IMPLEMENTING A LAYER 2 ENTERPRISE INFRASTRUCTURE WITH RTG
**Table of Contents**

- Introduction .................................................................................................................. 3
- Scope ............................................................................................................................ 3
- Design Considerations ................................................................................................. 3
- Redundant Trunk Group ............................................................................................... 3
- VLANs and 802.1Q ........................................................................................................ 3
- Integrated Routing and Bridging .................................................................................... 4
- Virtual Router Redundancy Protocol ............................................................................ 4
- DHCP Relay .................................................................................................................... 4
- Implementation .............................................................................................................. 4
  - Configuration Guidelines ............................................................................................. 4
    - Interface and VLAN Configuration ............................................................................. 4
    - RTG Configuration ..................................................................................................... 5
    - IRBs and VRRP Configuration .................................................................................. 6
    - Bridge Domains Configuration ................................................................................ 7
    - DHCP Relay Configuration ...................................................................................... 7
- Verification ..................................................................................................................... 7
- Troubleshooting ............................................................................................................. 8
- Implementation Example .............................................................................................. 8
  - Network Topology ....................................................................................................... 8
  - Hardware Used for Validation .................................................................................... 9
  - The following devices are required to implement the topology described: .................. 9
  - Testing Equipment Used for Validation ..................................................................... 9
  - Table 2: Testing Equipment ....................................................................................... 9
  - Software Used for Validation ..................................................................................... 9
  - Detailed Configurations .............................................................................................. 9
- Summary ....................................................................................................................... 12
- Appendix A: Conventions/Glossary .............................................................................. 13
- Appendix B: Detailed Configurations ........................................................................... 14
- About Juniper Networks ............................................................................................... 21

**Table of Figures**

- Figure 1: Logical diagram with RTG ........................................................................... 8
Introduction

This document discusses a Layer 2 design implementation for enterprise networks using the Redundant Trunk Group (RTG) feature. Juniper Networks® EX Series Ethernet Switches and MX Series 3D Universal Edge Routers run the Juniper Networks Junos® operating system and support a similar set of Layer 2 features. By supporting Layer 2, Layer 3, or a combination of both, these devices provide flexibility in designing and deploying networks. Layer 2 can be implemented initially and Layer 3 functionality can be enabled later on the same devices without additional costs.

After an overview of design considerations and protocols, we will discuss the differences between EX Series and MX Series supported features. These topics will be followed by an implementation example with RTG, configuration guidelines, and verification and troubleshooting procedures.

Scope

This document provides guidelines and an implementation example for Layer 2 enterprise environments using EX Series Ethernet Switches in the access layer and MX Series 3D Universal Edge Routers for core and aggregation. After a brief features and protocols overview, we present the topology implemented and provide configuration guidelines as well as verification and troubleshooting procedures. The design presented in this document uses RTG to prevent loops. Other design options using Rapid Spanning Tree Protocol (RSTP), Multiple Spanning Tree Protocol (MSTP), and Virtual Chassis are presented in separate implementation guides.

This document is intended for network design and operation engineers or other technical audiences who support enterprise customers with Layer 2 deployments using the EX Series and MX Series.

Design Considerations

The network architecture presented in this document is based on a collapsed campus model where the EX Series is used in the access layer, while the core and aggregation layers are combined using the MX Series. The access switches are dual-homed to two aggregation/core switches. This is required to provide physical redundancy while allowing for load balancing. Device redundancy at Layer 2 introduces the potential of broadcast storms with packets traveling endlessly and crippling the network. A mechanism is required to prevent Layer 2 loops. The mechanism used in this document is the Redundant Trunk Group feature supported on the EX Series.

Layer 3 is enabled only at the aggregation/core layer. MX Series 3D Universal Edge Routers are configured with integrated routing and bridging (IRB) and Virtual Router Redundancy Protocol (VRRP). They also act as Dynamic Host Configuration Protocol (DHCP) relay agents to allow clients in the access layer to obtain IP addresses dynamically.

