Concepts & Examples ScreenOS Reference Guide

Volume 1: Overview

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FCC Statement

The following information is for FCC compliance of Class A devices: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. The equipment generates, uses, and can radiate radio-frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case users will be required to correct the interference at their own expense.

The following information is for FCC compliance of Class B devices: The equipment described in this manual generates and may radiate radio-frequency energy. If it is not installed in accordance with Juniper Networks' installation instructions, it may cause interference with radio and television reception. This equipment has been tested and found to comply with the limits for a Class B digital device in accordance with the specifications in part 15 of the FCC rules. These specifications are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

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

Caution: Changes or modifications to this product could void the user's warranty and authority to operate this device.

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About the *Concepts & Examples ScreenOS Reference Guide*

Juniper Networks security devices are Application-Specific Integrated Circuit (ASIC)-based, Internet Computer Security Association (ICSA)-certified Internet security appliances and security systems that integrate firewall, virtual private network (VPN), and traffic-shaping features to provide flexible protection for security zones such as the internal local area network (LAN) or demilitarized zone (DMZ) when connecting to the Internet.

- **Firewall:** A firewall screens traffic crossing the boundary between a private LAN and the public network, such as the Internet.

- **Layered Security:** The layered security solution is deployed at different locations to repel attacks. If the first one fails, the second layer catches the attacks. Some functions help protect remote locations with site-to-site VPN. Devices deployed at the perimeter help repel network-based attacks. Another layer is the integrated intrusion prevention in the form of both IDP and Deep Inspection. Intrusion prevention automatically detects and prevents attacks from inflicting damages. Moving further into the network, the last security layer is network segmentation also described as virtualization. This is the ability to divide the network up into secure domains and protecting critical resources from unauthorized roaming users and network attacks.

- **Content Security:** Protects users from malicious URLs and provides embedded antivirus scanning and web filtering. In addition, works with third-party products to provide external antivirus scanning, anti-spam, and web filtering.

- **VPN:** A VPN provides a secure communications channel between two or more remote network appliances.

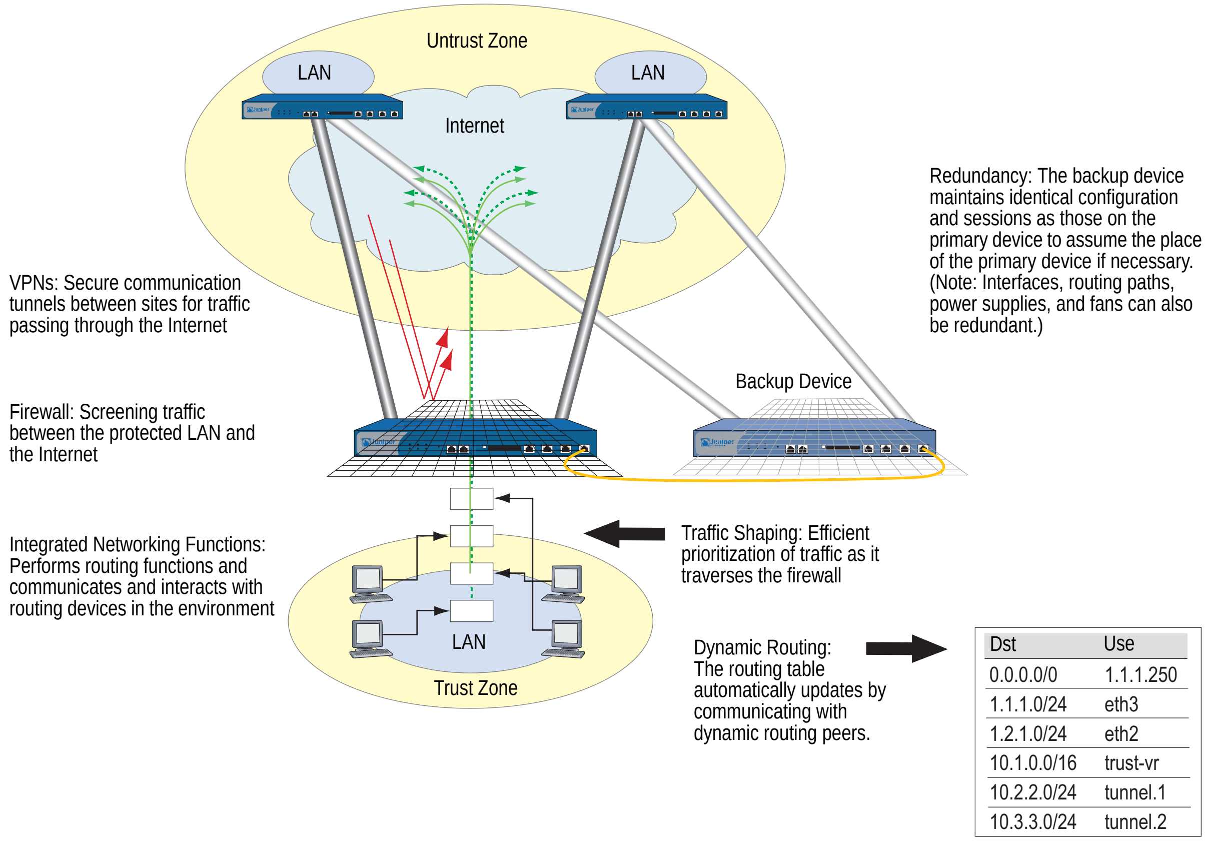
- **Integrated Networking Functions:** Dynamic routing protocols learn reachability and advertise dynamically changing network topologies. In addition, traffic shaping functionality allows administrative monitoring and control of traffic passing across the Juniper Networks firewall to maintain a network's quality-of-service (QoS) level.

- **Centralized Management:** The Netscreen-Security Manager tool simplifies configuration, deployment, and management of security devices.

- **Redundancy:** High availability of interfaces, routing paths, security devices, and—on high-end Juniper Networks devices—power supplies and fans, to avoid a single point of failure in any of these areas.

NOTE: For information about Juniper Networks compliance with Federal Information Processing Standards (FIPS) and for instructions on setting a FIPS-compliant security device in FIPS mode, see the platform-specific Cryptographic Module Security Policy document on the documentation CD.

Figure 1: Key Features in ScreenOS



VPNs: Secure communication tunnels between sites for traffic passing through the Internet

Redundancy: The backup device maintains identical configuration and sessions as those on the primary device to assume the place of the primary device if necessary. (Note: Interfaces, routing paths, power supplies, and fans can also be redundant.)

Firewall: Screening traffic between the protected LAN and the Internet

Integrated Networking Functions: Performs routing functions and communicates and interacts with routing devices in the environment

Traffic Shaping: Efficient prioritization of traffic as it traverses the firewall

Dynamic Routing: The routing table automatically updates by communicating with dynamic routing peers.

Dst	Use
0.0.0.0/0	1.1.1.250
1.1.1.0/24	eth3
1.2.1.0/24	eth2
10.1.0.0/16	trust-vr
10.2.2.0/24	tunnel.1
10.3.3.0/24	tunnel.2

The ScreenOS system provides all the features needed to set up and manage any security appliance or system. This document is a reference guide for configuring and managing a Juniper Networks security device through ScreenOS.

Volume Organization

The *Concepts & Examples ScreenOS Reference Guide* is a multi-volume manual. The following information outlines and summarizes the material in each volume:

Volume 1: Overview

- "Table of Contents" contains a master table of contents for all volumes in the manual.
- Appendix A, "Glossary," provides definitions for all the key terms used throughout all volumes in the manual.
- "Master Index" is a master index for all volumes in the manual.

Volume 2: Fundamentals

- Chapter 1, "ScreenOS Architecture," presents the fundamental elements of the architecture in ScreenOS and concludes with a four-part example illustrating an enterprise-based configuration incorporating most of those elements. In this and all subsequent chapters, each concept is accompanied by illustrative examples.
- Chapter 2, "Zones," explains security zones, tunnel zones, and function zones.
- Chapter 3, "Interfaces," describes the various physical, logical, and virtual interfaces on security devices.
- Chapter 4, "Interface Modes," explains the concepts behind Transparent, Network Address Translation (NAT), and Route interface operational modes.
- Chapter 5, "Building Blocks for Policies," discusses the elements used for creating policies and virtual private networks (VPNs): addresses (including VIP addresses), services, and DIP pools. It also presents several example configurations support for the H.323 protocol.
- Chapter 6, "Policies," explores the components and functions of policies and offers guidance on their creation and application.
- Chapter 7, "Traffic Shaping," explains how you can manage bandwidth at the interface and policy levels and prioritize services.
- Chapter 8, "System Parameters," presents the concepts behind Domain Name System (DNS) addressing; using Dynamic Host Configuration Protocol (DHCP) to assign or relay TCP/IP settings; downloading and uploading system configurations and software; and setting the system clock.

Volume 3: Administration

- Chapter 1, "Administration," explains the different means available for managing a security device both locally and remotely. This chapter also explains the privileges pertaining to each of the four levels of network administrators that can be defined.
- Chapter 2, "Monitoring Security Devices," explains various monitoring methods and provides guidance in interpreting monitoring output.

Volume 4: Attack Detection and Defense Mechanisms

- Chapter 1, "Protecting a Network," outlines the basic stages of an attack and the firewall options available to combat the attacker at each stage.
- Chapter 2, "Reconnaissance Deterrence," describes the options available for blocking IP address sweeps, port scans, and attempts to discover the type of operating system (OS) of a targeted system.
- Chapter 3, "Denial-of-Service (DoS) Attack Defenses," explains firewall, network, and OS-specific DoS attacks and how ScreenOS mitigates such attacks.
- Chapter 4, "Content Monitoring and Filtering," describes how to protect HyperText Transfer Protocol (HTTP) users from malicious uniform resource locators (URLs) and how to configure the security device to work with third party products to provide antivirus scanning and web filtering.
- Chapter 5, "Deep Inspection," describes how to configure the security device to obtain Deep Inspection (DI) attack object updates, how to create user-defined attack objects and attack object groups, and how to apply IDP at the policy level.
- Chapter 6, "Intrusion Detection and Prevention," describes Juniper Networks Intrusion Detection and Prevention (IDP) technology which can both detect and then stop attacks when deployed inline to your network. The chapter describes how to apply IDP at the policy level to drop malicious packets or connections before the attacks can enter your network.
- Chapter 7, "Suspicious Packet Attributes," explains a number of SCREEN options that block potentially dangerous packets.
- Appendix A, "Contexts for User-Defined Signatures," provides a list and descriptions of contexts that you can specify when defining a stateful signature attack object.

