HTGR- Netflow

or, how to know what your network *really* did without going broke

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What is the Problem?

- The network is more and more important
- The network is invisible
- It's easy to blame the network
- Ignorance of TCP/IP is rampant
- “The T1 is full? Full of what?”
- “What broke?”

“Absence of evidence” !=
“evidence of absence”

What is the Solution?

- Know what happened on the network!
- Netflow is summary of historical network traffic.
- Tcpdump of all your switches might be better, but badly searchable and takes a *lot* of storage.

What Is a Flow?

- “A unidirectional sequence of packets all sharing the same source and destination IP address, source and destination port, and IP protocol.”
- Each TCP connection is two or more flows, at least one in each direction.
- Also known as “session-level data.”

What is Netflow?

- Netflow is a suite of tools and protocols for collecting, managing, and reporting on flow records.
- Netflow components can be mixed-and-matched as desired

What Netflow Gives You

- Who talked to who?
- How much was said?
- What port did they talk on?
- What protocol did they use?
- What TCP/IP flags did they use?
- All the history you have disk for

What Netflow Doesn't Give You

- The contents of the conversation
- You can see that you transferred 10kB out via HTTP, but not the contents of that data
- Alarms (at least, not directly)_
- Decent Mailing List Archives

Netflow record versions

Netflow comes in many different versions:

- v5: today's lowest common denominator
- v7: switching information
- v9: sings, dances, does the dishes, IPv6

You don't care which one you have, so long as you have it.

Netflow Architecture

- Sensor(s)_
- Collector(s)_
- Analysis System(s)_

These can be on the same system, or all on different systems, depending on available hardware and network architecture.

the sensor

- A program or device that sniffs the network
- Aggregates and condenses tcpdump-style information into flow records
- security-sensitive device
- very few system resources required
- flow records are flung across the network
- sensitive to network loss

the collector

- The software that catches records flung by the collector
- Stores the flows in files on disk
- Managing those flow files is your problem, not the collector software's.
- 5Mb/s uses 2GB disk/month

the reporting system

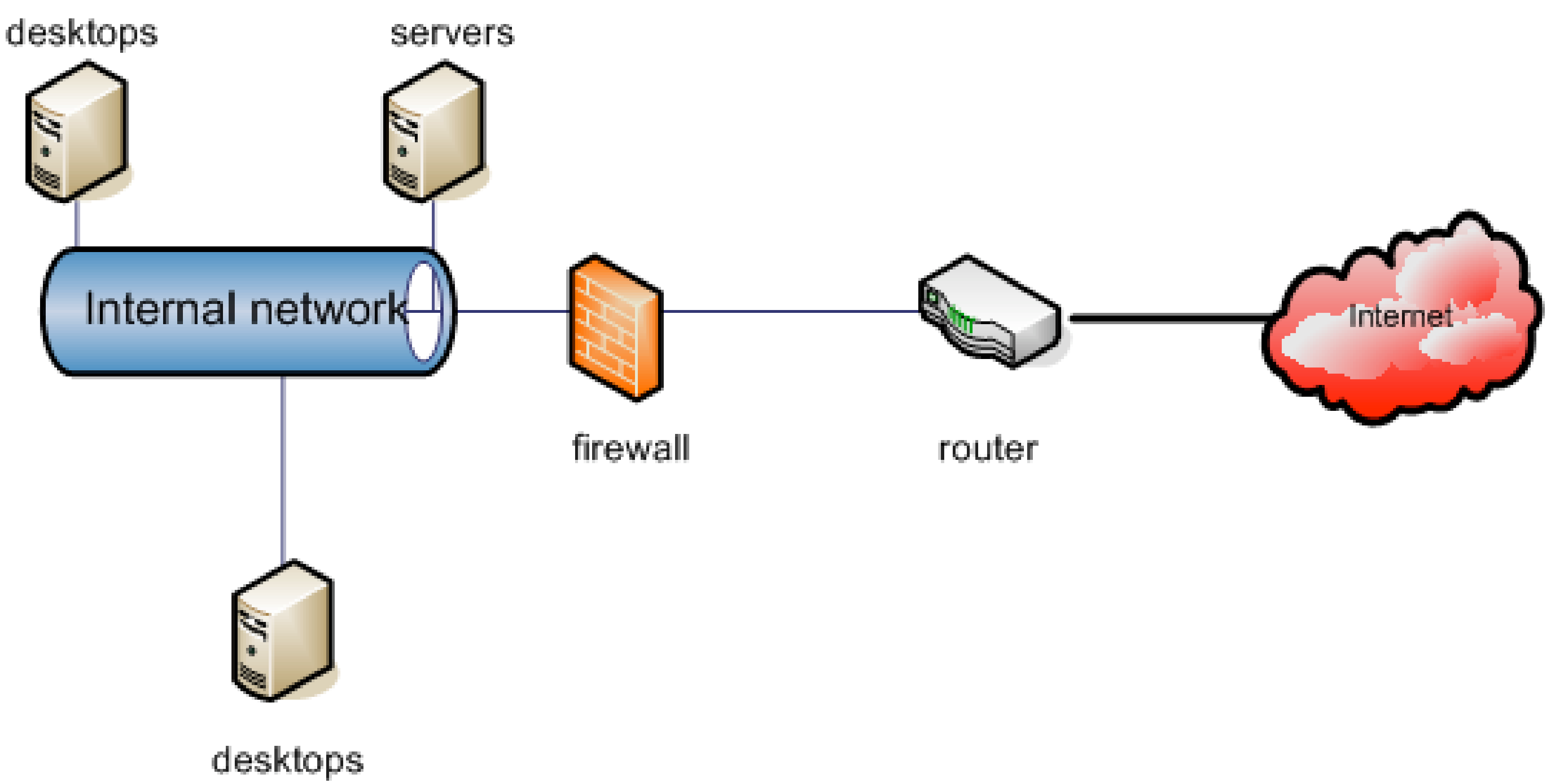
- Data files are nice, but you need to get information out of them.
- Choice of graphical or text reports
- Must have flexibility to transform and aggregate data in any way you desire.

