HoneySpam: Honeypots fighting SPAM at the source

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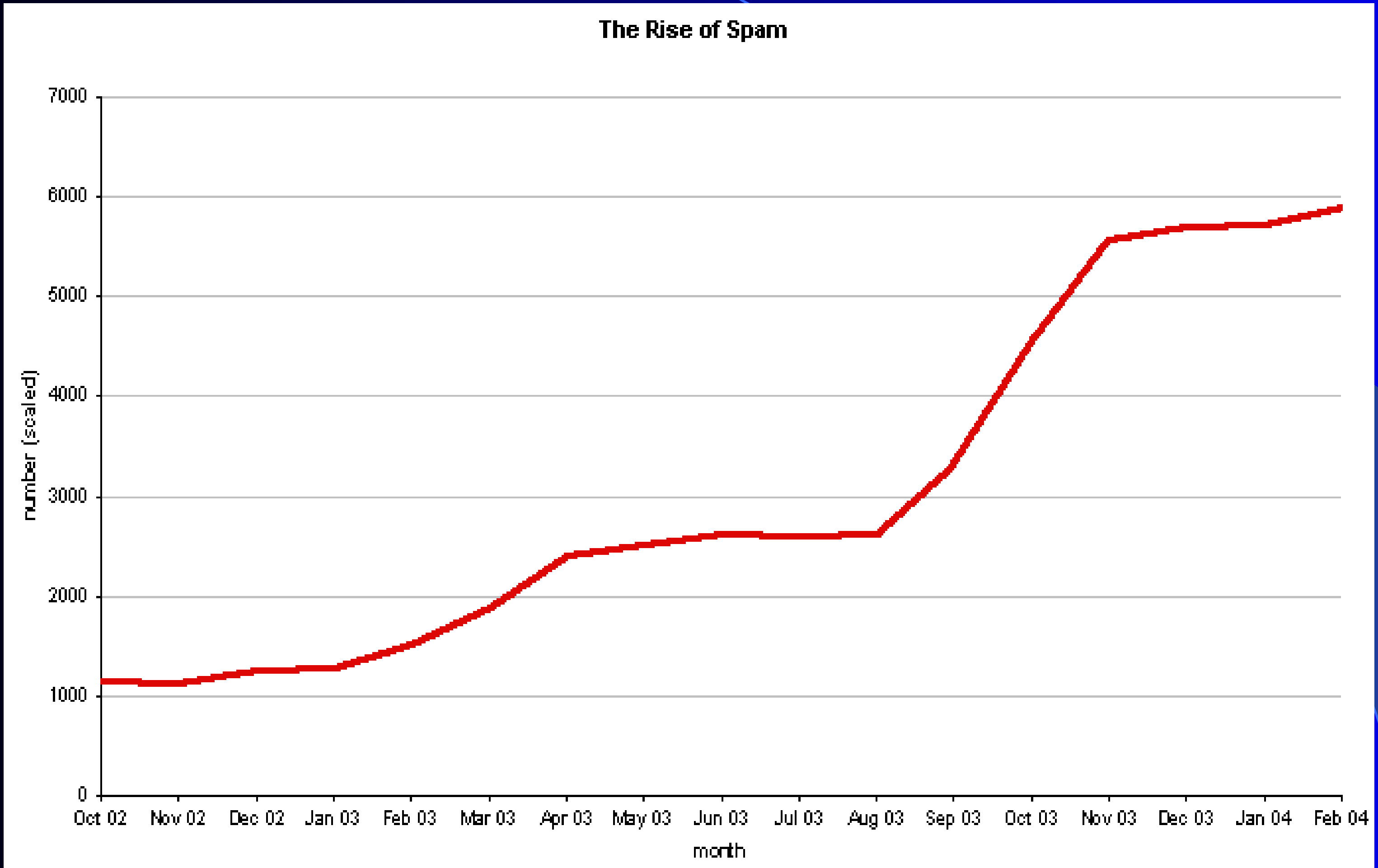
Outline

- Receiver-oriented anti-SPAM tools
- Source-oriented anti-SPAM tools
- Requirements of an anti-spam system
- HoneySpam architecture
- HoneySpam emulated services
- Conclusions and future work