Volume 5: Virtual Private Networks

- Chapter 1, “Internet Protocol Security,” provides background information about IPSec, presents a flow sequence for Phase 1 in IKE negotiations in Aggressive and Main modes, and concludes with information about IKE and IPSec packet encapsulation.
- Chapter 2, “Public Key Cryptography,” provides information about how to obtain and load digital certificates and certificate revocation lists (CRLs).
- Chapter 3, “Virtual Private Network Guidelines,” offers some useful information to help in the selection of the available VPN options. It also presents a packet flow chart to demystify VPN packet processing.
- Chapter 4, “Site-to-Site Virtual Private Networks,” provides extensive examples VPN configurations connecting two private networks.
- Chapter 5, “Dialup Virtual Private Networks,” provides extensive examples of client-to-LAN communication using AutoKey IKE. It also details group IKE ID and shared IKE ID configurations.
- Chapter 6, “Layer 2 Tunneling Protocol,” explains the Layer 2 Tunneling Protocol and its use alone and in conjunction with IPSec (L2TP-over-IPSec).
- Chapter 7, “Advanced Virtual Private Network Features,” contains information and examples for the more advanced VPN configurations, such as NAT-Traversal, VPN monitoring, binding multiple tunnels to a single tunnel interface, and hub-and-spoke and back-to-back tunnel designs.

Volume 6: Voice-over-Internet Protocol

- Chapter 1, “H.323 Application Layer Gateway,” describes the H.323 protocol and provides examples of typical scenarios.
- Chapter 2, “Session Initiation Protocol Application Layer Gateway,” describes the Session Initiation Protocol (SIP) and shows how the SIP ALG processes calls in Route and Network Address Translation (NAT) modes. Examples of typical scenarios follow a summary of the SIP architecture.
- Chapter 3, “Media Gateway Control Protocol Application Layer Gateway,” presents an overview of the Media Gateway Control Protocol (MGCP) ALG and lists the firewall security features of the implementation. Examples of typical scenarios follow a summary of the MGCP architecture.
- Chapter 4, “Skinny Client Control Protocol Application Layer Gateway,” presents an overview of the Skinny Client Control Protocol (SCCP) ALG and lists the firewall security features of the implementation. Examples of typical scenarios follow a summary of the SCCP architecture.

Volume 7: Routing

- Chapter 1, “Static Routing,” describes the ScreenOS routing table, the basic routing process on the security device, and how to configure static routes on security devices.
- Chapter 2, “Routing,” explains how to configure virtual routers on security devices and how to redistribute routing table entries between protocols or between virtual routers.
- Chapter 3, “Open Shortest Path First,” describes how to configure the OSPF dynamic routing protocol on security devices.
- Chapter 4, “Routing Information Protocol,” describes how to configure the RIP dynamic routing protocol on security devices.
- Chapter 5, “Border Gateway Protocol,” describes how to configure the BGP dynamic routing protocol on security devices.
- Chapter 6, “Policy-Based Routing,” explains how to force interesting traffic along a specific path in the network.
- Chapter 7, “Multicast Routing,” introduces basic multicast routing concepts.
- Chapter 8, “Internet Group Management Protocol,” describes how to configure the Internet Group Management Protocol (IGMP) on security devices.
- Chapter 9, “Protocol Independent Multicast,” describes how to configure the Protocol Independent Multicast (PIM) routing protocol on security devices.
- Chapter 10, “ICMP Router Discovery Protocol,” explains how to set up an Internet Control Messages Protocol (ICMP) message exchange between a host and a router.

Volume 8: Address Translation

- Chapter 1, “Address Translation,” gives an overview of the various translation options, which are covered in detail in subsequent chapters.
- Chapter 2, “Source Network Address Translation,” describes NAT-src, the translation of the source IP address in a packet header, with and without Port Address Translation (PAT).
- Chapter 3, “Destination Network Address Translation,” describes NAT-dst, the translation of the destination IP address in a packet header, with and without destination port address mapping. This section also includes information about the packet flow when doing NAT-src, routing considerations, and address shifting.
- Chapter 4, “Mapped and Virtual Addresses,” describes the mapping of one destination IP address to another based on IP address alone (mapped IP) or based on destination IP address and destination port number (virtual IP).

Volume 9: User Authentication

- Chapter 1, “Authentication,” details the various authentication methods and uses that ScreenOS supports.

- Chapter 2, “Authentication Servers,” presents the options of using one of three possible types of external authentication server—RADIUS, SecurID, or LDAP—or the internal database and shows how to configure the security device to work with each type.

- Chapter 3, “Infranet Authentication,” details how the security device is deployed in a unified access control (UAC) solution. Juniper Networks unified access control solution (UAC) secures and assures the delivery of applications and services across an enterprise infranet.

- Chapter 4, “Authentication Users,” explains how to define profiles for authentication users and how to add them to user groups stored either locally or on an external RADIUS authentication server.

- Chapter 5, “IKE, XAuth, and L2TP Users,” explains how to define IKE, XAuth, and L2TP users. Although the XAuth section focusses primarily on using the security device as an XAuth server, it also includes a subsection on configuring select security devices to act as an XAuth client.

- Chapter 6, “Extensible Authentication for Wireless and Ethernet Interfaces,” explains the options available for and examples of how to use Extensible Authentication Protocol to provide authentication for Ethernet and wireless interfaces.

Volume 10: Virtual Systems

- Chapter 1, “Virtual Systems,” discusses virtual systems, objects, and administrative tasks.

- Chapter 2, “Traffic Sorting,” explains how ScreenOS sorts traffic.

- Chapter 3, “VLAN-Based Traffic Classification,” explains VLAN-based traffic classification for virtual systems.

- Chapter 4, “IP-Based Traffic Classification,” explains IP-based traffic classification for virtual systems.

Volume 11: High Availability

- Chapter 1, “NetScreen Redundancy Protocol,” explains how to cable, configure, and manage Juniper Networks security devices in a redundant group to provide high availability (HA) using the NetScreen Redundancy Protocol (NSRP).

- Chapter 2, “Interface Redundancy,” describes the various ways in which Juniper Networks security devices provide interface redundancy.

- Chapter 3, “Failover,” describes the configuration for the failover of a device, virtual security device (VSD) group, and virtual system. It also explains how to monitor certain objects to determine the failover of a device or VSD group.

- Chapter 4, “NSRP-Lite,” explains how to configure Juniper Networks security devices that support NSRP-Lite.

Volume 12: WAN, ADSL, Dial, and Wireless

- Chapter 1, “Wide Area Networks,” describes how to configure a wide area network (WAN).

- Chapter 2, “Asymmetric Digital Subscriber Line,” describes the Asymmetric Digital Subscriber Line (ADSL) interface on the security device. ADSL is a Digital Subscriber Line (DSL) technology that allows existing telephone lines to carry both voice telephone service and high-speed digital transmission.

- Chapter 3, “ISP Failover and Dial Recovery,” describes how to set priority and define conditions for ISP failover and how to configure a dialup recovery solution.

- Chapter 4, “Wireless Local Area Network,” describes the wireless interfaces on Juniper Networks wireless devices and provides example configurations.

- Appendix A, “Wireless Information,” lists available channels, frequencies, and regulatory domains and lists the channels that are available on wireless devices for each country.

Volume 13: General Packet Radio Service

- Chapter 1, “GPRS,” describes the GPRS Tunneling Protocol (GTP) features in ScreenOS and demonstrates how to configure GTP functionality on a Juniper Networks security device.

Volume 14: Dual-Stack Architecture with IPv6

- Chapter 1, “Internet Protocol Version 6 Introduction,” explains IPv6 headers, concepts, and tunneling guidelines.
- Chapter 2, “IPv6 Configuration,” explains how to configure an interface for operation as an IPv6 router or host.
- Chapter 3, “Connection and Network Services,” explains how to configure Dynamic Host Configuration protocol version 6 (DHCPv6), Domain Name Services (DNS), Point-to-Point Protocol over Ethernet (PPPoE), and fragmentation.
- Chapter 4, “Static and Dynamic Routing,” explains how to set up static and dynamic routing. This chapter explains ScreenOS support for Routing Information Protocol-Next Generation (RIPng).
- Chapter 5, “Address Translation,” explains how to use Network Address Translation (NAT) with dynamic IP (DIP) and mapped-IP (MIP) addresses to traverse IPv4/IPv6 boundaries.
- Chapter 6, “IPv6 in an IPv4 Environment,” explains manual and dynamic tunneling .
- Chapter 7, “IPSec Tunneling,” explains how to configure IPSec tunneling to connect dissimilar hosts.
- Chapter 8, “IPv6 XAuth User Authentication,” explains how to configure Remote Authentication Dial In User Service (RADIUS) and IPSec Access Session (IAS) management.
- Appendix A, “Switching,” lists options for using the security device as a switch to pass IPv6 traffic.

Document Conventions

This document uses several types of conventions, which are introduced in the following sections:

- “CLI Conventions” on page lviii
- “Illustration Conventions” on page lix
- “Naming Conventions and Character Types” on page lx
- “WebUI Conventions” on page lx

CLI Conventions

The following conventions are used to present the syntax of CLI commands in examples and in text.

In examples:

- Anything inside square brackets [ ] is optional.
- Anything inside braces { } is required.
- If there is more than one choice, each choice is separated by a pipe (|). For example:

  ```
  set interface { ethernet1 | ethernet2 | ethernet3 } manage
  ```

  means "set the management options for the ethernet1, the ethernet2, *or* the ethernet3 interface."

- Variables are in *italic* type:

  set admin user *name1* password *xyz*

In text:

