

APPLICATION NOTE 006

WeOS Horseshoe Topology

Configure FRNT Bus Topologies with Redundant Uplinks



WeOS Horseshoe Topology

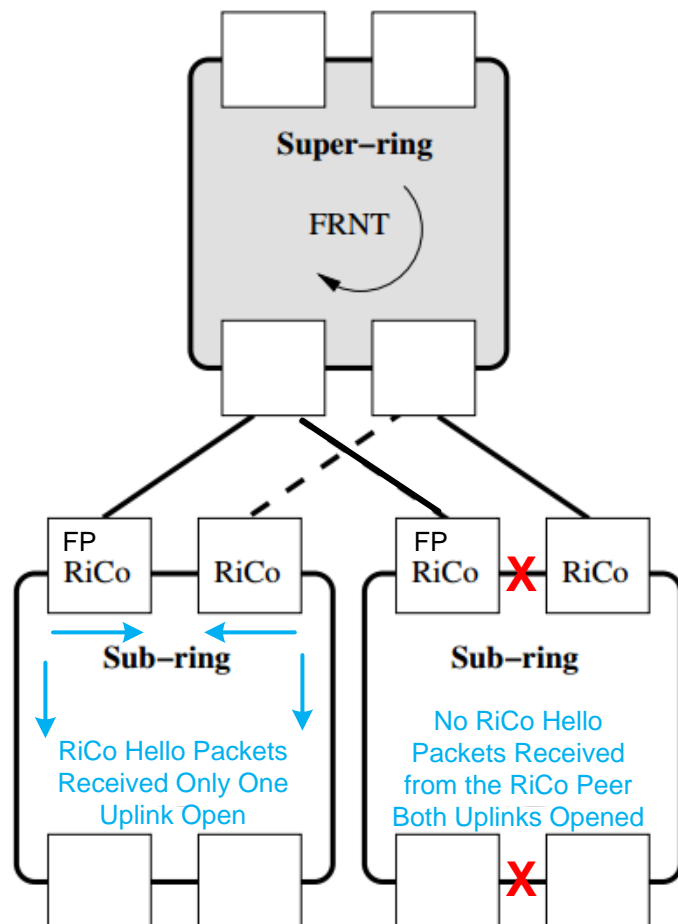
This Application Note shows how to use FRNT Bus Topologies together with FRNT Ring Coupling (RiCo) to create WeOS Horseshoe Topologies.

Background

In many applications it is not always possible to close the FRNT RiCo Sub-rings i.e. find a divergent way back to the beginning of the ring. This can be networks that cover large geographical areas like Trackage and Water Wastewater applications or networks in mines where there physically are no return paths present to run a cable in.

How it works

Horseshoe Topologies are an extension of the FRNT RiCo function but with the difference that the RiCo Sub-rings do not have to be closed. As the FRNT RiCo nodes constantly send Hello packets between each other over the Sub-ring in order to negotiate which RiCo node that shall own the active uplink. If no Hello packets are received at all over the Sub-ring it means that the RiCo nodes have become isolated from each other. When this happens it is safe for both RiCo nodes to open their uplinks to the Super-ring without causing an uncontrolled loop in the network. Even though two failures have occurred full connectivity is achieved with the help of the Super-ring.



