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DON'T SPEW  
A Set of Guidelines for Mass Unsolicited  
Mailings and Postings (spam\*)

Status of this Memo

This memo provides information for the Internet community. It does not specify an Internet standard of any kind. Distribution of this memo is unlimited.

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Abstract

This document explains why mass unsolicited electronic mail messages are harmful in the Internetworking community. It gives a set of guidelines for dealing with unsolicited mail for users, for system administrators, news administrators, and mailing list managers. It also makes suggestions Internet Service Providers might follow.

1. Introduction

The Internet's origins in the Research and Education communities played an important role in the foundation and formation of Internet culture. This culture defined rules for network etiquette (netiquette) and communication based on the Internet's being relatively off-limits to commercial enterprise.

This all changed when U.S. Government was no longer the primary funding body for the U.S. Internet, when the Internet truly went global, and when all commercial enterprises were allowed to join what had been strictly research networks. Internet culture had become deeply embedded in the protocols the network used. Although the social context has changed, the technical limits of the Internet protocols still require a person to enforce certain limits on resource usage for the 'Net to function effectively. Strong authentication was not built into the News and Mail protocols. The only thing that is saving the Internet from congestion collapse is the voluntary inclusion of TCP backoff in almost all of the TCP/IP

driver code on the Internet. There is no end-to-end cost accounting and/or cost recovery. Bandwidth is shared among all traffic without resource reservation (although this is changing).

Unfortunately for all of us, the culture so carefully nurtured through the early years of the Internet was not fully transferred to all those new entities hooking into the bandwidth. Many of those entities believe they have found a paradise of thousands of potential customers each of whom is desperate to learn about stunning new business opportunities. Alternatively, some of the new netizens believe all people should at least hear about the one true religion or political party or process. And some of them know that almost no one wants to hear their message but just can't resist how inexpensive the net can be to use. While there may be thousands of folks desperate for any potential message, mass mailings or Netnews postings are not at all appropriate on the 'Net.

This document explains why mass unsolicited email and Netnews posting (aka spam) is bad, what to do if you get it, what webmasters, postmasters, and news admins can do about it, and how an Internet Service Provider might respond to it.

## 2. What is Spam\*?

The term "spam" as it is used to denote mass unsolicited mailings or netnews postings is derived from a Monty Python sketch set in a movie/tv studio cafeteria. During that sketch, the word "spam" takes over each item offered on the menu until the entire dialogue consists of nothing but "spam spam spam spam spam spam and spam." This so closely resembles what happens when mass unsolicited mail and posts take over mailing lists and netnews groups that the term has been pushed into common usage in the Internet community.

When unsolicited mail is sent to a mailing list and/or news group it frequently generates more hate mail to the list or group or apparent sender by people who do not realize the true source of the message. If the mailing contains suggestions for removing your name from a mailing list, 10s to 100s of people will respond to the list with "remove" messages meant for the originator. So, the original message (spam) creates more unwanted mail (spam spam spam spam), which generates more unwanted mail (spam spam spam spam spam spam and spam). Similar occurrences are perpetrated in newsgroups, but this is held somewhat in check by "cancelbots" (programs which cancel postings) triggered by mass posting. Recently, cancelbots have grown less in favor with those administering News servers since the cancelbots are now generating the same amount of traffic as spam. Even News admins are beginning to use filters, demonstrating that spam spam spam spam spam spam and spam is a monumental problem.

### 3. Why Mass Mailing is Bad

In the world of paper mail we're all used to receiving unsolicited circulars, advertisements, and catalogs. Generally we don't object to this - we look at what we find of interest, and we discard/recycle the rest. Why should receiving unsolicited email be any different?

The answer is that the cost model is different. In the paper world, the cost of mailing is borne by the sender. The sender must pay for the privilege of creating the ad and the cost of mailing it to the recipient. An average paper commercial mailing in the U.S. ends up costing about \$1.00 per addressee. In the world of electronic communications, the recipient bears the majority of the cost. Yes, the sender still has to compose the message and the sender has to pay for Internet connectivity. However, the recipient ALSO has to pay for Internet connectivity and possibly also connect time charges and for disk space. For electronic mailings the recipient is expected to help share the cost of the mailing. Bulk Internet mail from the U.S. ends up costing the sender only about 1/100th of a cent per address; or FOUR ORDERS of magnitude LESS than bulk paper mailings!