The growth of SPAM traffic



Source: http://www.stilgherrian.com/spam/

Receiver-oriented anti-SPAM tools

- Most anti-SPAM tools are receiver-oriented
- Proper filtering actions are taken AFTER the delivery of the message
  - at the server level
    - Sophos MailMessage, MailSWAT, MailStripper
  - the client level
    - Sophos MailMonitor, WebWasher
  - at both levels
    - SpamAssassin
- still provide false negatives
- do not aim at reducing unwanted Internet traffic

Source-oriented anti-SPAM tools

- Try to fight SPAM acting on the SPAM sources
- Examples: SMTP server black/white lists
- Issues with black lists:
  - brute force approach, does not scale with the increasing number of spammers
  - black lists do not help in reducing unwanted traffic
- Issues with white lists:
  - really effective for specific user communities

Spammer activities

- Sending unsolicited e-mails is just the last step of a complex series of operations:
  - crawling Web sites for e-mail harvesting
  - search and use of open proxies to operate anonimously
  - search and use of open relays to send e-mails without need for authentication
- Remarks
  - Different actions call for different tools
  - Fight these actions at their source
  - Try to reduce unwanted network traffic

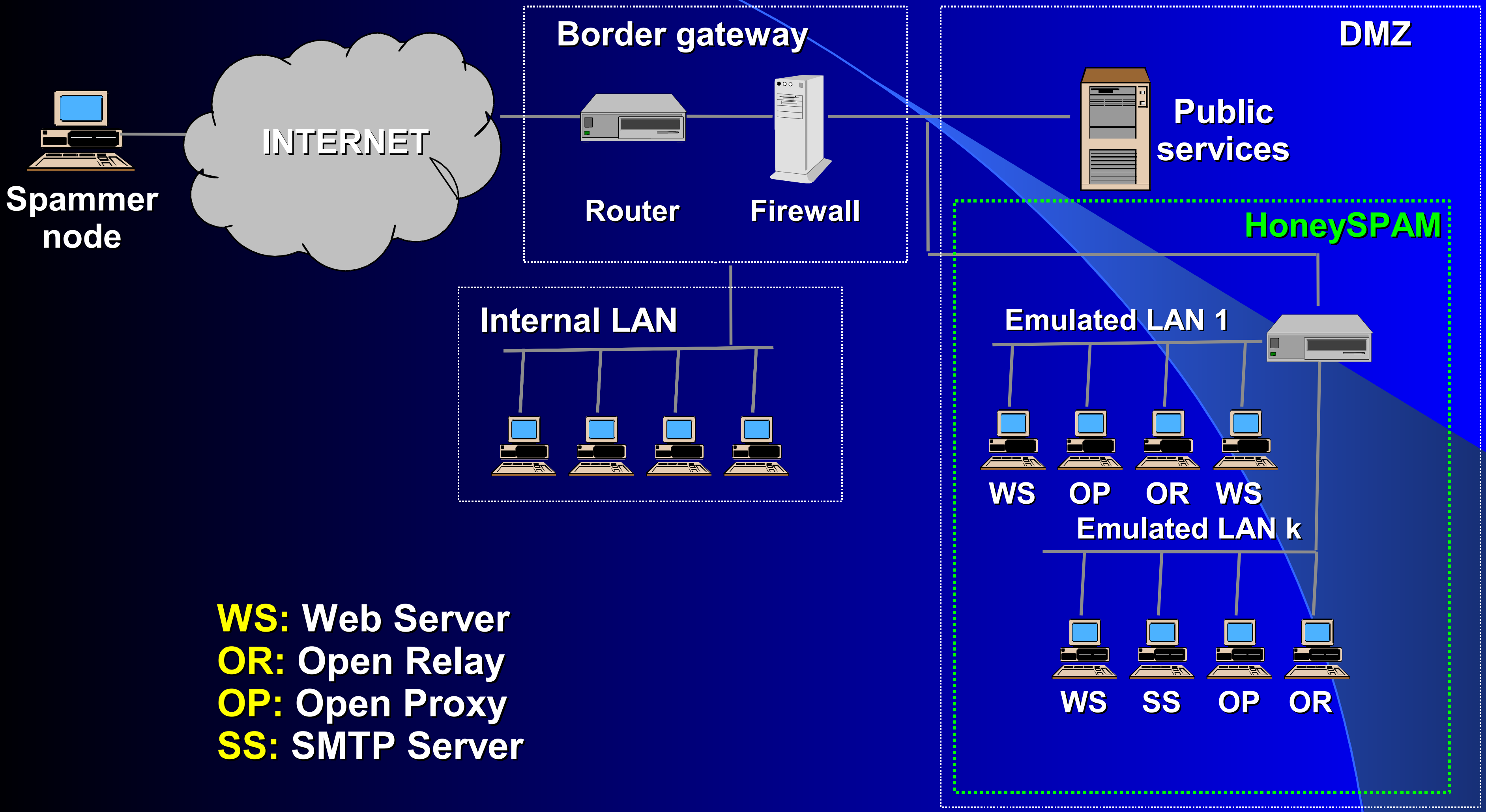
Our goal

- Present a framework of tools that:
  - provides attracting services to spammers
  - fights spamming activities at their sources
  - tries to reduce unwanted network traffic related to unsolicited e-mail messages
  - is fully compliant with existing protocols and practices

Requirements of an anti-SPAM system

- Reduce the efficiency of crawlers
  - force crawlers into an endless loop
  - e-mail address database poisoning
  - protect legitimate crawlers
- Identify spammers
  - log every spammer activity
- Block spam e-mails
  - must not block valid e-mail messages (false positives)
  - should pass the least amount of unsolicited messages (false negatives)

