MIX Peering Port Configuration How-to

1.   Purpose

This document wants to give some suggestions and hints on how to configure equipment directly connected to MIX L2 switches. We will refer to configuration scenarios described in MIX-302 document. Some configuration examples are available for the most popular vendors grouped by equipment type (Layer 2 Switches, Routers and Layer 3 Switches) and also some guidance on how to configure Link Aggregation on multiple peering ports.

2.   Switch L2 Configuration Examples

The following examples are referred to the 'Member Switch' Equipment in the picture above.

2.1. Switch Cisco Catalyst 29xx e 35xx

When connecting a Catalyst switch to MIX the following protocols/services must be disabled:

VTP (VLAN Trunking Protocol)

DTP (Dynamic Trunking Protocol)

LLDP (Link Layer Discovery Protocol)

UDLD (Unidirectional Link Detection)

SEP Type in the following commands in global config mode (IOS sw)

```
vtp mode transparent
!
no spanning-tree vlan 100
! global disable of LLDP
no lldp run
! Global dsable of CDP
no cdp run
!
vlan 100
 name MIX
!
interface /IfIdent/
 description MIX Interface
 switchport access vlan 100
 switchport mode access
 switchport nonegotiate
 no keepalive
```

```
 speed nonegotiate

 no udld enable

 ! If CDP can/has not been disabile globally

 no cdp enable

 ! If LLDP can/has not been disabile globally

 no lldp receive

 no lldp transmit

 ! If Spanning Tree can't be disabile globally

 spanning-tree bpdufilter enable
end
```

2.2. Cisco Catalyst 6500 Family

CatOS software is still very used on such equipment: the folowing commands apply:

```
set vtp mode off

set port name /IfIdent/  MIX Port

set cdp disable /IfIdent/

set udld disable /IfIdent/

set trunk /IfIdent/ off dot1q

set spantree bpdu-filter /IfIdent/ enable

set vlan 100 name MIX VLAN

set vlan 100 /IfIdent
```

If VTP can not be disabile globally the only known workaround is using l2pt thus disabling it on a per port basis:

```
set port l2protocol-tunnel /IfIdent/ vtp enable
```

Keep attention: this command could not be available on certain CatOS releases.

2.3. Extreme Networks L2 Switch

The configuration fragment which follows is related to a L2 Switch directly connected to MIX belonging also to a EAPS ring. In the example, port 1 is connected to MIX, and port 2 and 3 belong to the ring. Teh peering router is connected to the ring on the MIX Vlan. All ports are Gigabit Ethernet.

```
create vlan "ring"

configure vlan "ring"  tag 1700  # VLAN-ID=0x6a4  Global Tag 9

configure vlan "ring" qosprofile "QP8"
```

```
configure vlan "ring" add port 2 tagged

configure vlan "ring" add port 3 tagged

 create vlan "mix"

configure vlan "mix" tag 1200  # VLAN-ID=0x4b0  Global Tag 3

configure vlan "mix" add port 1 untagged

configure vlan "mix" add port 2 tagged

configure vlan "mix" add port 3 tagged

 configure port 1 auto off speed 1000 duplex full

configure port 2 auto off speed 1000 duplex full

configure port 3 auto off speed 1000 duplex full

 disable edp port 1

disable igmp snooping

disable igmp snooping with-proxy

 create eaps "ring-eaps"

configure eaps "ring-eaps" mode transit

configure eaps "ring-eaps" primary port 2

configure eaps "ring-eaps" secondary port 3

configure eaps "ring-eaps" add control vlan "ring"

configure eaps "ring-eaps" add protect vlan "mix"

enable eaps "ring-eaps"
```

2.4. Brocade L2 Switch

Here follows a configuration fragment for a Brocade BigIron switch used as access device towards MIX LAN. In this example the Peering Router is connected to another porto f thesame switch.

```
! Define ua VLAN for MIX port and the peering Router

vlan number name "MIX" by port

no spanning-tree

untagged ethernet if-MIX

untagged ethernet if-mamber-peering-router
```

3.   Switch L3 / Peering Router Configuration Hints

Here follows some configuration templates for Layer 3 switches or Routers acting as Peering Border Router, according to the scheme visible in the picture above.