Of course, this cost model is very popular with those looking for cheap methods to get their message out. By the same token, it's very unpopular with people who have to pay for their messages just to find that their mailbox is full of junk mail. Neither do they appreciate being forced to spend time learning how to filter out unwanted messages. Consider this: if you had to pay for receiving paper mail would you pay for junk mail?

Another consideration is that the increase in volume of spam will have an impact on the viability of electronic mail as a communications medium. If, when you went to your postal mail box you found four crates of mail, would you be willing to search through the crates for the one or two pieces of mail which were not advertising? Spam has a tremendous potential to create this scenario in the electronic world.

Frequently spammers indulge in unethical behavior such as using mail servers which allow mail to be relayed to send huge amounts of electronic solicitations. Or they forge their headers to make it look as if the mail originates from a different domain. These people don't care that they're intruding into a personal or business mailbox nor do they care that they are using other people's resources without compensating them.

The huge cost difference has other bad effects. Since even a very cheap paper mailing is going to cost tens of (U.S.) cents there is a real incentive to send only to those really likely to be interested.

So paper bulk mailers frequently pay a premium to get high quality mailing lists, carefully prune out bad addresses and pay for services to update old addresses. Bulk email is so cheap that hardly anyone sending it bothers to do any of this. As a result, the chance that the receiver is actually interested in the mail is very, very, very low.

As of the date of this document, it is a daily event on the Internet for a mail service to melt-down due to an overload of spam. Every few months this happens to a large/major/regional/national/international service provider resulting in denial of or severe degradation of service to hundreds of thousands of users. Such service degradations usually prompt the providers to spend hundreds of thousands of dollars upgrading their mail service equipment just because of the volume of spam. Service providers pass those costs on to customers.

Doesn't the U.S. Constitution guarantee the ability to say whatever one likes? First, the U.S. Constitution is law only in the U.S., and the Internet is global. There are places your mail will reach where free speech is not a given. Second, the U.S. Constitution does NOT guarantee one the right to say whatever one likes. In general, the U.S. Constitution refers to political freedom of speech and not to commercial freedom of speech. Finally, and most importantly, the U.S. Constitution DOES NOT guarantee the right to seize the private property of others in order to broadcast your speech. The Internet consists of a vast number of privately owned networks in voluntary cooperation. There are laws which govern other areas of electronic communication, namely the "junk fax" laws. Although these have yet to be applied to electronic mail they are still an example of the "curbing" of "free speech." Free speech does not, in general, require other people to spend their money and resources to deliver or accept your message.

Most responsible Internet citizens have come to regard unsolicited mail/posts as "theft of service". Since the recipient must pay for the service and for the most part the mail/posts are advertisements of unsolicited "stuff" (products, services, information) those receiving it believe that the practice of making the recipient pay constitutes theft.

The crux of sending large amounts of unsolicited mail and news is not a legal issue so much as an ethical one. If you are tempted to send unsolicited "information" ask yourself these questions: "Whose resources is this using?" "Did they consent in advance?" "What would happen if everybody (or a very large number of people) did this?" "How would you feel if 90% of the mail you received was advertisements for stuff you didn't want?" "How would you feel if 95%

of the mail you received was advertisements for stuff you didn't want?" "How would you feel if 99% of the mail you received was advertisements for stuff you didn't want?"

Although numbers on the volume and rate of increase of spam are not easy to find, seat-of-the-pants estimates from the people on spam discussion mailing lists [1] indicate that unsolicited mail/posts seems to be following the same path of exponential growth as the Internet as a whole [2]. This is NOT encouraging, as this kind of increase puts a strain on servers, connections, routers, and the bandwidth of the Internet as a whole. On a per person basis, unsolicited mail is also on the increase, and individuals also have to bear the increasing cost of increasing numbers of unsolicited and unwanted mail. People interested in hard numbers may want to point their web browsers to <http://www.techweb.com/se/directlink.cgi?INW19980504S0003> where Internet Week reports what spam costs.

