



Технология Junos Fusion и  
коммутаторы EX-серии для  
построения корпоративных сетей

# Технология Junos Fusion Enterprise



## Проблемы в корпоративной сети сегодня

Изменения могут сломать что-то или открыть брешь безопасности!



Ядро

Распределение

Доступ

Не хватает масштабирования, надежности и видимости

Слишком сложно: уровни коммутации и VLAN

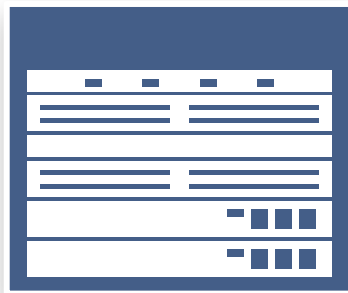
Большое количество “ручных” операций

Сложности в диагностике неисправностей



### Трансформируйте вашу сеть

Вся ваша сеть



Завтрашняя  
корпоративная сеть:  
упрощенная  
архитектура, которая  
масштабируется

Фактически “свернутое” ядро,  
распределение и доступ

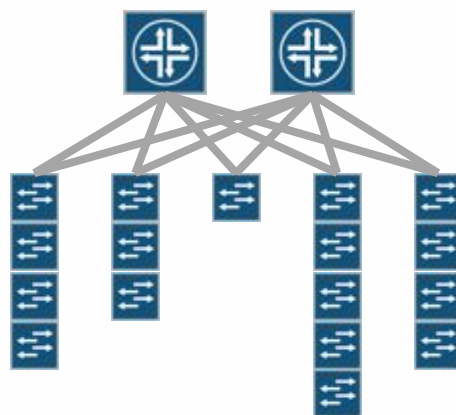
Единая, простая в управлении  
платформа

Централизованное  
конфигурирование,  
инициализация, управление



# Junos Fusion Enterprise

Junos Fusion  
Enterprise



## Simple Smart Flexible

Завтрашняя  
корпоративная сеть:  
**Простая, Умная,  
Гибкая**

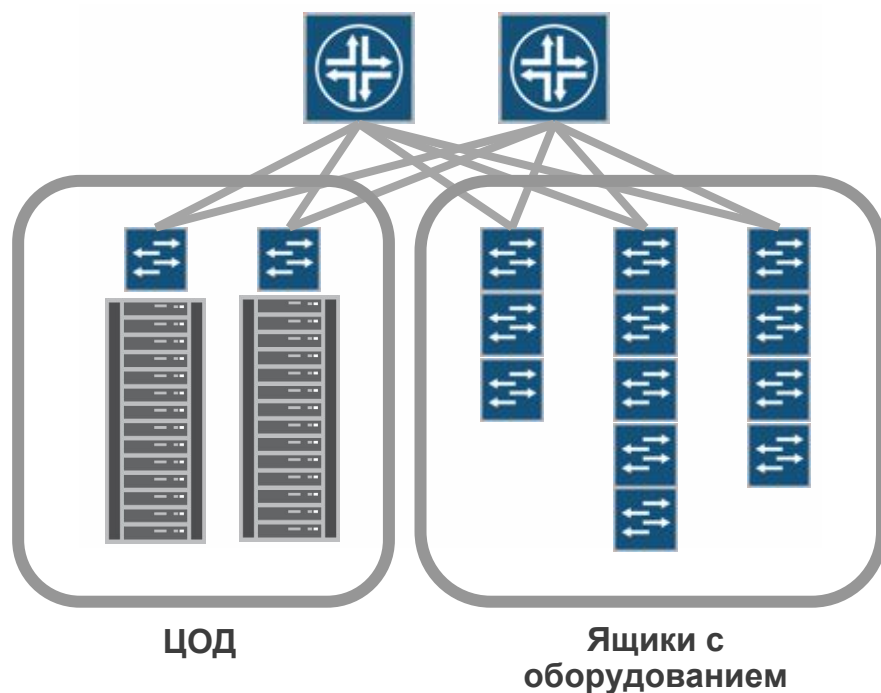
**Простая:** одно логическое устройство для управления, plug-n-play, zero touch

