lineNumber* **of warm start file** *filePathname* **has bad format, ignored.**

Explanation: Warm start file has some invalid characters. Informational message.

ICA4158 Line *lineNumber* **of warm start file** *filePathname* **has no message, ignored.**

Explanation: Warm start file has no messages. Informational message.

ICA4159 Error queueing line *lineNumber* **of warm start file** *filePathname***, ignored.**

Explanation: Warm start file has some invalid characters. Informational message.

ICA4160 Warm start of *count* **messages from file** *filePathname* **complete.**

Explanation: Informational message.

ICA4161 Error(*program*): Too many consecutive child errors.

Explanation: Too many child errors in a row. This occurs if either the carrier or the modem definition file has some invalid characters.

User Response: Check carrier database file and modem definition file using the user interface menu.

ICA4162 Child cannot exec *program* **:** *errno***.**

Explanation: Possible system error.

ICA4163 Error(*errno*): Child cannot fork child : *program name***.**

Explanation: Possible system error.

ICA4164 Could not create paging carrier list.

Explanation: Internal program error.

ICA4165 Errors in paging carrier file *carrierFile*

Explanation: Carrier database contains some invalid data.

User Response: Check carrier database file using the user interface menu.

ICA4166 Informational message. IPC key is: 0x*IpcKey***.**

Explanation: Informational message.

ICA4167 Could not create queue, page_q_err: *pageQerr***.**

Explanation: Failed while trying to create queue.

ICA4168 Paging Warm Start file created at *time*

Explanation: Informational message.

ICA4169 priority -p *priority numPager* **from** *objfrom message*

Explanation: Informational message.

ICA4170 priority -p *priority alpaPager@carrier* **from** *from message*

Explanation: Informational message.

ICA4171 priority -p *priority* **-n** *numPager@carrier* **from** *from message*

Explanation: Informational message.

ICA4172 End of pager warm start file.

Explanation: Informational message. Denotes end of message.

ICA4173 Cannot write into warm start file *warmstrtFile***.**

Explanation: Warm start file may not exist.

ICA4174 *time* **STATUS-REQUEST from** *user@host*

Explanation: Displays the status request information.

ICA4175 *time* **SUMMARY-REQUEST from** *user@host***.**

Explanation: Displays the summary request information.

ICA4176 *count* **queue entries.**

Explanation: Counts the number of queue entries in pager queue.

ICA4177 **Oldest entry: ID** *id* **received at** *time***.**

Explanation: Displays the oldest entry in queue.

ICA4178 **Re-attaching memory after expansion failed.**

Explanation: Possible system error.

ICA4179 **Re-attaching memory after expansion failed to align.**

Explanation: Possible system error.

ICA4180 **Could not down PAGE_Q semaphore in page_q_print() :** *errno***.**

Explanation: Possible system error.

ICA4181 **Could not up PAGE_Q semaphore in page_q_print() :** *errno***.**

Explanation: Possible system error.

ICA4182 **link** *headLink* **->** **message ID:** *id***.**

Explanation: Informational message.

ICA4183 **Priority:** *priority***.**

Explanation: Informational message.

ICA4184 **Person:** *name***.**

Explanation: Informational message.

ICA4185 **Carrier:** *carrier***.**

Explanation: Informational message.

ICA4186 **Mesg:** *message***.**

Explanation: Informational message.

ICA4187 **Could not get shared RAM :** *errno***.**

Explanation: Possible system error.

ICA4188 **Could not get attached shared RAM :** *errno***.**

Explanation: Possible system error.

ICA4189 **Could not get PAGE_Q semaphore.**

Explanation: Possible system error.

ICA4190 Could not initialize PAGE_Q semaphore in page_q_create() : *errno***.**

Explanation: Possible system error.

ICA4191 Could not set PAGE_Q semaphore in page_q_create() : *errno***.**

Explanation: Possible system error.

ICA4192 Could not down PAGE_Q semaphore in page_q_empty() : *errno***.**

Explanation: Possible system error.

ICA4193 Could not up PAGE_Q semaphore in page_q_empty() : *errno***.**

Explanation: Possible system error.

ICA4194 Could not down PAGE_Q semaphore in page_q_enq(*name***,***message***) :** *errno***.**

Explanation: Possible system error.

ICA4195 Could not up PAGE_Q semaphore in page_q_enq() : *errno***.**

Explanation: Possible system error.

ICA4196 page_q_enq(): ID(*id***) Pri(***priority***) Person(***name***) Mesg(***message***.**

Explanation: Informational message.

ICA4197 Could not down PAGE_Q semaphore in page_q_head() : *errno***.**

Explanation: Possible system error.

ICA4198 Could not up PAGE_Q semaphore in page_q_head() : *errno***.**

Explanation: Possible system error.

ICA4199 Could not down PAGE_Q semaphore in page_q_first() : *errno***.**

Explanation: Possible system error.

ICA4200 Could not up PAGE_Q semaphore in page_q_first() : *errno***.**

Explanation: Possible system error.

ICA4201 Could not down PAGE_Q semaphore in page_q_next() : *errno***.**

Explanation: Possible system error.

ICA4202 Could not up PAGE_Q semaphore in page_q_next() : *errno***.**

Explanation: Possible system error.

ICA4203 Could not down PAGE_Q semaphore in page_q_tail() : *errno***.**

Explanation: Possible system error.

ICA4204 Could not up PAGE_Q semaphore in page_q_tail() : *errno***.**

Explanation: Possible system error.

ICA4205 Could not down PAGE_Q semaphore in page_q_del() : *errno***.**

Explanation: Possible system error.

ICA4206 Could not up PAGE_Q semaphore in page_q_del() : *errno***.**

Explanation: Possible system error.

ICA4207 page_q_del(*ID***).**

Explanation: Debug information.

ICA4208 Could not down PAGE_Q semaphore in page_q_deq() : *errno***.**

Explanation: Possible system error.

ICA4209 Could not up PAGE_Q semaphore in page_q_deq() : *errno***.**

Explanation: Possible system error.

ICA4210 page_q_del(): ID(*id***) Pri(***priority***) Person(***name***) Mesg(***message***).**

Explanation: Informational message.

ICA4211 Could not down PAGE_Q semaphore in page_q_walk() : *errno***.**

Explanation: Possible system error.

ICA4212 Could not up PAGE_Q semaphore in page_q_walk() : *errno***.**

Explanation: Possible system error.

ICA4213 PAGE_Q is full.

Explanation: The paging queue is full.

User Response: Send the page later.

ICA4300 Hanging up.

Explanation: Hanging up the call.

ICA4301 Initializing modem ..

Explanation: Initializing modem with the init string.

ICA4302 Dialing ......

Explanation: Dialing the phone number.

ICA4303 Waiting for connection.

Explanation: Waiting for the modem connection

ICA4304 CONNECTED *speed*

Explanation: Connecting at |speed| baud rate

ICA4305 CONNECTED!!!!!!!

Explanation: Connected to the pager service provider

ICA4306 Requesting prompt for Automatic Mode.

Explanation: Requesting prompt for automatic mode. Waiting for "ID="

ICA4307 Prompt OK.....

Explanation: Got "ID=" back from the provider.

ICA4308 Sending Automatic Mode Request.

Explanation: Sending ID and SST over to the pager service provider

ICA4309 Send Automatic Mode Request .....OK!

Explanation: Got [p back. Means communication successful

ICA4310 Sending out message

Explanation: Sending out message block over

ICA4311 Waiting for result

Explanation: Waiting for the confirmation

ICA4312 Ack received. Page successful
ICA4313 Nak received, Resend block. Attempt *NakTries*

Explanation: Nak received. Pager provider is asking for resend

ICA4314 Transaction error. Resend block. Attempt *RsTries*

Explanation: Transaction error. Resending the block over.

ICA4315 Carrier Terminate Connection.

Explanation: Pager provider terminated the conversation. Call provider for the problem.

ICA4350 fwpage [carrier="..."] [modem="..."] [ID="..."] [msg="..."]

Explanation: fwpage usage. Check your parameters and try again

ICA4351 %1$s file not exist

Explanation: Check the file to see if it is under the right directory. carriers.cfg, modems.cfg, and pager.cfg must be created before using this code.

ICA4352 *What* **file corrupted**

Explanation: File has been modified by user and not in the stanza format. All attributes should be entered through GUI.

ICA4353 *What* **too long, please shorten it and try again**

Explanation: |What| too long. Shorten it and try again.

ICA4354 *What* **is wrong.**

Explanation: If baud rate wrong, the valid options are: 600, 1200, If data bit per byte wrong, the valid options are: 7, 8 If stop bits wrong, the valid options are: 1,2 If out line prefix wrong, the inputs should only be numbers. If paging method wrong, only TAP is supported in this version. If pager ID error, check to see if its all numbers. If parity wrong, the valid options are: O(odd), E(even), N(none), S(space), M(mark). If COM port wrong, the valid options are: COM1, COM2 .... COM port should be less than 10 in this versin. If message character wrong, check the message to see if there is special character in it.

ICA4355 **Set Parameters in** *where* **error.**

Explanation: Unable to set parameters in |where|. Check parameters and try again.

ICA4356 **when** *When***, COM port reading error.**

Explanation: COM port reading error. Set modem echo on and try again

ICA4357 **when** *Where***, COM port writing error.**

Explanation: COM port write error.

ICA4358 **Set** *What* **error**

Explanation: Set |What| error. Check the log file and pin down the error.

ICA4359 **Max tries exceed in** *Where***. Abort program ......**
ICA4360 **Unknown character in Carrier phone number:** **pCarrierPhoneNum*

Explanation: an unrecognized character found in the carrier phone number. Please check the number and try again.

ICA4361 **Warning!!! Paging provider's modem normally should be less than 2400.**

Explanation: This is just a warning. Paging provider's modem speed is normally set less than 2400.

ICA4362 **Unable to initialize modem**

Explanation: Change modem initialization string and try again.

ICA4363 **Modem returned Error.**

Explanation: Modem communication error

ICA4364 *tries* **try on open Com port error. Retry in 1 minute**

Explanation: Open com port error. Probably another program is using it. Automatically retry in 1 minutes

ICA4365 **Send page failed on** *tries* **try. Retry in 1 minutes**

Explanation: Send page failed. Check log file to find out the exact reason.

ICA4366 **Message too long, truncated**

Explanation: Just a warning. Message length is too long. Truncate to fit in.

ICA4367 Reset Max message length to the internal defined value:%1$d

Explanation: Reset the max message length to the default ones, because user defined message length is larger the the internal defined, which is 80.

ICA4368 Action: ***Where*** **error**

Explanation: If opening COM port error, check configuration and try again. If close COM handle error, system problem. If purge COM error, system problem. If send dial command error, dialing command problem. Check to see if it is a Haye compatible modem If send ID request error, check if the pager provider supports TAP protocol. If send automatic prompt error, check if the pager service works correctly. If send message error, check the log file to pin down the cause of failure. If prompt error, unable to get a prompt back from the pager provider.

ICA4369 Too many transaction error. aborting ....

Explanation: Too many transaction errors, abort this try.

ICA4370 Too many Nak received, aborting the program .....

Explanation: Too many Nak received from the page provider, abort this try.

ICA4371 *szComPort* **on COM port with function** *FunctionName* **return** *Error Number*

Explanation: check the parameters and try again.

ICA4372 Modem return error message...... *ReturnMessag*

Explanation: Messages are. Not connected Ringing, but not connected No carrier No dial tone Busy No answer unknown code, please report it.

ICA5022 The sslrctd daemon process is successfully activated.

Explanation: The Windows 95 Secure Remote Client SSL Server has been successfully activated.

ICA5023 Cannot start the sslrctd daemon process

Explanation: The Windows 95 Secure Remote Client SSL Server has not been activated. This may have been caused by the Windows 95 Secure Remote Client SSL Server not being able to find the SSL keyring file. See Chapter 5, “Using the Make Key File Utility (MKKF)” on page 57 for more information.

ICA5028 Invalid Login Request.

Explanation: The Windows 95 Secure Remote Client SSL Server received an invalid Login request packet.

ICA5030 Unknown Remote Client ID: UserID

Explanation: The Windows 95 Secure Remote Client SSL Server Received an invalid UserID during the login sequence.

ICA5035 Invalid Logout Request

Explanation: The Windows 95 Secure Remote Client SSL Server received an invalid logout request packet.

ICA5060 Tunnel up for client UserID

Explanation: The Windows 95 Secure Remote Client SSL Server started a tunnel for UserID.

ICA5082 Tunnel to client UserID has been disconnected.

Explanation: The Windows 95 Secure Remote Client SSL Server stopped a tunnel for UserID.

ICA5087 Authentication failed for UserID

Explanation: The Windows 95 Secure Remote Client SSL Server received an invalid password for UserID.

ICA9000 IBM Firewall evaluation expires in *number of* **days.**

Explanation: This software is branded as an evaluation copy and will disable itself as indicated.

ICA9001 File System Integrity Checker Warning - *warning description text*

Explanation: fwfschk found a discrepancy in the system - potential security threat.