3.1. Cisco

The following configuration fragmnts aims at disabling all functionalities which generate un wanted and undesirable traffic over MIX Peering LAN;

Autoconfiguration Protocol

DHCP

BOOTP

TFTP of the configuration through MIX LAN

Other Protocols and Services which traffic must not be sent through MIX LAN

CDP

DEC MOP

IP redirects

IP directed broadcasts

proxy ARP

IPv6 RouterAdvertisements

L2keepalive

3.1.1. Global Configuration

```
! Remove DHCP
no service dhcp
!Older Release may require instead:
no ip bootp server
! Do not allow Tftp download of configuration
no service config
! Global Disable of Cisco Discovery Protocol (CDP)
no cdp run
```

3.1.2. Interface Configuration

```
! Disable IP redirects


no ip redirects
 ! Disable proxy ARP
no ip proxy-arp
 ! If CDP can not be disabled globally do it on MIX port
no cdp enable
 ! Disable directed broadcasts
no ip directed-broadcast
 ! If DEC/MOC can not be disabled globally do it on MIX
no mop enable
 ! (Fast)Ethernet Ports: no auto-negotiation.
no negotiation auto
! fix the duplex mode
duplex full
 ! L2 keepalives does not have reason to exist on MIX peering LAN
no keepalive
```

3.2. Extreme Networks

The following example shows the details of a L3 router/switch connected through port 1 on vlan 'mix' (untagged).

```
#
# Config information for VLAN MIX.
#
create vlan "mix"
configure vlan "mix" tag 1200
configure vlan "mix" protocol "IP"
configure vlan "mix" ipaddress 217.29.66./Y/ 255.255.254.0
configure vlan "mix" add port 1 untagged
#
configure port 1 display-string "MIX"
disable edp port 1
#
```

```
enable ipforwarding vlan "mix"

disable ipforwarding broadcast vlan "mix"

disable ipforwarding fast-direct-broadcast vlan "mix"

disable ipforwarding ignore-broadcast vlan "mix"

disable ipforwarding lpm-routing vlan "mix"


disable isq vlan "mix"

disable irdp vlan "mix"

disable icmp unreachable vlan "mix"

disable icmp redirects vlan "mix"

disable icmp port-unreachables vlan "mix"

disable icmp time-exceeded vlan "mix"

disable icmp parameter-problem vlan "amsix"

disable icmp timestamp vlan "mix"

disable icmp address-mask vlan "mix"

disable subvlan-proxy-arp "mix"

configure ip-mtu 1500 vlan "mix"

#

# IP Route Configuration

#

configure iproute add blackhole default

disable icmpforwarding vlan "mix"

disable igmp vlan "mix"
```

3.3. Force 10
This example shows a configuration fragment for a router/switch L3 Force10 connected to MIX through a 10 Gbit port.

```
! Disable proxy-arp over MIX interface

Force10(conf)#interface tengigabitethernet 0/0

Force10(conf-if-te-0/0)#no ip proxy-arp

 !  Disable Ipv6 ND RA

Force10(conf-if-te-0/0)#ipv6 nd suppress-ra

 ! ARP timeout is 4 hrs by default but can be changed
```

```
Force10(conf)#interface tengigabitethernet 0/0

Force10(conf-if-te-0/0)#arp timeout /minutes/
```

3.4. Brocade

Follows a configuration fragment for a Layer 3 Switch Brocade directly connected to MIX.

```
! MIX interface configuration

interface ethernet if

 port-name "MIX"

 ! Activate the port at Layer 3 only

 route-only

 no spanning-tree

 ! Disable IPv6 ND-RA (Router Advertisements)

 ipv6 nd suppress-ra

 ! Disable VLAN auto discovery.

 no vlan-dynamic-discovery

 ! IP address

 ip address 216.29.6X.Y 255.255.254.0

 ! No redirects

 no ip redirect

 no ipv6 redirect

 ! MIX recommends at least 2 hrs as ARP timeouts value

 ip arp-age 120

 ! fast-ethernet ports: fix speed and duplex

 speed-duplex 100-full
```

In some Ironware releases default settings for ICMPv6 ND was at 1 second, this value ha sto be changed to a much reasonable value of 1 hr, with the following command:

```
!Se IPv6 nd timeout at 1 hr.

 ipv6 nd ns-retransmit 3600
```

3.5. Juniper

For Juniper routers be sure that you are announcing only unicast routes overMIX peering LAN by adding the following command to all neighbor, groups and prefix-limits:

```
set family inet unicast
```

Even just one neighbor configured with family inet 'any' will activate multi cast routing and MBGP over the peering LAN.