**Умная:** открытые APIs, интеллектуальные обновления программного обеспечения

**Гибкая:** защита инвестиций, использование существующей топологии, гибкие развертывания



### Ваша сеть



### Simple Smart Flexible

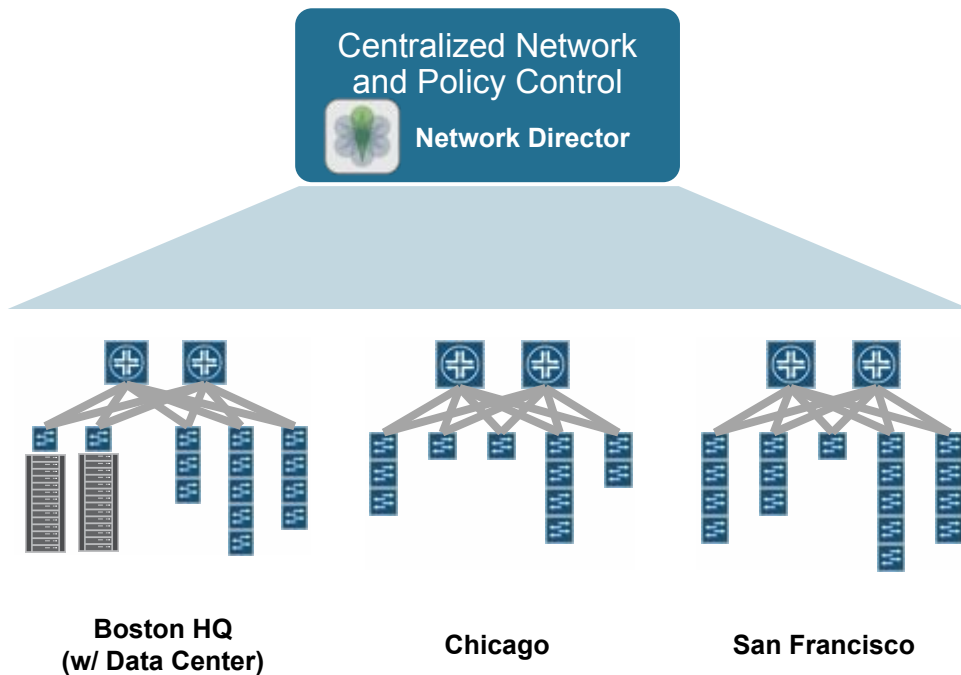
Общее ядро:  
**Корпоративная сеть  
и ЦОД**

Консолидированные,  
централизованные операции =  
Снижение эксплуатационных  
расходов (OPEX)

Enterprise campus + data center =  
одно управляемое устройство



## Управляйте несколькими фабриками



**Simple Smart Flexible**

Junos Space Network Director  
**Single-pane-of-glass**

Network Director:  
централизованная конфигурация,  
управление и политики

Адаптация для бизнеса и  
безопасности - применяйте  
политики один раз!



# Junos Fusion – одна технология, несколько вариантов

Aggregation  
Device  
(AD)

Junos Fusion  
Provider Edge



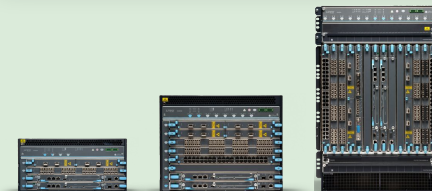
MX

Junos Fusion  
Datacenter



QFX10000

Junos Fusion  
Enterprise



EX9200

Satellite  
Device  
(SD)

QFX5100



EX4300



QFX5100



EX4300



QFX5100



EX4300

EX3400

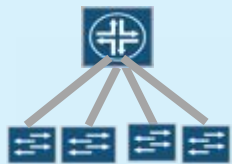
EX2300



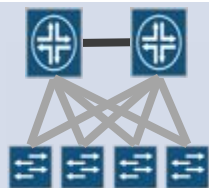


## Несколько вариантов развертывания

### Modes of Deployment



Single Aggregation Device

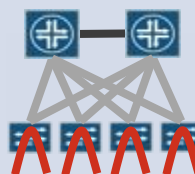


Dual Aggregation Device

### Modes of Operation

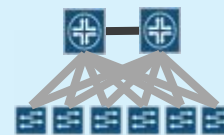


Extended mode

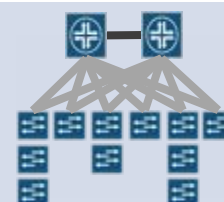


Local Switching

### Satellite Connections



Single Satellite Device (SD)



Cluster of SDs



|                               | Junos Fusion<br>Provider Edge | Junos Fusion<br>Datacenter        | Junos Fusion<br>Enterprise                          |
|-------------------------------|-------------------------------|-----------------------------------|-----------------------------------------------------|
| Aggregation Device (AD)       | MX Series                     | QFX10000                          | EX9200                                              |
| Satellite Device (SD)         | QFX5100, EX4300               | QFX5100, EX4300                   | QFX5100, EX4300,<br>EX3400, EX2300                  |
| Deployment Mode               | Single AD<br>Dual AD          | Dual AD                           | Dual AD<br>Single AD                                |
| Extended Mode                 | ✓                             | ✓                                 | ✓                                                   |
| Local Switching Mode          | ✓                             | ✓                                 | ✗                                                   |
| Satellite Cluster support     | ✗                             | ✗                                 | ✓                                                   |
| Use case specific<br>features | L3 on SD, MPLS,<br>PPQOS      | Overlay, FCoE, local<br>switching | Access control, PoE,<br>Access security,<br>cluster |

# Коммутаторы серии EX9200



New

New



EX9251

EX9253

### Programmable

- Programmable ASIC (Junos)
- Programmable control and management planes via open APIs
- Automation

### Flexible

- Campus- and data center-optimized
- Extensive protocol support
- Feature rich
- Future ready

### Scalable

- Logical scale
- High density
- Up to 13.2 Tbps chassis throughput
- 1G, 10G, 40G and 100G

