

Charity Stamps

Doing well for the internet community by doing good

Mark N. Wegman

Scott Fahlman and I have proposed Charity stamps – the email equivalent of Easter stamps -- as a solution to the problem of spam. Placing a charity stamp on e-mail would cost senders of spam too much money to remain profitable, yet would cost legitimate senders very little and what it would cost them would go to good works.

Spam, unsolicited commercial e-mail, is an increasing problem. It costs the recipients inconvenience and has been estimated to cost the economy as much as \$20 billion. Spammers are sending spam to make money. It cost them next to nothing to send large quantities of e-mail that clutter up the in-boxes of many people. If the e-mail programs of potential receivers of the mail refused to accept the mail unless the sender paid something to a charity, then it would become unprofitable to send spam to those receivers. This would be good for the receivers, in that they'd get almost no spam. It would be good for the charities, in that they would receive more donations. It would be good for the senders of legitimate mail in that their mail is not likely to be lost in a vast sea of spam. It would be good for the operators of the internet infrastructure, because the burden of transporting and storing huge amounts of spam would be eliminated. Moreover, it would cost most legitimate senders very little. It might, in fact, cost legitimate senders nothing if they already donate to charity.

There are a number of variants of this idea. Rather than go into all of the pros and cons, we'll go over one to try to convince the reader that at least one of these schemes works

A consortium of charities is formed, consisting of relatively non-controversial charities. The consortium might include, say, all universities, hospitals, and others such as blood banks, etc. They would establish a web site, which we'll call the *Charity Stamp Server* or *CSServer* for short. At the web site someone we'll call Bob could donate money to his favorite member charity. In exchange, Bob's charity stamp account would be credited by the amount he donates. When Bob wants to send a piece of e-mail to someone he's never communicated with, say Alice, Bob's computer asks the CSServer to give him a charity stamp with the names Bob and Alice on it. We can use cryptography to make it impossible for anyone other than the CSServer to create this stamp. Bob's computer adds that stamp to the e-mail he's about to send Alice. Alice's computer, upon receiving e-mail containing the stamp, can know that Bob has paid money to the CSServer for the privilege of e-mailing her, and will know he isn't a spammer and puts his mail in her e-mail inbox in the usual fashion.

Alice maintains a list, called a *whitelist*, of people she is happy to communicate with. This probably would include everyone Alice has ever sent mail to, in addition to some others. If Bob's e-mail address is on the whitelist, his mail will be accepted even if it doesn't include a charity stamp. But if he's not on the whitelist, and he hasn't included a stamp, an automatic but politely

written note is sent to Bob explaining that, before Alice will accept mail from him, he must go to the CSServer and affix a stamp to his mail. Of course Alice is free to accept mail from anyone. If both Alice and Bob work for say IBM, they might choose to automatically accept any mail from IBM on the grounds that they expect it is something they want to see.

Once Alice and Bob start communicating, Alice (or her software) will probably add him to her “whitelist” of welcome correspondents and not require further stamps from Bob. However, if Bob starts sending her large quantities of commercial e-mail she might delete him from her list and either stop accepting any mail from him by putting him on a *blacklist*, or make him buy another charity stamp for each future message. We would guess that a typical stamp might cost something like 25 cents though in fact even a penny would stop most of the spam we typically get.

Each user of e-mail can decide for herself whether to adopt this scheme for her incoming mail. For example, there are companies that accept orders using e-mail and for them they will hardly want to tell a customer that they must give money to charity in order to send in an order. Other users might want to use a filter that would exclude for example all mail that dealt with inkjet cartridges (a common phrase in spam that I get) regardless of whether someone has attached a charity stamp. Some users may want to charge more than the typical stamp if they really value their time and don’t anticipate wanting to communicate with new people.

Frequently Asked Questions:

Doesn’t this destroy the freedom we’ve grown to expect from the internet?

The flood of spam is already driving many e-mail users to accept mail only from people they or their systems recognize, and reject all mail from strangers. This scheme provides users with a way to accept free e-mail from their friends and to provide strangers with a way to reach them if they are willing to pay a small price.