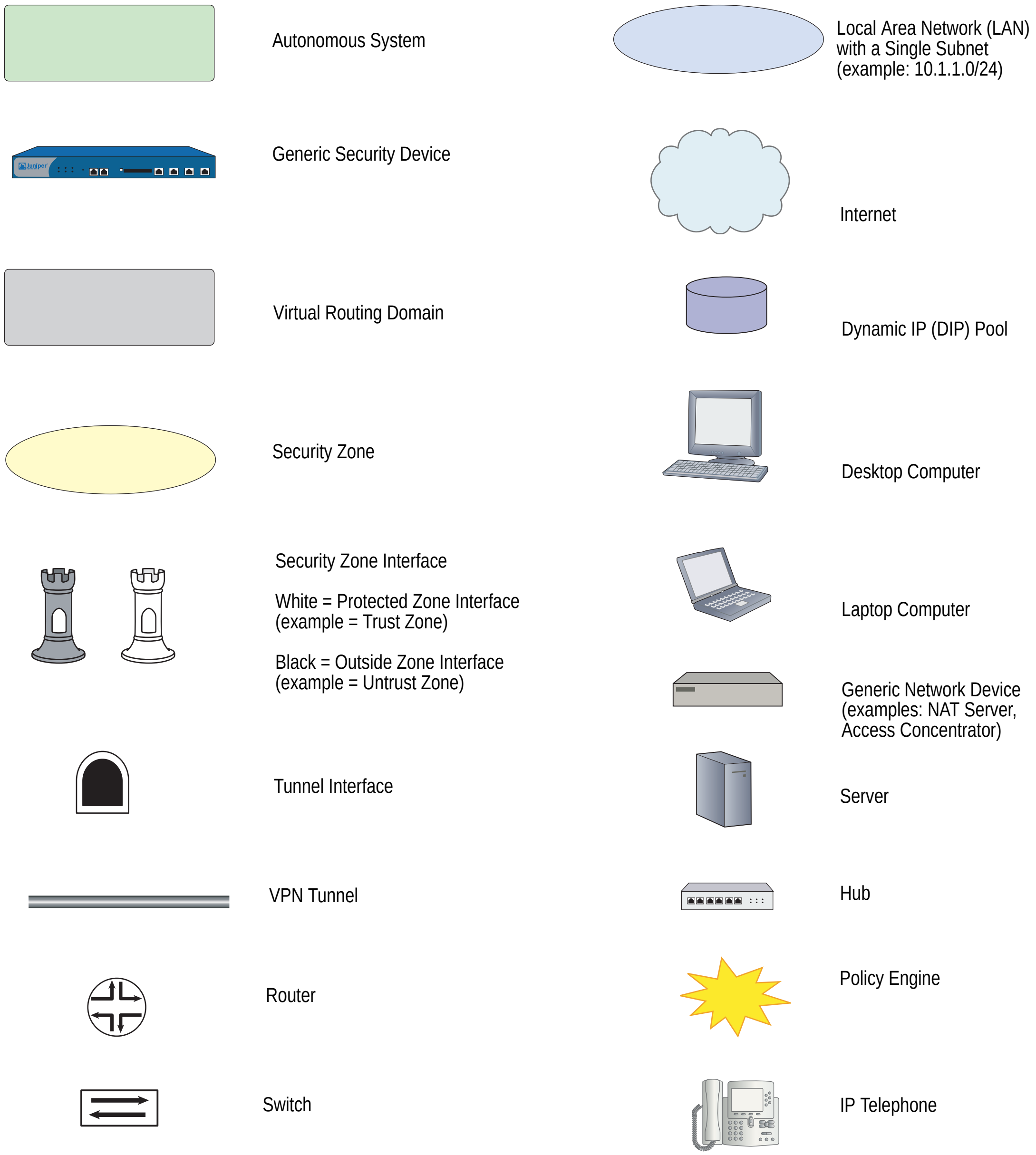
- Commands are in **boldface** type.
- Variables are in *italic* type.

NOTE: When entering a keyword, you only have to type enough letters to identify the word uniquely. For example, typing **set adm u kath j12fmt54** is enough to enter the command **set admin user kathleen j12fmt54**. Although you can use this shortcut when entering commands, all the commands documented here are presented in their entirety.

Illustration Conventions

The following figure shows the basic set of images used in illustrations throughout this manual.

Figure 2: Images in Manual Illustrations



Naming Conventions and Character Types

ScreenOS employs the following conventions regarding the names of objects—such as addresses, admin users, auth servers, IKE gateways, virtual systems, VPN tunnels, and zones—defined in ScreenOS configurations:

- If a name string includes one or more spaces, the entire string must be enclosed within double quotes; for example:

  set address trust "local LAN" 10.1.1.0/24

- Any leading spaces or trailing text within a set of double quotes are trimmed; for example, **" local LAN "** becomes **"local LAN"**.

- Multiple consecutive spaces are treated as a single space.

- Name strings are case-sensitive, although many CLI keywords are case-insensitive. For example, **"local LAN"** is different from **"local lan"**.

ScreenOS supports the following character types:

- Single-byte character sets (SBCS) and multiple-byte character sets (MBCS). Examples of SBCS are ASCII, European, and Hebrew. Examples of MBCS—also referred to as double-byte character sets (DBCS)—are Chinese, Korean, and Japanese.

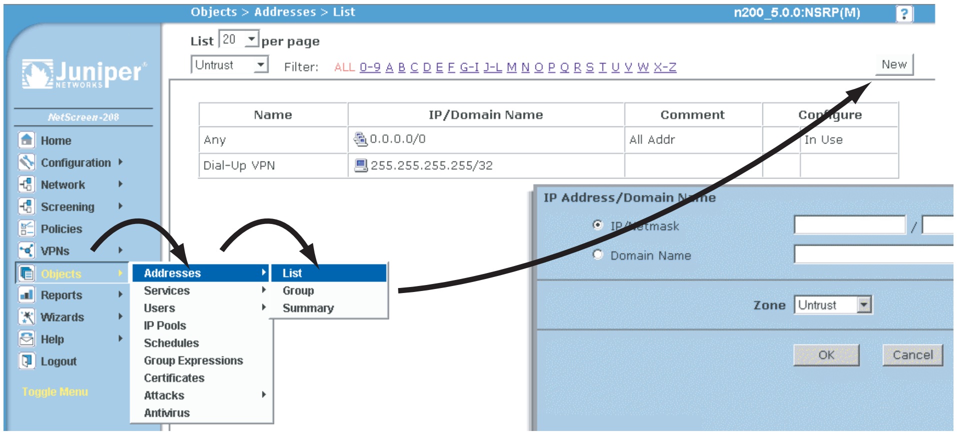
- ASCII characters from 32 (0x20 in hexadecimals) to 255 (0xff), except double quotes ("), which have special significance as an indicator of the beginning or end of a name string that includes spaces.

NOTE: A console connection only supports SBCS. The WebUI supports both SBCS and MBCS, depending on the character sets that your browser supports.

WebUI Conventions

A chevron (>) shows the navigational sequence through the WebUI, which you follow by clicking menu options and links. The following figure shows the following path to the address configuration dialog box—Objects > Addresses > List > New:

Figure 3: WebUI Navigation



Objects > Addresses > List

n200_5.0.0:NSRP(M)

List 20 per page

Untrust

Name	IP/Domain Name	Comment	Configure
Any	0.0.0.0/0	All Addr	In Use
Dial-Up VPN	255.255.255.255/32		

IP Address/Domain Name

● IP/Netmask

○ Domain Name

Zone Untrust

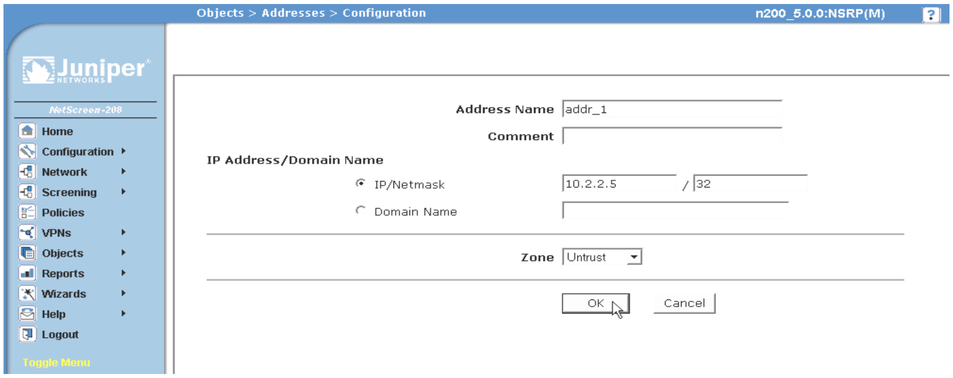
To perform a task with the WebUI, you first navigate to the appropriate dialog box, where you then define objects and set parameters. The set of instructions for each task is divided into navigational path and configuration settings:

The next figure lists the path to the address configuration dialog box with the following sample configuration settings:

Objects > Addresses > List > New: Enter the following, then click **OK**:

Address Name: addr_1
IP Address/Domain Name:
IP/Netmask: (select), 10.2.2.5/32
Zone: Untrust

Figure 4: Navigational Path and Configuration Settings



Objects > Addresses > Configuration

n200_5.0.0:NSRP(M)

Address Name: addr_1
Comment:
IP Address/Domain Name
● IP/Netmask: 10.2.2.5 / 32
○ Domain Name:
Zone: Untrust

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techpubs-comments@juniper.net

Appendix A

Glossary

10BaseT Also known as *Unshielded Twisted Pair (UTP)*, 10BaseT is the standard cabling used for telephone lines and the most common form of Ethernet connection. 10BaseT denotes a peak transmission speed of 10 Megabits per second (Mbps) using copper twisted-pair cable. Ethernet is a standard for connecting computers into a local area network (LAN). The maximum cable distance is 100 meters (325 feet), the maximum devices per segment is 1, and the maximum devices per network are 1024. *See also* 100BaseT.

100BaseT Another term for *Fast Ethernet*, an upgraded standard for connecting computers in a LAN. 100BaseT ethernet works like regular ethernet but is able to transfer data at a peak rate of 100 Mbps. It is also more expensive and less common than its slower 10BaseT sibling. *See also* 10BaseT.

802.11a A WLAN standard that provides up to 54 Mbps in the 5GHz radio band.

802.11b A WLAN standard that provides up to 11 Mbps in the 2.4 GHz radio band.

802.11g A WLAN standard that provides 20+ Mbps in the 2.4 GHz radio band.

802.11SuperG A WLAN standard that provides up to 108 Mbps in the 2.4 GHz radio band.

ABR *See* Area Border Router (ABR).

Access-Challenge An additional condition required for a successful Telnet login by an authentication user via a RADIUS server.

Access Control List (ACL) Identifies clients by their MAC addresses and specifies whether the wireless device allows or denies access for each address.

Access List A list of network prefixes that are compared to a given route. If the route matches a network prefix defined in the access list, the route is either permitted or denied.

Access Point (AP) *See* Wireless access point.

Access Point Name (APN) An information element (IE) included in the header of a GTP packet that provides information on how to reach a network. It is composed of a network ID and an operator ID.

ACL *See* Access Control List (ACL).

Address Shifting A mechanism for creating a one-to-one mapping between any original address in one range of addresses and a specific translated address in another range.

Adjacencies When two routers can exchange routing information, they are considered to have constructed an adjacency. Point-to-point networks, which have only two routers, automatically form an adjacency. Point-to-multipoint networks are a series of several point-to-point networks. When routers pair in this more complex networking scheme, they are considered to be adjacent to one another.

ADM *See* Add-Drop Multiplexer (ADM).

ADSL *See* Asymmetric Digital Subscriber Line (ADSL).

Advertisement A method a router uses to announce itself to other devices on the network, transmitting basic information including IP address, network mask, and other data.

Aggregate State A router is in an aggregate state when it is one of multiple virtual BGP routing instances bundled into one address. *See also* Border Gateway Protocol (BGP).

Aggregation The process of combining several routes in such a way that only a single route advertises itself. This technique minimizes the size of the routing table for the router.

Aggregator An object used to bundle multiple routes under one common route generalized according to the value of the network mask.

Aggressive Aging A mechanism to accelerate the timeout process when the number of sessions in the session table surpasses a specified high-watermark threshold. When the number of sessions in the table dips below a specified low-watermark threshold, the timeout process returns to normal.

AH *See* Encapsulating Security Protocol/Authentication Header (ESP/AH).

ALG *See* Application Layer Gateway (ALG).