ICA9002 last message repeated *number* **times**

Explanation: Message generated by AIX syslogd when an identical message is logged without any intervening message. The message is kept here for Log Monitor to be able to detect the condition. This message must be in whatever language the real syslogd message is being written.

ICA9003 Authentication failed for user *name* **on the configuration server.**

Explanation: FW configuration server is unable to authenticate the indicated user.

User Response: See your FW administrator.

ICA9004 User *name* **successfully authenticated on the configuration server.**

Explanation: FW configuration server authenticated the indicated user.

ICA9005 Starting remote configuration server.

Explanation: Configuration server has been started.

ICA9006 Ending remote configuration server.

Explanation: Configuration server is ending.

ICA9007 Remote configuration server unable to open message catalog.

Explanation: One or more message catalogs used by the remote configuration server may be missing.

User Response: See your FW administrator.

ICA9008 Remote configuration server failed on getpeername(): error *errno***.**

Explanation: Configuration server is unable to obtain information about the client.

User Response: See your FW administrator.

ICA9009 Remote configuration server failed on getsockname(): error *errno*.

Explanation: Configuration server is unable to obtain information about itself.

User Response: See your FW administrator.

ICA9010 Remote configuration server failed obtaining adapter information.

Explanation: Configuration server is unable to obtain adapter information.

User Response: See your FW administrator.

ICA9011 Configuration server not enabled for remote configuration.

Explanation: Configuration server has local=yes set in its configuration file and the client is on a remote machine.

User Response: See your FW administrator.

ICA9012 Remote configuration server unable to read logon request.

Explanation: Configuration server cannot read in the client logon request.

User Response: See your FW administrator.

ICA9013 Remote configuration server received incorrect logon request.

Explanation: Logon request contained incorrect information.

User Response: See your FW administrator.

ICA9014 Remote configuration server unable to create pipe.

Explanation: Configuration server cannot create a pipe for authentication.

User Response: See your FW administrator.

ICA9015 Remote configuration server unable to create process.

Explanation: Configuration server cannot create a process for authentication.

User Response: See your FW administrator.

ICA9016 Starting EFM daemon.

Explanation: The EFM daemon has been started on the managed firewall.

ICA9017 Ending EFM daemon; rc = *value*.

Explanation: The EFM daemon is ending with the specified return code.

ICA9018 EFM daemon unable to open message catalog.

Explanation: One or more message catalogs used by the EFM daemon may be missing.

User Response: See your FW administrator.

ICA9020 Unable to switch the running user ID.

Explanation: failed to make the system call to switch the running user ID.

User Response: See your FW administrator.

ICA9021 This firewall does not support *logon* mode.

Explanation: This firewall does not support this particular mode.

User Response: See your FW administrator.

ICA9022 *user* is not authorized to logon to the firewall in *logon* mode.

Explanation: This username is not authorized to logon using this particular mode.

User Response: See your FW administrator.

ICA9023 Unable to load EFM DLL.

Explanation: failed to load the efm dll.

ICA9024 Transfer request started by *username* to firewall *machinename*.

Explanation: The transfer operation has started.

ICA9025 Transfer request ended with return code *returncode*.

Explanation: The transfer operation is complete.

ICA9026 Transfer request received from *user* on firewall *machinename* on *date/time*.

Explanation: The transfer operation started at the specified time.

ICA9027 File *filename* in function *function* added to transfer request.

Explanation: The specified file is to be transferred.

ICA9028 Activate request started by *user* to firewall *machinename*.

Explanation: The activate operation has started.

ICA9029 Activate request ended with return code *returncode*

Explanation: The activate operation is complete.

ICA9030 Activate request received from *user* on firewall *machinename* on *date/time*.

Explanation: The activate operation started at the specified time.

ICA9031 Activate of function *function* ended with return code *returncode*.

Explanation: Activation of the specified function is complete.

ICA9032 NAT configuration updated at *time* on *date*.

Explanation: NAT configuration has been updated.

ICA9033 NAT support (level *version*.*release*) initialized at *time* on *date*.

Explanation: Firewall NAT support has been initialized.

ICA9034 NAT support deactivated at *time* on *date*.

Explanation: NAT is disabled.

ICA9035 **NAT unable to allocate Registered Address for Secured Address** *Secured IP Address***.**

Explanation: Registered Address not translated.

ICA9036 **NAT released Registered Address** *Registered IP Address* **to address pool.**

Explanation: Registered Address is released to registered IP address pool.

Appendix B. Hardening for AIX System Configuration

Hardening is a process that maximizes security and efficiency by turning off unnecessary daemons and disabling unauthorized user IDs. Hardening is part of installation of the IBM Firewall software and edits the system resources that might compromise security.

The hardening process:

- Removes these daemons from /etc/rc.tcpip: lpd, routed, gated, portmap, timed, snmpd, rwhod, fs, sendmail, named and dpid2.
- Disables the AIX Common Desktop Environment.
- Removes all unnecessary programs from inittab. Everything is taken out of /etc/inittab EXCEPT init, brc, powerfail, rc, fbcheck, srcmstr, rctcpip, cron, cons, logsymp, diagd, acfgd, pmd and tty.
- Disables all logins for users except root, daemon, bin, adm, nobody, and any previous IBM Firewall users.
- Sets owners to root for all files and directories that have no owners, and sets permissions to zero.
- During the hardening process, root is converted to a firewall user with remote logins disabled. Also, any previous firewall users using a downlevel version are migrated to the new version.
- Disables nonsecure applications by setting permissions to zero. These nonsecure applications are: tftp, utftp, tftpd, uucpd, rcp, rlogin, rlogind, rsh, and rshd.
- Disables everything in /etc/inetd.conf EXCEPT: ftp, telnet, and ibmfwrcs (remote config server daemon).

When the hardening process is complete, the file system integrity checker database is generated.

Appendix C. SNMP Management Information Base (MIB)