Redundant Trunk Group

Redundancy is an important design consideration for high availability and resiliency in an enterprise network. Redundant Trunk Group (RTG) is a feature supported on EX Series Ethernet Switches that provides a Layer 2 link failover mechanism between redundant links. An RTG consists of a pair of redundant links that are configured such that one is active and the other is a backup. When the active link fails, traffic is switched over to the non-active link. The primary application of RTG is an enterprise technology where each access switch is dual-homed to two aggregation switches for redundancy purposes. The RTG feature can be configured either on a Layer 2 physical interface or a link aggregation group (LAG). With RTG, Spanning Tree Protocol is not required. Therefore, RTG and STP are mutually exclusive on a given port.

VLANs and 802.1Q

A VLAN is a logical grouping of end devices allowing communication as if they were on the same LAN.

On the EX Series, ports that are assigned to a VLAN can be configured as either access or trunk ports. A port in access mode connects to a network device such as a desktop computer, an IP telephone, a printer, a file server, or a security camera. The interface itself belongs to a single VLAN. Trunk interfaces are generally used to interconnect switches to one another. The frames on a trunk port are tagged as defined in 802.1Q standard. Juniper Networks EX4200 Ethernet Switch and EX4200 Ethernet Switch both support a maximum of 4096 VLANs. VLANs 0 and 4095 are reserved by Junos OS.
Integrated Routing and Bridging

Integrated routing and bridging (IRB) interfaces on the MX Series allow the flexibility of supporting both Layer 2 bridging and Layer 3 routing on the same interface. Frames are bridged if they are not sent to the router’s media access control (MAC) address. Frames sent to the router’s MAC address are routed to other interfaces configured for Layer 3 routing.

The EX Series switches also support routed interfaces called Routed VLAN Interfaces (RVIs) (These are not implemented in this guide.) As opposed to IRBs which route bridge domains, RVIs route VLANs. A port of a switch VLAN is identified by an interface and a VLAN-id which is globally significant across the switch.

Virtual Router Redundancy Protocol

The EX Series and MX Series support Virtual Router Redundancy Protocol (VRRP). With VRRP, routers viewed as a redundancy group share the responsibility for forwarding packets as if they owned the IP address corresponding to the default gateway configured on the hosts. At any time, one of the VRRP routers acts as the master, and other VRRP routers act as backup routers. If the master router fails, a backup router becomes the new master, providing router redundancy and allowing traffic on the LAN to be routed without relying on a single router.

DHCP Relay

DHCP requests sent from a client to a server are normally restricted to the same physical segment, LAN, or VLAN on which the client resides. In the event that the server and client are on different LANs or VLANs, a relay agent is required. The main advantage of this feature is that a single DHCP server can serve clients on remote LANs or VLANs, eliminating the requirement for a dedicated DHCP server in each LAN or VLAN environment. Both EX Series switches and MX Series routers can be configured to relay requests to a DHCP/BOOTP server and use the DHCP Relay Agent option (option 82) in the relayed messages. Since Layer 3 is not implemented on the access switches in this guide, the MX Series routers will act as the DHCP relay agents.

Implementation

Configuration Guidelines

Interface and VLAN Configuration

Switch ports can be configured with either access mode or trunk mode. Access ports typically belong to a single VLAN and transmit and receive untagged Ethernet frames. A trunk port typically connects to another switch or to a customer edge router. Interfaces configured for trunk mode handle traffic for multiple VLANs, multiplexing the traffic for all configured VLANs over the same physical connection, and separating the traffic by tagging it with the appropriate VLAN-id.

Below are sample interface and VLAN configurations for both the EX Series and MX Series:

EX-VC-1:

```text
vlans {
  HR {
    vlan-id 100;
  }
  ENG {
    vlan-id 200;
  }
  SALES {
    vlan-id 300;
  }
  SERVER {
    vlan-id 600;
  }
}
```

MX-A:

```text
interfaces {
  interfaces {
    ge-8/0/0 { /*Trunk port example */
      vlan-tagging;
      encapsulation extended-vlan-bridge;
      unit 100 {
        vlan-id 100;
      }
      unit 200 {
        vlan-id 200;
      }
      unit 300 {
        vlan-id 300;
      }
      unit 600 {
      }
  }
```
The example above shows a port-based assignment of VLANs on the EX Series switch where VLANs are added under the interface stanza. It is also possible to use a VLAN-based assignment where interfaces are added under the VLAN stanza (as shown below). Some users may be more familiar with the first form of configuration. Others may prefer the second method in that functionalities are grouped by feature rather than per interface. Both methods result in the same configuration from a software perspective.