EX9204

EX9208

EX9214



Juniper One Custom Silicon



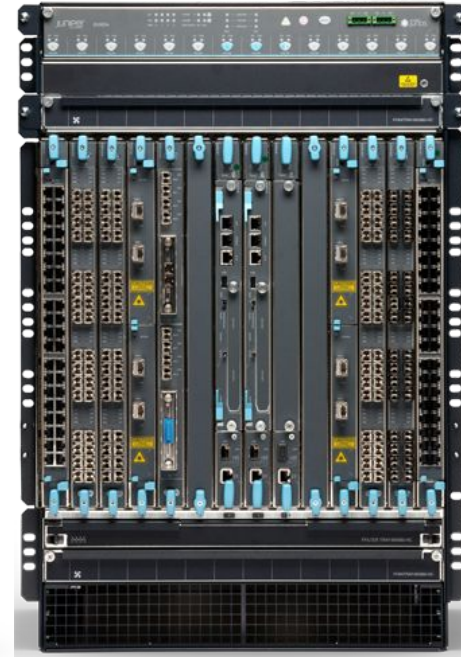
### EX9204

- ❑ 5U
- ❑ 3 line card
- ❑ 10GbE - 144
- ❑ 100GbE - 12



### EX9208

- ❑ 8U
- ❑ 6 line card
- ❑ 10GbE - 288
- ❑ 100GbE - 24



### EX9214

- ❑ 16U
- ❑ 12 line card
- ❑ 10GbE - 576
- ❑ 100GbE - 48



New

### EX9253

- ☐ 3U
- ☐ 2 line card
- ☐ 10GbE - 144
- ☐ 40GbE - 36
- ☐ 100GbE - 24



New

### EX9251

- ☐ 1U
- ☐ - line card
- ☐ 10GbE - 24
- ☐ 40GbE - 4
- ☐ 100GbE - 4



|                        |                                                    |
|------------------------|----------------------------------------------------|
| <b>EX9200-40T</b>      | 40-port 10/100/1000BASE-T RJ-45                    |
| <b>EX9200-40F*</b>     | 40-port 100FX/1000BASE-X SFP                       |
| <b>EX9200-32XS</b>     | 32-port 10GbE SFP+                                 |
| <b>EX9200-40XS</b>     | 40-port 10GbE SFP+ MACsec                          |
| <b>EX9200-12QS</b>     | 12-port 40GbE QSFP+ or 4-port 100GbE QSFP28 combo  |
| <b>EX9200-6QS</b>      | 6-port 40GbE QSFP+ or 24-port 10GbE SFP+ combo     |
| <b>EX9200-2C-8XS</b>   | 2-port 100GbE + 8-port 10GbE                       |
| <b>EX9200-MPC</b>      | Modular Port Concentrator (MPC)                    |
| <b>EX9200-20F-MIC</b>  | 20-port 100FX/1000BASE-X                           |
| <b>EX9200-40T-MIC</b>  | 40-port 10/100/1000GBASE-T                         |
| <b>EX9200-10XS-MIC</b> | 10-port 10GBASE-X                                  |
| <b>EX9253-6Q12C*</b>   | 12-port QSFP28 40GbE/100GbE and 6-port QSFP+ 40GbE |

\* есть модель с поддержкой MacSec

# Коммутаторы серии QFX5100



- ❑ 10-member Virtual Chassis
- ❑ 24 x 40GbE QSFP+ fixed ports
- ❑ Optional two 8 x 10GbE SFP+ module or 4 x 40GbE QSFP+
- ❑ Up to 104 - 10GbE ports
- ❑ Up to 32 - 40GbE ports
- ❑ Hot-swappable fans AFI or AFO
- ❑ Redundant power supplies, hot-swappable, AC or DC



- ❑ 10-member Virtual Chassis
- ❑ 48 x 10GbE SFP+ fixed ports
- ❑ 6 x 40GbE QSFP+ fixed ports
- ❑ Up to 72 - 10GbE ports
- ❑ Up to 6 - 40GbE ports
- ❑ Hot-swappable fans AFI or AFO
- ❑ Redundant power supplies, hot-swappable, AC or DC



- ❑ 10-member Virtual Chassis
- ❑ 48 x 10GbE BASE-T fixed ports
- ❑ 6 x 40GbE QSFP+ fixed ports
- ❑ Up to 72 - 10GbE ports
- ❑ Up to 6 - 40GbE ports
- ❑ Hot-swappable fans AFI or AFO
- ❑ Redundant power supplies, hot-swappable, AC or DC



- ❑ 10-member Virtual Chassis
- ❑ 96 x 10GbE SFP+ fixed ports
- ❑ 8 x 40GbE QSFP+ fixed ports
- ❑ Up to 104 - 10GbE ports
- ❑ Up to 8 - 40GbE ports
- ❑ Hot-swappable fans AFI or AFO
- ❑ Redundant power supplies, hot-swappable, AC or DC

# Коммутаторы серии EX4300



- ❑ 10-member Virtual Chassis
- ❑ 24/48 x 10/100/1000BASE-T fixed port
- ❑ Power over Ethernet (PoE)-enabled standards based 802.3at PoE+ up to 30W
- ❑ 4 x 40GbE QSFP+ fixed ports
- ❑ Optional 4 x 10GbE SFP+ module (Virtual Chassis/uplinks)
- ❑ Hot-swappable fans
- ❑ Redundant power supplies, hot-swappable, both AC and DC
- ❑ IEEE 802.1ae (MACsec)