This appendix gives detail of the Firewall MIB.

```
-- FW fwMib Definitions
--
IBMFW-fwMib DEFINITIONS ::= BEGIN

-- This component represents a system configured with IBM's
-- Internet Connection IBM Firewall (FW) product.
-- The groups defined are as follows:

-- the FW Syslog Trap group
-- the FW Server Status Trap group
-- the FW Component ID group
-- the FW Software Component Information group
-- the FW Subagent group
-- the FW Server Table group
-- the ftpd Proxy Server Group
-- the telnetd Proxy Server Group
-- the Mail Server Table Group
-- the Log File Management Table group
-- the FW Server Status Table group
-- the FW Server Concurrency Status Table group
-- the FW Configuration File Table group
-- the FW Filter Status group
-- the Network Configuration group
-- the Threshold Configuration Table group
-- the Active IP Tunnel Table group
-- the Network Address Translation Table


IMPORTS
     Counter, enterprises
             FROM RFC1155-SMI
     OBJECT-TYPE
             FROM RFC-1212
     DisplayString
             FROM RFC1213-fwMib
     TRAP-TYPE
             FROM RFC-1215;
--
-- The MIB was registered under the original name Secured Network Gateway
-- (SNG).
--

internet            OBJECT IDENTIFIER ::= { iso org(3) dod(6) 1 }
private             OBJECT IDENTIFIER ::= { internet 4}
enterprises         OBJECT IDENTIFIER ::= { private 1 }
ibm                 OBJECT IDENTIFIER ::= { enterprises 2 }
ibmProd             OBJECT IDENTIFIER ::= { ibm  6 }
ibmSNG              OBJECT IDENTIFIER ::= { ibmProd 129 }
fwMib                OBJECT IDENTIFIER ::= { ibmSNG 1 }
fwSubagent          OBJECT IDENTIFIER ::= { ibmSNG 2 }


-- FW Syslog Trap Group =======================================

    fwSyslogTrapGrp OBJECT IDENTIFIER ::= {fwMib 1}

    fwSyslogFacility OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..20))
        ACCESS            not-accessible
        STATUS            mandatory
        DESCRIPTION       "syslog facility that generated the record."
         --               The string can be one of the following:
         --                     "local1"
         --                     "local4"
        ::= {fwSyslogTrapGrp 1}

    fwSyslogLogFileName OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..255))
        ACCESS            not-accessible
        STATUS            mandatory
        DESCRIPTION       "File where the syslog record was entered."
        ::= {fwSyslogTrapGrp 2}

    fwSyslogDate OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..50))
        ACCESS            not-accessible
        STATUS            mandatory
        DESCRIPTION       "Date of the syslog record."
        ::= {fwSyslogTrapGrp 3}

    fwSyslogTime OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..20))
        ACCESS            not-accessible
        STATUS            mandatory
        DESCRIPTION       "Time of the syslog record."
        ::= {fwSyslogTrapGrp 4}

    fwSyslogHost OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..255))
        ACCESS            not-accessible
        STATUS            mandatory
        DESCRIPTION       "Host in the syslog record."
        ::= {fwSyslogTrapGrp 5}

    fwSyslogPid OBJECT-TYPE
        SYNTAX            INTEGER
        ACCESS            not-accessible
        STATUS            mandatory
        DESCRIPTION       "Process id in the syslog record."
        ::= {fwSyslogTrapGrp 6}

    fwSyslogMsgText OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..255))
        ACCESS            not-accessible
        STATUS            mandatory
        DESCRIPTION       "Message text in the syslog record."
        ::= {fwSyslogTrapGrp 7}


-- FW Server Status Trap Group =================================
    fwSvrStatTrapGrp OBJECT IDENTIFIER ::= {fwMib 2}

    fwSvrName OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..255))
        ACCESS            not-accessible
        STATUS            mandatory
        DESCRIPTION       "The server's name."
        ::= {fwSvrStatTrapGrp 1}

    fwSvrProgram OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..255))
        ACCESS            not-accessible
        STATUS            mandatory
        DESCRIPTION       "The server executable name"
        ::= {fwSvrStatTrapGrp 2}

    fwSvrState OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..50))
        ACCESS            not-accessible
        STATUS            mandatory
        DESCRIPTION       "The server's current running state."
         --               The string can be one of the following:
         --                     "running"
         --                     "not running"
        ::= {fwSvrStatTrapGrp 3}

    fwSvrStateValue OBJECT-TYPE
        SYNTAX            INTEGER
        {
            vUnknown      (0),
            vNotRunning   (1),
            vRunning      (2)
        }
        ACCESS            not-accessible
        STATUS            mandatory
        DESCRIPTION      "The server's current running state (integer form)."
        ::= {fwSvrStatTrapGrp 4}

   fwSvrTrapTimestamp OBJECT-TYPE
       SYNTAX            DisplayString (SIZE (0..30))
       ACCESS            not-accessible
       STATUS            mandatory
       DESCRIPTION       "Timestamp at which the server status trap generated."
       ::= {fwSvrStatTrapGrp 5}

    fwSvrTrapHost OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..255))
        ACCESS            not-accessible
        STATUS            mandatory
        DESCRIPTION       "Hostname from where the trap generated."
        ::= {fwSvrStatTrapGrp 6}


-- FW Component ID Group ======================================
   fwComponentIdGroup OBJECT IDENTIFIER ::= {fwMib 3}

   fwManufacturer OBJECT-TYPE
       SYNTAX            DisplayString (SIZE (0..32))
       ACCESS            read-only
       STATUS            mandatory
       DESCRIPTION       "The company that produced this component."
        --               The string is: "IBM Corporation".
       ::= {fwComponentIdGroup 1}
   fwProduct OBJECT-TYPE
       SYNTAX            DisplayString (SIZE (0..255))
       ACCESS            read-only
       STATUS            mandatory
       DESCRIPTION       "The name of this component or product."
        --               The string is: "IBM FW SNMP Subagent."
       ::= {fwComponentIdGroup 2}

   fwVersion OBJECT-TYPE
       SYNTAX            DisplayString (SIZE (0..16))
       ACCESS            read-only
       STATUS            mandatory
       DESCRIPTION       "The version string for this component."
       ::= {fwComponentIdGroup 3}

   fwVerify OBJECT-TYPE
       SYNTAX            INTEGER
    -- {
         -- vAnErrorOccurred;CheckStatusCode       (0),
         -- vThisComponentDoesNotExist             (1),
         -- vTheVerifyIsNotSupported               (2),
         -- vReserved                              (3),
         -- vComponent'sFunctionalityUntested      (4),
         -- vComponent'sFunctionalityUnknown       (5),
         -- vComponentIsNotFunctioningCorrectly    (6),
         -- vComponentFunctionsCorrectly           (7)
    -- }
       ACCESS            read-only
       STATUS            mandatory
       DESCRIPTION       "A code that provides a level of verification
                         that the component is still installed and
                         working.  This value is 2 for this release."
       ::= {fwComponentIdGroup 4}

   fwVerifyString OBJECT-TYPE
       SYNTAX            DisplayString (SIZE (0..32))
       ACCESS            read-only
       STATUS            mandatory
       DESCRIPTION       "A string that corresponds to the aVerify
                         value.  The string for this release will
                         be:  Verify is not supported."
       ::= {fwComponentIdGroup 5}

-- FW Software Component Information Group ========================
   fwSoftwareCompInfoGroup OBJECT IDENTIFIER ::= {fwMib 4}

   fwMajorVersion OBJECT-TYPE
       SYNTAX            DisplayString (SIZE (0..16))
       ACCESS            read-only
       STATUS            mandatory
       DESCRIPTION       "Major version of this fwSoftware component."
             ::= {fwSoftwareCompInfoGroup 1}

   fwMinorVersion OBJECT-TYPE
       SYNTAX            DisplayString (SIZE (0..16))
       ACCESS            read-only
       STATUS            mandatory
       DESCRIPTION       "Minor version of this fwSoftware component."
```

```
            ::= {fwSoftwareCompInfoGroup 2}

   fwRevision OBJECT-TYPE
       SYNTAX            DisplayString (SIZE (0..16))
       ACCESS            read-only
       STATUS            mandatory
       DESCRIPTION       "Revision of this fwSoftware component."
              ::= {fwSoftwareCompInfoGroup 3}

   fwTargetOperatingSystem OBJECT-TYPE
       SYNTAX            INTEGER
       ACCESS            read-only
       STATUS            mandatory
       DESCRIPTION       "The operating system for which this fwSoftware
                         component is intended."
              ::= {fwSoftwareCompInfoGroup 4}

   fwLanguageEdition OBJECT-TYPE
       SYNTAX            DisplayString (SIZE (0..16))
       ACCESS            read-only
       STATUS            mandatory
       DESCRIPTION       "The language edition of this fwSoftware
                         component.  This string will be : English."
       ::= {fwSoftwareCompInfoGroup 5}

   fwTargetOsString OBJECT-TYPE
       SYNTAX            DisplayString (SIZE (0..32))
       ACCESS            read-only
       STATUS            mandatory
       DESCRIPTION       "The operating system for which this fwSoftware
                         component is intended.  This is AIX for this release."
       ::= {fwSoftwareCompInfoGroup 6}

-- FW Subagent Group ==========================================
   fwSubagentGroup OBJECT IDENTIFIER ::= {fwMib 5}

   fwSubagtName OBJECT-TYPE
       SYNTAX            DisplayString (SIZE (0..32))
       ACCESS            read-only
       STATUS            mandatory
       DESCRIPTION       "The name of this subagent is IBM FW
                         Subagent.  The string is: IBM FW Subagent."
       ::= {fwSubagentGroup 1}

   fwSubagtUpTime OBJECT-TYPE
       SYNTAX            DisplayString (SIZE (0..26))
       ACCESS            read-only
       STATUS            mandatory
       DESCRIPTION       "The date and time the FW subagent was last
                         started."
       ::= {fwSubagentGroup 2}

   fwCritlogPoll OBJECT-TYPE
        SYNTAX            INTEGER
        ACCESS            read-write
        STATUS            mandatory
        DESCRIPTION       "Polling interval (in minutes) for critlog thread."
        ::= {fwSubagentGroup 3}
   fwCritlogTimestamp OBJECT-TYPE
       SYNTAX           DisplayString (SIZE (0..26))
       ACCESS           read-write
       STATUS           mandatory
       DESCRIPTION      "Beginning timestamp for monitoring critlog records."
       ::= {fwSubagentGroup 4}

   fwCritlogLocation OBJECT-TYPE
       SYNTAX           DisplayString (SIZE (0..255))
       ACCESS           read-write
       STATUS           mandatory
       DESCRIPTION      "Location of critlog file(s)."
       ::= {fwSubagentGroup 5}

   fwSvrStatPoll OBJECT-TYPE
        SYNTAX           INTEGER
        ACCESS           read-write
        STATUS           mandatory
        DESCRIPTION      "Polling interval (in minutes) for server status thread."
        ::= {fwSubagentGroup 6}

-- FW Server Table Group ========================================
-- FwSvrEntry has to start with an upper case otherwise mosy gives an error

    fwSvrTbl OBJECT-TYPE
        SYNTAX           SEQUENCE OF FwSvrEntry
        ACCESS           not-accessible
        STATUS           mandatory
        DESCRIPTION      "A list of entries for FW servers configured on this host."
        ::= {fwMib 6}

    aFwSvrEntry OBJECT-TYPE
        SYNTAX           FwSvrEntry
        ACCESS           not-accessible
        STATUS           mandatory
        DESCRIPTION      ""
        INDEX            {fwServerName}
        ::= {fwSvrTbl 1}

    FwSvrEntry ::= SEQUENCE
    {        fwServerName           DisplayString,
        fwServerSocketType      DisplayString,
        fwServerProtocol        DisplayString,
        fwServerWait            DisplayString,
        fwServerUser            DisplayString,
        fwServerProgram         DisplayString,
        fwServerArgs            DisplayString }

    fwServerName OBJECT-TYPE
        SYNTAX           DisplayString (SIZE (0..50))
        ACCESS           read-only
        STATUS           mandatory
        DESCRIPTION      "The name of the FW or inet server."
         --              The string can be one of the following:
         --                    "Unknown"
         --                    "FTPD Proxy"
         --                    "Telnetd Proxy"
         --                     "Http Proxy"
         --               ... or any service in the file /etc/services.
        ::= {aFwSvrEntry 1}

    fwServerSocketType OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..50))
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "The type of socket the server is using."
         --               The string can be one of the following:
         --                     "stream"
         --                     "dgram"
         --                     "sunrpc_udp"
         --                     "sunrpc_tcp"
        ::= {aFwSvrEntry 2}

    fwServerProtocol OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..50))
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "The communication protocol the server is using."
         --               The string can be one of the protocols found in the
         --               file /etc/protocols.
        ::= {aFwSvrEntry 3}

    fwServerWait OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..50))
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION      "The wait/no wait attribute of the server."
         --               The string can be one of the following:
         --                     "wait"
         --                     "nowait"
        ::= {aFwSvrEntry 4}

    fwServerUser OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..50))
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "The username inetd uses to start the server."
        ::= {aFwSvrEntry 5}

    fwServerProgram OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..255))
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "Full pathname of the server that inetd shuold execute."
        ::= {aFwSvrEntry 6}

    fwServerArgs OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..50))
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "Command line arguments used in starting the server."
        ::= {aFwSvrEntry 7}


-- ftpd Proxy Server Group =======================================
    fwFtpdSvrGrp OBJECT IDENTIFIER ::= {fwMib 7}

    fwFtpdSvrName OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..50))
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "The name of the FW server."
         --               The string is "pftpd"
        ::= {fwFtpdSvrGrp 1}

    fwFtpdSvrSocketType OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..50))
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "The type of socket the server is using."
         --               The string can be one of the following:
         --                     "stream"
         --                     "dgram"
         --                     "sunrpc_udp"
         --                     "sunrpc_tcp"
        ::= {fwFtpdSvrGrp 2}

    fwFtpdSvrProtocol OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..50))
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "The communication protocol the server is using."
         --               The string can be one of the protocols found in the
         --               file /etc/protocols.
        ::= {fwFtpdSvrGrp 3}

    fwFtpdSvrWait OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..50))
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "The wait/no wait attribute of the server."
         --               The string can be one of the following:
         --                     "wait"
         --                     "nowait"
        ::= {fwFtpdSvrGrp 4}

