

# Comprehensive Email Filtering: Barracuda Spam Firewall Safeguards Legitimate Email

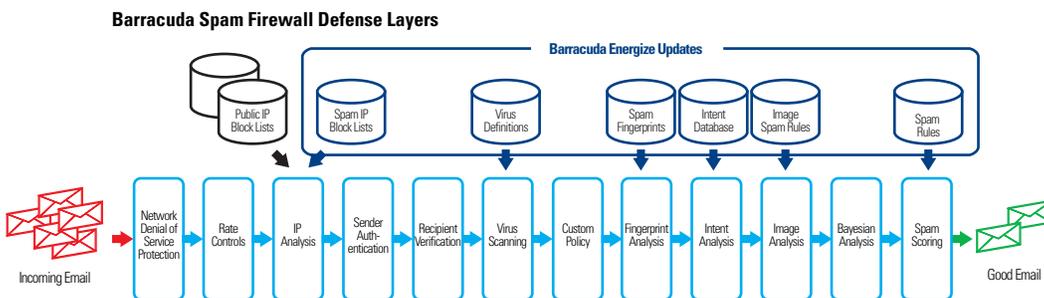
Email has undoubtedly become a valued communications tool among organizations worldwide. With frequent virus attacks and the alarming influx of spam, email loses the efficiency to communicate. The Radicati Group, a market research firm in Palo Alto, California, predicts that by 2009, there will be 228 billion spam messages each day, representing the vast majority of email traffic on the Internet. Spam is no longer a simple annoyance; it is a significant security issue and a massive drain on financial resources.

This is simply astounding and unacceptable. It's time to take control of spam.

## Filtering Email in Two Advanced Processes

Today, there are a number of solutions designed to help alleviate the spam problem. Barracuda Networks designed the affordable Barracuda Spam Firewall as an easy-to-use, enterprise-class hardware and software solution for businesses of all sizes that comprehensively evaluates each email, using two main classes of sophisticated algorithms and techniques: Connection Management and Mail Scanning.

During the connection management process, emails are filtered through five defense layers to verify authenticity of envelope information, and any inappropriate incoming mail connections are dropped even before receiving the message. Any emails that survive the connection verification process must then undergo a thorough mail scanning process that involves an additional seven defense layers of message analysis. The algorithms and techniques used by the Barracuda Spam Firewall are continuously updated via the hourly Barracuda Energize Updates service to stay ahead of spam trends as they emerge.



## Connection Management

The Connection Management process generally requires less processing time. For the average small or medium business, more than half of the total email volume can be blocked through Connection Management techniques. Extremely large Internet Service Providers (ISPs) or even small Web hosts, while under attack, may observe block rates at the Connection Management layers exceeding 99 percent of total email volume.

## Network Denial of Service Protection

Built on a hardened and secure operating system, the Barracuda Spam Firewall receives email on behalf of the organization, insulating the organization's email server from receiving direct Internet connections and the associated threats.

RELEASE 1  
FEBRUARY 2007

### Spam History

Spam is one form of abuse of the Simple Mail Transfer Protocol (SMTP), which is implemented in email systems on the basis of RFC 524. First proposed in 1973, RFC 524 was developed during a time when computer security was not a significant concern. As such, RFC 524 is no longer a secure command set, making it and SMTP susceptible to abuse.

Most spam-making tools exploit the security holes in SMTP. They do this by forging email headers, disguising sender addresses, and hiding the sending system, such that it becomes difficult or even impossible to identify the true sender.

To address some of SMTP's security holes, enhancement protocols to the venerable SMTP have been proposed. Most of these enhancement protocols involve features to accurately identify the sender before accepting the email. However, it would be difficult for these new protocols to be widely adopted because anyone who implements the new protocol would only be able to accept email from others who have also implemented the new protocol. So, without a more secure SMTP in the near future, spam will continue to be a problem, driving organizations to seek out effective spam-blocking solutions.

## Rate Controls

Automated spam software can be used to send large amounts of email to a single email server. To protect the email infrastructure from these flood-based attacks, the Barracuda Spam Firewall counts the number of incoming connections from a particular IP address and throttles the connections once a particular threshold is exceeded.