**EX Series:**

```plaintext
vlans {
  HR {
    vlan-id 100;
    interface {
      ge-0/0/0.0;
      ge-0/0/1.0;
    }
  }
}
```

**RTG Configuration**

RTG provides L2 loop free logical topology and fast convergence without the need of spanning-tree. Data traffic is forwarded only on the active link and dropped on the secondary link, while Layer 2 control traffic is permitted on both. One of the links in an RTG can be configured manually to become the primary link. If a primary link is not specified, the software calculates and assigns the lexically higher interface from the redundant group as the active link.
In the example below, a redundant trunk group is configured on each EX Series switch in such a way that the primary and secondary roles are alternating on uplinks going towards the aggregation switches. For EX-VC-1, the primary interface is ge-0/1/0.1 while the secondary interface is ge-0/1/1.0 (and inversely for EX-VC2):

**EX-VC-1:**
```
ethernet-switching-options {
    redundant-trunk-group {
        group group1 {
            interface ge-0/1/0.0 {
                primary;
            }
            interface ge-0/1/1.0;
        }
    }
}
```

**EX-VC-2:**
```
ethernet-switching-options {
    redundant-trunk-group {
        group group2 {
            interface ge-0/1/0.0 {
            }
            interface ge-0/1/1.0;
                primary;
        }
    }
}
```

**IRBs and VRRP Configuration**

An IRB is configured on the MX Series routers in two steps:
1. Configuring the IRB interface using the irb statement.
2. Referencing the IRB interface at the bridge domain level of the configuration.

The VRRP can be configured on the IRB interface so that redundant links can be used to carry traffic between the bridge domain and the router network.

The example below shows IRBs configured with VRRP groups and virtual addresses. The priority is set to 254 for groups 1, 2, and 4 on MX-A. This makes MX-A the master for these groups, while MX-B is left with the default priority of 100 and will act as the backup. The “accept-data” command allows an IRB interface to accept packets destined for a virtual IP address.

**MX-A:**
```
interfaces {
    irb {
        unit 100 {
            family inet {
                address 10.10.10.4/24 {
                    vrrp-group 1 {
                        virtual-address 10.10.10.1;
                        priority 254;
                        accept-data;
                    }
                }
            }
        }
        unit 200 {
            family inet {
                address 20.20.20.4/24 {
                    vrrp-group 2 {
                        virtual-address 20.20.20.1;
                        priority 254;
                        accept-data;
                    }
                }
            }
        }
    }
}
```

**MX-B:**
```
unit 300 {
    family inet {
        address 30.30.30.4/24 {
            vrrp-group 3 {
                virtual-address 30.30.30.1;
                accept-data;
            }
        }
    }
}

unit 600 {
    family inet {
        address 60.60.60.4/24 {
            vrrp-group 4 {
                virtual-address 60.60.60.1;
                priority 254;
                accept-data;
            }
        }
    }
}
Bridge Domains Configuration

Bridge domains limit the scope of media access control (MAC) learning and thereby the size of the MAC table. They also determine where the device should propagate frames sent to broadcast, unknown unicast, and multicast MAC addresses. Each interface that belongs to a bridge domain must be referenced under the corresponding bridge domain stanza. IRB interfaces are also referenced using the “routing-interface” statement as shown below:

```
MX-A:
```

```
bridge-domains {
    ENG {
        domain-type bridge;
        vlan-id 200;
        interface ge-8/0/0.200;
        interface ge-8/0/3.200;
        interface xe-2/0/0.200;
        routing-interface irb.200;
    }
    HR {
        domain-type bridge;
        vlan-id 100;
        interface ge-8/0/0.100;
        interface ge-8/0/3.100;
        interface xe-2/0/0.100;
        routing-interface irb.100;
    }
    SALES {
        domain-type bridge;
        vlan-id 300;
        interface ge-8/0/1.300;
        interface ge-8/0/2.300;
        interface xe-2/0/0.300;
        routing-interface irb.300;
    }
    SERVER {
        domain-type bridge;
        vlan-id 600;
        interface ge-8/0/0.600;
        interface xe-2/0/0.600;
        routing-interface irb.600;
    }
}
```

DHCP Relay Configuration

The DHCP server is configured under the “forwarding option” stanza as illustrated in the example below. Here, the MX Series routers are configured to forward BOOTP/DHCP requests coming from IRBs 100 and 200 to the DHCP server address. This is accomplished with the relay-agent-option (option 82) in the relayed messages.