Antivirus (AV) Scanning A mechanism for detecting and blocking viruses in File Transfer Protocol (FTP), Internet Message Access Protocol (IMAP), Simple Mail Transfer Protocol (SMTP), HyperText Transfer Protocol (HTTP)—including HTTP webmail—and Post Office Protocol version 3 (POP3) traffic. ScreenOS offers an internal AV scanning solution.

Application Layer Gateway (ALG) On a security device, a software component that is designed to manage specific protocols such as Session Initiation Protocol (SIP) or File Transfer Protocol (FTP). The ALG intercepts and analyzes the specified traffic, allocates resources, and defines dynamic policies to permit the traffic to pass securely through the security device.

Area The most fundamental ordering method in the Open Shortest Path First (OSPF) routing protocol. An OSPF area divides the internetwork into smaller, more manageable constituent pieces. This technique reduces the amount of information about all the other routers that each router must store and maintain. When a router in an area needs information about another device inside or outside its area, it contacts a special router, called the Area Border Router (ABR), that contains all essential device information. In addition, the ABR filters all information coming into the area to avoid burdening other routers in the area with unnecessary information.

Area Border Router (ABR) A router with at least one interface in Area 0 and at least one interface in another area.

Area Range A sequence of IP addresses, defined by a lower and an upper limit, that indicates a series of device addresses within an area.

AS *See* Autonomous System (AS).

AS Boundary Router A router that connects an Autonomous System (AS) running one routing protocol to another AS running a different protocol.

AS Number The identification number of the local Autonomous System (AS) mapped to a BGP routing instance. The ID number can be any valid integer. *See also* Border Gateway Protocol (BGP).

AS Path A list of all the autonomous systems that a router update has traveled through in the current transmission.

AS Path Access List An access list used by a BGP routing instance to permit or deny packets sent by neighbor routing instances to the current virtual routing instance. *See also* Border Gateway Protocol (BGP).

AS Path Attribute Class BGP provides four classes of path attributes: well-known mandatory, well-known discretionary, optional transitive, and optional non-transitive. *See also* Border Gateway Protocol (BGP).

AS Path String A string that acts as an identifier for an Autonomous System (AS) path. It is configured alongside an AS Path access list ID.

Asymmetric Digital Subscriber Line (ADSL) A Digital Subscriber Line (DSL) technology that allows existing telephone lines to carry both voice telephone service and high-speed digital transmission. A growing number of service providers offer ADSL service to home and business customers.

Atomic Aggregate An object used by a Border Gateway Protocol (BGP) router to inform other BGP routers that the local system has selected a generalized route.

Attack Objects Stateful signatures and protocol anomalies that a security device with Deep Inspection (DI) functionality uses to detect attacks aimed at compromising one or more hosts on a network.

Authentication Authentication ensures that digital data transmissions are delivered to the intended recipient. Authentication also validates the integrity of the message for the receiver, including its source (where or whom it came from). The simplest form of authentication requires a username and password for access to a particular account. Authentication protocols can also be based on secret-key encryption, such as DES or 3DES, or on public-key systems that use digital signatures.

Authentication Header (AH) *See* Encapsulating Security Protocol/Authentication Header (ESP/AH).

Autonomous System (AS) A set of routers set off from the rest of the network and governed by a single technical administration. This router group uses an Interior Gateway Protocol (IGP) or several IGPs and common metrics to route packets within the group. The group also uses an Exterior Gateway Protocol (EGP) to route packets to other autonomous systems. Each AS has a routing plan that indicates which destinations are reachable through it. This plan is called the *Network Layer Reachability Information (NLRI)* object. Border Gateway Protocol (BGP) routers periodically generate and receive NLRI updates.

Auxiliary port (AUX) This port is usually the same as COM 1 and is used to access external networks.

B8ZS 8 bits zero suppression.

B-Channel The ISDN BRI service provided by your telephone service provider two bearer channels (B channels) and one data channel (D channel). The B channel operates at 64 kbps and carries user data.

Bit error rate (BER) The ratio of error bits to the total number of bits received in a transmission, usually expressed as 10 to a negative power.

Border Gateway Protocol (BGP) An inter-autonomous system routing protocol. BGP routers and autonomous systems exchange routing information for the Internet.

Basic Rate Interface (BRI) An ISDN service also called 2B + D, because it consists of two 64 Kbps B-channels and one 16 Kbps D-channel.

Bridge A device that forwards traffic between network segments based on Data-Link Layer information. These segments share a common Network Layer address space.

Bridge Group interface This interface is also known as the bgroup interface. These interfaces allow several physical ports to be grouped together acting like a pseudo switch. You can group multiple wired interfaces or wireless and wired interfaces so they are located in the same subnet.

Broadcast Network A network that supports many routers with the capability to communicate directly with one another. Ethernet is an example of a broadcast network.

bundle An aggregation of multiple physical links.

Certificate Revocation List (CRL) A list of invalid certificates.

Circuit-Level Proxy Proxy servers are available for common Internet services; for example, an HTTP proxy is used for Web access; an FTP proxy is used for file transfers. Such proxies are called *application-level proxies* or *application-level gateways*, because they are dedicated to a particular application and protocol and are aware of the content of the packets being sent. A generic proxy, called a *circuit-level* proxy, supports multiple applications. For example, SOCKS is a generic IP-based proxy server that supports TCP and UDP applications. *See also* Proxy Server.

Cisco High-Level Data Link Control (Cisco-HDLC) Proprietary Cisco encapsulation for transmitting LAN protocols over a WAN. HDLC specifies a data encapsulation method on synchronous serial links by means of frame characters and checksums. Cisco HDLC enables the transmission of multiple protocols.

Classless Routing Support for interdomain routing, regardless of the size or class of the network. Network addresses are divided into three classes, but these are transparent in BGP, giving the network greater flexibility. *See also* Border Gateway Protocol (BGP).

Cluster A group of routers in a BGP AS where one is established as a route reflector and the others are clients to the reflector. The reflector is responsible for informing the clients of route and address information it learns from devices in another AS. The term *cluster* has another meaning in regards to high availability. *See* High Availability; NetScreen Redundancy Protocol (NSRP). *See also* Border Gateway Protocol (BGP).

Cluster List A list of paths recorded as a packet travels through a BGP route-reflector cluster.

Communication Protocol A set of rules that allow computers with different operating systems to communicate with each other.

Community A grouping of Border Gateway Protocol (BGP) destinations. By updating the community, you automatically update its member destinations with new attributes.

Confederation An object inside a Border Gateway Protocol Autonomous System (BGP AS) that is a subset of routing instances in the AS. By grouping devices into confederations inside a BGP AS, you reduce the complexity associated with the matrix of routing connections, known as a *mesh*, within the AS.

Connection States When a packet sent from one router arrives at another router, a negotiation occurs between the source and destination routers. The negotiation goes through six states: Idle, Connect, Active, OpenSent, OpenConnect, and Establish.

CRL *See* Certificate Revocation List (CRL).

Data circuit-terminating equipment (DCE) Equipment that provides switching services in the WAN and is typically owned and managed by the service provider.

Data Encryption Standard (DES) A 40-bit and 56-bit encryption algorithm that was developed by the National Institute of Standards and Technology (NIST). DES is a block-encryption method originally developed by IBM. It has since been certified by the U.S. government for transmission of any data that is not classified top secret. DES uses an algorithm for private-key encryption. The key consists of 64 bits of data, which are transformed and combined with the first 64 bits of the message to be sent. To apply the encryption, the message is broken up into 64-bit blocks so that each can be combined with the key using a complex 16-step process. Although DES is fairly weak, with only one iteration, repeating it using slightly different keys can provide excellent security.

Data Encryption Standard–Cipher Block Chaining (DES–CBC) Message text and, if required, message signatures can be encrypted using the Data Encryption Standard (DES) algorithm in the Cipher Block Chaining (CBC) mode of operation. The character string “DES-CBC” within an encapsulated Privacy Enhanced Mail (PEM) header field indicates the use of DES–CBC.

Data-Link Connection Identifier (DLCI) Separates customer traffic in Frame Relay configuration.

Data terminal equipment (DTE) A RS-232 interface that is used to exchange information with a serial device. This equipment is the terminating point for a specific network and is typically located on the customer premises.

Dead Interval The amount of time that elapses before a routing instance determines that another routing instance is not running.

Dead Peer Detection (DPD) DPD allows an IPSec device to verify the current existence and availability of other IPSec peer devices. The device performs this verification by sending encrypted IKE Phase 1 notification payloads (R-U-THERE) to the peers and waiting for DPD acknowledgements (R-U-THERE-ACK).

Deep Inspection (DI) A mechanism for filtering the traffic permitted by the firewall. Deep Inspection examines Layer 3 and Layer 4 packet headers and Layer 7 application content and protocol characteristics in an effort to detect and prevent any attacks or anomalous behavior that might be present.

Default Route A catch-all routing table entry that defines the forwarding of traffic for destination networks that are not explicitly defined in the routing table. The destination network for the default route is represented by the network address 0.0.0.0/0.

Demilitarized Zone (DMZ) From the military term for an area between two opponents where fighting is prevented. DMZ ethernets connect networks and computers controlled by different bodies. They may be external or internal. External DMZ ethernets link regional networks with routers.

DES *See* Data Encryption Standard (DES).

DES–CBC *See* Data Encryption Standard–Cipher Block Chaining (DES–CBC).

Destination Network Address Translation (NAT-dst) The translation of the original destination IP address in a packet header to a different destination address. ScreenOS supports the translation of one or several original destination IP addresses to a single IP address (one-to-one or many-to-one relationships). The security device also supports the translation of one range of IP addresses to another range (a many-to-many relationship) using address shifting.

When the security device performs NAT-dst without address shifting it can also map the destination port number to a different predetermined port number. When the security device performs NAT-dst with address shifting, it cannot also perform port mapping.

DI *See* Deep Inspection (DI).

Digital signal 0 (DS0) The base for the digital signal X series. Provides a transmission rate of 64 Kbps.

DS1 Digital signal 1, also known as a T1 interface.

DS3 Digital signal 3, also known as a T3 interface.

Distance Vector A routing strategy that relies on an algorithm that works by having routers sporadically broadcast entire copies of their own routing table to all directly connected neighbors. This update identifies the networks each router knows about, and the distance between each of those networks. The distance is measured in hop counts or the number of routing domains that a packet must traverse between its source device and the device it attempts to reach.

DMZ *See* Demilitarized Zone (DMZ).

Domain Name System (DNS) Stores information about host names and domain names in a type of distributed database on networks such as the Internet. Of the many types of information that can be stored, DNS most importantly provides a physical location (IP address) for each domain name and lists the mail-exchange servers accepting email for each domain.

DNS allows technical information to be transmitted in a human-readable way. While computers and network hardware work with IP addresses (such as 207.17.137.68) to perform tasks such as addressing and routing, humans generally find it easier to work with host names and domain names (such as www.juniper.com) in URLs and email addresses. DNS therefore mediates between the needs and preferences of humans and of software by translating domain names to IP addresses, such as www.juniper.net = 207.17.137.68.