Organizations that relay email through known servers or communicate frequently with known partners can and should add the IP addresses of those trusted relays and good email servers to the Rate Control exemption list.

## IP Analysis

After applying Rate Controls based on IP addresses, the Barracuda Spam Firewall performs analysis to determine IP reputation.

- **Customer-defined policy for allowed IP addresses.** Administrators can define a list of trusted email servers by IP address. By adding IP addresses to this list, administrators can avoid spam scanning of good email, both reducing processing requirements and eliminating the chances of false positives.

- **Customer-defined policy for blocked IP addresses.** Administrators can also define a list of known, bad email senders. In general, administrators need not enter blacklists of spam senders, as these are typically added to the Barracuda Blacklist Service by Barracuda Central. In some cases, administrators may choose to utilize the IP block lists to restrict specific email servers as a matter of policy rather than as a matter of spam protection.

- **Barracuda Reputation.** Barracuda Reputation is maintained by Barracuda Central and includes two lists of IP addresses: recognized good senders and identified spammers. Updates to the Barracuda Reputation database are delivered to the Barracuda Spam Firewall via the Barracuda Energize Updates service.

- **External block lists.** Administrators can take advantage of external block lists, also known as real-time block lists (RBLs) or DNS block lists (DNSBLs). Several organizations, such as spamhaus.org, maintain external block lists.

In general, external blacklists take precedence over subsequent allow lists (“whitelists”) for the sender email address or domain, recipient, headers or message body. The Barracuda Spam Firewall does offer an option to delay RBL checks so that subsequent allow lists can take precedence over external block lists.

## Sender Authentication

Declaring an invalid “from” address is a common practice by spammers. The Barracuda Spam Firewall utilizes a number of techniques to both validate the sender as well as apply policy.

- **Protocol compliance.** First and foremost, the sender is validated for being specified properly. Examples of enforcement policies include, forcing RFC 821 compliance or requiring fully-qualified domain names.

- **DNS lookup.** To prevent senders from faking a “from” domain, a DNS lookup is performed on the sender domain to ensure that the domain exists.

**IP Address:** A unique identifier for a computer or device on a TCP/IP network. Networks using the TCP/IP protocol route messages based on the IP address of the destination.

**False Positive:** A legitimate email that is accidentally identified as spam

**Barracuda Central:** An advanced technology center at Barracuda Networks, consisting of highly trained engineers that monitor the latest Internet threats and develop mitigation strategies. As new forms of spam emerge, Barracuda Central is quick to respond to early outbreaks and delivers the latest spam definitions through Barracuda Energize Updates.

**Barracuda Energize Updates:** A subscription service that automatically provides the latest spam-blocking techniques, lists of known spammers, and spam and virus definitions for the Barracuda Spam Firewall from the engineers at Barracuda Central. Updates are delivered on an hourly basis to ensure all Barracuda Spam Firewalls are equipped with the latest definitions and the most comprehensive protection.

**Domain Name System (DNS):** A DNS stores and associates many types of information with domain names (computer hostnames), and most importantly, translates domain names to IP addresses.

**Vanity Domain Names:** Domain names that are typically registered to individuals or families for the use of email. They typically do not have their own email server, but share an email server with a hosting company.

- **Sender spoof protection.** The Barracuda Spam Firewall has the option to prevent “spoofing” of an organization’s own domain by disallowing emails using that domain name to be sent from outside the organization. Note that sender spoof protection should not be enabled if the organization sends messages from outside their internal email infrastructure (e.g., in the case of marketing bulk-mail services).

- **Custom policies.** Organizations can define their own allowed sender domains or email addresses. They can also define their own block lists based on sender domains or email addresses. Note that allow lists override block lists.

- **Sender policy framework (SPF).** SPF is a proposed standard with growing momentum, designed to prevent spoofing of email domains. SPF provides a means for organizations to declare their known email servers in their DNS records so that email recipients can validate the identity of the sender domain based on the IP address of the sending email server. The Barracuda Spam Firewall enables email administrators to block or tag messages on failed SPF checks.