Where to place each component?

- Sensor in a place you want to collect data from
- Collector in a secure environment
- Reporter only needs read access to collector files

Simple Network

Two sensible collector points: inside & outside



Implementing the Sensor

- Choose your platform first, based on what you have
- Some Cisco switches, most routers speak Netflow natively
- Juniper speaks cflowd, aka Netflow v5
- Implement on UNIX via softflowd (http://www.mindrot.org/softflowd.html)_

implementing the collector

- The sensor throws stuff at the net, the collector catches it and stores it to disk
- Collector and reporting system are linked
- Need a secure system!
- Many flow collectors available:
  - flowd (developed by softflowd developer)_
  - cflowd (obsolete)_
  - flow-capture (part of flow-tools)_

flow-tools history

- For many years, the standard toolkit
- Was neglected, has recently risen from the dead
- Original version is not 64-bit clean, new version is
- Not all tools interoperate well with new version yet

Which version?

- Old version: http://www.splintered.net/sw/flow-tools/
- New version: http://code.google.com/p/flow-tools/

- When you need flowscan or Cflow.pm, use old version on i386 until new version has fixed Cflow.pm.
- Otherwise, use new version

Implementing Reporting

- Lots available, but most extensive by far is based on flow-tools
- Cflow.pm is older, but lots of tools built around it
- integrated with flow-capture

Cflowd Warning

- Cflowd is the primary predecessor of flow-capture.
- It is obsolete, deprecated, and referred to in many online documents.
- Cflowd does not build easily on amd64 (requires gcc 2.9)_
- You do not need Cflowd.
- You do need Cflow.pm, a different tool!
- May have to hack package management or build system