    fwFtpdSvrUser OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..50))
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "The user who invoked the server."
        ::= {fwFtpdSvrGrp 5}

    fwFtpdSvrProgram OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..255))
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "Full pathname of the server that inetd shuold execute."
        ::= {fwFtpdSvrGrp 6}

    fwFtpdSvrArgs OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..50))
        ACCESS            read-only
```

```
        STATUS            mandatory
        DESCRIPTION       "Command line arguments used in starting the server."
        ::= {fwFtpdSvrGrp 7}

-- telnetd Proxy Server Group =====================================
    fwTelnetdSvrGrp OBJECT IDENTIFIER ::= {fwMib 8}

    fwTelnetdSvrName OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..50))
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "The name of the FW server."
         --               The string is "ptelnetd"
        ::= {fwTelnetdSvrGrp 1}

    fwTelnetdSvrSocketType OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..50))
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "The type of socket the server is using."
         --               The string can be one of the following:
         --                     "stream"
         --                     "dgram"
         --                     "sunrpc_udp"
         --                     "sunrpc_tcp"
        ::= {fwTelnetdSvrGrp 2}

    fwTelnetdSvrProtocol OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..50))
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "The communication protocol the server is using."
         --               The string can be one of the protocols found in the
         --               file /etc/protocols.
        ::= {fwTelnetdSvrGrp 3}

    fwTelnetdSvrWait OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..50))
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "The wait/no wait attribute of the server."
         --               The string can be one of the following:
         --                     "wait"
         --                     "nowait"
        ::= {fwTelnetdSvrGrp 4}

    fwTelnetdSvrUser OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..50))
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "The user who invoked the server."
        ::= {fwTelnetdSvrGrp 5}

    fwTelnetdSvrProgram OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..255))
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "Full pathname of the server that inetd shuold execute."
```

```
            ::= {fwTelnetdSvrGrp 6}

        fwTelnetdSvrArgs OBJECT-TYPE
            SYNTAX            DisplayString (SIZE (0..50))
            ACCESS            read-only
            STATUS            mandatory
            DESCRIPTION       "Command line arguments used in starting the server."
            ::= {fwTelnetdSvrGrp 7}

    -- FW Mail Servers Group =======================================-
    -  FwMailSvrEntry has to start with an upper case otherwise mosy gives an error

        fwMailSvrTbl OBJECT-TYPE
            SYNTAX            SEQUENCE OF FwMailSvrEntry
            ACCESS            not-accessible
            STATUS            mandatory
            DESCRIPTION       "A list of entries for FW mail servers configured on this hos
            ::= {fwMib 9}

        aFwMailSvrEntry OBJECT-TYPE
            SYNTAX            FwMailSvrEntry
            ACCESS            not-accessible
            STATUS            mandatory
            DESCRIPTION       ""
            INDEX             {fwMailSecDomName}
            ::= {fwMailSvrTbl 1}

        FwMailSvrEntry ::= SEQUENCE
        {
            fwMailSecDomName            DisplayString,
            fwMailSecNKSvr              DisplayString,
            fwMailPubDomName            DisplayString
        }

        fwMailSecDomName OBJECT-TYPE
            SYNTAX            DisplayString (SIZE (0..255))
            ACCESS            read-only
            STATUS            mandatory
            DESCRIPTION       "The name of the FW Secure Domain Name."
             --               The first column in /etc/security/mail.conf
            ::= {aFwMailSvrEntry 1}

        fwMailSecNKSvr OBJECT-TYPE
            SYNTAX            DisplayString (SIZE (0..255))
            ACCESS            read-only
            STATUS            mandatory
            DESCRIPTION       "The name of the FW Secure Network Mail Server."
             --               The second column in /etc/security/mail.conf
            ::= {aFwMailSvrEntry 2}

        fwMailPubDomName OBJECT-TYPE
            SYNTAX            DisplayString (SIZE (0..255))
            ACCESS            read-only
            STATUS            mandatory
            DESCRIPTION       "The name of the FW Public Domain Name."
             --               The second column in /etc/security/mail.conf
            ::= {aFwMailSvrEntry 3}
```

```
-- Log File Management Table Group ===============================
    fwLogFileMgmtTbl OBJECT-TYPE
        SYNTAX          SEQUENCE OF FwLogFileMgmtEntry
        ACCESS          not-accessible
        STATUS          mandatory
        DESCRIPTION     "table of log files to be Managed"
        ::= {fwMib 10}

    aFwLogFileMgmtEntry OBJECT-TYPE
        SYNTAX            FwLogFileMgmtEntry
        ACCESS            not-accessible
        STATUS            mandatory
        DESCRIPTION       ""
        INDEX             {fwLogFileName}
        ::= {fwLogFileMgmtTbl 1}

    FwLogFileMgmtEntry ::= SEQUENCE
    {
        fwLogFileName         DisplayString,
        fwLogDaysInLog        INTEGER,
        fwLogArchive          DisplayString,
        fwLogDaysInArc        INTEGER,
        fwLogWorkSpace        DisplayString,
        fwLogComments         DisplayString
    }

    fwLogFileName OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..255))
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "Name of the log file to be Managed."
        ::= {aFwLogFileMgmtEntry 1}

    fwLogDaysInLog OBJECT-TYPE
        SYNTAX            INTEGER
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "Days to keep in logfile."
        ::= {aFwLogFileMgmtEntry 2}

    fwLogArchive OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..255))
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "Archive name."
        ::= {aFwLogFileMgmtEntry 3}

    fwLogDaysInArc OBJECT-TYPE
        SYNTAX            INTEGER
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "Days to keep in archive."
        ::= {aFwLogFileMgmtEntry 4}

     fwLogWorkSpace OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..255))
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "directory where log Management operations take place."
        ::= {aFwLogFileMgmtEntry 5}

     fwLogComments OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..255))
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "comments."
        ::= {aFwLogFileMgmtEntry 6}

-- FW Server Status Table Group ==================================
    fwSvrStatTbl OBJECT-TYPE
        SYNTAX          SEQUENCE OF FwSvrStatEntry
        ACCESS          not-accessible
        STATUS          mandatory
        DESCRIPTION     "A list of status entries for FW servers configured on this host
        ::= {fwMib 11}

    aFwSvrStatEntry OBJECT-TYPE
        SYNTAX            FwSvrStatEntry
        ACCESS            not-accessible
        STATUS            mandatory
        DESCRIPTION       ""
        INDEX             {fwSvrStatServerName}
        ::= {fwSvrStatTbl 1}

    FwSvrStatEntry ::= SEQUENCE
    {
        fwSvrStatServerName           DisplayString,
        fwSvrStatServerState          DisplayString
    }

    fwSvrStatServerName OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..50))
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "The name of the FW or inet server."
         --               The string can be one of the following:
         --                     "fwsubagt"
         --                     "inetd"
         --                     "fwpagerd"
         --                     "fwmaild"
         --                     "named"
        ::= {aFwSvrStatEntry 1}

    fwSvrStatServerState OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..50))
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "Is the server running?"
         --               The string can be one of the following:
         --                     "unknown"
         --                     "running"
         --                     "not running"
        ::= {aFwSvrStatEntry 2}

-- FW Server Concurrency Status Table Group ========================
    fwSvrConStatTbl OBJECT-TYPE
        SYNTAX          SEQUENCE OF FwSvrConStatEntry
        ACCESS          not-accessible
        STATUS          mandatory
        DESCRIPTION     ""
        ::= {fwMib 12}

    aFwSvrConStatEntry OBJECT-TYPE
        SYNTAX            FwSvrConStatEntry
        ACCESS            not-accessible
        STATUS            mandatory
        DESCRIPTION       ""
        INDEX             {fwSvrConStatServerName}
        ::= {fwSvrConStatTbl 1}

    FwSvrConStatEntry ::= SEQUENCE
    {
        fwSvrConStatServerName          DisplayString,
        fwSvrConStatSessions         INTEGER
    }

    fwSvrConStatServerName OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..50))
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "The name of the FW."
         --               The string can be one of the following:
         --                     "FTPD Proxy"
         --                     "Telnetd Proxy"
         --                     "SOCKS Server"
         --                     "Http Proxy"
        ::= {aFwSvrConStatEntry 1}

    fwSvrConStatServerSessions OBJECT-TYPE
        SYNTAX            INTEGER
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "Number of concurrent sessions."
        ::= {aFwSvrConStatEntry 2}


-- FW Configuration File Table Group ===============================
    fwCfgFileTbl OBJECT-TYPE
        SYNTAX          SEQUENCE OF FwCfgFileEntry
        ACCESS          not-accessible
        STATUS          mandatory
        DESCRIPTION     "Information about FW and FW-related configuration files."
        ::= {fwMib 13}


    aFwCfgFileEntry OBJECT-TYPE
        SYNTAX            FwCfgFileEntry
        ACCESS            not-accessible
        STATUS            mandatory
        DESCRIPTION       ""
        INDEX             {fwCfgFileName}
        ::= {fwCfgFileTbl 1}
```

```
FwCfgFileEntry ::= SEQUENCE
{
    fwCfgFileName         DisplayString,
    fwCfgUser             DisplayString,
    fwCfgGroup            DisplayString,
    fwCfgTimeStamp        DisplayString,
    fwCfgSize             INTEGER,
    fwCfgStatus           INTEGER,
    fwCheckSum            INTEGER
}

fwCfgFileName OBJECT-TYPE
    SYNTAX            DisplayString (SIZE (0..255))
    ACCESS            read-only
    STATUS            mandatory
    DESCRIPTION       "The monitored file."
    ::= {aFwCfgFileEntry 1}

fwCfgUser OBJECT-TYPE
    SYNTAX            DisplayString (SIZE (0..50))
    ACCESS            read-only
    STATUS            mandatory
    DESCRIPTION       "The user who owns the file."
    ::= {aFwCfgFileEntry 2}

fwCfgGroup OBJECT-TYPE
    SYNTAX            DisplayString (SIZE (0..50))
    ACCESS            read-only
    STATUS            mandatory
    DESCRIPTION       "The file's primary group."
    ::= {aFwCfgFileEntry 3}

fwCfgTimeStamp OBJECT-TYPE
    SYNTAX            DisplayString (SIZE (0..50))
    ACCESS            read-only
    STATUS            mandatory
    DESCRIPTION       "Current timestamp."
    ::= {aFwCfgFileEntry 4}

fwCfgSize OBJECT-TYPE
    SYNTAX            INTEGER
    ACCESS            read-only
    STATUS            mandatory
    DESCRIPTION       "File size in bytes."
    ::= {aFwCfgFileEntry 5}

fwCfgStatus OBJECT-TYPE
    SYNTAX            INTEGER
    {
        vUnknown       (0),
        vNotFound      (1),
        vFound         (2)
    }
    ACCESS            read-only
    STATUS            mandatory
    DESCRIPTION       "Is the file found?"
    ::= {aFwCfgFileEntry 6}
    fwCheckSum OBJECT-TYPE
        SYNTAX            INTEGER
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "checksum on the file"
        ::= {aFwCfgFileEntry 7}


-- FW Filter Status Group ========================================
    fwFilterStatGrp OBJECT IDENTIFIER ::= {fwMib 14}

    fwFilterNumIfs OBJECT-TYPE
        SYNTAX            INTEGER
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "Number of secure interfaces defined."
        ::= {fwFilterStatGrp 1}

    fwFilterNumRules OBJECT-TYPE
        SYNTAX            INTEGER
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "Number of rules in filter list."
        ::= {fwFilterStatGrp 2}

    fwFilterLevel OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..50))
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "Netinet filter support code level."
        ::= {fwFilterStatGrp 3}

-- XXX Can status be anything other than 'not available'?
    fwFilterStat OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..50))
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "Status of filter support code."
        ::= {fwFilterStatGrp 4}

-- XXX Can status be anything other than 'not available'?
    fwPktLogStat OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..50))
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "Status of packet logging."
        ::= {fwFilterStatGrp 5}

    fwFilterRulesTimeStamp OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..100))
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "Timestamp of last update to rules."
        ::= {fwFilterStatGrp 6}

    fwFilterNumRulesUpdates OBJECT-TYPE
        SYNTAX            INTEGER
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "Number of updates to rules since initialization."
        ::= {fwFilterStatGrp 7}


-- Network Configuration Group ==================================
    fwNetCfgGrp OBJECT IDENTIFIER ::= {fwMib 15}

    fwSecDomName OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..100))
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "Secure domain name."
        ::= {fwNetCfgGrp 1}

    fwNonSecDomSvrTbl OBJECT-TYPE
        SYNTAX          SEQUENCE OF FwNonsecDomSvrEntry
        ACCESS          not-accessible
        STATUS          mandatory
        DESCRIPTION     ""
        ::= {fwNetCfgGrp 2}

    aFwNonsecDomSvrEntry OBJECT-TYPE
        SYNTAX            FwNonsecDomSvrEntry
        ACCESS            not-accessible
        STATUS            mandatory
        DESCRIPTION       ""
        INDEX             {fwNonSecSvraddr}
        ::= {fwNonSecDomSvrTbl 1}

    FwNonsecDomSvrEntry ::= SEQUENCE
    {
        fwNonSecSvrAddr           DisplayString
    }

    fwNonSecSvrAddr OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..100))
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       ""
        ::= {aFwNonsecDomSvrEntry 1}

    fwSecDomSvrTbl OBJECT-TYPE
        SYNTAX          SEQUENCE OF FwSecDomSvrEntry
        ACCESS          not-accessible
        STATUS          mandatory
        DESCRIPTION     ""
        ::= {fwNetCfgGrp 3}

    aFwSecDomSvrEntry OBJECT-TYPE
        SYNTAX            FwSecDomSvrEntry
        ACCESS            not-accessible
        STATUS            mandatory
        DESCRIPTION       ""
        INDEX             {fwSecSvrAddr}
        ::= {fwSecDomSvrTbl 1}
    FwSecDomSvrEntry ::= SEQUENCE
    {
        fwSecSvrAddr           DisplayString
    }

    fwSecSvrAddr OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..100))
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       ""
        ::= {aFwSecDomSvrEntry 1}


-- Threshold Configuration Group ==================================
    fwThrCfgGrp OBJECT IDENTIFIER ::= {fwMib 16}

    fwMailToTbl OBJECT-TYPE
        SYNTAX          SEQUENCE OF FwMailToEntry
        ACCESS          not-accessible
        STATUS          mandatory
        DESCRIPTION     "Table of users to notify of threshold violations"
        ::= {fwThrCfgGrp 1}

    aFwMailToEntry OBJECT-TYPE
        SYNTAX            FwMsgThrEntry
        ACCESS            not-accessible