DPD *See* Dead Peer Detection (DPD).

Dynamic Filtering An IP service that can be used within VPN tunnels. Filters are one method some security devices use to control traffic from one network to another. When TCP/IP sends data packets to the firewall, the filtering function in the firewall looks at the header information in the packets and directs them accordingly. The filters operate on criteria such as IP source or destination address range, Transmission Control Protocol (TCP) ports, User Datagram Protocol (UDP), Internet Control Message Protocol (ICMP), or TCP responses. *See also* Tunneling; Virtual Private Network (VPN).

Dynamic Host Configuration Protocol (DHCP) A method for automatically assigning IP addresses to hosts on a network. Depending upon the specific device model, security devices can allocate dynamic IP addresses to hosts, receive dynamically assigned IP addresses, or receive DHCP information from a DHCP server and relay the information to hosts.

Dynamic Routing A routing method which adjusts to changing network circumstances by analyzing incoming routing update messages. If the message indicates that a network change has occurred, the routing software recalculates routes and sends out new routing update messages. These messages populate the network, directing routers to rerun their algorithms and change their routing tables accordingly. There are two common forms of dynamic routing, including Distance Vector Routing and Link State Routing.

E1 interface The European format for digital transmission. This format carries signals at 2 Mbps (32 channels at 64 Kbps, with 2 channels reserved for signaling and controlling).

Encapsulating Security Protocol (ESP) *See* Encapsulating Security Protocol/Authentication Header (ESP/AH).

Encapsulating Security Protocol/ Authentication Header (ESP/AH) The IP-level security protocols, AH and ESP, were originally proposed by the Network Working Group focused on IP security mechanisms, IPSec. The term IPSec is used loosely here to refer to packets, keys, and routes that are associated with these protocols. The IP AH protocol provides authentication. ESP provides both authentication and encryption.

Encryption The process of changing data into a form that can be read only by the intended receiver. To decipher the message, the receiver of the encrypted data must have the proper decryption key. In traditional encryption schemes, the sender and the receiver use the same key to encrypt and decrypt data. Public-key encryption schemes use two keys: a public key, which anyone may use, and a corresponding private key, which is possessed only by the person who created it. With this method, anyone may send a message encrypted with the owner’s public key, but only the owner has the private key necessary to decrypt it. Data Encryption Standard (DES) and Triple DES (3DES) are two of the most popular public-key encryption schemes.

Equal Cost Multipath (ECMP) ECMP assists with load balancing among two to four routes to the same destination or increases the effective bandwidth usage among two or more destinations. When enabled, security devices use the statically defined routes or dynamically learn multiple routes to the same destination through a routing protocol. The security device assigns routes of equal cost in round robin fashion. Default: disabled

Ethernet A best-effort Local Area Network (LAN) delivery system that uses Carrier Sense Multiple Access with Collision Detection (CSMA/CD) technology. Ethernet can be run over a variety of cable schemes, including thick coaxial, thin coaxial, twisted pair, and fiber optic cable. Ethernet is a standard for connecting computers into a LAN. The most common form of ethernet is 10BaseT, also called *Unshielded Twisted Pair (UTP)*, which denotes a peak transmission speed of 10 Mbps using copper twisted-pair cable. *See also* 100BaseT.

Export Rules When you have two or more virtual routers on a security device, you can configure export rules that define which routes on one virtual router are allowed to learned by another virtual router. *See also* Import Rules.

External Neighbors Two peer BGP routers residing in two different autonomous systems. *See* Border Gateway Protocol (BGP).

Extranet The connecting of two or more intranets. An intranet is an internal website that allows users inside a company to communicate and exchange information. An extranet connects that virtual space with the intranet of another company, thus allowing these two (or more) companies to share resources and communicate over the Internet in their own virtual space. This technology greatly enhances business-to-business communications.

Fast Ethernet *See* 100BaseT.

Filter List A list of IP addresses permitted to send packets to the current routing domain.

Firewall A device that protects and controls the connection of one network to another, for traffic both entering and leaving. Firewalls are used by companies that want to protect any network-connected server from damage (intentional or otherwise) by those who log in to it. This could be a dedicated computer equipped with security measures, or it could be a software-based protection.

Frame Relay WAN protocol that operates over a variety of network interfaces, including serial, T1/E1, and T3/E3. Frame Relay allows private networks to reduce costs by sharing facilities between the end-point switches of a network managed by a Frame Relay service provider.

Gateway Also called a *router*, a gateway is a program or a special-purpose device that transfers IP datagrams from one network to another until the final destination is reached.

Gateway GPRS Support Node (GGSN) A device that acts as an interface between the GPRS backbone network and the external packet data networks (radio and IP). Among other things, a GGSN converts GPRS packets coming from an SGSN into the appropriate Packet Data Protocol (PDP) format and sends them out on the corresponding PDN. A GGSN also performs authentication and charging functions. *See also* General Packet Radio Service (GPRS).

Generic Routing Encapsulation (GRE) A protocol that encapsulates any type of packet within IPv4 unicast packets. For additional information on GRE, refer to RFC 1701, *Generic Routing Encapsulation (GRE)*.

General Packet Radio Service (GPRS) A mobile data service available to users of Global System for Mobile Communication (GSM) mobile phones. It is often described as 2.5G, that is, a technology between the second generation (2G) and third generation (3G) of mobile telephony. GPRS provides moderate speed data transfer by using unused Time Division Multiple Access (TDMA) channels in the GSM network.

GGSN *See* Gateway GPRS Support Node (GGSN).

Gigabit Interface Connector (GBIC) A kind of interface module card used on some security devices for connecting to a fiber optic network.

General Packet Radio Service (GPRS) A packet-based technology that enables high-speed wireless Internet and other data communications. GPRS provides more than three to four times greater speed than conventional Global System for Mobile Communications (GSM) systems.

G-PDU A user data message consisting of a T-PDU plus a GPRS Tunneling Protocol (GTP) header. *See also* T-PDU.

Gi interface The interface between a GSN and an external network or the Internet. *See* GPRS Support Node (GSN).

Global System for Mobile Communication (GSM) A globally accepted standard for digital cellular communication. GSM is the name of a standardization group established in 1982 to create a common European mobile telephone standard that formulates specifications for a pan-European mobile cellular radio system operating at 900 MHz.

Gn interface The interface between two GSNs within the same Public Land Mobile Network (PLMN).

Gp interface The interface between two GSNs located in different Public Land Mobile Networks (PLMNs).

GPRS *See* General Packet Radio Service (GPRS).

GPRS Roaming Exchange (GRX) Since the Gp interface is IP based, it must support appropriate routing and security protocols to enable a subscriber to access its home services from any of its home PLMN’s roaming partners. Many GPRS operators/carriers have abstracted these functions through the GPRS Roaming Exchange (GRX). This function is typically provided by a third-party IP network that offers VPN services to connect the roaming partners. The GRX service provider ensures that all aspects of routing and security between the networks are optimized for efficient operation. *See also* General Packet Radio Service (GPRS).

GPRS Support Node (GSN) A term used to include both Gateway GPRS Support Node (GGSN) and Serving GPRS Support Node (SGSN). *See also* General Packet Radio Service (GPRS).

GPRS Tunneling Protocol (GTP) An IP-based protocol used within Global System for Mobile Communications (GSM) and Universal Mobile Telecommunications System (UMTS) networks. GTP is layered on top of User Datagram Protocol (UDP). There are actually three separate protocols: GTP’, GTP-Control (GTP-C), and GTP User (GTP-U). *See also* General Packet Radio Service (GPRS); GTP-Control (GTP-C) Message; GTP-User (GTP-U) Message.

GRX *See* GPRS Roaming Exchange (GRX).

GSM *See* Global System for Mobile Communication (GSM).

GSN *See* GPRS Support Node (GSN).

GTP *See* GPRS Tunneling Protocol (GTP).

GTP-Control (GTP-C) Message GTP-C messages are exchanged between GPRS Support Node (GSN) pairs in a path. The messages are used to transfer GSN capability information between GSN pairs; to create, update and delete GPRS Tunneling Protocol (GTP) tunnels; and for path management. *See also* GPRS Tunneling Protocol (GTP); GTP Tunnel.

GTP Protocol Data Unit (GTP-PDU) Either a GTP-C or a GTP-U message. *See also* GPRS Tunneling Protocol (GTP).

GTP Tunnel A GPRS Tunneling Protocol (GTP) tunnel in the GTP-U plane is defined for each Packet Data Protocol (PDP) Context in the GSNs. A GTP tunnel in the GTP-C plane is defined for all PDP Contexts with the same PDP address and access point name (APN) for tunnel-management messages or for each mobile station (MS) for messages not related to tunnel management. A GTP tunnel is identified in each node with a Tunnel Endpoint Identifier (TEID), an IP address, and a User Datagram Protocol (UDP) port number. A GTP tunnel is necessary to forward packets between an external network and an MS user.

GTP-User (GTP-U) Message GTP-U messages are exchanged between GPRS Support Node (GSN) pairs or GSN/Radio Network Controller (RNC) pairs in a path. The GTP-U messages are used to carry user data packets and signaling messages for path management and error indication. The user data transported can be packets in any of IPv4, IPv6, or PPP formats.

HA *See* High Availability (HA).

Hello Interval The amount of time that elapses between instances of Hello packets. *See* Hello Packet.

Hello Packet A packet that advertises information, such as its presence and availability, to the network about the router that generated the packet.

High Availability (HA) Configuring pairs of security devices with NetScreen Redundancy Protocol (NSRP) to ensure service continuity in the event of a network outage or device failure.

HLR *See* Home Location Register (HLR).

Hold Time In OSPF, the maximum amount of time between instances of initiating Shortest Path First (SPF) computations. In Border Gateway Protocol (BGP), the maximum time that elapses between message transmissions between a BGP speaker and its neighbor.

Home Location Register (HLR) A database within a cellular network that stores current details about a subscriber, including the equipment in use, the service(s) required, the user’s identification encryption code and home cell, and the network the subscriber was last known to have used.

Hub A hardware device used to link computers (usually over an ethernet connection). It serves as a common wiring point so that information can flow through a central location to any other computer on the network. A hub repeats signals at the Physical Layer (most commonly ethernet). A hub retains the behavior of a standard bus type network (such as Thinnet), but produces a star topology with the hub at the center of the star. This configuration enables centralized management.

Import Rules When you have two or more virtual routers on a security device, you can configure import rules on one virtual router that define which routes are allowed to be learned from another virtual router. If you do not configure any import rules for a virtual router, all routes that are exported to that virtual router are accepted. *See also* Export Rules.

International Mobile Station Identity (IMSI) A GPRS Support Node (GSN) identifies a mobile station by its IMSI, which is composed of three elements: the Mobile Country Code (MCC), the Mobile Network Code (MNC), and the Mobile Subscriber Identification Number (MSIN). The MCC and MNC combined constitute the IMSI prefix and identify the mobile subscriber's home network, or Public Land Mobile Network (PLMN). *See also* GPRS Support Node (GSN); Public Land Mobile Network (PLMN).