Finally, sending large volumes of unsolicited email or posting voluminous numbers of Netnews postings is just plain rude. Consider the following analogy: Suppose you discovered a large party going on in a house on your block. Uninvited, you appear, then join each group in conversation, force your way in, SHOUT YOUR OPINION (with a megaphone) of whatever you happen to be thinking about at the time, drown out all other conversation, then scream "discrimination" when folks tell you you're being rude.

To continue the party analogy, suppose instead of forcing your way into each group you stood on the outskirts a while and listened to the conversation. Then you gradually began to add comments relevant to the discussion. Then you began to tell people your opinion of the issues they were discussing; they would probably be less inclined to look badly on your intrusion. Note that you are still intruding. And that it would still be considered rude to offer to sell products or services to the guests even if the products and services were relevant to the discussion. You are in the wrong venue and you need to find the right one.

Lots of spammers act as if their behavior can be forgiven by beginning their messages with an apology, or by personalizing their messages with the recipient's real name, or by using a number of ingratiating techniques. But much like the techniques used by Uriah Heep in Dickens' David Copperfield, these usually have an effect opposite to the one intended. Poor excuses ("It's not illegal," "This will be the only message you receive," "This is an ad," "It's easy to REMOVE yourself from our list") are still excuses. Moreover, they are likely to make the recipient MORE aggravated rather than

less aggravated.

In particular, there are two very severe problems with believing that a "remove" feature to stop future mail helps: (1) Careful tests have been done with sending remove requests for "virgin" email accounts (that have never been used anywhere else). In over 80% of the cases, this resulted in a deluge of unsolicited email, although usually from other sources than the one the remove was sent to. In other words, if you don't like unsolicited mail, you should think carefully before using a remove feature because the evidence is that it will result in more mail not less. (2) Even if it did work, it would not stop lots of new unsolicited email every day from new businesses that hadn't mailed before.

#### 4a. ACK! I've Been Spammed - Now What?

It's unpleasant to receive mail which you do not want. It's even more unpleasant if you're paying for connect time to download it. And it's really unpleasant to receive mail on topics which you find offensive. Now that you're good and mad, what's an appropriate response?

First, you always have the option to delete it and get on with your life. This is the easiest and safest response. It does not guarantee you won't get more of the same in the future, but it does take care of the current problem. Also, if you do not read your mail on a regular basis it is possible that your complaint is much too late to do any good.

Second, consider strategies that take advantage of screening technology. You might investigate technologies that allow you to filter unwanted mail before you see it. Some software allows you to scan subject lines and delete unwanted messages before you download them. Other programs can be configured to download portions of messages, check them to see if they are advertising (for example) and delete them before the whole message is downloaded.

Also, your organization or your local Internet Service Provider may have the ability to block unwanted mail at their mail relay machines and thus spare you the hassle of dealing with it at all. It is worth inquiring about this possibility if you are the victim of frequent spam.

Your personal mailer software may allow you to write rules defining what you do and do not wish to read. If so, write a rule which sends mail from the originator of the unwanted mail to the trash. This will work if one sender or site repeatedly bothers you. You may also consider writing other rules based on other headers if you are sure

the probability of them being activated for non-spam is low enough. That way, although you may still have to pay to download it, you won't have to read it!

Third, you may consider sending the mail back to the originator objecting to your being on the mailing-list; however, we recommend against this. First, a lot of spammers disguise who they are and where their mail comes from by forging the mail headers. Unless you are very experienced at reading headers discovering the true origin of the mail will probably prove difficult. Although you can engage your local support staff to help you with this, they may have much higher priorities (such as setting up site-wide filters to prevent spam from entering the site). Second, responding to this email will simply verify your address as valid and make your address more valuable for other (ab)uses (as was mentioned above in Section 3). Third, even if the two previous things do not happen, very probably your mail will be directed to the computer equivalent of a black hole (the bit-bucket).

As of the writing of this document, there are several pieces of pending legislation in several jurisdictions about the sending of unsolicited mail and also about forging headers. If forging of headers should become illegal, then responding to the sender is less risky and may be useful.