```
MX-A:
```

```
forwarding-options {
    helpers {
        bootp {
            server 60.60.60.2;
            relay-agent-option;
            interface {
                irb.100;
            }
        }
    }
}
```

Verification

Below are some of the commands that can be used to verify the RTG setup:

EX Series:
- show redundant-trunk-group
- show ethernet-switching interfaces
- show ethernet-switching table

MX Series:
- show bridge mac-table
- show vrrp summary
- show vrrp extensive
- show int irb terse
Troubleshooting

Below are some of the commands that can be used for troubleshooting:

EX Series:
- clear ethernet-switching table
- restart ethernet-switching

MX Series:
- show bootp statistics

Both:
- monitor traffic interface <interface_name> layer2-headers
- monitor traffic interface <interface_name> size <size> detail
- show system core-dumps

Implementation Example

Network Topology

The following diagram shows the logical topology using redundant trunk groups:

---

**Figure 1: Logical diagram with RTG**

Hardware Used for Validation
The following devices are required to implement the topology described:

- Four EX4200 line switches
- Two MX Series Routers: Juniper Networks MX240 3D Universal Edge Router, MX480 3D Universal Edge Router, or MX960 3D Universal Edge Router. We have used one MX480 and one MX960 for the aggregation devices.

Table 1: Hardware

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>COMPONENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 x EX4200</td>
<td>4 x 4-port uplink Gigabit Ethernet module (EX-UM-4SFP)</td>
</tr>
<tr>
<td></td>
<td>21 small form-factor pluggable transceivers (SFPs)</td>
</tr>
<tr>
<td>1 x MX480</td>
<td>2 x 40-port Gigabit Ethernet L2/L3 Dense Port Concentrators (DPCs) (DPCE-R-40GE-SFP or DPCE-R-Q-40GE-SFP)</td>
</tr>
<tr>
<td>1 x MX960</td>
<td>8 SFPs</td>
</tr>
<tr>
<td></td>
<td>2 x 4-port 10-Gigabit Ethernet L2/L3 DPCs (DPCE-R-4XGE-XFP or DPCE-R-Q-4XGE-XFP)</td>
</tr>
<tr>
<td></td>
<td>2 10-gigabit small form-factor pluggable transceivers (XFPs)</td>
</tr>
</tbody>
</table>

Testing Equipment Used for Validation

Table 2: Testing Equipment

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>COMPONENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agilent N2X tester</td>
<td>4 x 10/100/1000 Mb ports</td>
</tr>
<tr>
<td>Linux DHCP server</td>
<td></td>
</tr>
</tbody>
</table>

Software Used for Validation

Table 3: Software

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>COMPONENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>EX Series and MX Series</td>
<td>Junos OS 9.0</td>
</tr>
</tbody>
</table>

Detailed Configurations

The detailed configurations for EX-VC-1 and MX-A are listed below. For the rest of the configurations, please refer to Appendix B: Detailed Configurations.

Summary

EX-VC-1:

...truncated

```
interfaces {
  ge-0/0/0 {
    unit 0 {
      family ethernet-switching {
        port-mode access;
        vlan {
          members HR;
        }
      }
    }
  }
  ge-0/0/1 {
```

EX-VC-2:

...truncated