Internet A system of linked computer networks, international in scope, that facilitates data communications services such as remote login, file transfer, electronic mail, and newsgroups. The Internet is a way of connecting existing computer networks that greatly extends the reach of each participating system. Also known as the Net. Originally designed by the U.S. Defense Department so that a communications signal could withstand a nuclear war and serve military institutions worldwide. The Internet was first known as the ARPAnet. *See also* Intranet.

Internet Control Message Protocol (ICMP) Occasionally a gateway or destination host uses ICMP to communicate with a source host, for example, to report an error in datagram processing. ICMP uses the basic support of IP as if it were a higher-level protocol; however, ICMP is actually an integral part of IP and must be implemented by every IP module. ICMP messages are sent in several situations: for example, when a datagram cannot reach its destination, when the gateway does not have the buffering capacity to forward a datagram, and when the gateway can direct the host to send traffic on a shorter route. IP is not designed to be absolutely reliable. The purpose of these control messages is to provide feedback about problems in the communications environment, not to make IP reliable.

Internet Group Management Protocol (IGMP) A protocol that runs between hosts and routers to communicate multicast group-membership information.

Internet Key Exchange (IKE) The method for exchanging keys for encryption and authentication over an unsecured medium, such as the Internet.

Internet Protocol (IP) An Internet-standard protocol that defines a basic unit of data, called a *datagram*, which is used in a connectionless, best-effort delivery system. IP defines how information gets passed between systems across the Internet.

Internet Security Association and Key Management Protocol (ISAKMP) Provides a framework for Internet-key management and specific protocol support for negotiating security attributes. By itself, it does not establish session keys, however it can be used with various session key establishment protocols to provide a complete solution to Internet key management.

Infranet A public network that combines the ubiquitous connectivity of the Internet with the assured performance and security of a private network.

Intranet A play on the word *Internet*, an intranet is a restricted-access network that works like the Web, but isn't on it. Usually owned and managed by a corporation, an intranet enables a company to share its resources with its employees without confidential information being made available to everyone with Internet access.

IP Gateway Also called a *router*, a gateway is a program or a special-purpose device that transfers IP datagrams from one network to another until the final destination is reached.

IP Security (IPSec) Security standard produced by the Internet Engineering Task Force (IETF). It is a protocol suite that provides authentication, integrity, and confidentiality for secure communications and supports key exchanges even in larger networks. *See also* Data Encryption Standard-Cipher Block Chaining (DES-CBC); Encapsulating Security Protocol/Authentication Header (ESP/AH).

IP Tracking A mechanism for monitoring configured IP addresses to see if they respond to ping or ARP requests. You can configure IP tracking with NSRP to determine device or VSD group failover. You can also configure IP tracking on a device interface to determine if the interface is up or down.

Integrated Services Digital Network (ISDN) ISDN is an international communications standard for sending voice, video, and data over digital telephone lines.

Keepalive Interval The time, in seconds, that elapses between keepalive packets, which ensure that the TCP connection is up between a local BGP router and its neighbor.

Key Management The only reasonable way to protect the integrity and privacy of information is to rely upon the use of secret information in the form of private keys for signing and/or encryption. The management and handling of these pieces of secret information is generally referred to as *key management*. This includes the activities of selection, exchange, storage, certification, expiration, revocation, changing, and transmission of keys. Most of the work in managing information security systems lies in the key management. *See also* Internet Security Association and Key Management Protocol (ISAKMP).

Link State Link-state routing protocols operate using an algorithm commonly called *Shortest Path First (SPF)*. Instead of relying on rumored information from directly connected neighbors as in distance vector protocols, each router in a link-state system maintains a complete topology of the network and computes SPF information based on the topology.

Link State Advertisement The conveyance that enables OSPF routers to make device, network, and routing information available for the link-state database. Each router retrieves information from the LSAs sent by other routers on the network to construct a picture of the entire internetwork from which an individual routing instance distills path information to use in its routing table.

Load Balancing The mapping (or re-mapping) of work to two or more processors, with the intent of improving the efficiency of a concurrent computation.

Local Area Network (LAN) Any network technology that interconnects resources within an office environment, usually at high speeds, such as Ethernet. A LAN is a short-distance network used to link a group of computers together within a building. 10BaseT Ethernet is the most commonly used form of LAN. A hardware device called a hub serves as the common wiring point, enabling data to be sent from one machine to another over the network. LANs are typically limited to distances of less than 1,640 feet (500 meters) and provide low-cost, high-bandwidth networking capabilities within a small geographical area.

Local Preference A Border Gateway Protocol (BGP) attribute superior to the Multi-Exit Discriminator (MED) attribute for selecting a packet's path. LOCAL_PREF is the attribute used most often to configure preferences for one set of paths over another. *See also* Multi-Exit Discriminator (MED).

Loopback Interface A logical interface that emulates a physical interface on the security device, but is always in the up state as long as the device is up. You must assign an IP address to a loopback interface and bind it to a security zone.

Mapped IP Address (MIP) A direct one-to-one mapping of traffic destined for one IP address to another IP address.

MCC *See* Mobile Country Code (MCC).

MED *See* Multi Exit Discriminator (MED).

Media Access Control (MAC) Address An address that uniquely identifies the network interface card, such as an ethernet adapter. For ethernet, the MAC address is a 6-octet address assigned by IEEE. On a LAN or other network, the MAC address is a computer's unique hardware number. (On an ethernet LAN, the MAC address is the same as the ethernet address.) When you are connected to the Internet from your computer (or *host*, as the Internet protocol views it), a correspondence table relates your IP address to your computer's physical (MAC) address on the LAN. The MAC address is used by the Media Access Control sub-layer of the Data-Link Control (DLC) Layer of telecommunications protocols. There is a different MAC sub-layer for each physical device type.

Member AS The name of the Autonomous System (AS) being included in a Border Gateway Protocol (BGP) confederation.

Message Digest 5 (MD5) Message Digest [version] 5, an algorithm that produces a 128-bit message digest (or hash) from a message of arbitrary length. The resulting hash is used, like a fingerprint of the input, to verify authenticity.

Metric A value associated with a route that the virtual router uses to select the active route when there are multiple routes to the same destination network with the same preference value. The metric value for connected routes is always 0. The default metric value for static routes is 1, but you can specify a different value when defining a static route.

MIME *See* Multipurpose Internet Mail Extension (MIME).

MIP *See* Mapped IP Address (MIP).

MNC *See* Mobile Network Code (MNC).

Mobile Country Code (MCC) One of the three elements of an International Mobile Station Identity (IMSI); the other two are the Mobile Network Code (MNC) and the Mobile Subscriber Identification Number (MSIN). The MCC and MNC combined constitute the IMSI prefix and identify the mobile subscriber's home network, or Public Land Mobile Network (PLMN). *See also* International Mobile Station Identify (IMSI); Public Land Mobile Network (PLMN).

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Mobile Subscriber Identification Number (MSIN) One of the three elements of an International Mobile Station Identity (IMSI); the other two are the Mobile Country Code (MCC) and the Mobile Network Code (MNC). *See also* International Mobile Station Identify (IMSI).

MSIN *See* Mobile Subscriber Identification Number (MSIN).

Multicast Policies Multicast policies allow multicast control traffic, such as Internet Group Management Protocol (IGMP) or Protocol-Independent Multicast (PIM) messages, to cross security devices.

Multicast Routing A routing method used to send multimedia streams to a group of receivers. Multicast-enabled routers transmit multicast traffic only to hosts that want to receive the traffic. Hosts must signal their interest in receiving multicast data and they must join a multicast group in order to receive the data.

Multi Exit Discriminator (MED) A Border Gateway Protocol (BGP) attribute that determines the relative preference of entry points into an Autonomous System (AS). *See also* Local Preference.

Multi Exit Discriminator (MED) Comparison A Border Gateway Protocol (BGP) attribute used to determine an ideal link to reach a particular prefix in or behind the current Autonomous System (AS). The MED contains a metric expressing a degree of preference for entry into the AS. You can establish precedence for one link over others by configuring a MED value for one link that is lower than other links. The lower the MED value, the higher priority the link has. The way this occurs is that one AS sets the MED value and the other AS uses the value in deciding which path to choose.

Multipurpose Internet Mail Extension (MIME) Extensions that allow users to download different types of electronic media, such as video, audio, and graphics.

NAT *See* Network Address Translation (NAT).

NAT-dst *See* Destination Network Address Translation (NAT-dst).

NAT-src *See* Network Address Translation (NAT).

NAT-Traversal (NAT-T) A method for allowing IPSec traffic to pass through NAT devices along the data path of a Virtual Private Network (VPN) by adding a layer of User Datagram Protocol (UDP) encapsulation. The method first provides a means for detecting NAT devices during Phase 1 IKE exchanges and then provides a means for traversing them after Phase 2 IKE negotiations are complete.

Neighbor To begin configuring a BGP network, you need to establish a connection between the current device and a counterpart, adjacent device known as a neighbor or peer. While this counterpart device may seem like unneeded information at first, it is actually central to the way BGP works. Unlike RIP or OSPF, you now have to configure two devices, both the current router and its neighbor, for BGP to work. While this requires more effort, it enables networking to occur on a larger scale as BGP eludes deploying the limited advertising techniques inherent to interior networking standards.

There are two types of BGP neighbors: internal neighbors, which are in the same Autonomous System (AS), and external neighbors, which are in different autonomous systems. A reliable connection is required between neighbors and is achieved by creating a TCP connection between the two. The handshake that occurs between the two prospect neighbors evolves through a series of phases or states before a true connection can be made. *See also* Connection States.

Netmask A netmask indicates which part of an IP address indicates network identification and which part indicates the host identification. For example, the IP address and netmask 10.20.30.1 255.255.255.0 (or 10.20.30.1/24) refers to all the hosts in the 10.20.30.0 subnet. The IP address and netmask 10.20.30.1 255.255.255.255 (or 10.20.30.1/32) refers to a single host. *See also* IP Address; Subnet Mask.

NetScreen Gatekeeper Protocol (NSGP) A proprietary protocol that uses Transmission Control Protocol (TCP) and monitors the connectivity between client and server by sending Hello messages at specified intervals.

NetScreen Redundancy Protocol (NSRP) A proprietary protocol that provides configuration and Run-Time Object (RTO) redundancy and a device failover mechanism for security units in a high availability (HA) cluster.

NetScreen Reliable Transfer Protocol (NRTP) A proprietary protocol for multicasting NetScreen Redundancy Protocol (NSRP) control messages to multiple receivers when security devices are in a redundancy cluster (interconnected through the High Availability, or HA, ports). NRTP ensures that the primary security device always forwards configuration and policy messages to the backup devices.