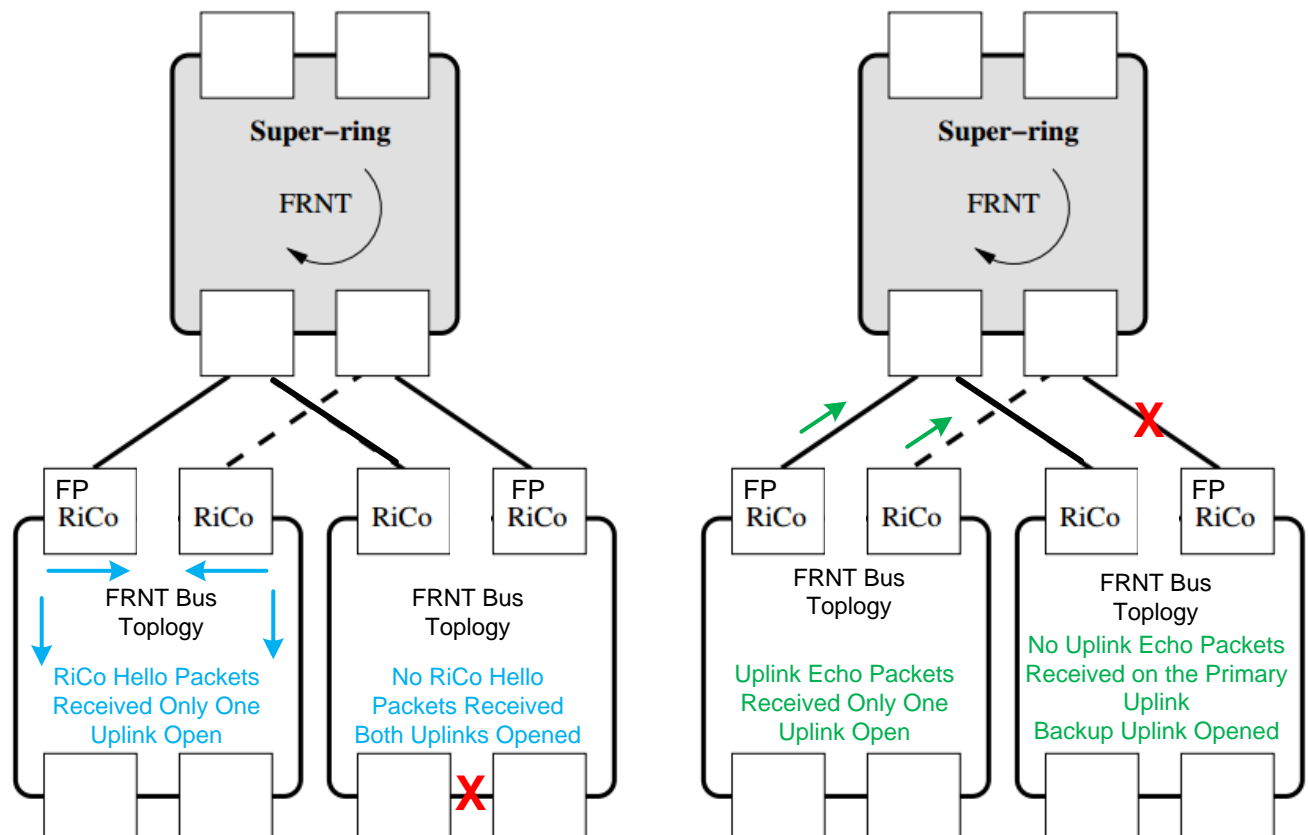
This behaviour of the RiCo protocol can be used to create Horseshoe Topologies. Instead of building closed FRNT rings as the RiCo Sub-rings an FRNT Bus Topology is used. FRNT Bus Topologies do not require two ring ports to be configured for the bus end-points, as with normal FRNT rings, so there are no wasted ports. A Focal Point shall still be present in order to achieve the best possible fail-over timing for the Horseshoe Topology. To further increase the resilience of the network up to four uplink connections from the RiCo nodes to the Super-ring are supported.

Horseshoe Topology Timings

The best possible fail-over timing is achieved when the FRNT Bus Focal Point has the primary uplink to the Super-ring.

In the Sub-rings RiCo hello packets are sent with 100ms intervals by default. The hello interval can be lowered to a minimum of 50ms. This will speed up the fail-over timing, but will increase the CPU-load of the RiCo Nodes.

The uplinks to the Super-ring are also monitored but with RiCo echo packets as they differ from the hello packets sent over the Sub-ring. The RiCo echo packet monitoring allows a Horseshoe Topology to have its uplinks run over a third party Layer 2 network like MPLS. The default interval with which the uplink echo packets are sent is 200ms.



