Measuring and Analyzing Traffic with JUNOS

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Agenda

- **Introduction**
- **Traditional Traffic Analysis with JUNOS**
  - Collection of measurements
  - Local handling of measurement data
  - Exporting of measurement data
- **Specialized Applications on top of JUNOS**
  - Partner Solution Development Platform (PSDP)
  - Applicability of PSDP for Traffic Analysis
Introduction

- **Measurements are important**
  - Measuring = knowing
  - Final goals might differ
    - Traffic Matrix Estimations
    - Network Topology Optimization
    - Billing
    - Peering Reconsiderations
    - ...

- **But LESS important than forwarding**
  - Should be absolutely non-destructive
  - Should also not cause additional delay or jitter
  - Should also not impact other services
Collection of measurements - 1

- Traffic information collected at Input or Output
  - Interface Statistics
  - Queue Statistics
  - Firewall (ACL) Counters*
  - ...

*Implemented at Forwarding
Collection of measurements - 2

- Traffic information collected during Forwarding
  - Sampling
  - Mirroring
  - Source/Destination Class Usage (SCU/DCU)
  - MPLS LSP Statistics

1:1000 – copy of header
Copy of packet
Src/Dst Attribute X = Class X – Count C_X
Nexthop LSP Y – Count C_Y
Local handling of measurement data - 1

- Simple handling of the data
  - With native storage
    - Examples: I/O Statistics, SCU/DCU, Filter Counters
    - In various registers, variables, memory locations …
    - Typically done on PFE with (bulk) transfer to RE*
  - Without storage
    - Example: Mirroring
    - No local storage
    - PFE only activity

* RE = Routing Engine (Control Plane)
PFE = Packet Forwarding Engine (Forwarding Plane)
Local handling of measurement data - 2

- Advanced handling of the data
  - Sampling Data Files
    - Example: Sampling
    - (Aggregated) Header information
    - By default on RE
    - Can be done within PFE (MS-PIC) for better scaling*
  - Accounting Profiles
    - Examples: I/O Statistics, Filter Counters, SCU/DCU
    - Periodical storage in user configurable file
  - MPLS Statistics File
    - Example: Per LSP Statistics
    - Periodical storage in user configurable file

* MS-PIC = MultiServices Physical Interface Card
Exporting of measurement data

- Through human user interface
  - CLI or GUI

- Towards server
  - SNMP
  - XML
  - FTP
    - Triggered by script (running locally or on server)
  - Accounting Profiles
    - User configurable data exchange parameters for stored files
  - NetFlow
    - v5, v8 and/or v9
Need more choices?

- The JUNOS Traffic Analysis toolset
  - Is very flexible and scalable
  - Allows for many different choices and combinations
  - …

- But what if you need more or something else?
  - Different data fields to be collected
  - Inter-router cooperation
  - Interoperability with non-standard applications
  - …

- Then Juniper’s New PSDP might be the answer
Partner Solution Development Platform (PSDP)

- Enables licensed partners (including customers) to build applications on JUNOS software
  - 3rd party developed apps can run on or integrate with JUNOS
  - Accelerates innovation for the delivery of revenue-generating services and improved operations

- Powerful set of resources includes software development kit (SDK)
  - Intelligent and secure interfaces to JUNOS routing and service functions
How the PSDP Works

**Routing Engine (RE-SDK)**
- Routing and control functions
- Slow path packet processing
- User interface extension

**Partner Solution Development Platform**
- Adapts applications to run in JUNOS
- Certificate used to sign apps
- Admin controls activated apps

**MultiService PIC SDK (MP-SDK)**
- Raw packet processing framework
- Very efficient and scalable
Development Benefits of JUNOS Software

- **One Code Base**
  - Single implementation to build upon
  - Mbps-Tbps platform range

- **One Release Line**
  - Each release is a superset of prior
    - Readily adapted forward/backward compatibility
  - Predictable schedule of development

- **One Modular Architecture**
  - Functional separation to protect base software and the PSDP applications
  - Well-defined, intelligent interfaces to specific routing and services functions
Applicability of PSDP for Traffic Analysis

- Develop specialized collector logic running on MS-PIC
- Develop optimized signaling protocol running on RE
Summary

- JUNOS supports the relevant standards for traditional collection and analysis of traffic data.
- Customers requiring more sophisticated mechanisms can now extend JUNOS’ capabilities with their own developments.
Questions? Comments?

- Can be now in French or English
- Or by email to bdetroch@juniper.net
Additional Details

- SCU/DCU
- Accounting Profiles
- XML
- PSDP Development
SCU/DCU Details

- Destination Class A from so-0/1/0 to 172.23.0.0/16 prefixes
- Results stored in SNMP MIB on the router
- DCU applied to inbound interface and destination IP address
- Billing software can apply different tariffs per destination class

1. Source
2. M-Series Router
3. Switch
4. Server
5. Access Router
6. Customer
Accounting Profiles

- Reliable collection & transfer of billing data
  - Less CPU intensive than SNMP
  - Guaranteed delivery to mediation server
XML – Information extraction

- CLI versus XML:

  **Formatted ASCII format:**
  
  Physical interface: fxp0, Enabled, Physical link is Up
  Interface index: 4, SNMP ifIndex: 3

  **XML-tagged version:**
  
  ```xml
  <interface>
    <name>fxp0</name>
    <admin-status>enabled</admin-status>
    <operational-status>up</operational-status>
    <index>4</index>
    <snmp-index>3</snmp-index>
  </interface>
  ```
The PSDP Build Process

- PSDP Application Source (from developer)
- SDK "Backing Sandbox" (SDK Libraries)
- SDK Build Environment & Tools
  - FreeBSD
  - VMWare
- Developer & Juniper Certification Info
- PSDP Binary
- PSDP Binary w/Signatures
- PSDP Binary Loaded onto Router