Network Address Translation (NAT) The translation of the source IP address in a packet header to a different IP address. Translated source IP addresses can come from a dynamic IP (DIP) address pool or from the IP address of the egress interface. When the security device draws addresses from a DIP pool, it can do so dynamically or deterministically. When doing the former, it randomly draws an address from the DIP pool and translates the original source IP address to the randomly selected address. When doing the latter, it uses address shifting to translate the source IP address to a predetermined IP address in the range of addresses that constitute the pool. When the security device uses the IP address of the egress interface, it translates all original source IP addresses to the address of the egress interface.

When the translated address comes from a DIP pool using address shifting, it cannot perform source port address translation. When the translated address comes from a DIP pool without address shifting, port translation is optional. When the translated address comes from the egress interface, port translation is required.

NAT is also referred to as *NAT-src* to distinguish it from Destination Network Address Translation (NAT-dst).

Network Layer Reachability Information (NLRI) Each Autonomous System (AS) has a routing plan that indicates the destinations that are reachable through it. This routing plan is called the NLRI object. BGP routers periodically generate and receive NLRI updates. Each update contains information on the list of autonomous systems that reachability information capsules traverse. Common values described by an NLRI update include a network number, a list of autonomous systems that the information passed through, and other path attributes.

Network Service Access Point Identifier (NSAPI) An index to the Packet Data Protocol (PDP) context that is using the services provided by the lower layer Subnetwork Dependent Convergence Protocol (SNDCP). One PDP may have several PDP contexts and NSAPIs. *See also* Packet Data Protocol (PDP).

Next Hop In the routing table, an IP address to which traffic for the destination network is forwarded. The next hop can also be another virtual router in the same security device.

Nonce In security engineering, a nonce is a *number used once*, often a random or pseudo-random number issued in an authentication protocol to ensure that old communications cannot be reused in replay attacks. For example, nonces are used in HTTP digest access authentication to calculate an MD5 digest of the password. The nonces are different each time the 401 authentication challenge-response code is presented, thus making the replay attack virtually impossible.

NSAPI *See* Network Service Access Point Identifier (NSAPI).

NSGP *See* NetScreen Gatekeeper Protocol (NSGP).

NSRP *See* NetScreen Redundancy Protocol (NSRP).

Online Certificate Status Protocol (OCSP) When a security device performs an operation that uses a certificate, it is usually important to verify the validity of that certificate. Certificates might have become invalid through expiration or revocation. The default way to check the status of certificates is to use certificate revocation lists (CRLs). The Online Certificate Status Protocol (OCSP) is an alternative way to check the status of certificates. OCSP can quickly provide additional information about certificates and provide status checks.

Open Shortest Path First (OSPF) A dynamic routing protocol intended to operate within a single Autonomous System (AS).

Packet Data Protocol (PDP) The primary protocol(s) used for packet data communications on a PDN, for example, TCP/IP on the Internet.

Packet Data Protocol (PDP) Context A user session on a GPRS network.

PDU *See* Protocol Data Unit.

Peer *See* Neighbor.

PIM *See* Protocol Independent Multicast (PIM).

PLMN *See* Public Land Mobile Network (PLMN).

Point-to-Point Protocol over Ethernet (PPPoE) Allows multiple users at a site to share the same digital subscriber line, cable modem, or wireless connection to the Internet. You can configure PPPoE client instances, including the username and password, on any or all interfaces on some security devices.

Policies Policies provide the initial protection mechanism for the firewall, allowing you to determine which traffic passes across it based on IP session details. You can use policies to protect the resources in a security zone from attacks from another zone (interzone policies) or from attacks from within a zone (intrazone policies). You can also use policies to monitor traffic attempting to cross your firewall.

Port Address Translation (PAT) The translation of the original source port number in a packet to a different, randomly designated port number.

Port Mapping The translation of the original destination port number in a packet to a different, predetermined port number.

Port Mode A feature supported on some Juniper Networks security appliances, port mode allows you to select one of several different sets of port, interface, and zone bindings on the device. Changing the port mode removes any existing configurations on the device and requires a system reset.

Preference A value associated with a route that the virtual router uses to select the active route when there are multiple routes to the same destination network. The preference value is determined by the protocol or origin of the route. The lower the preference value of a route, the more likely the route is to be selected as the active route.

Prefix An IP address that represents a route.

Protocol Data Unit (PDU) Information that is delivered as a unit among peer entities of a network and that may contain control information, address information, or data.

In layered systems, a PDU is a unit of data specified in a protocol for a given layer and consisting of protocol-control information (and possibly user data) for the layer.

Protocol Independent Multicast (PIM) A multicast routing protocol that runs between routers to forward multicast traffic to multicast group members throughout the network. PIM-Dense Mode (PIM-DM) floods multicast traffic throughout the network and then prunes routes to receivers that do not want to receive the multicast traffic. PIM-Sparse Mode (PIM-SM) forwards multicast traffic only to those receivers that request it.

Protocol Independent Multicast-Source-Specific Mode (PIM-SSM) is derived from PIM-SM, and, like PIM-SM, it forwards multicast traffic to interested receivers only. Unlike PIM-SM, it immediately forms an SPT to the source.

Proxy Server Also called a *proxy*, a proxy server is a technique used to cache information on a webserver and act as an intermediary between a web client and that webserver. It stores the most commonly and recently used web content in order to provide quicker access and to increase server security. This is common for an ISP, especially if it has a slow link to the Internet. *See also* Circuit-Level Proxy.

Public Land Mobile Network (PLMN) A public network dedicated to the operation of mobile radio communications.

Querier A router that sends Internet Group Management Protocol (IGMP) messages to all hosts in the network to solicit group membership information. There is usually one querier for each network.

Real-Time Transport Control Protocol (RTCP) RTCP provides information about the members of a session and the quality of the communication. It synchronizes media streams by associating timestamps and a real-time clock.

Real-Time Transport Protocol (RTP) RTP is used to ensure the reception of packets in a chronological sequence by assigning timestamps and sequence numbers to the packet header. Every RTP session has a corresponding RTCP session. *See* Real-Time Transport Control Protocol (RTCP).

Received Signal Strength Indicator (RSSI) A measurement of the strength (not necessarily the quality) of the received signal strength in a wireless environment. Measured in decibels relative to 1 milliwatt (dBm). The lower the RSSI, the stronger the signal.

Redistribution The process of importing a route into the current routing domain from another part of the network that uses another routing protocol. When this occurs, the current domain has to translate all the information, particularly known routes, from the other protocol. For example, if you are on an OSPF network and it connects to a BGP network, the OSPF domain has to import all the routes from the BGP network to inform all of its devices about how to reach all the devices on the BGP network. The receipt of all the route information is known as *route redistribution*.

Redistribution List A list of routes the current routing domain imported from another routing domain that uses a different protocol.

Rendezvous Point (RP) A router at the root of the multicast distribution tree. All sources in a group send their packets to the RP, and the RP sends data down the shared distribution tree to all receivers in a network.

Reverse Path Forwarding A method used by multicast routers to check the validity of multicast packets. A router performs a route lookup on the unicast route table to check if the interface on which it received the packet (ingress interface) is the same interface it must use to send packets back to the sender. If it is, the router creates the multicast route entry and forwards the packet to the next-hop router. If it is not, the router drops the packet.

RJ-11 Short for Registered Jack-11, a four- or six-wire connector used primarily to connect telephone equipment in the United States. RJ-11 connectors are also used to connect some types of local-area networks (LANs), although RJ-45 connectors are more common.

RJ-45 Resembling a standard telephone connector, an RJ-45 connector is twice as wide (with eight wires) and is used for hooking up computers to Local Area Networks (LANs) or telephones with multiple lines.

Route Flap Damping Border Gateway Protocol (BGP) provides a technique, called *flap damping*, for blocking the advertisement of a route somewhere near its source until the route becomes stable. Route flap damping allows routing instability to be contained at an Autonomous System (AS) border router adjacent to the region where instability is occurring. Limiting such unnecessary propagation maintains reasonable route-change convergence time as a routing topology grows.

Route Map Route maps are used with Border Gateway Protocol (BGP) to control and modify routing information and to define the conditions by which routes are redistributed between routing domains. A route map contains a list of route-map entries, each containing a sequence number along with a match and a set value. The route-map entries are evaluated in the order of an incrementing sequence number. Once an entry returns a matched condition, no further route maps are evaluated. Once a match has been found, the route map carries out a permit or deny operation for the entry. If the route-map entry is not a match, then the next entry is evaluated for matching criteria.

Route Redistribution The exporting of route rules from one virtual router to another.

Route Reflector A router whose Border Gateway Protocol (BGP) configuration enables readvertising of routes between Interior BGP (IBGP) neighbors or neighbors within the same BGP Autonomous System (AS). A route reflector client is a device that uses a route reflector to readvertise its routes to the entire AS. It also relies on that route reflector to learn about routes from the rest of the network.

Router A hardware or (in a security environment) virtual device that distributes data to all other routers and receiving points inside or outside the local routing domain. Routers also act as filters, allowing only authorized devices to transmit data into the local network so that private information can remain secure. In addition to supporting these connections, routers also handle errors, keep network usage statistics, and handle security issues.

Routing Information Protocol (RIP) A dynamic routing protocol used within moderate-sized autonomous systems.

Routing Table A list in a virtual router's memory that contains a real-time view of all the connected and remote networks to which a router is currently routing packets.

RSSI *See* Received Signal Strength Indicator (RSSI).

Run-Time Object (RTO) A code object created dynamically in memory during normal operation. Some examples of RTOs are session table entries, ARP cache entries, certificates, DHCP leases, and IPSec Phase 2 security associations (SAs).

Secure Copy (SCP) A method of transferring files between a remote client and a security device using the SSH protocol. The security device acts as an SCP server, accepting connections from SCP clients on remote hosts.

Secure Hash Algorithm-1 (SHA-1) An algorithm that produces a 160-bit hash from a message of arbitrary length. (It is generally regarded as more secure than MD5 because of the larger hashes it produces.)

Secure Shell (SSH) A protocol that allows device administrators to remotely manage the device in a secure manner. You can run either an SSH version 1 or version 2 server on the security device.

Security Association (SA) A unidirectional agreement between the VPN participants regarding the methods and parameters to use in securing a communication channel. For bidirectional communications, there must be at least two SAs, one for each direction. The VPN participants negotiate and agree to Phase 1 and Phase 2 SAs during an AutoKey IKE negotiation. *See also* Security Parameters Index (SPI).

Security Parameters Index (SPI) A hexadecimal value that uniquely identifies each tunnel. It also tells the security device which key to use to decrypt packets.

Security Zone A security zone is a collection of one or more network segments requiring the regulation of inbound and outbound traffic via policies.

Session Description Protocol (SDP) SDP session descriptions appear in many SIP messages and provide information that a system can use to join a multimedia session. SDP might include information such as IP addresses, port numbers, times, dates, and information about the media stream.

