nProbe: an Open Source NetFlow Probe for Gigabit Networks

Luca Deri
<deri@ntop.org>

NetFlow Traffic Monitoring

- Cisco NetFlow is a commercial standard for network monitoring and accounting
- Many companies (e.g. Cisco, Juniper, Extreme) ship appliances with embedded NetFlow probes.
- Most commercial probes perform very poorly (~7-10'000 pkt/sec)

NetFlow: State of the Art [1/2]

- Several collectors available (both commercial and Open Source).
- Very little offering in the probe side.
- NetFlow monitoring cannot cope with Gbit speeds and above hence new mechanisms (e.g. sampled NetFlow) have been used to overcome this problem.
- sFlow, if more popular, could become a good alternative for high speeds and backbone monitoring.

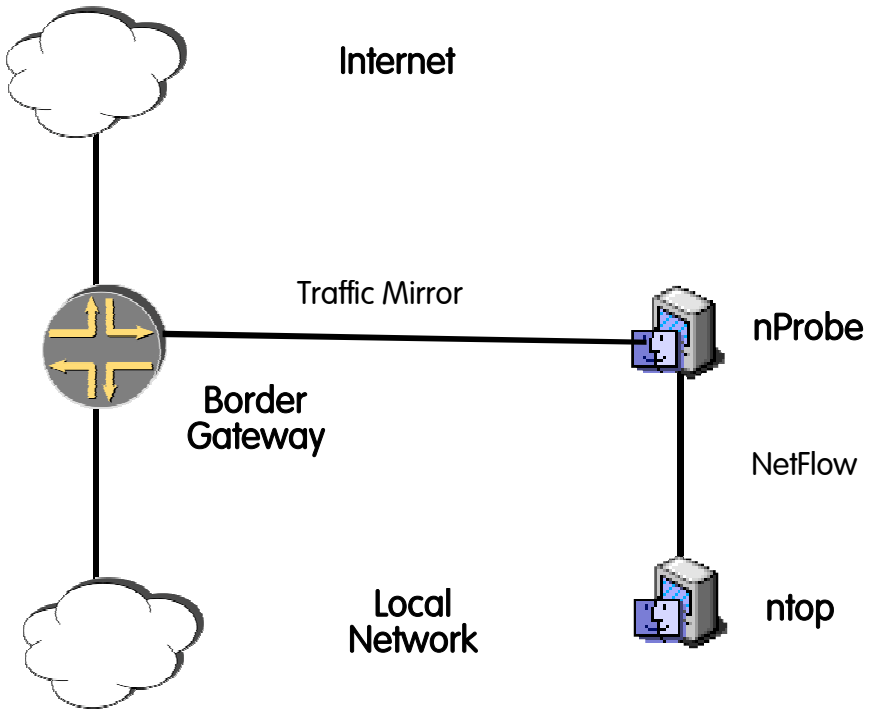
NetFlow: State of the Art [2/2]

- NetFlow is supported only on high-end routers (no support or inability to use it on mid/low-end routers.
- Most people still rely on SNMP MIB II interface counters (no fine grained measurement at all).
- RMON is relatively used and difficult to both instrument and use.

Solution: nProbe+nTop [1/2]

- The community needed an open source probe able to bring NetFlow both into small and large networks.
- Ability to run at wire speed (at least until 1 Gb) with no need to sample traffic.
- Complete open source solution for both flow generation (nProbe) and collection (nTop)

Solution: nProbe+nTop [2/2]



nProbe: Main Features

- Ability to keep up with Gbit speeds on Ethernet networks handling thousand of packets per second without packet sampling on commodity hardware.
- Support for major OS including Unix, Windows and MacOS X.
- Resource (both CPU and memory) savvy, efficient, designed for environments with limited resources.
- Source code available under GNU GPL.

nProbe: Internals

- One thread captures packets, classifies, and stores them into a hash table
- A second thread periodically walks the table and emits expired flows.
- Static hash (dynamic hashes may loose packets during resize)
- No dynamic memory: everything is allocated at startup (no need to call malloc/free hence better performance).

nProbe: BGP Support

- NetFlow packets include information about ASs (Autonomous System) origin/peer.
- nProbe has no access to the BGP table (it is not running on a router).
- AS information is read from file.
- AS file can be produced reading the BGP table (e.g. via SNMP) from the local router or downloading it from public sites on the Internet.

nProbe: Performance [1/2]

- Tests performed using a traffic generator (Agilent RouterTester 900).
- nProbe run on a Dual Athlon, Intel Pro 1000 Gbit Ethernet card, GNU/Linux Debian 3.0, standard setup, no kernel tuning, Intel drivers (publicly available)

nProbe: Performance [2/2]

Packet Size	Network Load	nProbe Performance
64	142 Mbit	277’340 packet/sec
64-1500 (random)	953.6 Mbit	152’430 packet /sec

Current Research Topics [1/2]

- nProbe-kernel: porting of nProbe into the Linux/BSD kernel for improving performance.
- nBox: Embedded nProbe-based appliance.

Current Research Topics [2/2]

- nFlow:
  - Security
  - Flow compression
  - MPLS/VLAN information
  - Payload information
  - Application/network performance.

Availability

- http://www.ntop.org/nProbe.html
- http://www.ntop.org/nBox.html
- http://www.nflow.org/