Trackside Horseshoe Topology Example

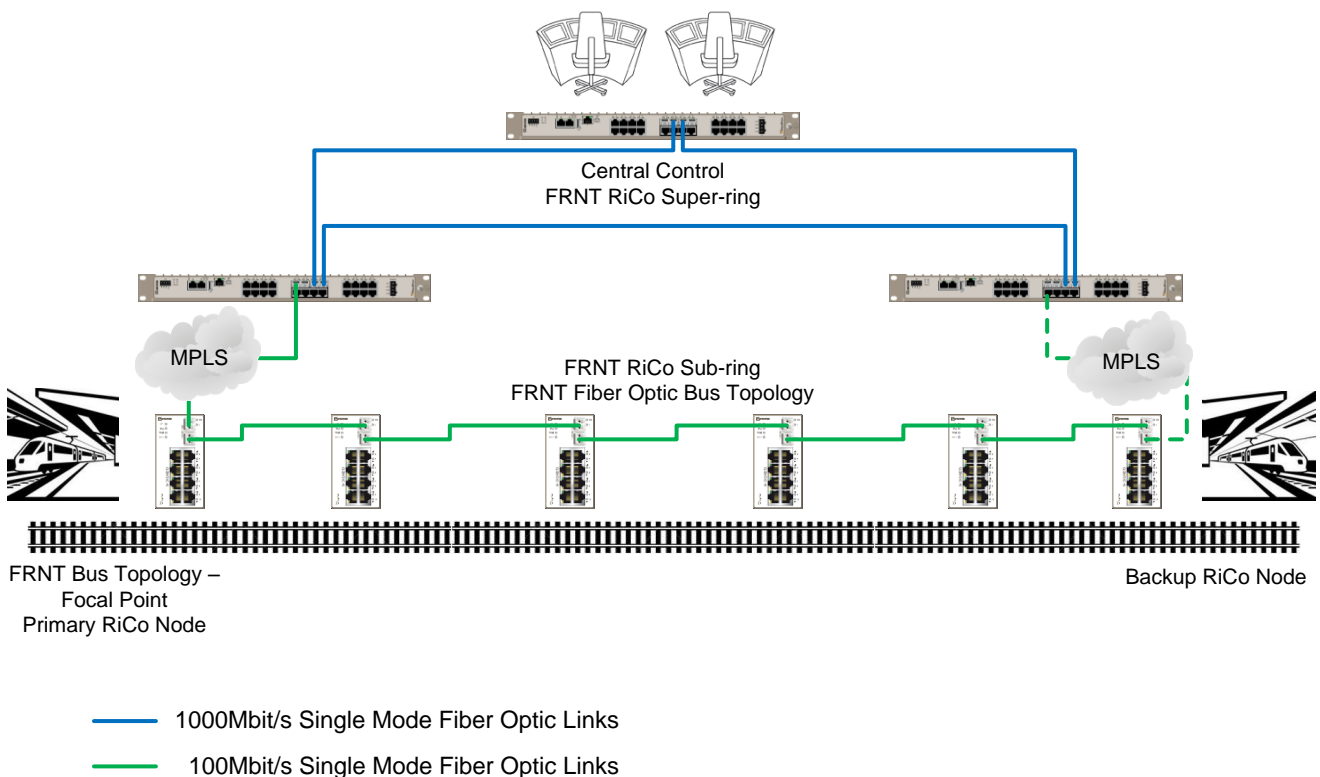
Trackside applications consists of many different systems that moves trains safely between destinations. These systems must be able to communicate vital information back to the control rooms reliably.

Trackside networks run along the railroad tracks for long distances and very rarely have a natural return path over which a ring topology can be closed.

Therefore Horseshoe Topologies are a perfect fit for these applications.

Another very useful feature of the RiCo protocol is that it allow the uplinks to the central FRNT ring to be passed over third party Layer 2 networks, like MPLS. This will help creating resilient paths back to the central control, however the fail-over performance is optimized for direct uplinks so link-down events can be quickly acted upon.

Products used in the topology are RedFox Rack Switches and Lynx-110.