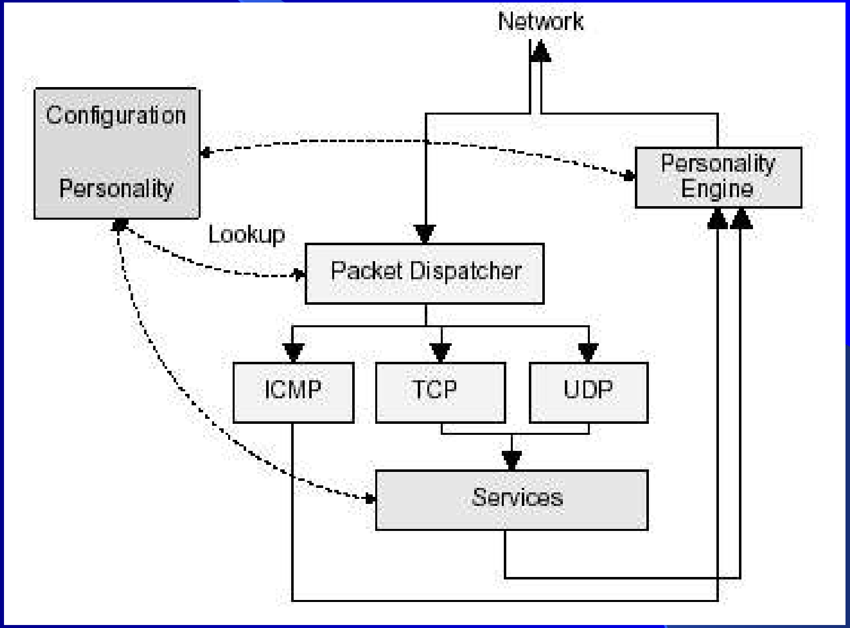
HoneySpam: architecture



WS: Web Server
OR: Open Relay
OP: Open Proxy
SS: SMTP Server

HoneySpam: implementation details

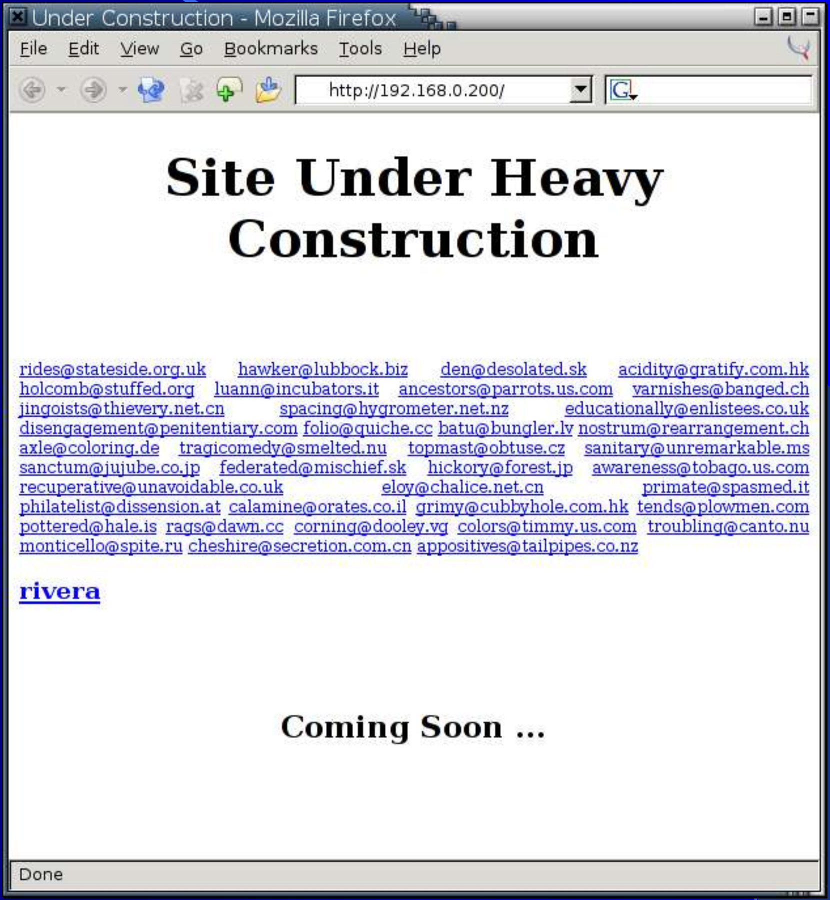
- The emulated services are implemented through the honeyd daemon
  - emulates operating system TCP/IP stacks
  - emulates common servers (Web, SMTP) through Perl scripts
  - easy to setup (through one relatively simple configuration file)
  - low overhead
- Configuration personality
- Packet dispatcher
- Personality engine



HoneySpam: services

Emulated Web server

- **GOAL:** hinder the work of illegitimate crawlers
- E-mail database poisoning
  - automatic building of HTML pages with fake e-mail addresses
- Crawler slowdown
  - automatic generation of endless link loops that block crawlers
- Compliance with legitimate crawlers
  - implements the robot exclusion protocol
- Spammers traceback
  - Logging of client requests



Site Under Heavy Construction

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rivera

Coming Soon ...

HoneySpam: services

Emulated Open Proxy

GOAL: identify spammers trying to operate through open proxy chains

- emulate a subset of the HTTP protocol
- redirection of HTTP proxy CONNECT requests to port 25 towards an emulated open relay
- HTTP proxy CONNECTs to other ports are answered with an error message
- logging of client requests

HoneySpam: services

Emulated Open Relay

- GOAL: block the traffic associated to unsolicited e-mail messages
- emulates postfix/sendmail MTA
- e-mails are not delivered, but saved for later analysis
  - actually, the first e-mail is also sent to let the spammer believe that the service is working
- logging of client activity

HoneySpam: implementation details

- Emulated OSs:
