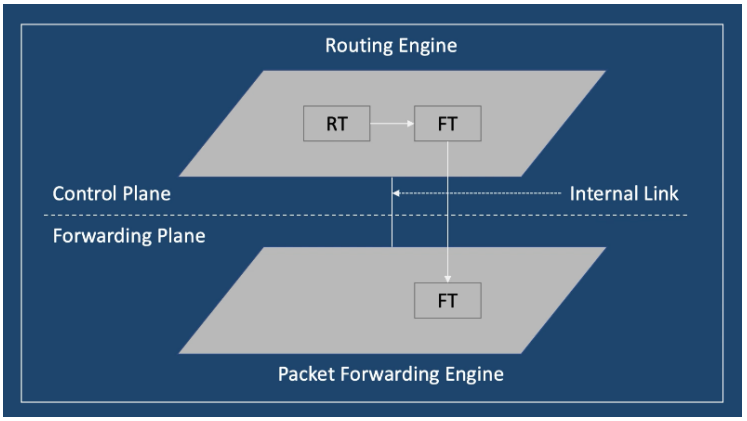
Junos Fundamentals

Junos Software Architecture

- Junos kernel is based on FreeBSD Unix, an open-source software
- Junos functionality is compartmentalized into multiple software processes.
- Each process runs in its own protected memory space.



Routing Engine and Packet Forwarding Engine

- **RE** is the brain of the device, responsible for performing protocol updates and system management.
- Based on x86 or PowerPC architecture.
- Maintain routing table, bridging table, and primary forwarding table (active routes).
- Controls the interfaces, chassis components, system management, and access to the device.
- Provides the CLI and J-WEB GUI

- **PFE** usually runs on separate hardware
- Responsible for forwarding transit traffic through the device
- Receives a copy of the forwarding table from the RE using an internal link
- In some cases uses Application Specific Integrated Circuits for increased performance.
- Implements services such as rate limiting, stateless firewall filters, and class of services (CoS)

Protocol Daemons

- Each process running in its own protected memory space is known as a daemon.
- Few important ones
- Routing protocol daemon - routing intelligent
- Device control daemon - manages the interfaces
- Management daemon - configuration

- Alarm daemon
- System log daemon

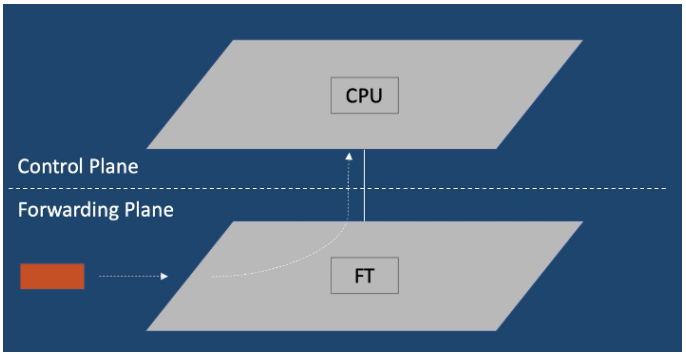
Transit vs Exception Traffic

Transit traffic

- Traffic that enters an ingress port, is compared against the forwarding table, and is finally forwarded out an egress port.
- Transit traffic is handled only by the forwarding plane.
- Unicast transit traffic is one to one.
- Multicast transit traffic is one ingress port and forward to multiple egress ports.

Exception Traffic

- Traffic that comes from ingress port but ends up head to Junos device itself.
- Packets addressed to the chassis, such as routing protocol updates, SSH sessions, ping, traceroute.
- TCP/IP packets with the IP options field.
- All exception traffic destined for the RE is sent over the internal link.
- Traffic traversing the internal link is rate limited to protect the RE from Dos attacks.
- Rate limiter is not configurable



Practice Questions

Which of these are functions of RE? (Choose two)

- **Implement policing, firewall filtering and class of service**
- **Maintain routing tables**
- （正确）
- **Forward traffic to the destination**
- **Manage the PFE**
- （正确）

注解
The RE maintains the routing tables, bridging table, and primary forwarding table and connects to the Packet Forwarding Engine (PFE) through an internal link.

The RE provides the intelligence side of the equation, so the PFE can simply perform as it is instructed.

Which of these commands can be used to view the egress interface selected on the PFE for destination prefixes?

- **show route private**
- **show route table**
- **show route interface**
- **show route forwarding-table**
- （正确）

注解
https://www.juniper.net/documentation/en_US/junos/topics/reference/command-summary/show-route-forwarding-table.html

Which of these constitutes the forwarding plane?

- **RE**
- **Routing table**
- **Forwarding table**
- **PFE**
- （正确）

注解
The control plane runs on the Routing Engine and the forwarding plane runs on the Packet Forwarding Engine.

Which of these about the role of Routing Engine are true? (Choose two)

- **The RE manages the Packet Forwarding Engine (PFE).**
- （正确）
- **The RE receives a copy of the forwarding table.**
- **The RE controls and monitors the chassis.**
- （正确）
- **The RE implements class of service (CoS).**

注解

The RE handles all protocol processes in addition to other software processes that control the device's interfaces, the chassis components, system management, and user access to the device.