        STATUS            mandatory
        DESCRIPTION       ""
        INDEX             {fwMailToId}
        ::= {fwMailToTbl 1}

    FwMailToEntry ::= SEQUENCE
    {
        fwMailToId               DisplayString,
        fwMailToComments         DisplayString
    }

    fwMailToId OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..255))
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "mail address to send threshold violation notice to"
        ::= {aFwMailToEntry 1}

    fwMailToComments OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..255))
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "comments"
        ::= {aFwMailToEntry 2}

    fwCommand OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..255))
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "program executed when threshold is reached."
        ::= {fwThrCfgGrp 2}
```

```
fwCommandComments OBJECT-TYPE
    SYNTAX           DisplayString (SIZE (0..255))
    ACCESS           read-only
    STATUS           mandatory
    DESCRIPTION      "comments"
    ::= {fwThrCfgGrp 3}

fwSnglAuthThrCount OBJECT-TYPE
    SYNTAX           INTEGER
    ACCESS           read-only
    STATUS           mandatory
    DESCRIPTION      "number of failed authentication messages to be detected."
    ::= {fwThrCfgGrp 4}

fwSnglAuthThrTime OBJECT-TYPE
    SYNTAX           INTEGER
    ACCESS           read-only
    STATUS           mandatory
    DESCRIPTION      "Number of minutes to detect failed auth messages."
    ::= {fwThrCfgGrp 5}

fwSnglAuthPagerAlert OBJECT-TYPE
    SYNTAX           DisplayString (SIZE (0..20))
    ACCESS           read-only
    STATUS           mandatory
    DESCRIPTION      "Pager notification"
    ::= {fwThrCfgGrp 6}

fwSnglAuthThrComments OBJECT-TYPE
    SYNTAX           DisplayString (SIZE (0..255))
    ACCESS           read-only
    STATUS           mandatory
    DESCRIPTION      "comments"
    ::= {fwThrCfgGrp 7}

fwMultAuthThrCount OBJECT-TYPE
    SYNTAX           INTEGER
    ACCESS           read-only
    STATUS           mandatory
    DESCRIPTION      "number of failed authentication messages to be detected."
    ::= {fwThrCfgGrp 8}

fwMultAuthThrTime OBJECT-TYPE
    SYNTAX           INTEGER
    ACCESS           read-only
    STATUS           mandatory
    DESCRIPTION      "Number of minutes to detect failed auth messages."
    ::= {fwThrCfgGrp 9}

fwMultAuthPagerAlert OBJECT-TYPE
    SYNTAX           DisplayString (SIZE (0..20))
    ACCESS           read-only
    STATUS           mandatory
    DESCRIPTION      "Pager notification"
    ::= {fwThrCfgGrp 10}

fwMultAuthThrComments OBJECT-TYPE
    SYNTAX           DisplayString (SIZE (0..255))
    ACCESS            read-only
    STATUS            mandatory
    DESCRIPTION       "comments"
    ::= {fwThrCfgGrp 11}


fwHostAuthThrCount OBJECT-TYPE
    SYNTAX            INTEGER
    ACCESS            read-only
    STATUS            mandatory
    DESCRIPTION       "number of failed authentication messages to be detected."
    ::= {fwThrCfgGrp 12}

fwHostAuthThrTime OBJECT-TYPE
    SYNTAX            INTEGER
    ACCESS            read-only
    STATUS            mandatory
    DESCRIPTION       "Number of minutes to detect failed auth messages."
    ::= {fwThrCfgGrp 13}

fwHostAuthPagerAlert OBJECT-TYPE
    SYNTAX            DisplayString (SIZE (0..20))
    ACCESS            read-only
    STATUS            mandatory
    DESCRIPTION       "Pager notification"
    ::= {fwThrCfgGrp 14}

fwHostAuthThrComments OBJECT-TYPE
    SYNTAX            DisplayString (SIZE (0..255))
    ACCESS            read-only
    STATUS            mandatory
    DESCRIPTION       "comments"
    ::= {fwThrCfgGrp 15}

fwMsgThrTbl OBJECT-TYPE
    SYNTAX          SEQUENCE OF FwMsgThrEntry
    ACCESS          not-accessible
    STATUS          mandatory
    DESCRIPTION     "Table of message threshold definition entries"
    ::= {fwThrCfgGrp 16}

aFwMsgThrEntry OBJECT-TYPE
    SYNTAX            FwMsgThrEntry
    ACCESS            not-accessible
    STATUS            mandatory
    DESCRIPTION       ""
    INDEX             {fwMsgThrTag}
    ::= {fwMsgThrTbl 1}

FwMsgThrEntry ::= SEQUENCE
{
    fwMsgThrTag           DisplayString,
    fwMsgThrCount         INTEGER,
    fwMsgThrTime          INTEGER,
    fwMsgThrPagerAlert    DisplayString,
    fwMsgThrComments      DisplayString
}
```

```
    fwMsgThrTag OBJECT-TYPE
        SYNTAX           DisplayString (SIZE (0..20))
        ACCESS           read-only
        STATUS           mandatory
        DESCRIPTION      ""
        ::= {aFwMsgThrEntry 1}

    fwMsgThrCount OBJECT-TYPE
        SYNTAX           INTEGER
        ACCESS           read-only
        STATUS           mandatory
        DESCRIPTION      "number of failed authentication messages to be detected."
        ::= {aFwMsgThrEntry 2}

    fwMsgThrTime OBJECT-TYPE
        SYNTAX           INTEGER
        ACCESS           read-only
        STATUS           mandatory
        DESCRIPTION      "Number of minutes to detect failed auth messages."
        ::= {aFwMsgThrEntry 3}


     fwMsgThrPagerAlert OBJECT-TYPE
        SYNTAX           DisplayString (SIZE (0..20))
        ACCESS           read-only
        STATUS           mandatory
        DESCRIPTION      "Pager notification."
        ::= {aFwMsgThrEntry 4}


    fwMsgThrComments OBJECT-TYPE
        SYNTAX           DisplayString (SIZE (0..255))
        ACCESS           read-only
        STATUS           mandatory
        DESCRIPTION      ""
        ::= {aFwMsgThrEntry 5}


-- FW Active IP Tunnel Table Group ===============================
   fwActiveTunnelGrp OBJECT IDENTIFIER ::= {fwMib 17}

    fwIbmTunnelTbl OBJECT-TYPE
        SYNTAX         SEQUENCE OF FwIbmTunnelEntry
        ACCESS         not-accessible
        STATUS         mandatory
        DESCRIPTION    "List of all IBM Tunnels "
        ::= {fwActiveTunnelGrp 1}

    aFwIbmTunnelEntry OBJECT-TYPE
        SYNTAX         FwIbmTunnelEntry
        ACCESS         not-accessible
        STATUS         mandatory
        DESCRIPTION    "A list of all IBM Tunnels."
        INDEX          {fwIbmTunnelId}
        ::= {fwIbmTunnelTbl 1}

    FwIbmTunnelEntry ::= SEQUENCE
    {
```

```
    fwIbmTunnelId      INTEGER,
    fwIbmSrcAddr       DisplayString,
    fwIbmDestAddr      DisplayString,
    fwIbmEncrption    DisplayString,
    fwIbmPolicy        DisplayString,
    fwIbmSessionLife   INTEGER,
    fwIbmInitFlag      DisplayString
}

fwIbmTunnelId OBJECT-TYPE
    SYNTAX            INTEGER
    ACCESS            read-only
    STATUS            mandatory
    DESCRIPTION       "The Identification number of the IBM Tunnel."
    ::= {aFwIbmTunnelEntry 1}

fwIbmSrcAddr OBJECT-TYPE
    SYNTAX            DisplayString (SIZE (0..100))
    ACCESS            read-only
    STATUS            mandatory
    DESCRIPTION       "The IP address of the local firewall."
    ::= {aFwIbmTunnelEntry 2}

fwIbmDestAddr OBJECT-TYPE
    SYNTAX            DisplayString (SIZE (0..100))
    ACCESS            read-only
    STATUS            mandatory
    DESCRIPTION       "The IP address of the partner firewall."
    ::= {aFwIbmTunnelEntry 3}

fwIbmEncryption OBJECT-TYPE
    SYNTAX            DisplayString (SIZE (0..20))
    ACCESS            read-only
    STATUS            mandatory
    DESCRIPTION       "Algorithm used for IP Packet encryption ."
    --                possible values are DES_CBC_8, CDMF, DES_CBC_4
    ::= {aFwIbmTunnelEntry 4}

fwIbmPolicy OBJECT-TYPE
    SYNTAX            DisplayString (SIZE (0..20))
    ACCESS            read-only
    STATUS            mandatory
    DESCRIPTION       "combination of encryption and authentication values."
    --                Possible values are encr/auth, auth/encr, encr only, auth only,
    ::= {aFwIbmTunnelEntry 5}

fwIbmSessionLife OBJECT-TYPE
    SYNTAX            INTEGER
    ACCESS            read-only
    STATUS            mandatory
    DESCRIPTION       "Time in minutes current session can be used."
    --                Max time is 1440.
    ::= {aFwIbmTunnelEntry 6}


fwIbmInitFlag OBJECT-TYPE
    SYNTAX            DisplayString (SIZE (0..20))
    ACCESS            read-only
    STATUS            mandatory
    DESCRIPTION       "Identifies which partner starts the session negotiation."
    --                Possible values are yes, no
    ::= {aFwIbmTunnelEntry 7}


fwManTunnelTbl OBJECT-TYPE
    SYNTAX          SEQUENCE OF FwManTunnelEntry
    ACCESS          not-accessible
    STATUS          mandatory
    DESCRIPTION     ""
    ::= {fwActiveTunnelGrp 2}

aFwManTunnelEntry OBJECT-TYPE
    SYNTAX          FwManTunnelEntry
    ACCESS          not-accessible
    STATUS          mandatory
    DESCRIPTION     "A list of all MAN Tunnels."
    INDEX           {fwManTunnelId}
    ::= {fwManTunnelTbl 1}

FwManTunnelEntry ::= SEQUENCE
{
    fwManTunnelId      INTEGER,
    fwManSrcAddr       DisplayString,
    fwManDestAddr      DisplayString,
    fwManEncryption    DisplayString,
    fwManPolicy        DisplayString,
    fwManSessionLife   INTEGER,
    fwManTargetSPI     INTEGER
}

fwManTunnelId OBJECT-TYPE
    SYNTAX            INTEGER
    ACCESS            read-only
    STATUS            mandatory
    DESCRIPTION       "The Identification number of the Man Tunnel."
    ::= {aFwManTunnelEntry 1}

fwManSrcAddr OBJECT-TYPE
    SYNTAX            DisplayString (SIZE (0..100))
    ACCESS            read-only
    STATUS            mandatory
    DESCRIPTION       "The IP address of the local firewall."
    ::= {aFwManTunnelEntry 2}

fwManDestAddr OBJECT-TYPE
    SYNTAX            DisplayString (SIZE (0..100))
    ACCESS            read-only
    STATUS            mandatory
    DESCRIPTION       "The IP address of the partner firewall."
    ::= {aFwManTunnelEntry 3}

fwManEncryption OBJECT-TYPE
    SYNTAX            DisplayString (SIZE (0..20))
    ACCESS            read-only
    STATUS            mandatory
    DESCRIPTION       "Algorithm used for IP Packet encryption ."
```

```
        --                possible values are DES_CBC_8, CDMF, DES_CBC_4
        ::= {aFwManTunnelEntry 4}

    fwManPolicy OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..20))
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "combination of encryption and authentication values."
        --                Possible values are encr/auth, auth/encr, encr only, auth only,
        ::= {aFwManTunnelEntry 5}

    fwManSessionLife OBJECT-TYPE
        SYNTAX            INTEGER
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "Time in minutes manual tunnel will be operational."
        --                Max time is 44640.
        ::= {aFwManTunnelEntry 6}


    fwManTargetSpi OBJECT-TYPE
        SYNTAX            INTEGER
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "Target Security Parameter Index for manual tunnel."
        --                Valid values are 1- 9999
        ::= {aFwManTunnelEntry 7}


-- FW Network Address Translation Group ===========================
    fwNatAddrTransGrp OBJECT IDENTIFIER ::= {fwMib 18}

    fwNatReservedTbl OBJECT-TYPE
        SYNTAX          SEQUENCE OF FwResvRegisterEntry
        ACCESS          not-accessible
        STATUS          mandatory
        DESCRIPTION     ""
        ::= {fwNatAddrTransGrp 1}

    aFwResvRegisterEntry OBJECT-TYPE
        SYNTAX            FwResvRegisterEntry
        ACCESS            not-accessible
        STATUS            mandatory
        DESCRIPTION       ""
        INDEX             {fwRegisteredIpAddr}
        ::= {fwNatReservedTbl 1}

    FwResvRegisterEntry ::= SEQUENCE
    {
        fwRegisteredIpAddr      DisplayString,
        fwRegisteredIpAddrMask  DisplayString,
        fwNatTimeout            INTEGER
    }

    fwRegisteredIpAddr OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..100))
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "Defines the IP addresses for outbound connections"
        ::= {aFwResvRegisterEntry 1}


     fwRegisteredIpMask OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..100))
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "The mask specifies the bits in the registered IP addr used to
        ::= {aFwResvRegisterEntry 2}


     fwNatTimeout OBJECT-TYPE
        SYNTAX            INTEGER
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "minutes an address translation can remain idle."
        ::= {aFwResvRegisterEntry 3}


    fwNatTranslateTbl OBJECT-TYPE
        SYNTAX          SEQUENCE OF FwNatTranslateEntry
        ACCESS          not-accessible
        STATUS          mandatory
        DESCRIPTION     ""
        ::= {fwNatAddrTransGrp 2}

    aFwNatTranslateEntry OBJECT-TYPE
        SYNTAX            FwNatTranslateEntry
        ACCESS            not-accessible
        STATUS            mandatory
        DESCRIPTION       ""
        INDEX             {fwTranslateSecIpAddr}
        ::= {fwNatTranslateTbl 1}

    FwNatTranslateEntry ::= SEQUENCE
    {
         fwTranslateSecIpAddr     DisplayString,
         fwTranslateSecIpAddrMask DisplayString
    }

    fwTranslateSecIpAddr OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..100))
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "Defines the IP addresses to be excluded from NAT"
        ::= {aFwNatTranslateEntry 1}


     fwTranslateSecIpAddrMask OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..100))
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "The mask specifies the bits in the secured IP addr used to i
        ::= {aFwNatTranslateEntry 2}


    fwNatExcludeTbl OBJECT-TYPE
```

```
    SYNTAX          SEQUENCE OF FwNatExcludeEntry
    ACCESS          not-accessible
    STATUS          mandatory
    DESCRIPTION     ""
    ::= {fwNatAddrTransGrp 3}

aFwNatExcludeEntry OBJECT-TYPE
    SYNTAX            FwNatExcludeEntry
    ACCESS            not-accessible
    STATUS            mandatory
    DESCRIPTION       ""
    INDEX             {fwExcludeSecIpAddr}
    ::= {fwNatExcludeTbl 1}

FwNatExcludeEntry ::= SEQUENCE
{
     fwExcludeSecIpAddr     DisplayString,
     fwExcludeSecIpAddrMask DisplayString
}

fwExcludeSecIpAddr OBJECT-TYPE
    SYNTAX            DisplayString (SIZE (0..100))
    ACCESS            read-only
    STATUS            mandatory
    DESCRIPTION       "Defines the IP addresses to be excluded from NAT"
    ::= {aFwNatExcludeEntry 1}


 fwExcludeSecIpAddrMask OBJECT-TYPE
    SYNTAX            DisplayString (SIZE (0..100))
    ACCESS            read-only
    STATUS            mandatory
    DESCRIPTION       "The mask specifies the bits in the secured IP addr used to iden
    ::= {aFwNatExcludeEntry 2}


fwNatMapTbl OBJECT-TYPE
    SYNTAX          SEQUENCE OF FwNatMapEntry
    ACCESS          not-accessible
    STATUS          mandatory
    DESCRIPTION     ""
    ::= {fwNatAddrTransGrp 4}

aFwNatMapEntry OBJECT-TYPE
    SYNTAX            FwNatMapEntry
    ACCESS            not-accessible
    STATUS            mandatory
    DESCRIPTION       ""
    INDEX             {fwMapSecIpAddr}
    ::= {fwNatMapTbl 1}

FwNatMapEntry ::= SEQUENCE
{
     fwMapSecIpAddr     DisplayString,
     fwMapRegisteredIpAddr DisplayString
}

fwMapSecIpAddr OBJECT-TYPE
```

```
        SYNTAX            DisplayString (SIZE (0..100))
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "IP address to be translated into a specified registered IP a
        ::= {aFwNatMapEntry 1}


     fwMapRegisteredIpAddr OBJECT-TYPE
        SYNTAX            DisplayString (SIZE (0..100))
        ACCESS            read-only
        STATUS            mandatory
        DESCRIPTION       "IP address into which a specified secured IP address should
        ::= {aFwNatMapEntry 2}

    fwNatStatus OBJECT-TYPE
        SYNTAX          DisplayString (SIZE (0..20))
        ACCESS          read-only
        STATUS          mandatory
        DESCRIPTION     "The status of Network Address Translation"
        --              The possible values are active, deactive.
        ::= {fwNatAddrTransGrp 5}


    fwNatLogStatus OBJECT-TYPE
        SYNTAX          DisplayString (SIZE (0..20))
        ACCESS          read-only
        STATUS          mandatory
        DESCRIPTION     "Logging status of Network Address Translation"
        --              The possible values are enabled, disabled
        ::= {fwNatAddrTransGrp 6}



END
```

