PSAMP Framework Document
draft-ietf-psamp-framework-02.txt

Duffield, Greenberg, Grossglauser, Rexford: AT&T

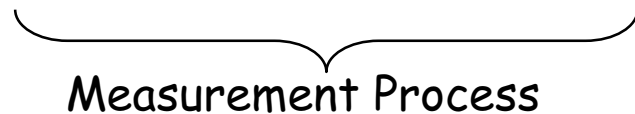Chiou: Avici

Claise, Marimuthu, Sadasivan: Cisco

Summary of Changes

❑ Architecture

❑ Redefinition of "Measurement Process"

❑ Selection Process

❑ Reporting Process

❑ Export Process

Architecture

❑ Change definition of "Measurement process"

❑ Selection Process -> Reporting Process -> Export Process

Measurement Process

❑ PSAMP measurement proc. analogous to IPFIX metering process

❑ Multiple parallel measurement processes

✦ Can feed single export process

✦ E.g. router with multiple line cards

• Per line card measurement processes
• Single export process on router

Selection Operations

❑ Output of selection operation is selected packet

✦ Previously: output was binary selection decision

✦ Now: easier to express ordered composite selection operations

❑ Selector Sequence Number

✦ Each selector keeps counter of input packets

✦ Counter value reported as sequence number for selected packets

✦ Used at collector to infer attained sampling rate (c.f. sFlow)

- attained sampling rate needed to infer actual traffic rate
- robust with respect to loss of reports after sampling

Selection Operations

❑ Count based vs. Timer based

 ✦ Timer based: simpler to implement? Useful for IPPM support

 ✦ Count based: more accurate for single packet statistics (Claffy 93)

❑ Simple random sampling:

 ✦ generalization: n from N random sampling

❑ Systematic 1 in N sampling

 ✦ generalization: n from N periodic

❑ Hash-based

❑ Stratified, non-uniform probability

 ✦ Probably too complex to specify at first cut

 ✦ No big demand from applications

Filtering

❑ Selection of packets based on packet fields, packet treatment

✦ Demand from applications, e.g. drill-down

❑ Don't expect all PSAMP devices to support filtering

✦ filter mist first parse fields, then filter on them

❑ Feasible for many existing devices

✦ routers already parsing fields and filtering for ACLs

✦ packet treatment also available at sufficiently low rate

❑ Filtering for measurement can be simpler than filtering for ACL

❑ Simple Proposal

✦ Filter on each of set of fields:
- Single match/mask (IP addresses, TCP flags, …)
- Single range (TCP/UDP port numbers, AS numbers,)

✦ Select packet if it passes all field filters

✦ Simple to configure in MIB
- No attempt to reproduce complexity of general ACL specification

Composite Selection Operations

❑ Application: drill down, e.g.,

✦ Baseline 1 in 10,000 sampling: notice "interesting" traffic

✦ Configure filter onto interesting traffic, 1 in 100 sampling

❑ Proposal:

✦ Allow composition of filtering with sampling, either order

- Filtering -> Sampling
- Sampling -> Filtering

✦ Advantageous to put first the operation that thins traffic most

- Allowing either order extends domain of utility

Multiple Parallel Measurement Processes

❑ Multiple measurement processes acting on same traffic stream

❑ Application: drill down, e.g.,

✦ Baseline 1 in 10,000 sampling: notice "interesting" traffic

✦ Configure filter onto interesting traffic, 1 in 100 sampling

❑ Want to be able to drill down while continuing base measurements

Which sampling operations?

❑ Capability Model

✦ Standard specifies each sampling method

✦ Implementers decide which to support

✦ Marketplace decides which are important

❑ Conformance Levels

✦ MUST/SHOULD/MAY

✦ Standards decide minimum PSAMP capabilities

✦ Clearer understanding of minimum PSAMP capabilities in practice

✦ What are the criteria to decide?

✦ Difficult to place newer sampling methods in correct level

Current Draft Proposal: 2 Conformance Levels

❑ MUST

✦ one of 1 in N systematic, or 1/N simple random

· both are currently available from vendors

❑ SHOULD

✦ both options above

✦ n from N systematic sampling

✦ hash-based selection

✦ filtering (see slide 6)

✦ composite selection operations (see slide 7)

✦ at least 2 parallel selection processes

Packet Reports

❑ Mandatory Reports:

✦ Report first n bytes beyond link level header
- No protocol and field parsing required
- Burden of interpretation falls in collector

✦ Report sequence numbers from selection operation(s)

✦ Report PSAMP device interfaces used by packet

✦ Any additional fields calculated during sampling e.g. hash, timestamps

❑ Optional Reports:

✦ Report configurable combination of selected fields instead of n bytes

✦ Saves bandwidth, less burden of interpretation for collector

✦ Should not be hard for a device that already filters on fields

❑ Either should be compatible with IPFIX, suitably tweaked

Export Process

❑ No substantive changes, yet

❑ Requirements

✦ Congestion avoiding

✦ Not onerous on PSAMP device

✦ Reliability not required, avoid overhead (buffers, ack processing)

❑ Candidate export protocols

✦ Collector based rate renegotiation

✦ Protocols in development (DCCP, PR-SCTP?)

✦ Whatever IPFIX decides
  • NetFlow v 9 basis, + TCP, unreliable transport TBD (PS-SCTP?)

❑ Other proposals?