Certainly we advocate communicating to the originator (as best as you can tell) to let them know you will NOT be buying any products from them as you object to the method they have chosen to conduct their business (aka spam). Most responses through media other than electronic mail (mostly by those who take the time to phone included "800" (free to calling party in the U.S.) phone numbers) have proved somewhat effective. You can also call the business the advertisement is for, ask to speak to someone in authority, and then tell them you will never buy their products or use their services because their advertising mechanism is spam.

Next, you can carbon copy or forward the questionable mail messages or news postings to your postmaster. You can do this by sending mail "To: Postmaster@your-site.example." Your postmaster should be an expert at reading mail headers and will be able to tell if the originating address is forged. He or she may be able to pinpoint the real culprit and help close down the site. If your postmaster wants to know about unsolicited mail, be sure s/he gets a copy, including headers. You will need to find out the local policy and comply.

## \*\*\* IMPORTANT \*\*\*

Wherever you send a complaint, be sure to include the full headers (most mail and news programs don't display the full headers by default). For mail it is especially important to show the "Received:" headers. For Usenet news, it is the "Path:" header. These normally show the route by which the mail or news was delivered. Without them, it's impossible to even begin to tell where the message originated. See the appendix for an example of a mail header.

There is lively and ongoing debate about the validity of changing one's email address in a Web Browser in order to have Netnews posts and email look as if it is originating from some spot other than where it does originate. The reasoning behind this is that web email address harvesters will not be getting a real address when it encounters these. There is reason on both sides of this debate: If you change your address, you will not be as visible to the harvesters, but if you change your address, real people who need to contact you will be cut off as well. Also, if you are using the Internet through an organization such as a company, the company may have policies about "forging" addresses - even your own! Most people agree that the consequences of changing your email address on your browser or even in your mail headers is fairly dangerous and will nearly guarantee your mail goes into a black hole unless you are very sure you know what you are doing.

Finally, DO NOT respond by sending back large volumes of unsolicited mail. Two wrongs do not make a right; do not become your enemy; and take it easy on the network. While the legal status of spam is uncertain, the legal status (at least in the U.S.) of a "mail bomb" (large numbers and/or sizes of messages to the site with the intent of disabling or injuring the site) is pretty clear: it is criminal.

There is a web site called "www.abuse.net" which allows you to register, then send your message to the name of the "offending-domain@abuse.net," which will re-mail your message to the best reporting address for the offending domain. The site contains good tips for reporting abuse netnews or email messages. It also has some automated tools that you may download to help you filter your messages. Also check CIAC bulletin I-005 at:

<http://ciac.llnl.gov/ciac/bulletins/i-005c.shtml>

or at:

<http://spam.abuse.net/spam/tools/mailblock.html>.



Check the Appendix for a detailed explanation of tools and methodology to use when trying to chase down a spammer.

#### 4b. There's a Spam in My Group!

Netnews is also subject to spamming. Here several factors help to mitigate against the propagation of spam in news, although they don't entirely solve the problem. Newsgroups and mailing lists may be moderated, which means that a moderator approves all mail/posts. If this is the case, the moderator usually acts as a filter to remove unwanted and off-topic posts/mail.

In Netnews there are programs which detect posts which have been sent to multiple groups or which detect multiple posts from the same source to one group. These programs cancel the posts. While these work and keep unsolicited posts down, they are not 100% effective and spam in newsgroups seems to be growing at an even faster rate than spam in mail or on mailing lists. After all, it's much easier to post to a newsgroup for which there are thousands of readers than it is to find individual email addresses for all those folks. Hence the development of the "cancelbots" (sometimes called "cancelmoose") for Netnews groups. Cancelbots are triggered when one message is sent to a large number of newsgroups or when many small messages are sent (from one sender) to the same newsgroup. In general these are tuned to the "Breibart Index" [3] which is a somewhat fuzzy measure of the interactions of the number of posts and number of groups. This is fuzzy purposefully, so that people will not post a number of messages just under the index and still "get away with it." And as noted above, the cancel messages have reached such a volume now that a lot of News administrators are beginning to write filters rather than send cancels. Still spam gets through, so what can a concerned netizen do?

If there is a group moderator, make sure s/he knows that off-topic posts are slipping into the group. If there is no moderator, you could take the same steps for dealing with news as are recommended for mail with all the same caveats.