Appendix D. ESP Specification for CDMF

This appendix describes the CDMF security transform for the IP Encapsulating Security Payload (ESP). See RFC1829 EPS DES_CBC for more details.

Keys

The secret CDMF key shared between the communicating parties is eight octets in length. This key is a 64-bit quantity used by the CDMF algorithm. The CDMF algorithm first runs a key-shortening algorithm to reduce the 64-bit value (56-bit key) to a 40-bit key. The 40-bit key is stored as 64 bits (eight octets). This 40-bit key is then used for encryption and decryption.

Initialization Vector

CDMF requires an Initialization Vector (IV) that is eight octets in length.

Each datagram contains its own IV. Including the IV in each datagram ensures that decryption of each received datagram can be performed, even when other datagrams are dropped, or datagrams are reordered in transit.

The method for selection of IV values is implementation dependent.

Data Size

The CDMF algorithm operates on blocks of eight octets. The CDMF algorithm is essentially the same as running DES_CBC with a weakened key (40 bits versus 56 bits). This often requires padding after the end of the unencrypted payload data.

Both input and output result in the same number of octets, which facilitates in-place encryption and decryption.

On receipt, if the length of the data to be decrypted is not an integral multiple of eight octets, then an error is indicated, as described in RFC-1825.

Payload Format

Figure 6 on page 158 shows the payload format.

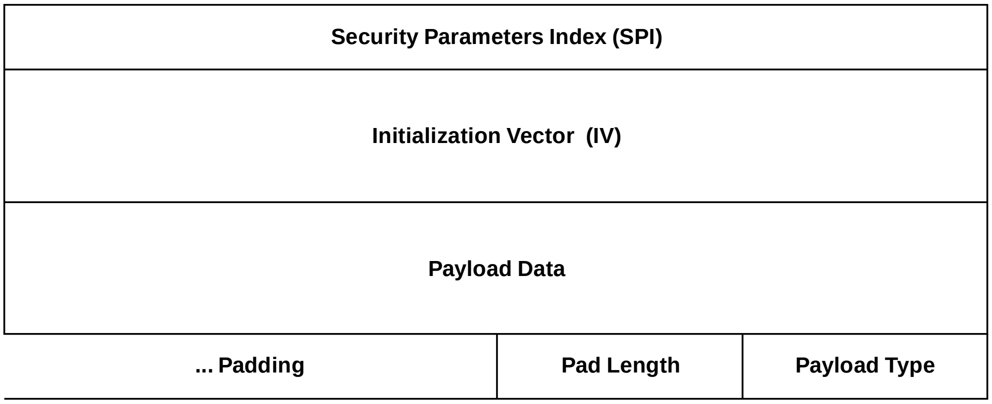


Figure 6. Payload Format

Value — **Description**

Security Parameters Index (SPI)
A 32-bit value identifying the Security Parameters for this datagram. The value must not be zero.

Initialization Vector (IV)
The size MUST be 64-bits. Octets are sent in network order with the most significant octet first (See RFC-1700.) It is the intent that the value not repeat during the lifetime of the encryption session key. Even when a full 64-bit IV is used, the session key should be changed at least as frequently as 2**32 datagrams.

Payload Data
The size of this field is variable. Prior to encryption and after decryption, this field begins with the IP Protocol/Payload header specified in the Payload Type field. Note that in the case of IP-in-IP encapsulation (Payload Type 4), this will be another IP header.

Padding
The size of this field is variable. Prior to encryption, it is filled with unspecified implementation-dependent (preferably random) values, to align the Pad Length and Payload Type fields at an eight octet boundary. After decryption, it must be ignored.

Pad Length
This field indicates the size of the Padding field. It does not include the Pad Length and Payload Type fields. The value typically ranges from 0 to 7, but may be up to 255 to permit hiding of the actual data length. This field is opaque. That is, the value is set prior to encryption and is examined only after decryption.

Payload Type
This field indicates the contents of the Payload Data field, using the IP Protocol/Payload value. Up-to-date values of the IP Protocol/Payload are specified in the most recent "Assigned Numbers" (See RFC-1700.) This field is opaque. That is, the value is set prior to encryption, and is examined only after decryption. For example, when encrypting an entire IP datagram (Tunnel- Mode), this field will contain the value 4, which indicates IP-in-IP encapsulation.

Algorithm

In CDMF, the base CDMF encryption function is applied to the XOR of each plaintext block with the previous ciphertext block to yield the ciphertext for the current block. This provides for re-synchronization when datagrams are lost.

Encryption

Append zero or more octets of (preferably random) padding to the plaintext, to make its modulo 8 length equal to 6. For example, if the plaintext length is 41, 5 octets of padding are added.

Append a Pad Length octet containing the number of padding octets just added.

Append a Payload Type octet containing the IP Protocol/Payload value which identifies the protocol header that begins the payload.

Provide an Initialization Vector (IV) of the size indicated by the SPI.

Encrypt the payload with CDMF, producing a ciphertext of the same length.

Octets are mapped to CDMF blocks in network order with the most significant octet first. (See RFC-1700.) Octet 0 (modulo 8) of the payload corresponds to bits 1-8 of the 64-bit CDMF input block, while octet 7 (modulo 8) corresponds to bits 57-64 of the CDMF input block.

Construct an appropriate IP datagram for the target destination, with the indicated SPI, IV, and payload.

The Total/Payload Length in the encapsulating IP header reflects the length of the encrypted data, plus the SPI, IV, padding, Pad Length, and Payload Type octets.

Decryption

First, the SPI field is removed and examined. This is used as an index into the local Security Parameter table to find the negotiated parameters and decryption key.

The encrypted part of the payload is decrypted using CDMF.

The Payload Type is removed and examined. If it is unrecognized, the payload is discarded with an appropriate ICMP message.

The Pad Length is removed and examined. The specified number of pad octets are removed from the end of the decrypted payload, and the IP Total/Payload Length is adjusted accordingly.

The IP Header(s) and the remaining portion of the decrypted payload are passed to the protocol receive routine specified by the Payload Type field.

Security Considerations

Users need to understand that the quality of the security provided by this specification depends completely on the strength of the CDMF algorithm, the correctness of that algorithm's implementation, the security of the key management mechanism and its implementation, the strength of the key and upon the correctness of the implementations in all of the participating nodes.

Among other considerations, applications may wish to take care not to select weak keys, although the odds of picking one at random are low.

The cut and paste attack exploits the nature of all Cipher Block Chaining algorithms. When a block is damaged in transmission, on decryption both it and the following block will be garbled by the decryption process, but all subsequent blocks will be decrypted correctly. If an attacker has legitimate access to the same key, this feature can be used to insert or replay previously encrypted data of other users of the same engine, revealing the plaintext. The usual (ICMP, TCP, UDP) transport checksum can detect this attack, but on its own is not considered cryptographically strong. In this situation, user or connection oriented integrity checking is needed. (See RFC-1826.)

Appendix E. Obtaining Requests for Comments (RFCs)

Requests for comments (RFCs) are documents that present new protocols and establish standards for the Internet protocol suite. Hardcopies of all RFCs are available from the Network Information Center (NIC), either individually or on a subscription basis. You can obtain these documents from:

Government Systems, Inc.
Attn: Network Information Center
14200 Park Meadow Drive
Suite 200
Chantilly, VA 22021

You can access RFCs from this URL:

http//www.cis.ohio-state.edu/hypertext/information/rfc.html.

Online copies are available from the NIC using FTP to connect to `ds.internic.net`. You can transfer the files using the following format:

```
RFC:RFCnnnn.TXT
RFC:RFCnnnn.PS
```

Where:

nnnn	Is the RFC number
`TXT`	Is the text format
`PS`	Is the PostScript format

The format for the RFC index is:

```
RFC:RFC-INDEX.TXT
```

Note: Many RFCs are only available in text format. Before requesting a PostScript file, first check the RFC Index to make sure the RFC is available in that format. You can also request online copies of the RFCs through the electronic mail, from the automated NIC mail server, by sending a message to `mailserv@ds.internic.net`. You must include one of the following commands in body of your note:

```
    SEND RFCnnnn.TXT
or
    SEND RFCnnnn.PS
```

Where:

nnnn	Is the RFC number
`TXT`	Is the text format
`PS`	Is the PostScript format

For example, to request the text format of RFC 812, you would specify in the body of your note:

```
SEND RFC812.TXT
```

To request an online copy of the RFC index, include the following command in the body of your note:

```
SEND RFC-INDEX.TXT
```

Appendix F. Creating a Socks Configuration File for AIX

This chapter shows you what a AIX socks client file should look like.

The socks configuration file (`/etc/socks.conf`) for AIX systems is used by the socks client programs to permit or deny access through the firewall using the socks server, or to redirect a client request to a standard (non-socks) server.

Some socks client programs use this file to determine whether to use a direct or a socks server connection to a given destination host, and to exert access control based on the destination host, the requested service (port number on the destination host), and the effective user ID of the requesting local user.

Web browsers generally have their own socks configuration methods.

Every time a socks client has to make a network connection,the client checks the pending request against the file `/etc/socks.conf`, one line at a time. When the client finds a line with conditions that are matched by the request, the action specified on that line is taken. The remaining lines of file `/etc/socks.conf` are skipped. So the order of the lines in the file is extremely important; switch two lines and you might have entirely different results. If no matching line is found throughout the file, the request is denied.

Although there is an implied "deny all" at the end of the control file, you can supply an explicit "deny all" rule, for example:

```
deny 0.0.0.0 0.0.0.0.0 : /usr/bin/mail -s 'SOCKS: rejected %S from %u to %Z' root
```

Connection to address 127.0.0.1 (localhost) and 0.0.0.0 (broadcast) is always done directly, so there is no need to specify those in `/etc/socks.conf`.

Notes:

1. Each line in the file can be up to 1023 characters long.
2. Spaces and tabs separate the fields.
3. Comment lines start with the character #.

The parameter options for the socks file are:

deny
Tells the socks clients when to reject a request.

direct
Tells the socks clients when to use a direct connection.

sockd
Tells the socks clients when to use a socks server connection and, optionally, which socks server it should try.

@=serverlist
Can be used only in a sockd rule. It names one or more socks servers that the socks client should try to use (in the indicated order). Only commas can be used as separators, no spaces or tabs are allowed in the list. Domain names of the servers can be used in the list, though it is probably more prudent to specify IP addresses. If this field is omitted, the client program will use the

default socks server, which is determined by the environment variable SOCKS_SERVER if it exists. If that is not set, the client will try to use the name compiled into the socks client itself.

***=userlist**

Consists of one or more user IDs or file names, separated by commas. (No spaces or tabs are allowed in the list.)

- The user IDs should be IDs of users on the local host, not those on the destination host or the socks server host.
- The file names must be full path names (with the leading /). The specified files contains the user IDs, listed one or more to a line. You can separate the IDs with any combination of blanks, tabs, and commas.
- If the *= userlist field is omitted, the line applies to all user IDs.

destination_address destination_mask

These operands specify the destination IP address or the range of destination IP addresses. Specify both in the usual dotted form, for example 129.1.2.3. Bits in `destination_mask` that are set to 0 indicate the bit positions which should be masked off (ignored) during comparison of `destination_address` and the actual destination IP address.

For example, if you specify 255.255.255.255 in the `destination_mask` field, the actual destination address must match exactly the address specified in the `destination_address` field.

But if you specify 0.0.0.0 in the `destination_mask` field, any destination address will match.

Note: This is the way subnet masks are interpreted in TCP/IP, but is the opposite of how the address masks are used in a router's access-lists.

log_op destination_portnumber

The `log_op` is an operation field, and can be one of these:

eq	equal to
neq	not equal to
lt	less than
gt	greater than
le	less than or equal to
ge	greater than or equal to

The `destination_portnumber` is a destination port.

The socks server uses the logical operation and the port number to compare to the port number in a request. The destination port in the request, and the `destination_portnumber` field must relate as stated by the `log_op`.

For example, if `log_op` is EQ and `destination_port` is 23, than the incoming request is allowed ONLY if it is for port 23. If you omit this pair, the rule applies to all ports.

command

Enter a colon (:) followed by a command to be executed when the conditions on that line are satisfied. The following substitutions occur before the string is presented to the Borne shell for execution:

%A Replaced by the client host's domain name if known, by its IP address otherwise

%a Replaced by the client host's IP address

%c Replaced by "connect" or "bind"

%p Replaced by the process id of the client program

%S Replaced by the service name (ftp) if known, by the destination port number otherwise

%s Replaced by the destination port number

%U Replaced by the user ID at login

%u Replaced by the effective user ID

%Z Replaced by the destination host's domain name if known, by its IP address otherwise

%z Replaced by the destination host's IP address

%% Replaced by a single %

Several shell commands can be strung together “|” or “;.”