3.5.1.   IPv4 ARP Cache Timeout

Juniper ARP cache timeout is 20 minutes: to reduce the amount of ARP broadcast traffic we recommend to raise this value up to 4 hrs. Follow the configuration commands to achieve this.

```
> *configure*

Entering configuration mode

 [edit]

you@juniper# *edit system arp*

 [edit system arp]

you@juniper# *set aging-timer 240*

 [edit system arp]

you@juniper# *show | compare*

[edit system arp]

+ aging-timer 240;

 [edit system arp]

you@juniper# *commit and-quit*

commit complete

Exiting configuration mode
```

Starting from release JUNOS 9.4 ARP cache timeout is configurable on each single interface:

```
[edit system arp aging-timer interface interface-name] aging-timer-minutes;
```

4.   Link Aggregation on Multiple MIX Ports

Link Aggregation (LAG) is available as a solution on MIX Peering LAN, according to the scheme visible in the picture below. To finalize this configuration is always mandatory to contact MIX Technical Department. Somo guideleines on how to configure it on the member side follow.

The service is available on Gigabit and 10 Gigabit Ethernet ports, up to a maximum of 8.

4.1. Cisco Catalyst 6500

The Port Channel on the Cisco side must be configured in mode on, and not as *negotiate* or *desirable*. MIX switches does not enable LACT or PaGP as default: LACP is possible asking this feature to the MIX Technical Department..Some Interface modules may have limitations in the amount of traffic injected on the LAG. Please verify your technical documentation or ask the vendor. MIX static MAC address assignment might be a problem so contact MIX Technical Department.

```
! Port Channel MIX: Config Example
interface GigabitEthernet1/1
 description MIX Link 1
 no ip address
 no ip redirects
 no ip proxy-arp
 no keepalive
 no cdp enable
 channel-group 1 mode on
!
interface GigabitEthernet1/2
 description MIX Link 2
 no ip address
 no ip redirects
 no ip proxy-arp


no keepalive
 no cdp enable
 channel-group 1 mode on
!
interface Port-channel1
 description MIX aggregated link
 ip address 217.29.6x.y 255.255.254.0
 no ip redirects
 no ip proxy-arp
 no keepalive
!
```

4.2. Cisco GSR

MIX static MAC address assignment could be a problem with Cisco GSR: keep in touch with MIX Technical Department in this case

```
! MIX Port Channel config example:
!
interface Port-channel1
 description MIX Port Channel
 ip address 217.29.6x.y 255.255.254.0
 no ip redirects
 no ip directed-broadcast
 no ip proxy-arp
 channel-group minimum active 1
 no channel-group bandwidth control-propagation
 hold-queue 150 in
!
interface GigabitEthernet1/2/1
 no keepalive
 no negotiation auto
 channel-group 1
 no cdp enable
!
interface GigabitEthernet1/2/2
 no keepalive
 no negotiation auto
 channel-group 1
 no cdp enable
!
```

4.3. Switch L3 Brocade

Old platforms like BigIron Jetcore and IronCore have limitations on the LAG port configuration. Please check your technical documentation. On BiGIron 15000 slot n. 8 is not available for LAG together with his neighbouring slots.

```
! BigIron JetCore LAG configuration example

trunk server ethernet slot/port to slot/port+1
```

[1.SFP]

BigIron RX e MLX/XMR does not have any limitation on LAG ports.

```
! RX/MLX/XMR MIX port channel config example

trunk ethe slot/port to slot/port ethe otherslot/otherport to otherslot/otherport
```

4.4. Juniper M-Series

 There are no nown problem with LAGs configuration starting from JuonOS release 6.0. A configuration example follows:

```
---

[edit]

ops@junix# show chassis

aggregated-devices {

  ethernet {

  device-count 1;

  }

}

---

[edit]

ops@junix# show interfaces ge-2/1/0

gigether-options {

  802.3ad ae0;

}

 [edit]

ops@junix# show interfaces ge-3/1/0

gigether-options {

  802.3ad ae0;

}

---

[edit]
```

```
ops@junix# show interfaces ae0
description "MIX";
unit 0 {
  family inet {
  filter {
  input MIX-in;
  output MIX-out;
  }
  address 217.29.6x.y/23;
  }
  family inet6 {
  address 2001:7F8:B:100:1D1:A5Dx:xxxx:y/64;
  }
}
```

[SFP] Optionally a more fine grained load balancing strategy is available:

```
#
 ---
routing-options {
  autonomous-system abcde;
  forwarding-table {
  export [ load-balance ];
  }
}
policy-options {
  policy-statement load-balance {
  then {
  load-balance per-packet;
  }
  }
}
```

```
forwarding-options {

  hash-key {

  family inet {

  layer-3;

  layer-4;

  }

  }

}
```

[SEP]Just in case this should not be sufficient the hashing algorithm can be modified through some undocumented options introduced starting from JunOS 7.0

```
hash-key {

  family inet {

  layer-3 {

  destination-address;

  protocol;

  source-address;

  }

  layer-4 {

  destination-port;

  source-port;

  type-of-service;

  }

  }

}
```