- ❑ 10-member Virtual Chassis
- ❑ 32 x 100/1000BASE-X fixed port
- ❑ 4 x 10GbE SFP+ fixed ports (Uplinks)
- ❑ 2 x 40GbE QSFP+ fixed ports (Virtual Chassis/uplinks)
- ❑ Optional 8 x 10GbE SFP+ or 2 x 40GbE QSFP+ module (Virtual Chassis/uplinks)
- ❑ Hot-swappable fans
- ❑ Redundant power supplies, hot-swappable, both AC and DC
- ❑ IEEE 802.1ae (MACsec)



- ❑ 10-member Virtual Chassis
- ❑ 24 x 10/100/1000BASE-T fixed port
- ❑ 24 x 100/1000/2500/5000/10000BASE-T
- ❑ Power over Ethernet (PoE)-enabled PoE++ up to 95W
- ❑ 4 x 40GbE QSFP+ fixed ports (Virtual Chassis)
- ❑ Optional 4 x 10GbE SFP+ module or 2 x 40GbE QSFP+ or 1 x QSFP28 (Uplink)
- ❑ Hot-swappable fans
- ❑ Redundant power supplies, hot-swappable, both AC and DC
- ❑ IEEE 802.1ae (MACsec)

# Коммутаторы серии EX3400



- ❑ 10-member Virtual Chassis
- ❑ 24/48 x 10/100/1000BASE-T fixed port
- ❑ Power over Ethernet (PoE)-enabled standards based 802.3at PoE+ up to 30W
- ❑ 4 x 10GbE SFP+ fixed ports
- ❑ 2 x 40GbE QSFP+ fixed ports
- ❑ Hot-swappable fans
- ❑ Redundant power supplies, hot-swappable, both AC and DC
- ❑ IEEE 802.1ae (MACsec)

# Коммутаторы серии EX2300



- ❑ 4-member Virtual Chassis
- ❑ 12 x 10/100/1000BASE-T fixed port
- ❑ Power over Ethernet (PoE)-enabled standards based 802.3at PoE+ up to 30W
- ❑ 2 x 10GbE SFP+ fixed ports
- ❑ Fanless
- ❑ Cable Guard
- ❑ Security Slot
- ❑ Virtual Chassis License