  - FreeBsd, Linux (2.4, 2.6 kernel), Windows 2000 and others (through nmap, xprobe2 and p0f fingerprints)
- Emulated services:
  - Web servers: Apache, IIS
  - SMTP servers: Postfix, Sendmail
  - Proxy servers: SOCKS4/5-based servers
- Emulated routers:
  - Cisco, Zyxel, Intel, 3Com

Possible attacks to HoneySpam

- Honeypot identification
  - Not vulnerable to:
    - network scanners (nmap, xprobe2, p0f)
  - Vulnerable to:
    - service scanners (honeypot hunter)
    - black list services
- Intrusion
  - Not vulnerable to:
    - remote attacks (if chrooted/jailed)
  - Vulnerable to:
    - honeyd exploits

Conclusions

- Implementation of a framework for fighting SPAM at the source
  - Reduce the associated traffic
  - Reduce the effectiveness of spamming techniques
- Emulated services:
  - Web server
    - pollution of spammer databases
    - slowdown and blocking of illegittimate crawlers
  - Open Proxy
    - spammers trace-back
    - redirection of spammer requests to emulated open relays
  - Open Relay
    - block the traffic associated to unsolicited messages
- Logging of spammer activity

Future work

- Scalability
  - Geographical replication of the framework
  - Clustering of HoneySpam in a LAN
- Fault-tolerance
  - If HoneySpam is detected, it is no longer useful
  - Many running HoneySpam instances make detection and black-listing harder
- Limiting the network throughput of spammers
  - Bandwidth-limiting traffic related to spamming activities

Future work

- Collaborative environment: extend HoneySpam to allow information exchange
- Sources of information exchange:
  - remote HoneySpams
  - authorized SMTP servers
  - Open proxy lists
  - Web server log information pertaining illegitimate crawlers (name, IP address)

Thanks for your attention