A reasonable printed reference one might obtain has been published by O'Reilly and Associates, Stopping Spam, by Alan Schwartz and Simson Garfinkel [4]. This book also has interesting histories of spammers such as Cantor and Siegel, and Jeff Slaton. It gives fairly clear instructions for filtering mail and news.

## 5. Help for Beleaguered Admins

As a system administrator, news administrator, local Postmaster, or mailing-list administrator, your users will come to you for help in dealing with unwanted mail and posts. First, find out what your institution's policy is regarding unwanted/unsolicited mail. It is possible that it won't do anything for you, but it is also possible to use it to justify blocking a domain which is sending particularly offensive mail to your users. If you don't have a clear policy, it would be really useful to create one. If you are a mailing-list administrator, make sure your mailing-list charter forbids off-topic posts. If your internal-only newsgroups are getting spammed from the outside of your institution, you probably have bigger security problems than just spam.

Make sure that your mail and news transports are configured to reject messages injected by parties outside your domain. Recently misconfigured Netnews servers have become subject to hijacking by spammers. SMTP source routing <@relay.host:user@dest.host> is becoming deprecated due to its overwhelming abuse by spammers. You should configure your mail transport to reject relayed messages (when neither the sender nor the recipient are within your domain). Check:

<http://www.sendmail.org/>

under the "Anti-Spam" heading.

If you run a firewall at your site, it can be configured in ways to discourage spam. For example, if your firewall is a gateway host that itself contains an NNTP server, ensure that it is configured so it does not allow access from external sites except your news feeds. If your firewall acts as a proxy for an external news-server, ensure that it does not accept NNTP connections other than from your internal network. Both these potential holes have recently been exploited by spammers. Ensure that email messages generated within your domain have proper identity information in the headers, and that users cannot forge headers. Be sure your headers have all the correct information as stipulated by RFC 822 [5] and RFC 1123 [6].

If you are running a mailing-list, allowing postings only by subscribers means a spammer would actually have to join your list before sending spam messages, which is unlikely. Make sure your charter forbids any off-topic posts. There is another spam-related problem with mailing-lists which is that spammers like to retaliate on those who work against them by mass-subscribing their enemies to mailing-lists. Your mailing-list software should require confirmation of the subscription, and only then should the address be subscribed.

It is possible, if you are running a mail transfer agent that allows it, to block persistent offending sites from ever getting mail into your site. However, careful consideration should be taken before taking that step. For example, be careful not to block out sites for which you run MX records! In the long run, it may be most useful to

help your users learn enough about their mailers so that they can write rules to filter their own mail, or provide rules and kill files for them to use, if they so choose.

There is information about how to configure sendmail available at "www.sendmail.org." Help is also available at "spam.abuse.net."

Another good strategy is to use Internet tools such as whois and traceroute to find which ISP is serving your problem site. Notify the postmaster or abuse (abuse@offending-domain.example) address that they have an offender. Be sure to pass on all header information in your messages to help them with tracking down the offender. If they have a policy against using their service to post unsolicited mail they will need more than just your say-so that there is a problem. Also, the "originating" site may be a victim of the offender as well. It's not unknown for those sending this kind of mail to bounce their mail through dial-up accounts, or off unprotected mail servers at other sites. Use caution and courtesy in your approach to those who look like the offender.

News spammers use similar techniques for sending spam to the groups. They have been known to forge headers and bounce posts off "open" news machines and remailers to cover their tracks. During the height of the infamous David Rhodes "Make Money Fast" posts, it was not unheard of for students to walk away from terminals which were logged in, and for sneaky folks to then use their accounts to forge posts, much to the later embarrassment of both the student and the institution.

One way to lessen problems is to avoid using mail-to URLs on your web pages. They allow email addresses to be easily harvested by those institutions grabbing email addresses off the web. If you need to have an email address prevalent on a web page, consider using a cgi script to generate the mailto address.

Participate in mailing lists and news groups which discuss unsolicited mail/posts and the problems associated with it. News.admin.net-abuse.misc is probably the most well-known of these.