Example of a sockd Rule

Consider this sample rule:

```
sockd @=1.2.3.4 *=boss,root 11.12.13.14 255.255.255.255 eq 23
```

To match the condition indicated in this line, a request must come from a local user whose effective ID is either boss or root. The destination IP address must be 11.12.13.14 exactly. The destination port must be 23. In that case, connection to host 11.12.13.14 should be done via a socks server on host 1.2.3.4.

Appendix G. The Crontab Command

The crontab command submits, edits, lists, or removes cron jobs. A cron job is a command run by the cron daemon at regularly scheduled intervals.

crontab syntax

```
crontab [-e | -l | -r | -v | File ]
```

–e Edits a copy of your crontab file or starts an editing session if you do not already have a crontab file. Each entry must be in a form acceptable to the cron daemon. When editing is complete, the entry is installed as your crontab file. The editing session is started using the editor specified by the EDITOR environment variable.

The default editor is vi.

–l Lists the contents of your crontab file.

–r Removes an existing crontab file from the crontab directory.

–v Lists the status of your cron jobs.

File Allows you to create your own crontab files.

When you finish creating entries and exit the file, the crontab command copies the file into the **/var/spool/cron/crontabs** directory and names it with your current username. If a file with your name already exists in the crontabs directory, the crontab command overwrites the existing name.

Alternatively, you can create a crontab file by specifying the File parameter. If the file already exists, it must be in the format the cron daemon expects. If the file does not exist, the crontab command invokes the editor. If the EDITOR environment variable exists, the command invokes the editor it specifies. Otherwise, the crontab command uses the vi editor.

The cron daemon runs commands according to the crontab file entries. Unless you redirect the output of a cron job to standard output or error, the cron daemon mails you any command output or error. If you specify a cron job incorrectly in your crontab file, the cron daemon does not run the job.

The cron daemon examines crontab files only when the cron daemon is initialized. When you make changes to your crontab file using the crontab command, a message indicating the change is sent to the cron daemon. This eliminates the overhead of checking for new or changed files at regularly scheduled intervals.

The **/var/adm/cron/cron.allow** and **/var/adm/cron/cron.deny** files control which users can use the crontab command. A root user can create, edit, or delete these files. Entries in these files are user login names with one name to a line. If your login ID is associated with more than one login name, the crontab command uses the first login name that is in the**/etc/passwd** file, regardless of which login name you might actually be using.

Here is a quick method for setting up a crontab. To learn more about the AIX crontab function, issue **"man crontab"** from the AIX command line.

To set up a crontab that will compress and archive all log files (that have been configured to be archived) every Sunday at 2am, follow these steps:

1. Start an editor session on the crontab file by issuing the **crontab –e** command.

   Note: This should bring up an editor session using the editor defined by your $EDITOR variable. If you wish to use another editor, you can either change the value of the $EDITOR vaiable or issue "crontab –1>tempcron". You can then edit the tempcron file and issue "crontab tempcron" to activate your changes to the file.

2. Each crontab file entry contains six fields separated by spaces or tabs in the following form:

   ```
   minute hour day_of_month month weekday
   ```

   These fields accept the following values:

   minute: 0 through 59

   hour: 0 through 23

   day_of_month: 1 through 31

   month: 1 through 12

   weekday: 0 through 6 for Sunday through Saturday

   To run the **fwlogmgmt** command every Sunday at 2 am, add the following line to the bottom of the crontab file:

   ```
   0 2 * * 0 /usr/bin/fwlogmgmt -1
   ```

   Your crontab file should look something like:

   ```
   --------------------------------------------------------
   #(c) COPYRIGHT International Business Machines Corp. 1989,1994
   #All Rights Reserved
   #Licensed materials - Property of IBM
   #
   #US Government Users Restricted Rights - Use, duplication or
   #disclosure restricted by GSA ADP Schedule Contract with IBM Corp.
   #
   #0 3 * * * /usr/sbin/skulker
   #45 2 * * 0 /usr/lib/spell/compress
   #45 23 * * * ulimit 5000; /usr/lib/smdemon.cleanu > /dev/null
   0 11 * * * /usr/bin/errclear -d S,0 30
   0 12 * * * /usr/bin/errclear -d H 90
   0 2 * * 0 /usr/bin/fwlogmgmt -1
   ---------------------------------------------------------,
   ```

3. Save the file to activate the changes.

Bibliography

- Cheswick, William R. and Bellovin, Steven M., *Firewalls and Internet Security*, Addison-Wesley Professional Computing Series, 1994.
- Garfinkle, Simson and Spafford, Gene, *Practical UNIX Security* O'Reilly & Associates, Inc., 1991.
- *AIX/6000 General Concepts and Procedures for IBM RISC System/6000*, GC23-2202.

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Glossary

This glossary contains technical terms that are used in the documentation for many of the IBM networking software products. It includes IBM product terminology as well as selected terms and definitions from:

- The *American National Standard Dictionary for Information Systems*, ANSI X3.172-1990, copyright 1990 by the American National Standards Institute (ANSI). Copies may be purchased from the American National Standards Institute, 11 West 42nd Street, New York, New York 10036. Definitions are identified by the symbol (A) after the definition.
- The ANSI/EIA Standard—440-A, *Fiber Optic Terminology*. Copies may be purchased from the Electronic Industries Association, 2001 Pennsylvania Avenue, N.W., Washington, DC 20006. Definitions are identified by the symbol (E) after the definition.
- The *Information Technology Vocabulary* developed by Subcommittee 1, Joint Technical Committee 1, of the International Organization for Standardization and the International Electrotechnical Commission (ISO/IEC JTC1/SC1). Definitions of published parts of this vocabulary are identified by the symbol (I) after the definition; definitions taken from draft international standards, committee drafts, and working papers being developed by ISO/IEC JTC1/SC1 are identified by the symbol (T) after the definition, indicating that final agreement has not yet been reached among the participating National Bodies of SC1.
- The *IBM Dictionary of Computing*, New York: McGraw-Hill, 1994.
- Internet Request for Comments: 1208, *Glossary of Networking Terms*
- Internet Request for Comments: 1392, *Internet Users' Glossary*
- The *Object-Oriented Interface Design: IBM Common User Access Guidelines*, Carmel, Indiana: Que, 1992.

The following cross-references are used in this glossary:

Contrast with: This refers to a term that has an opposed or substantively different meaning.

Synonym for: This indicates that the term has the same meaning as a preferred term, which is defined in its proper place in the glossary.

Synonymous with: This is a backward reference from a defined term to all other terms that have the same meaning.

See: This refers the reader to an entry that provides more information, to a term that is the expanded version of an abbreviation or acronym, or to a more preferred term.

See also: This refers the reader to terms that have a related, but not synonymous, meaning.

Deprecated term for: This indicates that the term should not be used. It refers to a preferred term, which is defined in its proper place in the glossary.

A

adapter. A part that electrically or physically connects a device to a computer or to another device.

address. In data communication, the unique code assigned to each device, workstation, or user connected to a network.

Administrative Domain. A collection of hosts and routers, and the interconnecting networks, managed by a single administrative authority.

AIX. Advanced Interactive Executive.

AIX operating system. IBM's implementation of the UNIX operating system. The RS/6000 system, among others, runs the AIX operating system.

API. Application programming interface.

application-level gateway. In a firewall, a proxy server that performs a requested service for a client. Contrast with *circuit-level gateway.*

application program interface. See *application programming interface (API).*

application programming interface (API). The set of programming language constructs or statements that can be coded in an application program to obtain the specific functions and services provided by an underlying operating system or service program.

ASCII (American National Standard Code for Information Interchange). The standard code, using a coded character set consisting of 7-bit coded characters (8 bits including parity check), that is used for information interchange among data processing systems, data communication systems, and associated equipment. The ASCII set consists of control characters and graphic characters. (A)

authentication. (1) In computer security, verification of the identity of a user or the user's eligibility to access an object. (2) In computer security, verification that a message has not been altered or corrupted. (3) In computer security, a process used to verify the user of an information system or protected resources.

B

Berkeley Software Distribution (BSD). Pertaining to any of the series of UNIX specifications or implementations distributed by the University of California at Berkeley. The mnemonic “BSD” is usually followed by a number to specify the particular version of UNIX that was distributed (for example, BSD 4.3). Many vendors use BSD specifications as standards for their UNIX products.

BSD. Berkeley Software Distribution.

button. (1) A mechanism on a pointing device, such as a mouse, used to request or initiate an action or a process. (2) A graphical device that identifies a choice. (3) A graphical mechanism that, when selected, performs a visible action. For example, when a user clicks on a list button, a list of choices appears.

C

circuit-level gateway. In a firewall, a proxy server that redirects a client's request through the firewall to the intended server. Contrast with *application-level gateway*.

click. To press and release a button on a pointing device without moving the pointer off of the object or choice.

client. A user.

command. A request from a terminal for the performance of an operation or the execution of a particular program.

command prompt. A displayed character or string of characters that indicates that a user may enter a command to be processed.

connection. (1) In data communication, an association established between functional units for conveying information. (I) (A) (2) In TCP/IP, the path between two protocol applications that provides reliable data stream delivery service. In the Internet, a connection extends from a TCP application on one system to a TCP application on another system.

D

daemon. A program that runs unattended to perform a standard service. Some daemons are triggered automatically to perform their task; others operate periodically.

DATABASE 2 (DB2). An IBM relational database management system.

Data Encryption Standard (DES). In computer security, the National Institute of Standards and Technology (NIST) Data Encryption Standard, adopted by the U.S. government as Federal Information Processing Standard (FIPS) Publication 46, which allows only hardware implementations of the data encryption algorithm.

datagram. (1) In packet switching, a self-contained packet, independent of other packets, that carries information sufficient for routing from the originating data terminal equipment (DTE) to the destination DTE without relying on earlier exchanges between the DTEs and the network. (I) (2) See *IP datagram*, *packet*, *segment*, and *User Datagram Protocol (UDP)*.

DB2. DATABASE 2.

default. Pertaining to an attribute, condition, value, or option that is assumed when none is explicitly specified. (I)

DES. Data Encryption Standard.

directory. (1) A table of identifiers and references to the corresponding items of data. (I) (A) (2) A type of file containing the names and controlling information for other files or other directories. (3) A listing of the files stored on a disk or diskette.

distinguished name. (1) In systems management, the name of an object formed from the sequence of the relative distinguished names (RDNs) of the object and each of its superior objects. Because each object has exactly one superior object (except the global root, which has none), each object has only one distinguished name. (2) The abstract syntax of a distinguished name or a value of this type of abstract syntax.

DNS. Domain Name System.

domain. See *Administrative Domain* and *domain name*.

domain name. In the Internet suite of protocols, a name of a host system. A domain name consists of a sequence of subnames separated by a delimiter character. For example, if the fully qualified domain name (FQDN) of a host system is `ralvm7.vnet.ibm.com`, each of the following is a domain name:

- `ralvm7.vnet.ibm.com`
- `vnet.ibm.com`
- `ibm.com`

Domain Name System (DNS). In the Internet suite of protocols, the distributed database system used to map domain names to IP addresses.

drive. A peripheral device, especially one that has addressed storage media.

E

EFM. See *Enterprise Firewall Manager.*

electronic mail (e-mail). (1) Correspondence in the form of messages transmitted between user terminals over a computer network. (T) (2) The generation, transmission, and display of correspondence and documents by electronic means. (A)

e-mail. Electronic mail.

encapsulation. In communications, a technique used by layered protocols by which a layer adds control information to the protocol data unit (PDU) from the layer it supports. In this respect, the layer encapsulates the data from the supported layer. In the Internet suite of protocols, for example, a packet would contain control information from the physical layer, followed by control information from the network layer, followed by the application protocol data.

Enterprise Firewall Manager (EFM). A component of the IBM Firewall that allows an organization to manage the configuration of multiple firewalls from a central location. This term may also refer to a machine on which this component is installed or to an IBM Firewall that is configured to be the EFM.

F

File Transfer Protocol (FTP). In the Internet suite of protocols, an application layer protocol that uses TCP and Telnet services to transfer bulk-data files between machines or hosts.

filter. (1) A device or program that separates data, signals, or material in accordance with specified criteria. (A) (2) See also *IP filter.*

finger. In the Internet suite of protocols, a program that displays information about the current users of a local or remote system. The finger usually displays the user's full name, last login time, idle time, terminal line, and terminal location (where applicable).

firewall. In communication, a functional unit that protects and controls the connection of one network to other networks. The firewall (a) prevents unwanted or unauthorized communication traffic from entering the protected network and (b) allows only selected communication traffic to leave the protected network.

FQDN. Fully qualified domain name.

FTP. File Transfer Protocol.

fully qualified domain name (FQDN). In the Internet suite of protocols, the name of a host system that includes all of the subnames of the domain name. An example of a fully qualified domain name is `ralvm7.vnet.ibm.com`. See also *host name.*

functional unit. An entity of hardware or software, or both, capable of accomplishing a specified purpose. (I) (A)

G

gateway. A functional unit that connects two networks or subnetworks having different characteristics, such as different protocols or different policies concerning security or transmission priority.