Moreover, this scheme is totally voluntary – you can choose to send or not to send charity stamps with your mail, and you can chose to read or not read mail without charity stamps. In our view this would be an individual decision.

The government is starting to regulate how messages may be legally sent. As with all regulation, it may take away freedom, and citizens must judge whether the laws will be effective and worth the cost in freedom. It is likely that to be really effective the regulations will have to be much more restrictive. But given that much of spam is already illegal with the spammers not being jailed because they are either in foreign countries or hard to find, even strong regulations may not be effective. Our plan is strictly optional on the receiver’s part. It provides a uniform way for the recipient to say that mail from strangers must bear evidence that the sender has paid a small fee. It’s still less than a first-class stamp.

How convenient is it to use?

Once mail programs have been modified to use charity stamps it will be nearly invisible. In addition to what you do now to send mail you will occasionally have to go to the CSServer, and contribute to your chosen charities. You will also have to decide whether you want to include a charity stamp on every piece of mail you send, or only include it in mail addressed to people not already in your address book, or make an individual decision for each piece of mail. Automatically stamping mail means everyone you send mail to will know that you donate money, though not what organization you donate to. This looks good, but also uses up your stamps faster. If you donate enough money during the year you probably don't care about that. If a sender automatically includes the charity stamp on each piece of mail means then that e-mail gets there a bit faster, because when if a receiver insists on a charity stamp, they will already have the stamp and won't have to request it.

As a receiver, you need to tell the mail program that you insist on charity stamps for all mail, or for senders not in your whitelist.

Technically it would not be hard for the people who wrote your mail program to adapt it to use and be aware of charity stamps. Most of the delay in getting the idea incorporated into the mail programs would be just in getting all the mail programs to agree on one standard.

Even before the mail programs are set up, you would go to a web page on the CSServer and type in your id and the recipient's id and it would give you a charity stamp back that you could cut and paste into your mail.

How much money do charities get out of this?

Charities will receive more money than they currently do because some people and institutions simply do not donate any money at all. Those that do not currently but want to send out e-mail may be forced to donate. Charitable giving will be more public, and hence people and institutions will likely think about donation more. Because charities will have solved a problem, spam, for people who ordinarily don't need charity, those people may feel more warmly about the whole idea of charities and increase their ordinary donations. It is likely that some people will buy Charity stamps in addition to their current level of giving.

The potential amount of money is quite large. IBM North America receives over a million pieces of legitimate e-mail per day and probably sends out a similar number. If just IBM insisted on charity stamps coming in on all mail as well as putting them on all mail we send out at \$.25/stamp then half a million dollars would go to charity every day from mail related to IBM. However, the amount is probably substantially less than that since many of those pieces of e-mail would go between people who have already corresponded. Unfortunately we don't have numbers that would say how often one person corresponds with another the first time instead of for each repeat time.

Spam has been estimated to cost the world economy \$20 billion/year now, and to grow to \$200 billion over the next few years. If charities could reap a small part of what they are saving the world from, they will be better off than they are now.

Hopefully the overhead of the CSServer should be very small. From a computational point of view it doesn't need to do much with each transaction, certainly under one second of computation for each stamp that it issues, and with a computer that costs about \$1,000 one second of its time is not much at all of a cost. With luck the overhead of giving through the CSServer should be less than charities now have to spend to publicize themselves and to collect money from a variety of sources.

It probably is not possible to know exactly how much actual additional money charities would get from charity stamps until the system is widely deployed.

How does this differ from solutions that pay the receiver?

Another idea that has been proposed is that a receiver potentially charges a sender money for the privilege of sending the receiver mail. Some of the "pay the receiver" schemes may work just fine. Charity stamps are a little simpler and, we feel, more likely to be adopted.

Part of the inspiration for Charity stamps comes from the feeling many people had that the "pay the receiver" schemes make the receiver look greedy. If I want to tell someone by e-mail that their lights are on in their car, I'm going to be annoyed to have to pay them money for the privilege of helping them. Moreover if I give say 25 cents to someone to receive my e-mail, I'm making a very small payment and banks tend to extract a large portion of small transactions so the receiver doesn't even get most of it. PayPal for example charges a minimum of \$0.30 per transaction. With the Charity stamp, I can buy a bunch of stamps for, say, \$6, and then I only have one bank transaction for each 24 stamps. People could pay more if that's convenient for them.