### Recipient Verification

Many spammers attack email infrastructures by harvesting email addresses. The Barracuda Spam Firewall verifies the validity of recipient email addresses through multiple techniques.

- **Protocol compliance.** Similar to Sender Authentication, a recipient is first validated for being specified properly. An example of an enforcement policy includes, forcing RFC 821 compliance.

- **Custom policies.** Organizations can define their policies based on allowed recipient email addresses for which spam scanning should be disabled. They can also define their own block lists based on email addresses. Note that allow lists override block lists.

- **LDAP recipient verification.** Customers of Barracuda Spam Firewall models 300 and higher can choose to reject messages if the recipient email addresses do not appear in the LDAP directory.

- **SMTP recipient verification.** By default, the Barracuda Spam Firewall rejects messages if the downstream mail server does not accept mail for that recipient.

### Mail Scanning

As spammers become more sophisticated, Mail Scanning techniques equally grow in their importance.

### Virus Scanning

The most basic level of Mail Scanning is virus scanning. The Barracuda Spam Firewall utilizes two layers of virus scanning and automatically decompresses archives for comprehensive protection.

Virus Scanning takes precedence over all other Mail Scanning techniques, and is applied even when mail passes through the Connection Management layers. As such, even email coming from “whitelisted” IP addresses, sender domains, sender email addresses or recipients are still scanned for viruses and blocked if a virus is detected.

### Custom Policy

Administrators can choose to define their own policies, perhaps for compliance or governance reasons, which take precedence over spam blocking rules delivered to the system automatically through Barracuda Energize Updates. The Barracuda Spam Firewall enables administrators to set custom content filters based on the subject, message headers, message bodies and attachment file type.

In general, administrators do not need to set their own filters for the purposes of blocking spam, as these forms of rules are delivered to Barracuda Spam Firewalls automatically through Barracuda Energize Updates.

**Spoofing or Spoofing Attack:** A spoofing attack is a situation where one person or program, successfully masquerades as another by falsifying data and thereby gains an illegitimate advantage. Spoofing is often used in spam attacks to forge sender email addresses.

**Sender Policy Framework (SPF):** SPF is an extension to SMTP that helps prevent sender forgery. It is also a free, open standard.

**Lightweight Directory Access Protocol (LDAP):** LDAP is a networking protocol for querying and modifying directory services running over TCP/IP.

## Fingerprint Analysis

A message "fingerprint" is based on commonly used message components (e.g., an image) across many instances of spam. Fingerprint analysis is often as a useful mechanism to block future instances of spam once an early outbreak is identified.

Engineers at Barracuda Central work around the clock to identify new spam fingerprints which are then updated on all Barracuda Spam Firewalls through hourly Barracuda Energize Updates.

## Intent Analysis

All spam messages have an "intent" – to get a user to reply to an e-mail, visit a Web site or call a phone number. Intent analysis involves researching email addresses, Web links and phone numbers embedded in email messages to determine whether they are associated with legitimate entities. Frequently, Intent Analysis is the defense layer that catches phishing attacks. The Barracuda Spam Firewall features multiple forms of Intent Analysis.

- **Intent analysis.** Markers of intent, such as URLs, are extracted and compared against a database maintained by Barracuda Central, and then delivered to the Barracuda Spam Firewall via hourly Barracuda Energize Updates.
- **Real-time intent analysis.** For new domain names that may come into use, Real-Time Intent Analysis involves performing DNS lookups against known URL block lists.
- **Multilevel intent analysis.** Use of free Web sites to redirect to known spammer Web sites is a growing practice used by spammers to hide or obfuscate their identity from mail scanning techniques such as Intent Analysis. Multilevel Intent Analysis involves inspecting the results of Web queries to URLs of well-known free Web sites for redirections to known spammer sites.

