History of the Internet Accounting Working Group

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Internet Accounting WG (i)

- Working Group began in 1991 in Network Management Area
- 'Accounting' meant measuring traffic within a network, and reporting it in a form suitable for use in biling systems
- Early discussions produced a model of traffic flows, and a scheme for measuring them
- RFC 1272, "Internet Accounting Background" published 1992

Internet Accounting WG (ii)

- Implementation work began in 1992
- WG became dormant pending implementation experience. WG closed
- NeTraMet released as freeware October 1993
- Internet Drafts produced to flesh out the model and document the implementation work:
  - draft-brownlee-acct-arch-report-02.txt
  - draft-brownlee-acct-meter-mib-03.txt
- Above drafts to be published as 'experimental' RFCs

Internet Accounting Model (i)

- Flows described by endpoint attributes, such as
  - addresses, address types, address masks
  - Packet and byte counts
  - Creation and last-use times
- Flows are bi-directional, Source and Dest are specified by the user
- Individual flows may be aggregated
- Each packet is counted in only ONE (aggregate) flow

Internet Accounting Model (ii)

- Meters build up tables of traffic flows. Each flow record contains counts and attribute values
- Collectors gather flow data from meters
- Managers co-ordinate Meters and Collectors

Rule Table (i)

- Rules describe the flows of interest as a set of patterns
- Meter matches these patterns against every packet it processes
- Each address attribute also has a Mask
- Mask bits indicate which address bits are significant
- Packet processing:
  - Classify: match patterns to determine flow. No match –> ignore this packet
  - Search: make sure flow is in the meter's tables
  - Count: increment flow counters, set times

Rule Table (ii)

- A rule is a row in the meter's rule table
- Each rule has the form
  { Attribute, Mask, Value, Action, Param }
- Attribute is ANDed with Mask and compared to Value. Equal –> execute Action. Param is a parameter for Action
- Action is performed when a rule is matched
  - Count
  - Push or PushPkt
  - Matching flow control
  - Matching subroutines

Rule Actions

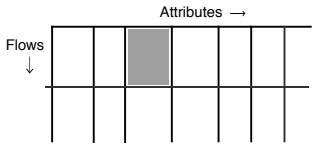
- Ignore: Stop matching, ignore the packet
- Retry: Retry match, pkt direction reversed
- Push, PushPkt: Save matched values in pattern stack
- Count:: Search, Insert, Update flow
- Assign: }
- Gosub: } Support rule-matching subroutines
- Return n: }

Creation and Activity Tables

- Each flow is stored as a row in the meter's Flow Table. Rows may appear and disappear
- Allow collection of flow data by several collectors at different intervals
- SNMP object IDs for 'creation' and 'activity' table entries include an index and a time
- Meter returns the first SNMP object with both time and index greater than the requested OID values
- This allows a collector to find all the flows created or active after a specified time

Bulk Data Collection

- Flow Table is a 2-D array: Attributes x Flows
- Meter uses an ASN.1 opaque object ('column blob') to collect part of an attribute column



- Collector can read specified set of attributes for flows active after a given time – this minimises SNMP traffic

Meter Control

- Meter maintains table of collector IP addresses and collection times: acctCollectorInfo
- Memory for flows which haven't been active since last recorded collection can be recovered
- InactivityTimeout variable specifies minimum lifetime for flows
- HighWaterMark variable warns meter that garbage collection should be speeded up. (NeTraMet does this by reducing InactivityTimeout)

Rule Set Info

- acctRuleSetInfo holds sizes of rule tables
- Setting these variables allocates space for the tables
- Set 1 is the meter's default, which the meter runs when sarted up. It can't be altered
- acctCurrentRuleSet specifies set meter is using. Set this to change the rule set

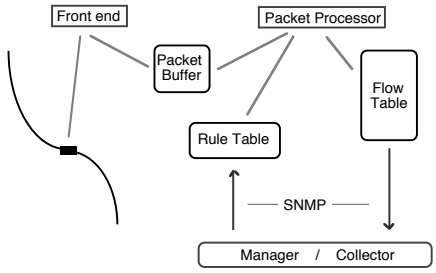
Other Control Variables

- **Emergency Rule Set. Allows the meter to switch to a 'coarser' rule table when the flow table gets too full, as specified by FloodMark variable**
- **Sampling Rate. Allows user to specify '1 in every n' packets to be processed. Default is n=1, i.e. every packet is processed**

NeTraMet

- **First implementation of the Internet Accounting Model**
- **Version 2.1 released as Freeware in October 93**
- **Version 3.2 (current version) or 3.3 beta available by anonymous FTP from:**
  ftp://ftp.auckland.ac.nz/
  pub/iawg/NeTraMet
- **NeTraMet home page:**
  http://www.auckland.ac.nz/
  net/Accounting/ntm.Release.note

NeTraMet Implementation



NeMaC: NeTraMet's Manager and Collector

- **Reads (ASCII text) rule file, checks it for consistency, downloads it to meters**
- **Collects flow data from meter at specified intervals**
- **Can handle a list of meters, each with its own rule file**
- **Simple flow data file format – normalised matrix of attributes vs flows**
- **File lines starting with # hold management information, e.g. attribute names (Format), sample times (Time)**
- **No provision for starting new files at intervals, e.g. daily**