[SEP]Also the minimum number of active links is configurable: when the minimum number of active links is reached the

aggregation will be removed, being the LAG not able anymore to carry all the expected traffic.

```
---
aggregated-ether-options {
  minimum-links 2;
  link-speed 1g;
}
---
```

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5. Tagged ports configuration on MIX

Mix ports can be also configured to be active on multiple VLANS other than the public Peering broadcast domain, followiing the 802.1Q standard. To accomplish this task and gain access to this functionality that allows the implementation of different type of services over the Mix ports the contact and coordination with the MIX NOC **is always a requirement**, after the subscription of the additional service(s) with the MIX Sales team. Find enclosed in the following some technical guidelines on how to configure this functionality. There are many scenarios where Q-tagging can be employed, here follows some of the most common uses. Additional information and case-by case detail will be provided by the NOC upon configuration of the service. Again, here are presented the most common scenarios:

1. Tagged peering port over two VLANs, one the main Public Peering VLAN and another VLAN to interconnect privately with another member or a Closed User Group of several members (each of them must have subscribed the service for the Q-tagging of the ports involved)

5.1. Cisco Configuration Commands

```
int gig 1.100

encap dot1q 100


description – Mix Milano –

ip addr 217.29.6x.y 255.255.254.0


int gig 1.501

description – MIX OHM –

encap dot1q 501

ip addr 185.1.186.x 255.255.255.0
```

5.2. Juniper Configuration Commands

```
user@host# set interfaces ge-0/0/0 vlan-tagging

user@host# set interfaces ge-0/0/0 unit 0 alias "MIX-MILANO"

user@host# set interfaces ge-0/0/0.0 vlan-id 100

user@host# set interfaces ge-0/0/0.0 family inet address 217.29.6x.y/23

user@host# set interfaces ge-0/0/0 unit 1 alias "MIX-OHM"

user@host# set interfaces ge-0/0/0.1 vlan-id 501

user@host# set interfaces ge-0/0/0.1 family inet address 185.1.186.x/24
```

Code MIX 305e – Version 1.2

5.3. Mikrotik Configuration Commands

```
/interface vlan
add interface=sfp-sfpplus1 name=MIX-MILANO vlan-id=100
/ip address
add address=217.29.6x.y/23 interface=MIX-MILANO network=217.29.66.0


/interface vlan
add interface=sfp-sfpplus1 name=MIX-OHM vlan-id=501
/ip address
add address=185.1.186.x/24 interface=MIX-OHM network=185.1.186.0
```

5.4. BGP Routing between Tagged ports (VLAN MIX and other MIX managed IXes)

In this Chapter the operational scenario of a Peering Port connected at the MIX Open Hub Med POP in Carini (PA) or at Mxi Bologna PoP and active both on the MIX Milan public Peering LAN and the local Public Peering VLAN is assessed. At the moment for this configuration the subscription of MIX additional service is not requested, so this can be done directly by sending a configuration request directly to the MIX NOC. Remote Local Peering VLANs are not extended to any other MIX PoP, being introduced to define a precise geographical location for the peering interconnection dedicated to the traffic being originated and terminated locally.

For further information regarding the 802.1Q configuration of such a port please refer to the instruction provided in the previous Chapter.

As a general rule, MIX Remote VLANs like MIX-OHM or MIX-BO ones must be used as the primary traffic exchange route between members both connected in OHM. As an example in the following picture a basic scenario is presented: ISP1 has multiple MIX connections, one in Milano and one in Palermo while ISP2 is just connected at MIX OHM premises. In normal condition all the traffic between ISP 1 and ISP must use Yellow WLAN and thus follw the green dashed line. When a fault occurs to ISP1 OHM PoP port, the traffic can be routed over red VLAN (Mix Milano Peering VLAN) over the orange dashed path. Same scenario applies if Mix Bologna is involved instead of MIX Palermo.

In this scenario the requested routing behaviour is obtainable by ISP2 raising the LP (*Local Preference*) attribute over the MIX OHM VLAN received announcements coming from ISP1, and by ISP1 in the same way around, raising ISP2 announcement LP over the MIX OHM VLAN. Upon a ISP1 port fault in OHM, the traffic between ISP1 and ISP2 will traverse the MIX Milano Peering VLAN going back to normal upon ISP1 OHM port restoration.

ISP1 - Milan PoP

ISP1 Untagged Port

Switch MIX - Milano Caldera

Primary Path (ISP1 ISP2)

Emergency Path (ISP1 OHM Fault)

ISP1 - OHM PoP

ISP2

Switch MIX - OHM

Other VLAns

VLAN MIX Public Peering

MIX-OHM Peering VLAN