If I already donate enough money to charity – and many people and large corporations do – then if they simply donate through the CSServer they will get enough stamps to attach a Charity stamp to every piece of mail they send outside of their corporation. The receiver would see the charity stamp and the corporation would get publicity for the good deeds they are already doing whether or not the user requires a stamp and sending e-mail is just as convenient as it is today. Other people or corporations may want to only attach a stamp when one is requested.

Some of the sender pay schemes have the sender only pay when the receiver classifies the mail sent as spam. Essentially the sender gives the receiver the right to charge for the receipt of the mail and trust the receiver will not charge for what the receiver considers legitimate mail. While these schemes probably don't end up with a receiver being greedy, they may require more thought on the part of the sender.

One of the problems with pay the receiver schemes is that if mail is misdirected, then the sender may want their money back, hence the protocols can become complex. When the money goes to charity the sender may be a bit less concerned about exact accounting, since at the end of the year they are likely going to make sure their giving equals some fixed amount anyway.

People seem to like the idea of giving money to charities and that may make this scheme be adopted more readily.

We don't want to imply that this is the only scheme that could succeed. Here's another fine example that doesn't give money to charity.

<http://www.research.ibm.com/journal/sj/414/forum.pdf>

Can a Charity stamp be forged?

A charity stamp will be protected by developments in the last two decades in cryptography, which have been challenged unsuccessfully by some of the best mathematicians in the world. Basically a charity stamp consists of a character string with four parts and a digital signature on the string. The string would consist of the sender's identity, the receiver's identity, the value of the stamp and a number. This string would be sent to the CSServer, which would return the signature and deduct the value from the sender's account. The point of the number is just so that if the receiver wants to force the sender to pay more the sender could get another stamp.

It turns out that if you know a key, you can construct a function which is very hard to compute without the key, but which is easy to compute with the key. Moreover, someone without the key can check to make sure the function was correctly computed. The signature returned by the CSServer is just the result of such a function. Only the CSServer or someone who knows the key can efficiently compute the function, but once computed anyone can check to see that it is valid.

It is very unlikely the spammers can figure out a way of forging the signatures when some of the best mathematicians in the world are not able to compute those functions without the key.

Does this really solve the spam problem?

If everyone insisted on getting charity stamps on the mail they read, we know of no way that spammers in their current form could stay in business. The amount of junk physical mail each of us receives at home is much less than the spam many of us already receive, because a postage stamp costs something. To be at all profitable junk mailers are very careful to figure out which people are likely to respond so that their postage stamp is only spent on very likely customers. Spammers know much less about us than the junk mailers do. Spammers currently blanket the internet, because it is easier to send out e-mail than to determine whether someone is a candidate for buying their product.

Spam currently has an estimated response rate of less than one purchase response for every 100,000 pieces of spam or at the price of \$0.25 per charity stamp, the spammer would pay \$25,000 per sale, which is hardly profitable, when their typical sales are around \$50.

We have discussed ways around the costs with a variety of people. The closest thing to a chink in our armor is that some charities might be able to send out free e-mail solicitations by donating the money to themselves. Even this won't really cause a problem because there will inevitably be some administrative costs and hence sending out spam won't even be free to

charities. Besides, the consortium could prohibit this contractually, and easily eject any charity that took advantage of their membership in the consortium to send spam.

To avoid this problem we would suggest the charity server organization would need to require that all charities use a charity stamp for a broad collection of charities so that they themselves will only get back a small part of what they pay to send mail.

Is it really this simple?

Almost. Spam affects more than just ordinary e-mail and Charity Stamps can solve these problems as well, but may require some extra functions. Newsgroups, forums, and mailing lists are related ways for a large number of people sharing information and discussing it. These are systems set up by a person, who is in charge of the system, who we will call somewhat inaccurately the *moderator*. Newsgroups and forums gather the various discussions so that they can be seen on the web or with a tool called a newsreader. Mailing lists let one person send mail to an email address owned by the moderator, and that email system automatically forwards the mail to perhaps thousands of people. Spammers have realized that sending one note to one of these has the potential to reach thousands of people and have effectively killed a number of electronic communities.