testing with flowdumper

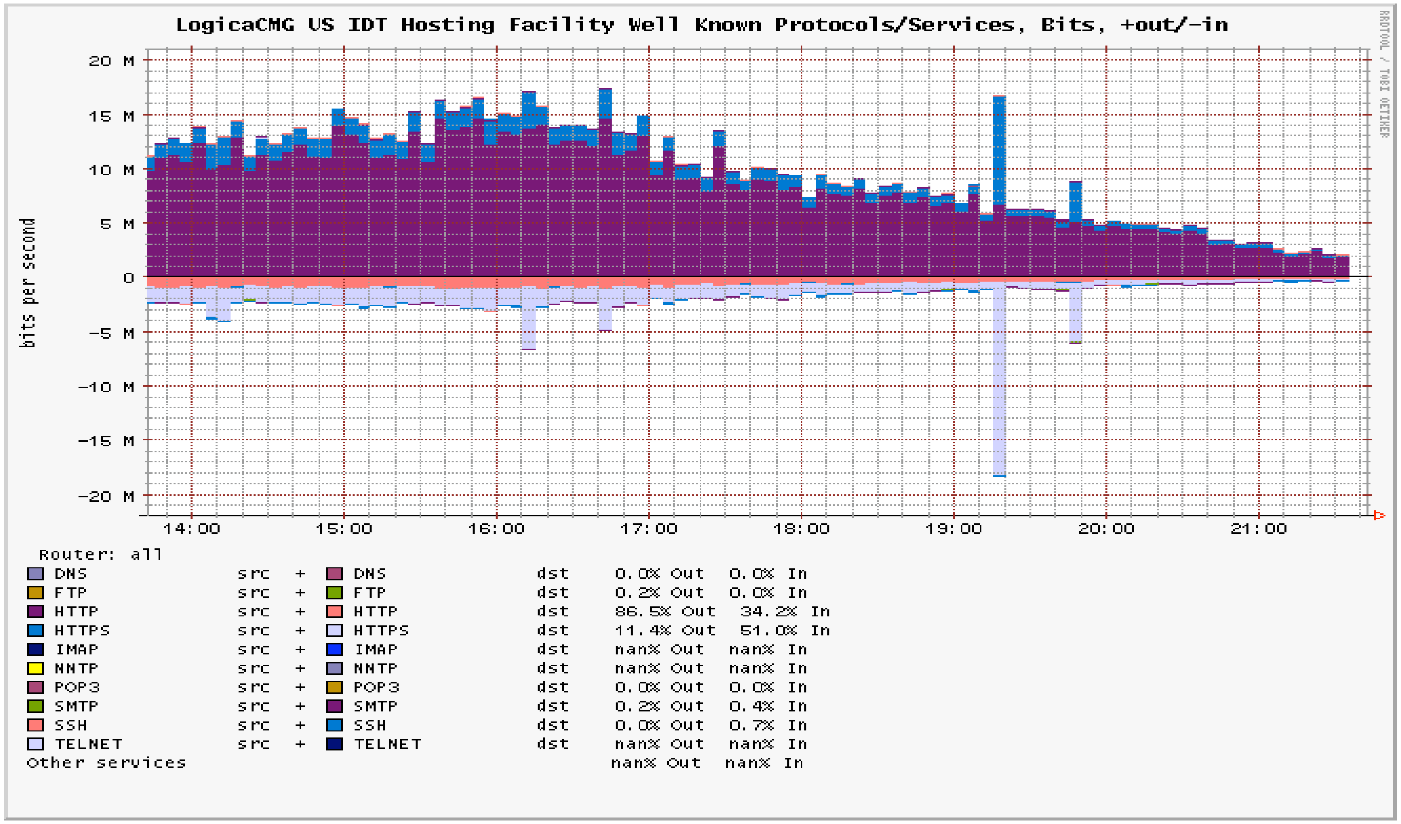
Cflow.pm includes flowdumper(1), a simple flow file query tool. If flowdumper works, you have successfully installed Cflow.pm and may continue

```
# flowdumper -s ft-your-flow-file-here
2005/04/28 19:14:01 172.16.30.247.80 ->
  216.98.200.250.63647 6(SYN|ACK) 3 144
 2005/04/28 19:14:01 216.98.200.250.63647 ->
  172.16.30.247.80 6(SYN) 1 48
...
```

Report Systems

- Flowscan: Web-based CGI: http://net.doit.wisc.edu/~plonka/FlowScan/
- Flowtracker – Web based, ad-hoc reporting: http://ensight.eos.nasa.gov/FlowViewer/
- Flow-print, flow-stat, flow-nfilter: flow-tools, text-based
- Flowdumper: Cflow.pm command line, uses Perl on command line

CUFlow: FlowScan Module



It's the quickest route to pretty pictures.

Flow-Tools

- Use flow-cat to open raw (binary) flow files
- flow-print will print them out much like flowdumper(1).

```
flow-cat ft-*| flow-print
```

- Default format much like flowdumper -s, but calls bytes “octets”.

flow-print output

Default Format:

```
srcIP            dstIP            prot  srcPort  dstPort  octets      packets
63.85.32.4       208.109.209.156  6     58943    80       1145        12
208.109.209.156  63.85.32.4       6     80       58943    12081       12
...
```

-f 1 Format:

```
Sif  SrcIPaddress     DIf  DstIPaddress      Pr SrcP DstP  Pkts  Octets
 StartTime          EndTime             Active   B/Pk Ts Fl

0000 63.85.32.4       0000 208.109.209.156   06 e63f 50    12         1145
 1016.12:09:58.042  1016.12:09:58.995      0.953 95  00 1b

0000 208.109.209.156  0000 63.85.32.4        06 50   e63f  12         12081
 1016.12:09:58.042  1016.12:09:58.995      0.953 1006 00 1b
...
```

flow-nfilter

- “What is the most heavily used port on this server?”
- “Who is connecting from this foreign network?”
- “What sort of traffic are we seeing from this application?”

