SHRED: Spam Harassment Reduction via Economic Disincentives

Balachander Krishnamurthy

AT&T Labs–Research

`http://www.research.att.com/~bala/papers`

Joint work with Ed Blackmond, Eureka! Computing Solutions, Inc.

Quick background on Spam

- Email deemed as unwanted by receiver (often commercial/mostly unsolicited)

- Problem getting worse

- Number one source of complaint for major ISPs

- Some customers believe ISP is behind the spamming!

- Spammers getting smarter and filtering alone may not work

Our contribution

- We propose economic disincentives to spammers (only)

- Current cost for spamming is close to zero

- Economic disincentives have never been tried

- Our scheme is complementary to all the filtering schemes (reuse what works)

Requirements of anti-spam scheme

- Wanted email flows exactly as today (transparent to sender and receiver) without added monetary cost.

- Spammers can continue to participate but with added cost

- Should not have to give up on mailing lists, mail forwarding etc.

- Non-participant ISPs can continue to send/receive mail

- Since 100% of inter-domain email is over SMTP, no new protocol should be invented

- No additional impact on privacy of participants

Novel notions in our scheme

- Limited liability (not necessarily translated to cost) with one possible expression of liability as "stamp", which have associated expiry time.

- Credit Limit: number of stamps available to user at any given time. Varies between classes of users, set by ISP.
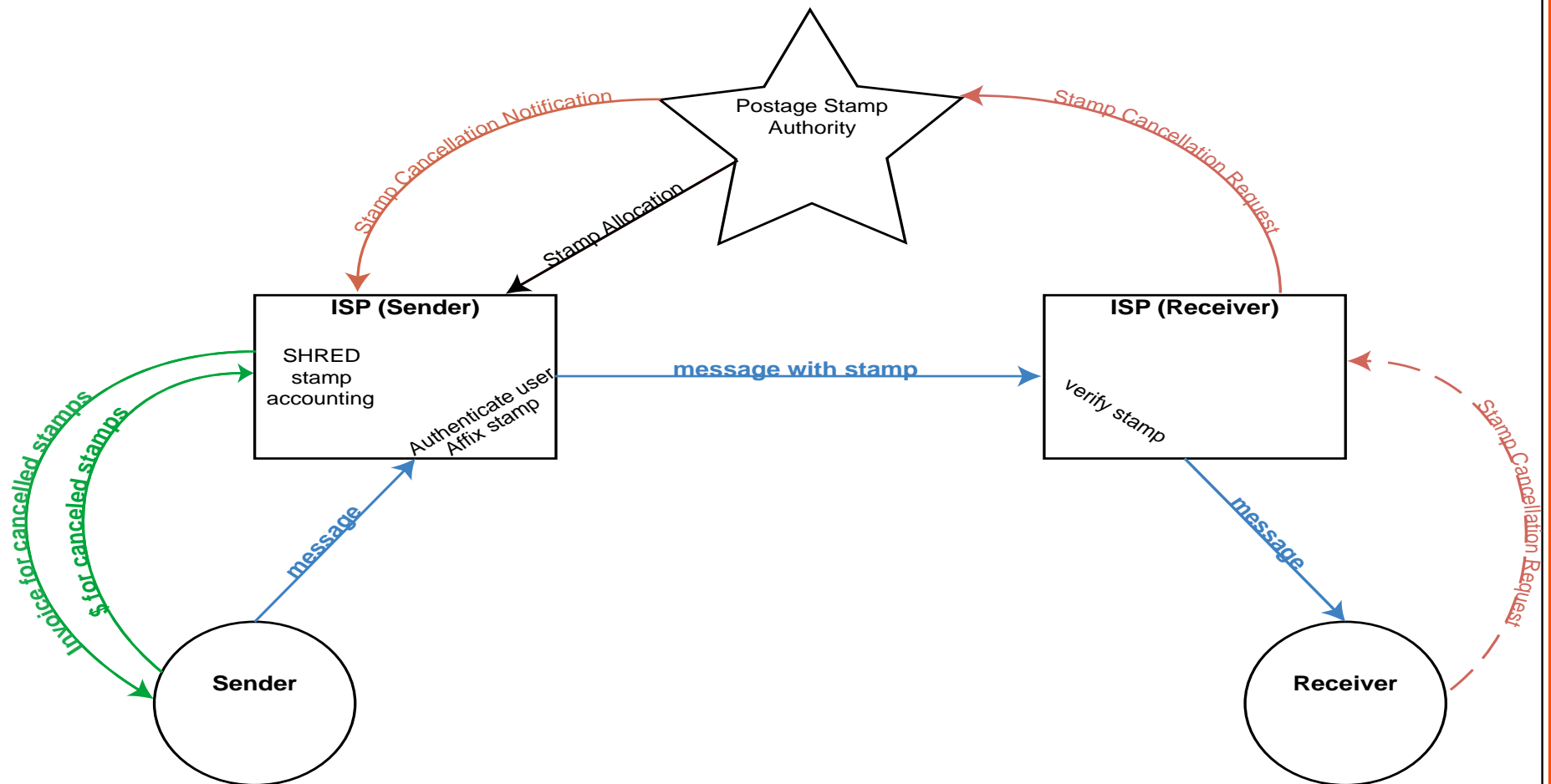
We seek to avoid:
Mandatory cost (monetary, computation, ...) added to *all* mail (wanted and unwanted).