Since these mechanisms allow a spammer to reach thousands of people, they may be willing to buy a normal charity stamp of say 25¢. We would allow receivers to register with the CSServer the size of a stamp they would insist on, so the owner of the group can set the size of the charity stamp high enough to discourage spammers, but someone who is being kind (e.g. answering a question someone else asked) may not be willing to give say \$10.00 in order to answer someone else's question. The solution we'd propose is that the moderator can require an Escrow Charity Stamp (ECS), which is something someone can tell the CSServer they want on mail coming to them. The idea behind an ESC is that the moderator can require that the sender be willing to give the amount on the ESC to charity, but the money is only given to charity if the moderator deems that the mail sent is spam. Moderators can be assumed to be honorable in their judgment because the moderator has nothing to gain. The use of Charity Stamps here is a real advantage over normal "receiver can get the money" escrow schemes where the moderator stands to gain the \$10, since it is manifest that the moderator can be trusted.

A moderator can delete a piece of spam from a forum before many people have seen it and charge the spammer, so the spammer has very little to gain. In the case of really big newsgroups and mailing lists, the moderator may want to designate some additional people to be able to get the rid of the piece of mail first, and to be given a chance to object before it is sent to further people. The moderator could then later override their decisions or decide to exercise the stamp and charge someone.

While this may seem somewhat complex, that complexity is justified if it allows these communities to survive. Of course, in many cases a simple charity stamp will suffice to discourage people from posting spam on these systems.

How does this get started?

We start one step at a time. We need to get some charities together to form a consortium to start the charity stamp process and run the CSServer. IBM should not be in charge – Charities

should be. After standards are written that detail the operation of the Charity stamps and server, the next step is that some software needs to be written to serve up Charity stamps, and perhaps some mail software needs to be tweaked to make it easier to append a Charity stamp. At the same time some companies and ISP's must make it easy for individuals to require charity stamps on incoming mail.

As some recipients start to insist on charity stamps and as some people start attaching charity stamps to all their mail, word of charity stamps will grow. Corporations may start to attach charity stamps to all mail just because of the good will, especially if they are already donating enough money to cover the costs of the stamps. A number of people use filtering software to get rid of spam. It should not be difficult to have those filters let mail with charity stamps though, so that people appending stamps get an immediate benefit, in addition to the good will they generate.

Each Charity stamp will have a link to a web page that explains the whole concept. Each person who insists on a Charity stamp should also refer to the web pages of the Charity stamp server. As more and more people recognize the idea the use of Charity stamps will grow. Just getting a number of large corporations to send mail out with Charity stamps will get most people to know about them. Getting a few large ISPs like AOL and Earthlink to participate would be very helpful, if not essential.

Once a large number of people and corporations start using Charity stamps, we would enter the final phase where those people who do not use Charity stamps will be increasingly confronted with the need to use a Charity stamp to get their mail delivered. Once enough people are using stamps more and more people will insist on them in order to relieve their spam burden and because the senders will be used to using stamps. As the cycle builds, spam will be eradicated.

What are the international implications?

This is really a question for the consortium behind the Charity Stamp Server. Many countries have lists of charities. For the few that don't, it is probably not hard to have a list of universities and hospitals within that country. There are many charities that are international in scope ranging from Unicef to the international Red Cross/Crescent. So there will always be some charities people can give to that the consortium can put in their list.

Are there any patents involved?

No. The original idea comes from a discussion between Mark Wegman and Scott Fahlman at IBM. IBM and the originators have decided that it is appropriate to give any rights we may have so that the idea may be taken advantage of most easily. Think of it as one of our gifts to charity. (There are no patent rights – no patent has been applied for, let alone granted.) It is not just our gift, many other folks have contributed to this, including Jason Crawford, Peter Capek, Bob Schloss and John Turek.