The RE controls the PFE by providing accurate, up-to-date Layer 2 and Layer 3 forwarding tables and by downloading microcode and managing software processes that reside in the PFE's microcode.

Which of these is true about Junos OS?

- **All platforms running the Junos OS use a separate process with protected memory space for each routing protocol.**
- （错误）
- **All platforms running the Junos OS use a hard drive to optimize syslog data storage.**
- **All platforms running the Junos OS use the same source code base.**
- （正确）
- **All platforms running the Junos OS use the same PFE.**

注解

All platforms running the Junos OS use the same software source code base within their platform-specific images. This design ensures that core features work in a consistent manner across all platforms running the Junos OS.

Which of these about exception traffic is true?

- **The internal link rate-limits exception traffic to protect the RE.**
- （正确）
- **Forwarding tables are used to forward exception traffic.**
- **Only PFE is responsible for handling exception traffic.**
- **When congestion occurs, exception traffic is not prioritised.**

注解

The Junos OS sends all exception traffic destined for the RE over the internal link that connects the control and forwarding planes. The Junos OS rate limits exception traffic traversing the internal link to protect the RE from denial-of-service (DoS) attacks.

Which of these is responsible for handling transit traffic?

- **Neither RE, not PFE**
- **RE only**

- **PFE only**
- （正确）
- **Both RE and PFE**
- （错误 ）

注解
Transit traffic consists of all traffic that enters an ingress network port, is compared against the forwarding table entries, and is finally forwarded out an egress network port toward its destination.

A forwarding table entry for a destination must exist for a device running the Junos OS to successfully forward transit traffic to that destination. Transit traffic passes through the forwarding plane only and is never sent to or processed by the control plane.

By processing transit traffic through the forwarding plane only, platforms running the Junos OS can achieve predictably high performance rates.

Which of these is true about the Junos operating system?

- **Junos provides separation between control and forwarding planes.**
- （正确）
- **All Juniper devices use the same Junos operating system.**
- **The Junos source code is specific to the device model.**

注解
An important aspect of Junos modularity is the separation of the control plane and the forwarding plane. The processes that control routing and switching protocols are cleanly separated from the processes that forward frames, packets, or both through the device running the Junos OS.

Which of these are benefits of the modular design of Junos? (Choose two)

- **Each module runs in it's own protected memory space.**
- （正确）
- **Each module uses specialised hardware.**
- **Each module can be restarted separately.**
- （正确）

注解
Junos OS functionality is compartmentalized into multiple software processes. Each process handles a portion of the device’s functionality. Each process runs in its own

protected memory space, ensuring that one process cannot directly interfere with another. When a single process fails, the entire system does not necessarily fail and can be restarted.

Which of these about forwarding table are true? (Choose two)

- **Incoming packets are compared against existing entries in the forwarding table to determine the next hop.**
- （正确）
- **The forwarding table contains all known routes.**
- （错误 ）
- **The forwarding table stores a subset of the information from the routing table.**
- （正确）
- **In case of multiple matches, the forwarding table uses the least-specific entry to forward packets.**

注解

The routing engine creates a table of all learned routes known as the routing table. This is used to build the forwarding table - a table consisting of all active routes. So the forwarding table is a subset of the routing table.

Transit traffic - traffic that enters an ingress port and exits an egress port must match an entry in the forwarding table to be forwarded out

Which of these is true about the routing table?

- **It contains all accepted routes to all destinations.**
- （正确）
- **It contains only active BGP routes.**
- **It finds the best path to each destination by using a modified shortest-path-first calculation.**
- （错误 ）
- **It contains routes learned dynamically only.**

注解

https://www.juniper.net/documentation/en_US/junos/topics/concept/routing-tables-understanding.html

From other documentation: The route table in Junos is defined as all routes learned from all protocols.

https://books.google.co.uk/books?id=UI2ZwjIgBwwC&lpg=PA1&ots=oLuvwQElzn&dq=junos%20forwarding%20table&pg=PA1#v=onepage&q=junos%20forwarding%20table&f=false

Which two statements about the JUNOS OS are true? (Choose two.)

- **It supports Java for automation on all platforms.**
- **It uses the same software source code base for all platforms.**
- （正确）
- **It uses a different software source code base for each platform.**
- **It supports XML for automation on all platforms.**
- （正确）

注解

Junos OS Overview -
https://www.juniper.net/documentation/en_US/junos/topics/concept/junos-software-introduction.html

Junos Automation -
https://www.juniper.net/documentation/en_US/junos/topics/concept/junos-script-automation-overview.html

Which of these is true about Junos OS?

- **The Junos kernel is based on the Solaris operating system.**
- **The Junos kernel is not based on any other operating system.**
- **The Junos kernel is based on the FreeBSD UNIX operating system.**
- （正确）
- **The Junos kernel is based on the GNU Zebra operating system.**

注解

https://www.juniper.net/documentation/en_US/junos/topics/topic-map/junos-os-overview.html

Which of these are Junos processes? (Choose two)

- **SNMP daemon (snmpd)**
- （正确）
- **Routing protocol daemon (rpd)**
- （正确）
- **OSPF daemon (ospfd)**
- **BGP daemon (bgpd)**

注解

List of Junos OS Processes -
https://www.juniper.net/documentation/en_US/junos/topics/reference/general/junos-os-processes.html