Gopher. In the Internet suite of protocols, a distributed information service that makes available hierarchical collections of information. A single Gopher client can access information from any accessible Gopher server. The Gopher client provides the user with a menu-driven interface.

graphical user interface (GUI). A type of computer interface consisting of a visual metaphor of a real-world scene, often of a desktop. Within that scene are icons, representing actual objects, that the user can access and manipulate with a pointing device. Contrast with *command line interface (CLI).*

GUI. Graphical user interface.

H

hacker. (1) A computer enthusiast who uses his or her knowledge and means to gain unauthorized access to protected resources. (T) (A) (2) A computer enthusiast.

HACMP. See *high-availability cluster multiprocessing.*

handle. (1) In the Advanced DOS and OS/2 operating systems, a binary value created by the system that identifies a drive, directory, and file so that the file can be found and opened. (2) In the AIX operating system, a data structure that is a temporary local identifier for an object. Allocating a handle creates it. Binding a handle makes it identify an object at a specific location.

hardening. The process of disabling nonsecure software on the machine where the IBM Firewall is being installed.

high-availability cluster multiprocessing (HACMP). An application service that enables up to eight RS/6000 servers to access the same data in parallel. This optimizes application execution and scalability and protects against unplanned outages and server downtime.

host. In the Internet suite of protocols, an end system. The end system can be any workstation.

host address. See *IP address*.

host name. In the Internet suite of protocols, the name given to a machine. Sometimes, "host name" is used to mean *fully qualified domain name (FQDN)*; other times, it is used to mean the most specific subname of a fully qualified domain name. For example, if `ralvm7.vnet.ibm.com` is the fully qualified domain name, either of the following may be considered the host name:

- `ralvm7.vnet.ibm.com`
- `ralvm7`

I

ICMP. Internet Control Message Protocol.

internet. A collection of networks interconnected by a set of routers that allow them to function as a single, large network. See also *Internet*.

Internet. The internet administered by the Internet Architecture Board (IAB), consisting of large national backbone networks and many regional and campus networks all over the world. The Internet uses the Internet suite of protocols.

Internet Control Message Protocol (ICMP). The protocol used to handle errors and control messages in the Internet Protocol (IP) layer. Reports of problems and incorrect datagram destinations are returned to the original datagram source. ICMP is part of the Internet Protocol.

Internet Protocol (IP). A connectionless protocol that routes data through a network or interconnected networks. IP acts as an intermediary between the higher protocol layers and the physical network. However, this protocol does not provide error recovery and flow control and does not guarantee the reliability of the physical network.

Internet service provider (ISP). An organization that provides access to the Internet.

interoperability. The capability to communicate, execute programs, or transfer data among various functional units in a way that requires the user to have little or no knowledge of the unique characteristics of those units. (T)

IP. Internet Protocol.

IP address. The 32-bit address defined by the Internet Protocol, standard 5, Request for Comments (RFC) 791. It is usually represented in dotted decimal notation.

IP datagram. In the Internet suite of protocols, the fundamental unit of information transmitted through an internet. It contains source and destination addresses, user data, and control information such as the length of the datagram, the header checksum, and flags indicating whether the datagram can be or has been fragmented.

IP filter. In the Internet suite of protocols, a set of rules based on IP addressing that control whether one host can access another host through a firewall.

IP tunnel. A mechanism for data encapsulation across an IP network.

ISP. See *Internet Service Provider*.

J

Java. An object-oriented programming language for portable interpretive code that supports interaction among remote objects. Java was developed and specified by Sun Microsystems, Incorporated.

L

LAN. Local area network.

local area network (LAN). (1) A computer network located on a user's premises within a limited geographical area. Communication within a local area network is not subject to external regulations; however, communication across the LAN boundary may be subject to some form of regulation. (T) (2) A network in which a set of devices are connected to one another for communication and that can be connected to a larger network.

login. The procedure by which a user begins a terminal or communication session.

M

Management Information Base (MIB). (1) A collection of objects that can be accessed by means of a network management protocol. (2) A definition for management information that specifies the information available from a host or gateway and the operations allowed. (3) In OSI, the conceptual repository of management information within an open system.

menu. (1) A list of options displayed to the user by a data processing system, from which the user can select an action to be initiated. (T) (2) In text processing, a list of choices displayed to the user by a text processor from which the user can select an action to be initiated. (T) (3) A list of choices that can be applied to an object. A menu can contain choices that are not available for selection in certain contexts. Those choices are indicated by reduced contrast.

message. An assembly of characters and sometimes control codes that is transferred as an entity from an originator to one or more recipients. A message consists of two parts: envelope and content. (T)

MIB. Management Information Base.

modem (modulator/demodulator). (1) A functional unit that modulates and demodulates signals. One of the functions of a modem is to enable digital data to be transmitted over analog transmission facilities. (T) (A) (2) A device that converts digital data from a computer to an analog signal that can be transmitted on a telecommunication line, and converts the analog signal received to data for the computer.

multihomed host. In the Internet Protocol (IP), a host that is connected to more than one network.

N

name resolution. In Internet communications, the process of mapping a machine name to the corresponding Internet Protocol (IP) address. See also *Domain Name System (DNS)*.

NAT. See *network address translation*.

National Computer Security Association (NCSA). An independent organization that strives to improve computer security by working with and fostering interaction among its members and constituents, which include computer users; product developers and vendors in the computer and communication industry; and computer and information security experts.

NCSA. See *National Computer Security Association*.

network. (1) An arrangement of nodes and connecting branches. (T) (2) A configuration of data processing devices and software connected for information interchange. (3) A group of nodes and the links interconnecting them.

network address translation (NAT). In a firewall, the conversion of secure IP addresses to external registered addresses. This enables communication with external networks but masks the IP addresses that are used inside the firewall.

Network Security Auditor. In an IBM Firewall, a program that scans a list of hosts and reports weak spots and potential security exposures for each system.

nonsecure interface. For security gateways, the physical layer connection between the gateway and a nonsecure network. Contrast with *secure interface*.

nonsecure network. A set of nodes that are not controlled by a single administrative party. Contrast with *secure network*.

O

octal. (1) Pertaining to a selection, choice, or condition that has eight possible different values or states. (I) (A) (2) Pertaining to a fixed-radix numeration having a radix of eight. (I) (A)

octet. A byte that consists of 8 bits. (T)

P

packet. In data communication, a sequence of binary digits, including data and control signals, that is transmitted and switched as a composite whole. The data, control signals, and, possibly, error control information are arranged in a specific format. (I)

parameter. A variable that is given a constant value for a specified application and that may denote the application. (I) (A)

partitioned data set (PDS). A data set in direct access storage that is divided into partitions, called members, each of which can contain a program, part of a program, or data.

path. The route used to locate files; the storage location of a file. A fully qualified path lists the drive identifier, directory name, subdirectory name (if any), and file name with the associated extension.

PDS. Partitioned data set.

PDU. Protocol data unit.

port. (1) An access point for data entry or exit. (2) A connector on a device to which cables for other devices such as display stations and printers are attached. (3) In the Internet suite of protocols, a 16-bit number used to communicate between TCP or the User Datagram Protocol (UDP) and a higher-level protocol or application. Some protocols, such as File Transfer Protocol (FTP) and Simple Mail Transfer Protocol (SMTP), use the same well-known port number in all TCP/IP implementations. (4) An abstraction used by transport protocols to distinguish among multiple destinations within a host machine. (5) Synonymous with *socket*.

port number. In Internet communications, the identification of an application entity to the transport service.

PostScript. A standard specified by Adobe Systems, Incorporated, that defines how text and graphics are presented on printers and display devices.

protocol. A set of semantic and syntactic rules that determine the behavior of functional units in achieving communication. (I)

protocol data unit (PDU). A unit of data specified in a protocol of a given layer and consisting of protocol control information of this layer, and possibly user data of this layer. (T)

protocol suite. A set of protocols that cooperate to handle the transmission tasks for a communication system.

proxy server. A server that receives requests intended for another server and that acts on the client's behalf (as the client's proxy) to obtain the requested service. A proxy server is often used when the client and the server are incompatible for direct connection (for example, when the client is unable to meet the security authentication requirements of the server but should be permitted some services).

R

RealAudio system. A client/server-based media delivery system developed by Progressive Networks. The RealAudio system supports live and on-demand audio over the Internet and can be used by news, entertainment, sports, and business organizations to create and deliver multimedia over the Internet.

reduced instruction-set computer (RISC). A computer that uses a small, simplified set of frequently used instructions for rapid execution.

Request for Comments (RFC). In Internet communications, the document series that describes a part of the Internet suite of protocols and related experiments. All Internet standards are documented as RFCs.

RFC. Request for Comments.

RISC. Reduced instruction-set computer.

S

SafeMail. An IBM proprietary mail gateway.

secure interface. For security gateways, the physical layer connection between the gateway and a secure network. Contrast with *nonsecure interface*.

secure network. A set of nodes that are controlled by a single administrative party. Contrast with *nonsecure network*.

Sendmail. In the UNIX operating system, the mail server that uses the Simple Mail Transfer Protocol (SMTP) to route mail from one host to another on the network.

server. (1) A functional unit that provides shared services to workstations over a network; for example, a file server, a print server, a mail server. (T) (2) In a network, a data station that provides facilities to other stations; for example, a file server, a print server, a mail server. (A)

session. In network architecture, for the purpose of data communication between functional units, all the activities which take place during the establishment, maintenance, and release of the connection. (T)

Simple Mail Transfer Protocol (SMTP). In the Internet suite of protocols, an application protocol for transferring mail among users in the Internet environment. SMTP specifies the mail exchange sequences and message format. It assumes that the Transmission Control Protocol (TCP) is the underlying protocol.

Simple Network Management Protocol (SNMP). In the Internet suite of protocols, a network management protocol that is used to monitor routers and attached networks. SNMP is an application layer protocol. Information on devices managed is defined and stored in the application's Management Information Base (MIB).

SMIT. System Management Interface Tool.

SMTP. Simple Mail Transfer Protocol.

SNMP. Simple Network Management Protocol.

socket. (1) An endpoint for communication between processes or application programs. (2) Synonym for *port*.

socket interface. A Berkeley Software Distribution (BSD) application programming interface (API) that allows users to easily write their own communication application programs.

socks server. A circuit-level gateway that provides a secure one-way connection through a firewall to server applications in a nonsecure network.

spoofing. A hacker's technique of using someone else's IP address to gain access to a network.

SQL. Structured Query Language.

Structured Query Language/Data System (SQL/DS). An IBM relational database management system.

subdirectory. A directory contained within another directory in a file system hierarchy.

subnet. (1) In TCP/IP, a part of a network that is identified by a portion of the IP address. (2) Synonym for *subnetwork*.

subnet address. In Internet communications, an extension to the basic IP addressing scheme where a portion of the host address is interpreted as the local network address.

subnetwork. (1) Any group of nodes that have a set of common characteristics, such as the same network ID. (2) Synonymous with *subnet*.

System Management Interface Tool (SMIT). An interface tool of the AIX operating system for installing, maintaining, configuring, and diagnosing tasks.

T

TCP. Transmission Control Protocol.

TCP/IP. Transmission Control Protocol/Internet Protocol.

Telnet. In the Internet suite of protocols, a protocol that provides remote terminal connection service. It allows users of one host to log on to a remote host and interact as directly attached terminal users of that host.

Time Sharing Option (TSO). An option of the MVS operating system that provides interactive time sharing from remote terminals.

Transmission Control Protocol (TCP). A communications protocol used in the Internet and in any network that follows the U.S. Department of Defense standards for internetwork protocol. TCP provides a reliable host-to-host protocol between hosts in packet-switched communications networks and in interconnected systems of such networks. It uses the Internet Protocol (IP) as the underlying protocol.

Transmission Control Protocol/Internet Protocol (TCP/IP). A set of communications protocols that support peer-to-peer connectivity functions for both local and wide area networks.

TSO. Time Sharing Option.

tunnel. See *IP tunnel*.

U

UDP. User Datagram Protocol.

UNIX operating system. An operating system developed by Bell Laboratories that features multiprogramming in a multiuser environment. The UNIX operating system was originally developed for use on minicomputers but has been adapted for mainframes and microcomputers. The AIX operating system is IBM's implementation of the UNIX operating system.

user. (1) Any person or any thing that may issue or receive commands and messages to or from the information processing system. (T) (2) Anyone who requires the services of a computing system.

User Datagram Protocol (UDP). In the Internet suite of protocols, a protocol that provides unreliable, connectionless datagram service. It enables an application program on one machine or process to send a datagram to an application program on another machine or process. UDP uses the Internet Protocol (IP) to deliver datagrams.

V

virtual private network (VPN). A network comprised of one or more secure IP tunnels connecting two or more networks.

VPN. See *virtual private network*.

W

World Wide Web (WWW). A network of servers that contain programs and files. Many of the files contain hypertext links to other documents available through the network.

WWW. World Wide Web.

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