```
interfaces {
  ge-1/0/0 {
    vlan-tagging;
    encapsulation extended-vlan-bridge;
    unit 100 {
      vlan-id 100;
    }
    unit 200 {
      vlan-id 200;
    }
    unit 600 {
      vlan-id 600;
```
unit 0 {
    family ethernet-switching {
        port-mode access;
        vlan {
            members ENG;
        }
    }
}

ge-0/0/22 {
    ether-options {
        link-mode full-duplex;
        speed { 100m; }
    }
    unit 0 {
        family ethernet-switching {
            port-mode access;
            vlan {
                members SERVER;
            }
        }
    }
}
ge-0/0/23 {
    unit 0 {
        family ethernet-switching {
            port-mode trunk;
            vlan {
                members [ HR ENG ];
            }
        }
    }
}
ge-0/1/0 {
    unit 0 {
        family ethernet-switching {
            port-mode trunk;
            vlan {
                members [ ENG HR SERVER ];
            }
        }
    }
}
ge-0/1/1 {
    unit 0 {
        family ethernet-switching {
            port-mode trunk;
            vlan {
                members [ HR SERVER ENG ];
            }
        }
    }
}
ge-0/1/2 {
    unit 0 {
        family ethernet-switching;
    }
}
ge-1/0/1 {
    vlan-tagging;
    encapsulation extended-vlan-bridge;
    unit 300 {
        vlan-id 300;
    }
}
ge-1/0/2 {
    vlan-tagging;
    encapsulation extended-vlan-bridge;
    unit 300 {
        vlan-id 300;
    }
}
ge-1/0/3 {
    vlan-tagging;
    encapsulation extended-vlan-bridge;
    unit 100 {
        vlan-id 100;
    }
    unit 200 {
        vlan-id 200;
    }
}
xe-2/0/0 {
    vlan-tagging;
    encapsulation extended-vlan-bridge;
    unit 100 {
        vlan-id 100;
    }
    unit 200 {
        vlan-id 200;
    }
    unit 300 {
        vlan-id 300;
    }
    unit 600 {
        vlan-id 600;
    }
    unit 100 {
        family inet {
            address 10.10.10.3/24 {
                vrrp-group 1 {
                    virtual-address 10.10.10.1;
                    accept-data;
                }
            }
        }
    }
    unit 200 {
        family inet {
            address 20.20.20.3/24 {
                vrrp-group 2 {
                    virtual-address 20.20.20.1;
                }
            }
        }
    }
    irb {
        unit 100 {
           _family inet {
                address 10.10.10.3/24 {
                    vrrp-group 1 {
                        virtual-address 10.10.10.1;
                        accept-data;
                    }
                }
            }
        }
    }
}
ge-0/1/3 {
    unit 0 {
        family ethernet-switching;
    }
}

vme {
    unit 0 {
        family inet {
            address 172.19.59.190/24;
        }
    }
}

ethernet-switching-options {
    redundant-trunk-group {
        group group1 {
            interface ge-0/1/0.0;
            interface ge-0/1/1.0 {
                primary;
            }
        }
    }
}

vlans {
    ENG {
        vlan-id 200;
    }
    HR {
        vlan-id 100;
    }
    SERVER {
        vlan-id 600;
    }
}

lo0 {
    unit 0 {
        family inet {
            address 127.0.0.1/32;
        }
    }
}

forwarding-options {
    helpers {
        bootp {
            server 60.60.60.2;
            relay-agent-option;
            interface {
                irb.100;
                irb.200;
            }
        }
    }
    protocols {
        vrrp {
            traceoptions {
                file vrrp;
                flag general;
                flag state;
            }
        }
    }
}

bridge-domains {
    ENG {
    accept-data;
    }
    }
    unit 300 {
        family inet {
            address 30.30.30.3/24 {
                vrrp-group 3 {
                    virtual-address 30.30.30.1;
                    priority 254;
                    accept-data;
                }
            }
        }
    }
    unit 600 {
        family inet {
            address 60.60.60.3/24 {
                vrrp-group 4 {
                    virtual-address 60.60.60.1;
                    accept-data;
                }
            }
        }
    }
    unit 0 {
        family inet {
            address 127.0.0.1/32;
        }
    }
    }
}

bridge-domains {
    ENG {
    accept-data;
    }
    unit 300 {
        family inet {
            address 30.30.30.3/24 {