## 6. What's an ISP to Do

As an Internet Service Provider, you first and foremost should decide what your stance against unsolicited mail and posts will be. If you decide not to tolerate unsolicited mail, write a clear Acceptable Use Policy which states your position and delineates consequences for abuse. If you state that you will not tolerate use of your resource for unsolicited mail/posts, and that the consequence will be loss of service, you should be able to cancel offending accounts relatively quickly (after verifying that the account really IS being mis-used). If you have downstreaming arrangements with other providers, you should make sure they are aware of any policy you set. Likewise, you should be aware of your upstream providers' policies.

Consider limiting access for dialup accounts so they cannot be used by those who spew. Make sure your mail servers aren't open for mail to be bounced off them (except for legitimate users). Make sure your mail transfer agents are the most up-to-date version (which pass security audits) of the software.

Educate your users about how to react to spew and spewers. Make sure instructions for writing rules for mailers are clear and available. Support their efforts to deal with unwanted mail at the local level - taking some of the burden from your system administrators.

Make sure you have an address for abuse complaints. If complainers can routinely send mail to "abuse@BigISP.example" and you have someone assigned to read that mail, workflow will be much smoother. Don't require people complaining about spam to use some unique local address for complaints. Read and use 'postmaster' and 'abuse'. We recommend adherence to RFC 2142, `_Mailbox Names for Common Services, Roles and Functions`. [7].

Finally, write your contracts and terms and conditions in such language that allows you to suspend service for offenders, and so that you can impose a charge on them for your costs in handling the complaints their abuse generates and/or terminating their account and cleaning up the mess they make. Some large ISPs have found that they can fund much of their abuse prevention staff by imposing such charges. Make sure all your customers sign the agreement before their accounts are activated. There is a list of "good" Acceptable Use Policies and Terms of Service at:

<http://spam.abuse.net/goodsites/index.html>.

Legally, you may be able to stop spammers and spam relayers, but this is certainly dependent on the jurisdictions involved. Potentially, the passing of spam via third party computers, especially if the

headers are forged, could be a criminal action depending on the laws of the particular jurisdiction(s) involved. If your site is being used as a spam relay, be sure to contact local and national criminal law enforcement agencies. Site operators may also want to consider bringing civil actions against the spammer for expropriation of property, in particular the computer time and network bandwidth. In addition, when a mailing list is involved, there is a potential intellectual property rights violation.

There are a few law suits in the courts now which claim spammers interfered with and endangered network connectivity. At least one company is attempting to charge spammers for the use of its networks ([www.kclink.com/spam/](http://www.kclink.com/spam/)).

## 7. Security Considerations

Certain actions to stop spamming may cause problems to legitimate users of the net. There is a risk that filters to stop spamming will unintentionally stop legitimate mail too. Overloading postmasters with complaints about spamming may cause trouble to the wrong person, someone who is not responsible for and cannot do anything to avoid the spamming activity, or it may cause trouble out of proportion to the abuse you are complaining about. Be sure to exercise discretion and good judgment in all these cases. Check your local escalation procedure. The Site Security Handbook [2] can help define an escalation procedure if your site does not have one defined.

Lower levels of network security interact with the ability to trace spam via logs or message headers. Measures to stop various sorts of DNS and IP spoofing can make this information more reliable. Spammers can and will exploit obvious security weaknesses, especially in NNTP servers. This can lead to denial of service, either from the sheer volume of posts, or as a result of action taken by upstream providers.

## 8. Acknowledgments

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## 9. References

- [1] See for example spam-l@peach.ease.lsoft.com
  - [2] Fraser, B., "Site Security Handbook", FYI 8, RFC 2196, September 1997.
  - [3] "Current Spam thresholds and guidelines," Lewis, Chris and Tim Skirvin, <http://www.killfile.org/~tskirvin/faqs/spam.html>.
  - [4] Schwartz, Alan and Simson Garfinkel, "Stopping Spam," O'Reilly and Associates, 1998.
  - [5] Crocker, D., "Standard for the format of ARPA Internet text messages", STD 11, RFC 822, August 1982.
  - [6] Braden, R., "Requirements for Internet hosts - application and support", STD 3, RFC 1123, October 1989.
  - [7] Crocker, D., "Mailbox Names for Common Services, Roles and Functions", RFC 2142, May 1997.
- \* Spam is a name of a meat product made by Hormel. "spam" (no capitalization) is routinely used to describe unsolicited bulk email and netnews posts.