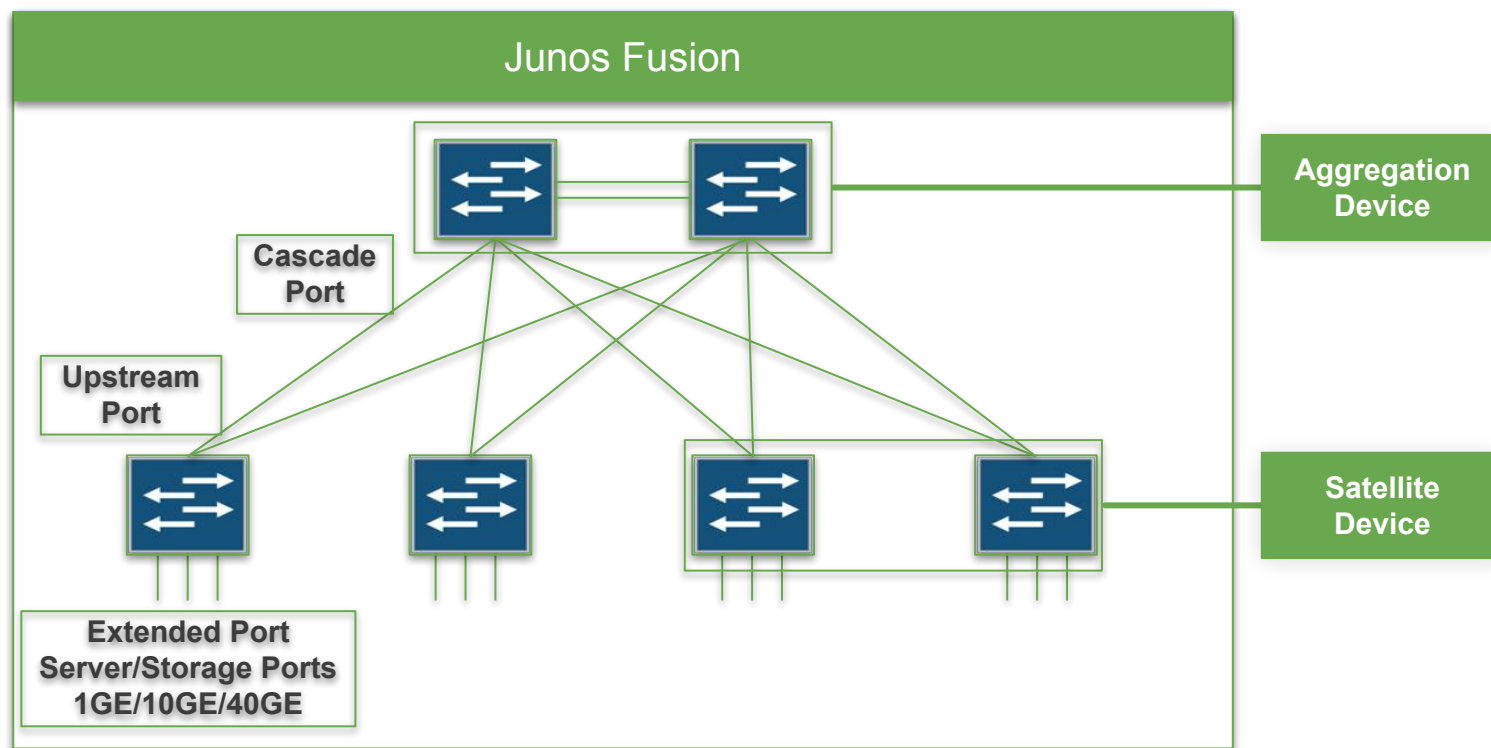


- ❑ 4-member Virtual Chassis
- ❑ 24/48 x 10/100/1000BASE-T fixed port
- ❑ Power over Ethernet (PoE)-enabled standards based 802.3at PoE+ up to 30W
- ❑ 4 x 10GbE SFP+ fixed ports
- ❑ Virtual Chassis License



- ❑ 4-member Virtual Chassis
- ❑ 24MP:
  - ❑ 16 x 10/100/1000BASE-T PoE+
  - ❑ 8 x 10/100/1000/2500BASE-T PoE+
  - ❑ 4 x 10GbE SFP+
- ❑ 48MP:
  - ❑ 32 x 10/100/1000BASE-T PoE+
  - ❑ 16 x 10/100/1000/2500BASE-T PoE+
  - ❑ 6 x 10GbE SFP+
- ❑ Power over Ethernet (PoE)-enabled standards based 802.3at PoE+ up to 30W
- ❑ Virtual Chassis License

# Настройка Junos Fusion Enterprise





## AGGREGATION DEVICE

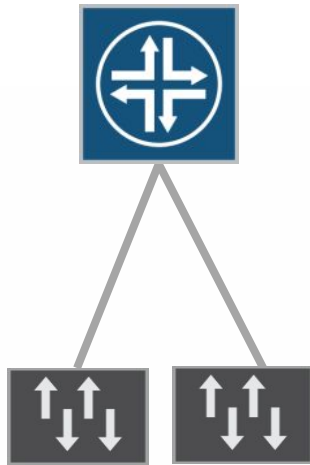
- ❑ One or more switches that manage satellite devices (top-of-rack switches) remotely
- ❑ Configuration, software image management, statistics polling
- ❑ Automated discovery and provisioning of satellite devices
- ❑ Provides in-band connectivity for management of satellite devices
- ❑ Runs Junos OS

## SATELLITE DEVICE

- ❑ Standard top-of-rack switches managed remotely by one or more aggregation devices
- ❑ No local management required
- ❑ Can be single or dual-homed to Aggregation Devices(AD)
- ❑ Supports multi-homing of any hosts (servers, appliances) to a pair of satellite devices
- ❑ Runs Windriver Yocto Linux