                vrrp-group 3 {
                    virtual-address 30.30.30.1;
                    priority 254;
                    accept-data;
                }
            }
        }
    }
    unit 600 {
        family inet {
            address 60.60.60.3/24 {
                vrrp-group 4 {
                    virtual-address 60.60.60.1;
                    accept-data;
                }
            }
        }
    }
    unit 0 {
        family inet {
            address 127.0.0.1/32;
        }
    }
    }

With the EX Series Ethernet Switches and MX Series 3D Universal Edge Routers, Juniper Networks offers its enterprise customers compelling end-to-end solutions that can meet the requirements of either Layer 2 or Layer 3 deployments. In Layer 2 environments, network administrators are faced with the task of preventing and possibly troubleshooting loops. This document has shown how to implement a layer design using the Redundant Trunk Group feature. Three other designs using Rapid Spanning Tree, Multiple Spanning Tree, and Virtual Chassis technology are described in separate implementation guides.

With the guidelines presented in these documents, Juniper’s customers can integrate the EX Series and MX Series into their Layer 2 networks. They can later enable Layer 3 on the same devices at no additional cost to leverage Junos OS’s rich feature set while minimizing capital and operational expenses.
### Appendix A: Conventions/Glossary

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOOTP</td>
<td>Bootstrap Protocol</td>
</tr>
<tr>
<td>BPDU</td>
<td>Bridge protocol data unit</td>
</tr>
<tr>
<td>DHCP</td>
<td>Dynamic Host Configuration Protocol</td>
</tr>
<tr>
<td>DPC</td>
<td>Dense Port Concentrator</td>
</tr>
<tr>
<td>IRB</td>
<td>Integrated routing and bridging</td>
</tr>
<tr>
<td>LACP</td>
<td>Link Aggregation Control Protocol</td>
</tr>
<tr>
<td>LAG</td>
<td>Link Aggregation Group</td>
</tr>
<tr>
<td>MSTP</td>
<td>Multiple Spanning Tree Protocol</td>
</tr>
<tr>
<td>RSTP</td>
<td>Rapid Spanning Tree</td>
</tr>
<tr>
<td>RTG</td>
<td>Redundant Trunk Group</td>
</tr>
<tr>
<td>RVI</td>
<td>Routed VLAN Interface</td>
</tr>
<tr>
<td>STP</td>
<td>Spanning Tree Protocol</td>
</tr>
<tr>
<td>SFP</td>
<td>Small form-factor pluggable transceiver</td>
</tr>
<tr>
<td>VLAN</td>
<td>Virtual LAN</td>
</tr>
<tr>
<td>VRRP</td>
<td>Virtual Router Redundancy Protocol</td>
</tr>
<tr>
<td>VSTP</td>
<td>Virtual Spanning Tree Protocol</td>
</tr>
<tr>
<td>XFP</td>
<td>10-gigabit small form-factor pluggable transceiver</td>
</tr>
</tbody>
</table>
Appendix B: Detailed Configurations

MX-B:

...truncated

interfaces {
  xe-2/0/0 {
    vlan-tagging;
    encapsulation extended-vlan-bridge;
    unit 100 {
      vlan-id 100;
    }
    unit 200 {
      vlan-id 200;
    }
    unit 300 {
      vlan-id 300;
    }
    unit 600 {
      vlan-id 600;
    }
  }
  /* Trunk example */
  ge-8/0/0 {
    vlan-tagging;
    encapsulation extended-vlan-bridge;
    unit 100 {
      vlan-id 100;
    }
    unit 200 {
      vlan-id 200;
    }
    unit 600 {
      vlan-id 600;
    }
  }
  ge-8/0/1 {
    vlan-tagging;
    encapsulation extended-vlan-bridge;
    unit 300 {
      vlan-id 300;
    }
  }
  ge-8/0/2 {
    vlan-tagging;
    encapsulation extended-vlan-bridge;
    unit 300 {
      vlan-id 300;
    }
  }
  ge-8/0/3 {
    vlan-tagging;
    encapsulation extended-vlan-bridge;
    unit 100 {
      vlan-id 100;
    }
    unit 200 {
      vlan-id 200;
    }
  }
ENG {
  domain-type bridge;
  vlan-id 200;
  interface ge-8/0/0.200;
  interface ge-8/0/3.200;
  interface xe-2/0/0.200;
  routing-interface irb.200;
}

HR {
  domain-type bridge;
  vlan-id 100;
  interface ge-8/0/0.100;
  interface ge-8/0/3.100;
  interface xe-2/0/0.100;
  routing-interface irb.100;
}

SALES {
  domain-type bridge;
  vlan-id 300;
  interface ge-8/0/0.300;
  interface ge-8/0/2.300;
  interface xe-2/0/0.300;
  routing-interface irb.300;
}

SERVER {
  domain-type bridge;
  vlan-id 600;
  interface ge-8/0/0.600;
  interface xe-2/0/0.600;
  routing-interface irb.600;
}

EX-VC-2

...truncated

interfaces {
  ge-0/0/0 {
    unit 0 {
      family ethernet-switching {
        port-mode access;
        vlan {
          members SALES;
        }
      }
    }
  }
  ge-0/0/1 {