## 10. Appendix - How to Track Down Spammers

In a large proportion of spams today, complaining to the postmaster of the site that is the apparent sender of a message will have little effect because either the headers are forged to disguise the source of the message, or the senders of the message run their own system/domain, or both.

As a result, it may be necessary to look carefully at the headers of a message to see what parts are most reliable, and/or to complain to the second or third-level Internet providers who provide Internet service to a problem domain.

In many cases, getting reports with full headers from various recipients of a spam can help locate the source. In extreme cases of header forgery, only examination of logs on multiple systems can trace the source of a message.

With only one message in hand, one has to make an educated guess as to the source. The following are only rough guidelines.

In the case of mail messages, "Received:" headers added by systems under control of the destination organization are most likely to be reliable. You can't trust what the source domain calls itself, but you can usually use the source IP address since that is determined by the destination domain's server.

In naive mail forgeries, the "Message-ID:" header may show the first SMTP server to handle the message and/or the "Received:" headers may all be accurate, but neither can be relied on. Be especially wary when the Received: headers have other headers intermixed. Normally, Received: headers are all together in a block, and when split up, one or the other blocks is probably forged.

In the case of news messages, some part of the Path: header may be a forgery; only reports from multiple sites can make this clear. In naive news forgeries, the "NNTP-Posting-Host:" header shows the actual source, but this can be forged too.

If a spam message advertises an Internet server like a WWW site, that server must be connected to the network to be usable. Therefore that address can be traced. It is appropriate to complain to the ISP hosting a web site advertised in a SPAM, even if the origin of the spam seems to be elsewhere. Be aware that the spam could be an attack on the advertised site; the perpetrator knows the site will be deluged with complaints and their reputation will be damaged. Any spam with an electronic address in it is suspect because most spammers know they're unwelcome and won't make themselves accessible.

Here is an example mail header:

```
-----
From friendlymail@209.214.12.258.com Thu Feb 26 20:32:47 1998
Received: from clio.sc.intel.com by Ludwig.sc.intel.com (4.1/SMI-4.1)
    id AA05377; Thu, 26 Feb 98 20:32:46 PST
Received: from 209.214.12.258.com (209.214.12.258.com [208.26.102.16])
    by clio.sc.intel.com (8.8.6/8.8.5) with ESMTP id UAA29637
    for <sallyh@intel.com>; Thu, 26 Feb 1998 20:33:30 -0800 (PST)
Received: ok
X-Sender: promol@gotosportsbook.com
X-Advertisement: <a href="http://www.opt-out.com">
Click here to be removed.
Date: Thu, 26 Feb 1998 23:23:03 -0500
From: Sent By <promol@gotosportsbook.com>
Reply-To: Sent By <promol@gotosportsbook.com>
To: friend@bulkmailer
Subject: Ad: FREE $50 in Sportsbook & Casino
X-Mailer: AK-Mail 3.0b [eng] (unregistered)
Mime-Version: 1.0
Content-Type: text/plain; charset=us-ascii
Content-Transfer-Encoding: 7bit
Sender: friendlymail@aqua.258.com
Message-Id: <bulk.6508.19980226232535@aqua.258.com>
Status: R
-----
```

Doing a traceroute on an IP address or DNS address will show what domains provide IP connectivity from you to that address.

Using whois and nslookup, one can try to determine who is administratively responsible for a domain.

In simple cases, a user of a responsible site may be exploiting an account or a weakness in dial-up security; in those cases a complaint to a single site may be sufficient. However, it may be appropriate to complain to more than one domain, especially when it looks like the spammers run their own system.

If you look at the traceroute to an address, you will normally see a series of domains between you and that address, with one or more wide-area/national Internet Service Providers in the middle and "smaller" networks/domains on either end. It may be appropriate to complain to the domains nearer the source, up to and including the closest wide-area ISP. However, this is a judgement call.

If an intermediate site appears to be a known, responsible domain, stopping your complaints at this point makes sense.



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