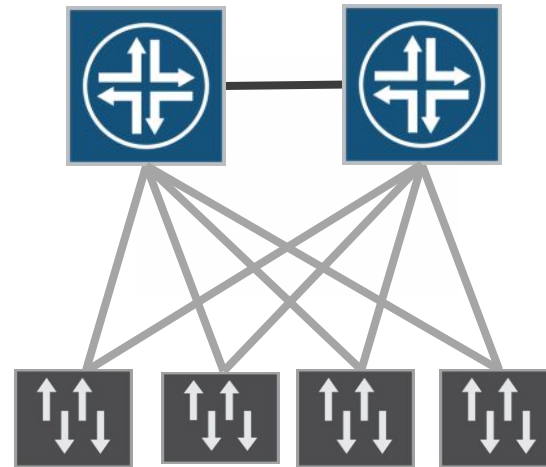


### Single Aggregation Device

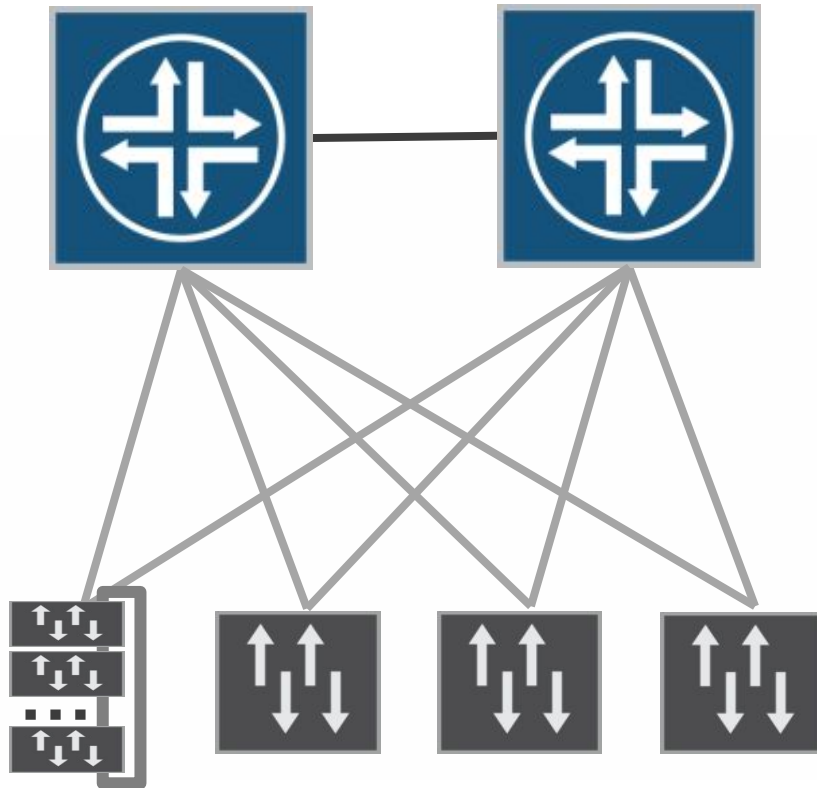


- ❑ Reduced port and installation costs
- ❑ Simple management; reduced network layers
- ❑ Easy to extend existing architecture

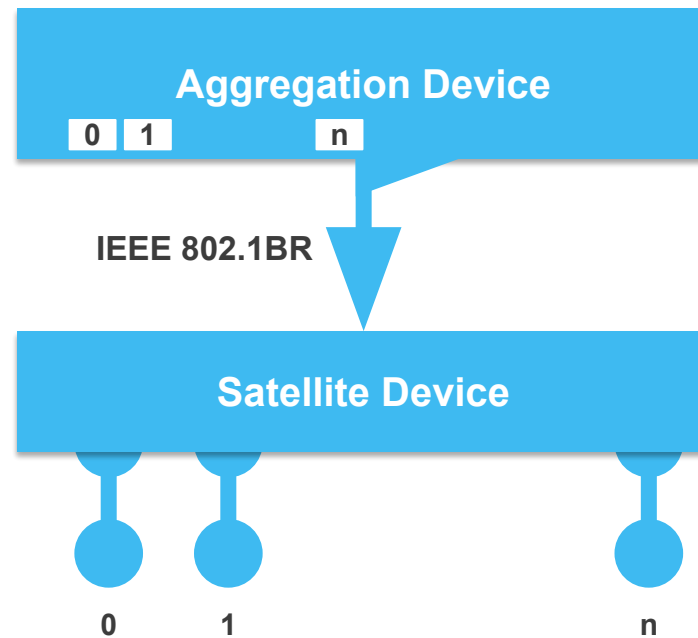
### Dual Aggregation Devices



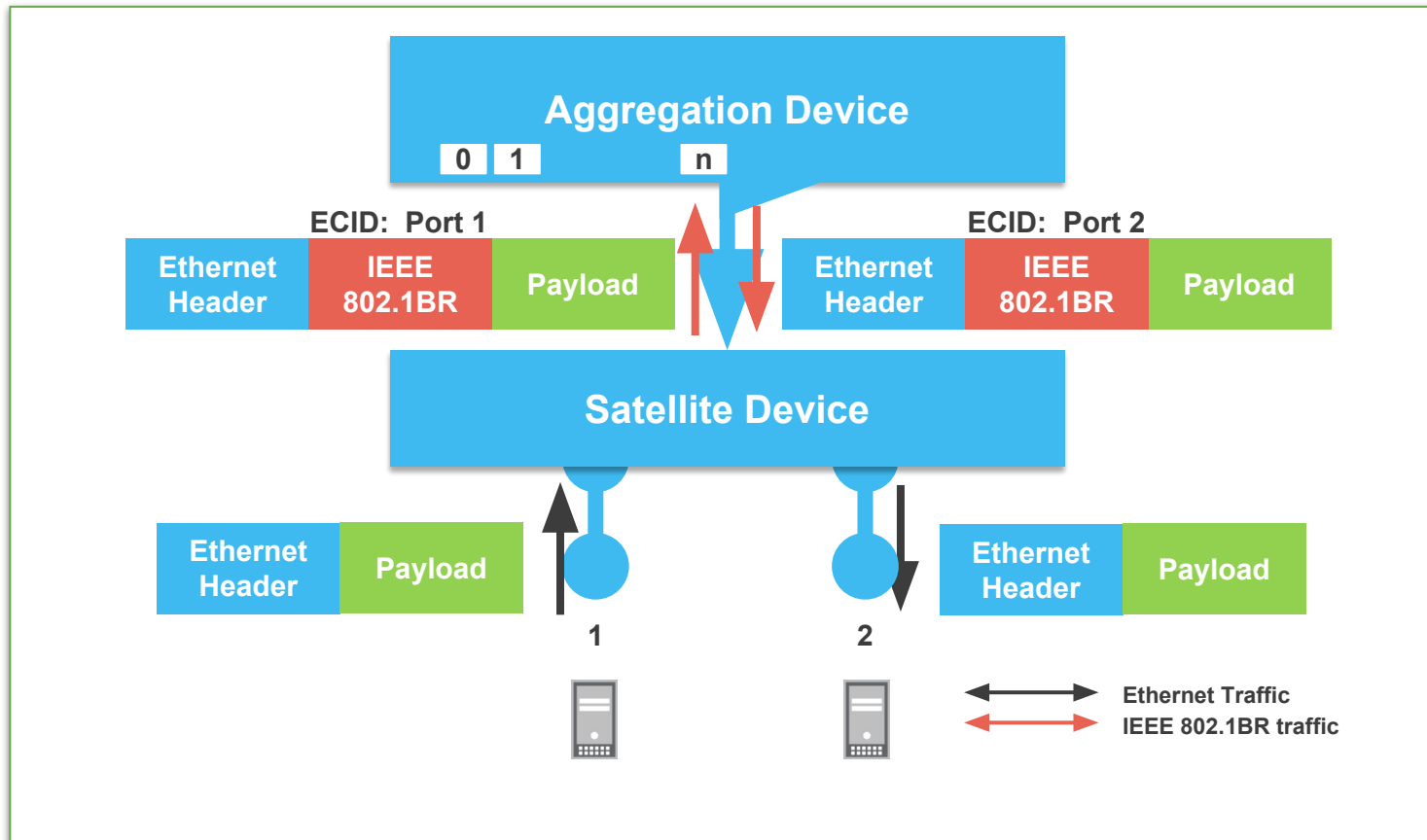
- ❑ Chassis-level redundancy
- ❑ Centralized point of management for access ports
- ❑ Aggregation devices remain independent