    unit 0 {
      family ethernet-switching {
        port-mode access;
        vlan {
          members SALES;
        }
      }
    }
  }
}
ge-0/0/23 {
    unit 0 {
        family ethernet-switching {
            port-mode access;
            vlan {
                members SALES;
            }
        }
    }
}
ge-0/1/0 {
    unit 0 {
        family ethernet-switching {
            port-mode trunk;
            vlan {
                members SALES;
            }
        }
    }
}
ge-0/1/1 {
    unit 0 {
        family ethernet-switching {
            port-mode trunk;
            vlan {
                members SALES;
            }
        }
    }
}
}
vme {
    unit 0 {
        family inet {
            address 172.19.59.192/24;
        }
    }
}
}
ethernet-switching-options {
    redundant-trunk-group {
        group group2 {
            interface ge-0/1/0.0 {
                primary;
            }
            interface ge-0/1/1.0;
        }
    }
}
vlans {
    SALES {
        vlan-id 300;
    }
}
EX-VC-3

...truncated

interfaces {
  ge-0/0/0 {
    unit 0 {
      family ethernet-switching {
        vlan {
          members SALES;
        }
      }
    }
  }
  ge-0/0/1 {
    unit 0 {
      family ethernet-switching {
        vlan {
          members SALES;
        }
      }
    }
  }
  ge-0/0/23 {
    unit 0 {
      family ethernet-switching {
        port-mode access;
        vlan {
          members SALES;
        }
      }
    }
  }
  ge-0/1/0 {
    unit 0 {
      family ethernet-switching {
        port-mode trunk;
        vlan {
          members SALES;
        }
      }
    }
  }
  ge-0/1/1 {
    unit 0 {
      family ethernet-switching {
        port-mode trunk;
        vlan {
          members SALES;
        }
      }
    }
  }
}
vme {
  unit 0 {
    family inet {
      address 172.19.59.193/24;
    }
  }
}
implementation-guide - implementing a layer 2 enterprise infrastructure with rtg

ethernet-switching-options {
    redundant-trunk-group {
        group group3 {
            interface ge-0/1/0.0 {
                primary;
            }
            interface ge-0/1/1.0;
        }
    }

    vlans {
        SALES {
            vlan-id 300;
        }
    }

    EX-VC-4

    ...truncated

    interfaces {
        ge-0/0/0 {
            unit 0 {
                family ethernet-switching {
                    port-mode access;
                    vlan {
                        members HR;
                    }
                }
            }
        }

        ge-0/0/1 {
            unit 0 {
                family ethernet-switching {
                    port-mode access;
                    vlan {
                        members ENG;
                    }
                }
            }
        }

        ge-0/0/23 {
            unit 0 {
                family ethernet-switching {
                    port-mode trunk;
                    vlan {
                        members [ HR ENG ];
                    }
                }
            }
        }

        ge-0/1/0 {
            unit 0 {
                family ethernet-switching {
                    port-mode trunk;
                    vlan {
                        members [ HR ENG ];
                    }
                }
            }
        }
    }
xe-0/1/0 {
    unit 0 {
        family ethernet-switching;
    }
}
ge-0/1/1 {
    unit 0 {
        family ethernet-switching {
            port-mode trunk;
            vlan {
                members [ HR ENG ];
            }
        }
    }
}
vme {
    unit 0 {
        family inet {
            address 172.19.59.194/24;
        }
    }
}
eternet-switching-options {
    redundant-trunk-group {
        group group4 {
            interface ge-0/1/0.0;
            interface ge-0/1/1.0 {
                primary;
            }
        }
    }
}
vlan {
    ENG {
        vlan-id 200;
    }
    HR {
        vlan-id 100;
    }
}
About Juniper Networks

Juniper Networks, Inc. is the leader in high-performance networking. Juniper offers a high-performance network infrastructure that creates a responsive and trusted environment for accelerating the deployment of services and applications over a single network. This fuels high-performance businesses. Additional information can be found at www.juniper.net.