We seek to reuse many existing ideas: whitelists, blacklists, filters

Scheme

- Postage Stamp Authority (PSA) – neutral stamp managing entity, allocates stamp offline to ISPs via secure channel

- Participant ISPs include a 'stamp' SMTP header with outgoing mail

- Stamp, with expiry time, expresses sender's liability (modest amount)

- Senders have a (varying) limit on number of outstanding stamps

- Receivers can (optionally) allow only stamped messages

- Receiver, within stamp expiry period, can 'cancel' unwanted messages

- Users 'credit' limit automatically increased upon stamp expiry

- Cancellations add cost reduce sender's ability to send more messages (can reduce credit limit for longer period – until renegotiation)

SHRED Architecture

Postage Stamp Authority

Stamp Cancellation Notification

Stamp Cancellation Request

Stamp Allocation

ISP (Sender)

SHRED stamp accounting

Authenticate user Affix stamp

ISP (Receiver)

verify stamp

message with stamp

Invoice for cancelled stamps

$ for cancelled stamps

message

Stamp Cancellation Request
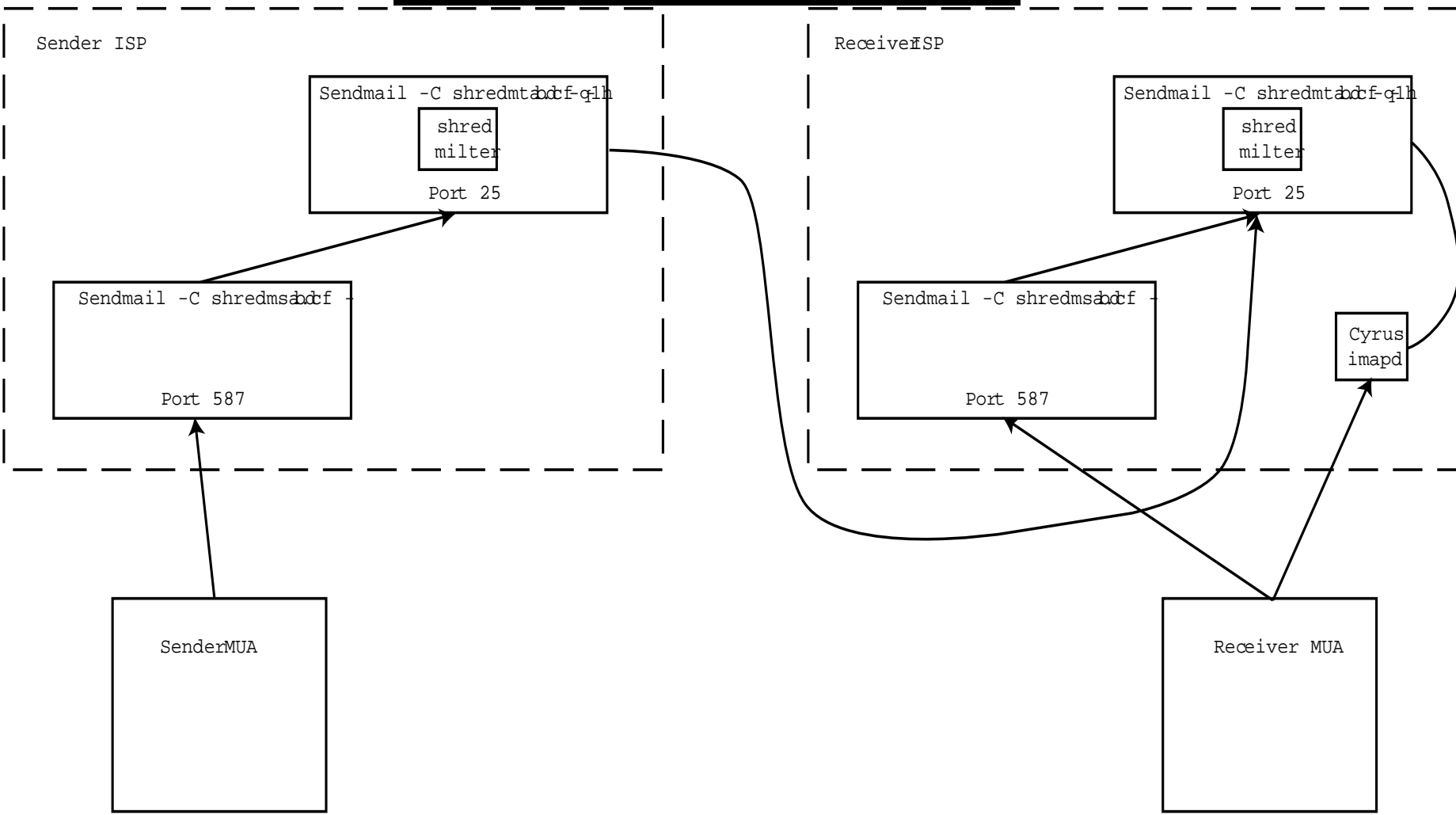
message

Sender

Receiver

Internet E-Mail Delivery w/ SHRED

Benefits

- Meets transparency goals of senders/receivers

- Implementable on top of SMTP (prototype done, 1K LOC)

- Stamps are cryptographically strong and costly for rogues to break and once detected get added to black list

- Co-operates well with all filtering schemes; can also use filter to cancel stamps of spam messages automatically

- Provides economic disincentive to spammers since they may now have to pay for mail that may not even be read

AT&T Labs–Research

SHRED Implementation

Sender ISP

Receiver ISP

Sendmail -C shredmtabcf -q1h

shred
milter

Port 25

Sendmail -C shredmsabcf -

Port 587

SenderMUA

Sendmail -C shredmtabcf -q1h

shred
milter

Port 25

Sendmail -C shredmsabcf -

Port 587

Cyrus
imapd

Receiver MUA

What does a stamp look like

- Version ID

- Julian seconds (current time)

- Internal counter

- Issuing PSA ID

- Sender ISP ID

- Signed by PSA issuing stamp

AT&T Labs–Research

Status

- AT&T has intellectual property interests in this area

- Prototype implementation

- Detailed paper ready (beta review)

- Ongoing discussions with WorldNet and AOL (anyone else here interested?)

- Open for suggestions