## Image Analysis

Today, image spam represents about one third of all traffic on the Internet. While Fingerprint Analysis captures a significant percentage of images after they have been seen, the Barracuda Spam Firewall also uses Image Analysis techniques which protect against new image variants. These techniques, include:

- **Optical character recognition (OCR).** Embedding text in images is a popular spamming practice to avoid text processing in anti-spam engines. OCR enables the Barracuda Spam Firewall to analyze the text rendered inside the images.
- **Image processing.** To mitigate attempts by spammers to foil OCR through speckling, shading or color manipulation, the Barracuda Spam Firewall also utilizes a number of lightweight image processing technologies to normalize the images prior to the OCR phase. More heavyweight image processing algorithms are utilized at Barracuda Central to quickly generate fingerprints that can be used by Barracuda Spam Firewalls to block messages.
- **Animated GIF analysis.** In addition, the Barracuda Spam Firewall contains specialized algorithms for analyzing animated GIFs for suspect content.

## Bayesian Analysis

Bayesian Analysis is a linguistic algorithm that profiles language used in both spam messages and legitimate email for any particular user or organization. To determine the likelihood that a new email is spam, Bayesian Analysis compares the words and phrases used in the new email against the corpus of previously identified email.

The Barracuda Spam Firewall only uses Bayesian Analysis, after administrators or users profile a corpus of at least 200 legitimate messages and 200 spam messages.

**Mail Hash or Message Digest:** A number generated from a string of text. The hash is substantially smaller than the text itself, and is generated by a formula in such a way that it is extremely unlikely that a different set of text would produce the same hash value.

**Phishing:** Phishing is a criminal activity where phishers attempt to fraudulently acquire sensitive information, such as passwords and credit card details, by masquerading as a trustworthy person or business in an electronic communication.

**Bayesian Analysis: A technique used for identifying spam.** Named after Thomas Bayes, a mathematician who developed a theory of probability inference, this technique analyzes each message based on the statistical frequency of word occurrence of a user's previous email activity to determine if the message is spam or legitimate.

## Spam Scoring

Beyond absolute blocks that a single filter can apply, the Barracuda Spam Firewall also includes a sophisticated scoring engine that weighs multiple factors where a single filter may result into restrictive policy. By combining multiple rules with known weightings, the Barracuda Spam Firewall can deliver a strong confidence interval for spam messages.

The Barracuda Spam Firewall enables administrators to set global spam scores. Certain models of the Barracuda Spam Firewall also support per domain and per user thresholds.

*For more information about the Barracuda Spam Firewall or to request a 30-day evaluation unit, please contact your regional Barracuda Networks sales representative.*

## About the Barracuda Spam Firewall

The Barracuda Spam Firewall is available in six models and supports from 1,000 to 30,000 active users with no per user licensing fees. The Barracuda Spam Firewall can be installed in front of the email server in typically less than five minutes and is automatically updated hourly to block new forms of spam and viruses. Its architecture leverages open source spam and virus solutions in conjunction with twelve defense layers. In addition, the entire Barracuda Spam Firewall line features simultaneous inbound and outbound email filtering with the inclusion of sophisticated outbound email filtering techniques such as rate controls, domain restrictions, user authentication (SASL), keyword and attachment blocking, dual layer virus blocking and remote user support for outbound email filtering. The Barracuda Spam Firewall's layered approach minimizes the processing of each email, which yields the performance required to process millions of messages per day. Unlike software solutions, the Barracuda Spam Firewall reduces the load placed on the email server by off-loading both spam and virus filtering. Barracuda Networks also offers the Energize Update subscription service to automatically update the Barracuda Spam Firewall with the latest spam rules and virus definitions.

## About Barracuda Networks, Inc.

Barracuda Networks is the leading provider of enterprise-class application security appliances for comprehensive email, Internet and IM protection. Its products protect more than 40,000 customers around the world, including Adaptec, Caltrans, CBS, Georgia Institute of Technology, IBM, NASA, Pizza Hut, Union Pacific Railroad Company, and the U.S. Treasury Department. The Barracuda Spam Firewall and Barracuda Spam Firewall - Outbound protect organizations against spam, viruses, and violations to e-mail security policy. The Barracuda Web Filter offers comprehensive content filtering and complete network protection against spyware, malware and viruses. The Barracuda IM Firewall is the only all in one gateway solution for IM traffic management and security. Barracuda Networks is a privately held company with headquarters in Mountain View, California. Barracuda Networks has offices in eight international locations and distributors in over 43 countries. More information is available at [www.barracuda.com](http://www.barracuda.com).