Session Initiation Protocol (SIP) SIP is an Internet Engineering Task Force (IETF)-standard protocol for initiating, modifying, and terminating multimedia sessions over the Internet. Such sessions might include conferencing, telephony, or multimedia, with features such as instant messaging and application-level mobility in network environments.

Service Set Identifier (SSID) A 32-character unique identifier attached to the header of packets sent over a wireless local area network (WLAN), which acts as a password when a mobile device tries to connect to the basic service set (BSS). The SSID differentiates one WLAN from another, so all access points and all devices attempting to connect to a specific WLAN must use the same SSID. A device will not be permitted to join the BSS unless it can provide the unique SSID. *See also* Basic Service Set (BSS).

Serving GPRS Support Node (SGSN) Connects one or more base station controllers (BSCs) to the GPRS backbone network, providing IP connectivity to the Gateway GPRS Support Node (GGSN).

Shared Distribution Tree A multicast distribution tree where the source transmits the multicast traffic to the rendezvous point (RP), which then forwards the traffic downstream to receivers on the distribution tree.

Shortest Path Tree (SPT) A multicast distribution tree where the source is at the root of the tree and it forwards multicast data downstream to each receiver. This is also referred to as a *source-specific tree.*

Signaling Message GPRS Tunneling Protocol (GTP) signaling messages are exchanged between GPRS Support Node (GSN) pairs in a path. The messages are used to transfer GSN capability information between GSN pairs and to create, update, and delete GTP tunnels. *See* G-PDU.

Signal-to-Noise Ratio (SNR) The ratio of the amplitude of a desired analog or digital data signal to the amplitude of noise in a transmission channel at a specific time SNR is typically expressed logarithmically in decibels (dB).

Source-Based Routing (SBR) You can configure a virtual router on a security device to forward traffic based on the source address of the data packet instead of just the destination address.

Source Interface-Based Routing (SIBR) SIBR allows the security device to forward traffic based on the source interface (the interface on which the data packet arrives on the security device).

SSID *See* Service Set Identifier (SSID).

Static Routing User-defined routes that cause packets moving between a source and a destination to take a specified path. Static routing algorithms are table mappings established by the network administrator prior to the beginning of routing. These mappings do not change unless the network administrator alters them. Algorithms that use static routes are simple to design and work well in environments where network traffic is relatively predictable and where network design is relatively simple.

The software remembers static routes until you remove them. However, you can override static routes with dynamic routing information through judicious assignment of administrative distance values. To do this, you must ensure that the administrative distance of the static route is higher than that of the dynamic protocol.

Subinterface A logical division of a physical interface that borrows the bandwidth it needs from the physical interface from which it stems. A subinterface is an abstraction that functions identically to an interface for a physically present port and is distinguished by 802.1Q VLAN tagging.

Subnet Mask In larger networks, the subnet mask lets you define subnetworks. For example, if you have a class B network, a subnet mask of 255.255.255.0 specifies that the first two portions of the decimal dot format are the network ID, while the third portion is a subnet ID. The fourth portion is the host ID. If you do not want to have a subnet on a class B network, you would use a subnet mask of 255.255.0.0. A network can be subnetted into one or more physical networks which form a subset of the main network. The subnet mask is the part of the IP address which is used to represent a subnetwork within a network. Using subnet masks allows you to use network address space which is normally unavailable and ensures that network traffic does not get sent to the whole network unless intended. *See also* IP Address; Netmask.

Syslog A protocol that enables a device to send log messages to a host running the syslog daemon (syslog server). The syslog server then collects and stores these log messages locally.

T1 interface Physical WAN interface for transmitting digital signals in the T-carrier system, used in North America and Japan. I usually a dedicated phone connection supporting data rates of 1.544 Mbps. This interface is also known as DS1.

T3 interface Physical WAN interface for transmitting digital signals in the T-carrier system, used in North America and Japan. A dedicated phone connection supporting data rates of about 43 Mbps. This interface is also known as DS3.

TEID *See* Tunnel Endpoint Identifier (TEID).

TID *See* Tunnel Identifier (TID).

Three-Way Handshake A Transmission Control Protocol (TCP) connection is established with a triple exchange of packets known as a three-way handshake: A sends a synchronize (SYN) packet to B, B responds with a synchronize/acknowledge (SYN/ACK) packet, and A responds with an acknowledge (ACK) packet.

T-PDU The payload that is tunneled in the GPRS Tunneling Protocol (GTP) tunnel.

Transmission Control Protocol/Internet Protocol (TCP/IP) A set of communication protocols that supports peer-to-peer connectivity functions both for Local Area Networks (LANs) and for Wide Area Networks (WANs). TCP/IP controls how data is transferred between computers on the Internet. See *Communication Protocols*.

Trunk Port A trunk port allows a switch to bundle traffic from several VLANs through a single physical port, sorting the various packets by the VLAN identifier (VID) in their frame headers.

Trust Zone One of two security zones that enables packets to be secured from being seen by devices external to your current security domain.

Tunnel Endpoint Identifier (TEID) Uniquely identifies a tunnel endpoint in the receiving GTP-U or GTP-C protocol entity. The receiving end side of a GPRS Tunneling Protocol (GTP) tunnel locally assigns the TEID value that the transmitting side has to use. The TEID values are exchanged between tunnel endpoints using GTP-C messages. *See also* GPRS Tunneling Protocol (GTP); GTP-Control (GTP-C) Message; GTP Tunnel; GTP-User (GTP-U) Message.

Tunnel Identifier (TID) Packets traveling along the GPRS backbone are wrapped inside an additional addressing layer to form GPRS Tunneling Protocol (GTP) packets. Each GTP packet then carries a TID. *See also G*lobal System for Mobile Communication (GSM).

Tunneling A method of data encapsulation. With Virtual Private Network (VPN) tunneling, a mobile professional dials into a Point of Presence (POP) of a local Internet Service Provider (ISP) instead of dialing directly into a corporate network. This means that no matter where mobile professionals are located, they can dial a local ISP that supports VPN tunneling technology and gain access to their corporate network, incurring only the cost of a local telephone call. When remote users dial into their corporate network using an ISP that supports VPN tunneling, the remote user as well as the organization knows that it is a secure connection. All remote dial-in users are authenticated by an authenticating server at the ISP's site and then again by another authenticating server on the corporate network. This means that only authorized remote users can access their corporate network and that they can access only the hosts that they are authorized to use.

Tunnel Interface The opening, or doorway, through which traffic to or from a VPN tunnel passes. A tunnel interface can be numbered (that is, assigned an IP address) or unnumbered. A numbered tunnel interface can be in either a tunnel zone or security zone. An unnumbered tunnel interface can only be in a security zone that contains at least one security zone interface. The unnumbered tunnel interface borrows the IP address from the security zone interface.

Tunnel Zone A tunnel zone is a logical segment that hosts one or more tunnel interfaces. A tunnel zone is associated with a security zone that acts as its carrier.

Uniform Resource Locator (URL) A standard method developed for specifying the location of a resource available electronically. Also referred to as a *location* or an *address*, a URL specifies the location of files on servers. A general URL has the syntax *protocol://address*. For example, http://www.juniper.net/support/manuals.html specifies that the protocol is HTTP and that the address is www.juniper.net/support/manuals.html.

Unshielded Twisted Pair (UTP) *See* 10BaseT. *See also* 100BaseT.

Universal Serial Bus (USB) An external bus standard that supports data transfer rates of 12 Mbps.

Untrust Zone One of two security zones that enables packets to be seen by devices external to your current security domain.

User Datagram Protocol (UDP) A protocol in the TCP/IP protocol suite that allows an application program to send datagrams to other application programs on a remote machine. UDP provides an unreliable and connectionless datagram service where delivery and duplicate detection are not guaranteed. It does not use acknowledgments or control the order of arrival.

V.92 modem A dial-up modem specification from the International Telecommunications Union (ITU) that introduces new features providing convenience and performance for the modem user.

Virtual Adapter The TCP/IP settings [Internet Protocol (IP) address, Domain Name System (DNS) server addresses, and Windows Internet Naming Service (WINS) server addresses] that a security device assigns to a remote XAuth user for use in a VPN connection.

Virtual IP (VIP) Address A VIP address maps traffic received at one IP address to another address based on the destination port number in the packet header.

Virtual Link A logical path from a remote OSPF area to the backbone area.

Virtual Local Area Network (VLAN) A logical rather than physical grouping of devices that constitutes a single broadcast domain. VLAN members are not identified by their location on a physical subnetwork but through the use of tags in the frame headers of their transmitted data. VLANs are described in the IEEE 802.1Q standard.

Virtual Private Network (VPN) A simple, cost-effective, and secure way for corporations to provide telecommuters and mobile professionals with local dial-up access to their corporate network or to another Internet Service Provider (ISP). Secure private connections over the Internet are more cost-effective than dedicated private lines. VPNs are possible because of technologies and standards such as tunneling, screening, encryption, and IPSec.

Virtual Router The component of ScreenOS that performs routing functions. By default, a security device supports two virtual routers: Untrust-VR and Trust-VR.

Virtual Security Device (VSD) A single logical device comprising a set of physical security devices.

Virtual Security Interface (VSI) A logical entity at Layer 3 that is linked to multiple Layer 2 physical interfaces in a Virtual Security Device (VSD) group. The VSI binds to the physical interface of the device acting as master of the VSD group. The VSI shifts to the physical interface of another device in the VSD group if there is a failover, and it becomes the new master.

Virtual System (vsys) A subdivision of the main system that appears to the user to be a standalone entity. Virtual systems reside separately from each other in the same security device. Each one can be managed by its own virtual system administrator.

WebTrends A product offered by NetIQ that supports the creation of customized reports based on the logs generated by a security device. WebTrends enables information to be displayed graphically.

WEP *See* Wired Equivalent Privacy (WEP).

Wi-Fi Protected Access (WPA) A Wi-Fi standard designed to improve upon the security features of Wired Equivalent Privacy (WEP).

Wired Equivalent Privacy (WEP) Encrypts and decrypts data as it travels over the wireless link with the Rivest Cipher 4 (RC4) stream cipher algorithm.

Wireless access point (AP) A hardware device that acts as a communication hub for wireless clients to connect to a wired LAN.

Wireless local area network (WLAN) A type of local-area network that uses high-frequency radio waves rather than wires to communicate between nodes.

WPA *See* Wi-Fi Protected Access (WPA).

Windows Internet Naming Service (WINS) A service for mapping Internet Protocol (IP) addresses to NetBIOS computer names on Windows NT server-based networks. A WINS server maps a NetBIOS name used in a Windows network environment to an IP address used on an IP-based network.

XAuth A protocol comprising two components: remote VPN user authentication (username plus password) and TCP/IP address assignments (IP address, netmask, DNS server, and WINS server assignments).

Zone A segment of network space to which security measures are applied (a security zone), a logical segment to which a VPN tunnel interface is bound (a tunnel zone), or either a physical or a logical entity that performs a specific function (a function zone).

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