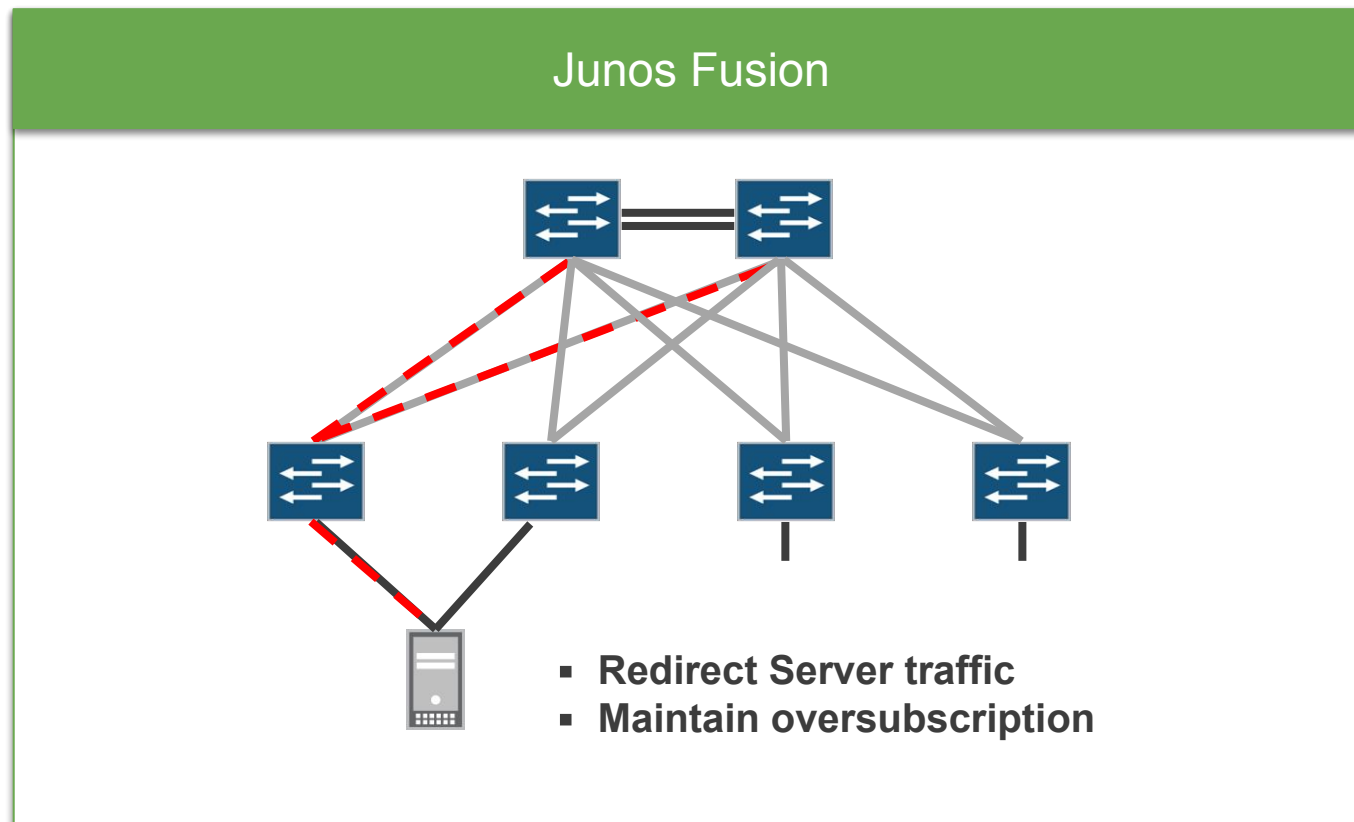


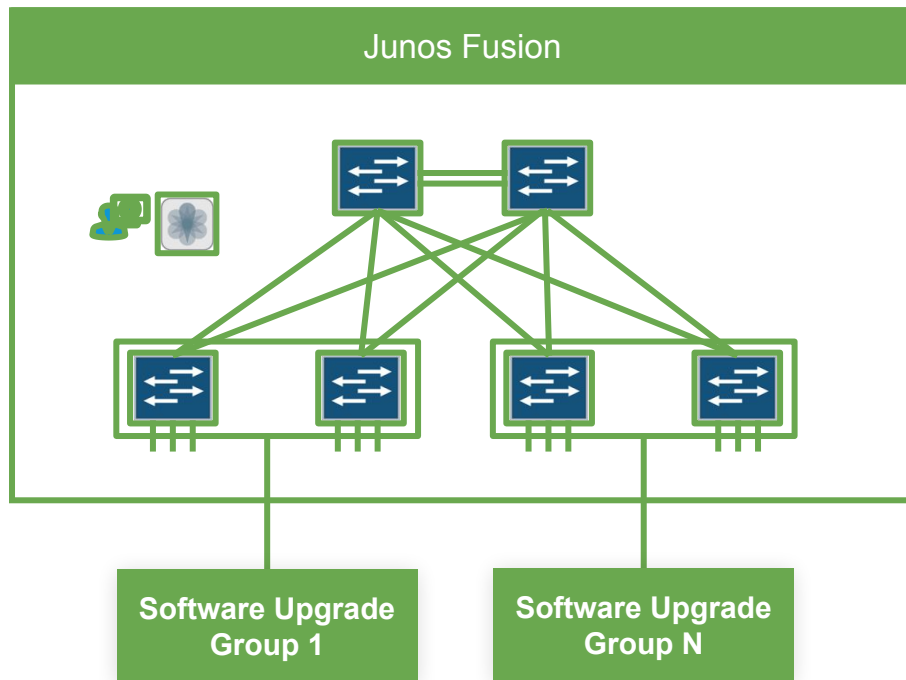
- ❑ SD does not run Junos
- ❑ Windriver Yacto Linux as base OS
- ❑ Linux Forwarding Engine software runs as an application on top of the Linux OS
- ❑ No local switching on the SD
- ❑ Junos Fusion Enterprise supports Satellite Device Cluster
  - ❑ Eliminates the need to connect every SD to the AD
  - ❑ Multiple SDs can be deployed behind a Cascade port
  - ❑ 10 SDs in a cluster; this may change in newer releases



In extended mode, each physical port on satellite device is represented in the aggregation device management/control/forwarding plane.







- SD software management from AD
- 3rd party application or Network Director using REST/JSON API
- SD Software image automatically upgraded when discovered
- Group SDs into different software upgrade groups for flexibility
- SDs in different software upgrade groups can have different image



## Standalone satellite:

```
[edit]
set interfaces xe-0/0/0 cascade-port
set chassis satellite-management fpc 101 cascade-ports xe-0/0/0
set chassis satellite-management fpc 101 alias alias
set chassis satellite-management fpc 101 description description
set chassis satellite-management fpc 101 serial-number ABCDEFGH
set chassis satellite-management fpc 101 system-id 00:00:5E:00:53:00
```

## Cluster satellite:

```
[edit]
set interfaces xe-0/0/1 cascade-port
set interfaces xe-0/0/2 cascade-port
set chassis satellite-management cluster building-1 cluster-id 1
set chassis satellite-management cluster building-1 cascade-ports
[xe-0/0/1 xe-0/0/2]
set chassis satellite-management cluster building-1 fpc 102 member-id 1
system-id 00:00:5E:00:53:01
set chassis satellite-management cluster building-1 fpc 103 member-id 2