Filtering can answer all of these easily.

using filters

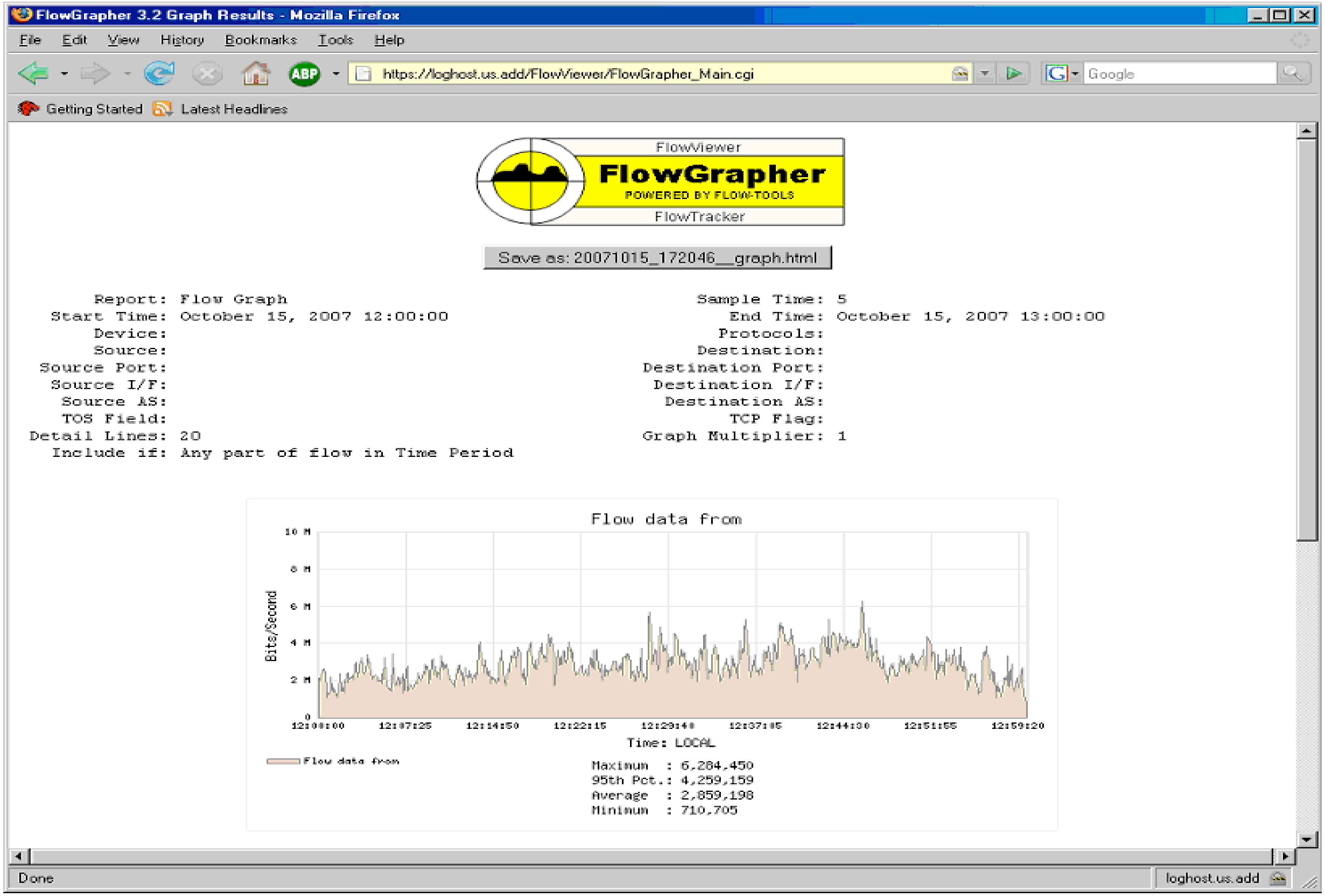
Specify the filter definition with *-F filtername*

```
flow-cat ft-* | flow-nfilter -F allmail |
  flow-print
```

Concatenate filters to make more complex queries on the fly

```
flow-cat ft-* | flow-nfilter -F allmail |
  flow-nfilter -F washdc-office | flow-print
```

FlowGrapher Results



```
      Report: Flow Graph                                  Sample Time: 5
  Start Time: October 15, 2007 12:00:00                      End Time: October 15, 2007 13:00:00
      Device:                                               Protocols:
      Source:                                             Destination:
 Source Port:                                        Destination Port:
  Source I/F:                                         Destination I/F:
   Source AS:                                          Destination AS:
   TOS Field:                                                TCP Flag:
Detail Lines: 20                                     Graph Multiplier: 1
  Include if: Any part of flow in Time Period
```

```
Maximum  : 6,284,450
95th Pct.: 4,259,159
Average  : 2,859,198
Minimum  : 710,705
```

How Not To Go BOFH

- You have evidence, you can afford to be generous
- “Here is the evidence that shows that the network is working. I am, however, happy to help *you* diagnose and troubleshoot the problem *you* are having with *your* application.”