system-id 00:00:5E:00:53:02
set chassis satellite-management auto-satellite-conversion satellite
101-103
```



- ❑ Download the satellite software onto both aggregation devices (recommended) or onto a remote server
- ❑ Create a satellite software upgrade group, and associate the satellite device
- ❑ Associate the satellite software upgrade group with a satellite software image

```
[edit]
set chassis satellite-management upgrade-groups group1 satellite 101-120
user@ad> request system software add
/var/tmp/satellite-3.0R1.2-signed.tgz upgrade-group group1
```



## Aggregation device 1:

```
[edit chassis satellite-management redundancy-groups]  
set fusion-network redundancy-group-id 1  
set chassis-id 1  
set fusion-network peer-chassis-id 2 inter-chassis-link xe-0/0/4  
set fusion-network satellite 101  
set fusion-network cluster building-1
```

## Aggregation device 2:

```
[edit chassis satellite-management redundancy-groups]  
set fusion-network redundancy-group-id 1  
set chassis-id 2  
set fusion-network peer-chassis-id 1 inter-chassis-link xe-0/0/4  
set fusion-network satellite 101  
set fusion-network cluster building-1
```



Aggregation device 1:

```
user@ad1# set system commit peers-synchronize
user@ad1# set system commit peers ad2 user root authentication password
user@ad1# set system services netconf ssh
user@ad1# commit
```

Aggregation device 2:

```
user@ad2# set system commit peers-synchronize
user@ad2# set system commit peers ad1 user root authentication password
user@ad2# set system services netconf ssh
user@ad2# commit
```

Aggregation device 1:

```
user@ad1# set groups TEST when peers [ad1 ad2]
user@ad1# set apply-groups TEST
```

Aggregation device 2:

```
user@ad2# set apply-groups TEST
```



SENETSY

Спасибо за внимание