Water Wastewater Horseshoe Topology Example

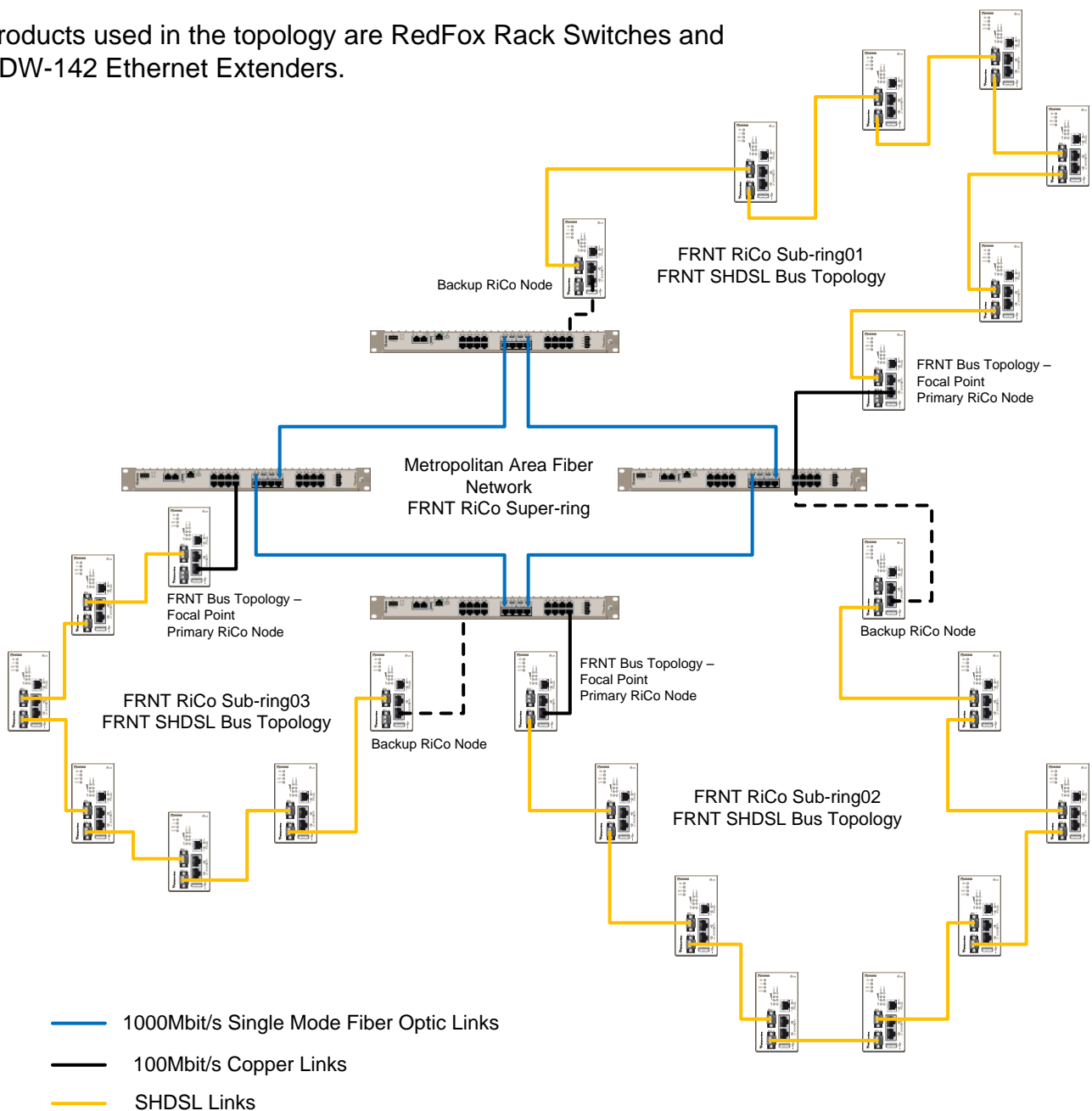
Water Wastewater systems often cover entire cities or large parts of a city including water intakes or pumping stations outside the city center.

The network must then cover a very large geographical area, sometimes with only old copper signalling cables available for communication.

Again there is no way back to the beginning of each sub ring so a complete ring cannot be created.

This is also a perfect fit for Horseshoe Topologies as the resilience can be achieved through the RiCo uplinks to the central RiCo super ring preventing single-point of failures in the network.

Products used in the topology are RedFox Rack Switches and DDW-142 Ethernet Extenders.



Application Note Network Layout

The main example topology to describe the WeOS Horseshoe Topology configuration procedure is presented below.

The different media types used in this topology are only for illustrating purposes to show how they can be combined in the same application.

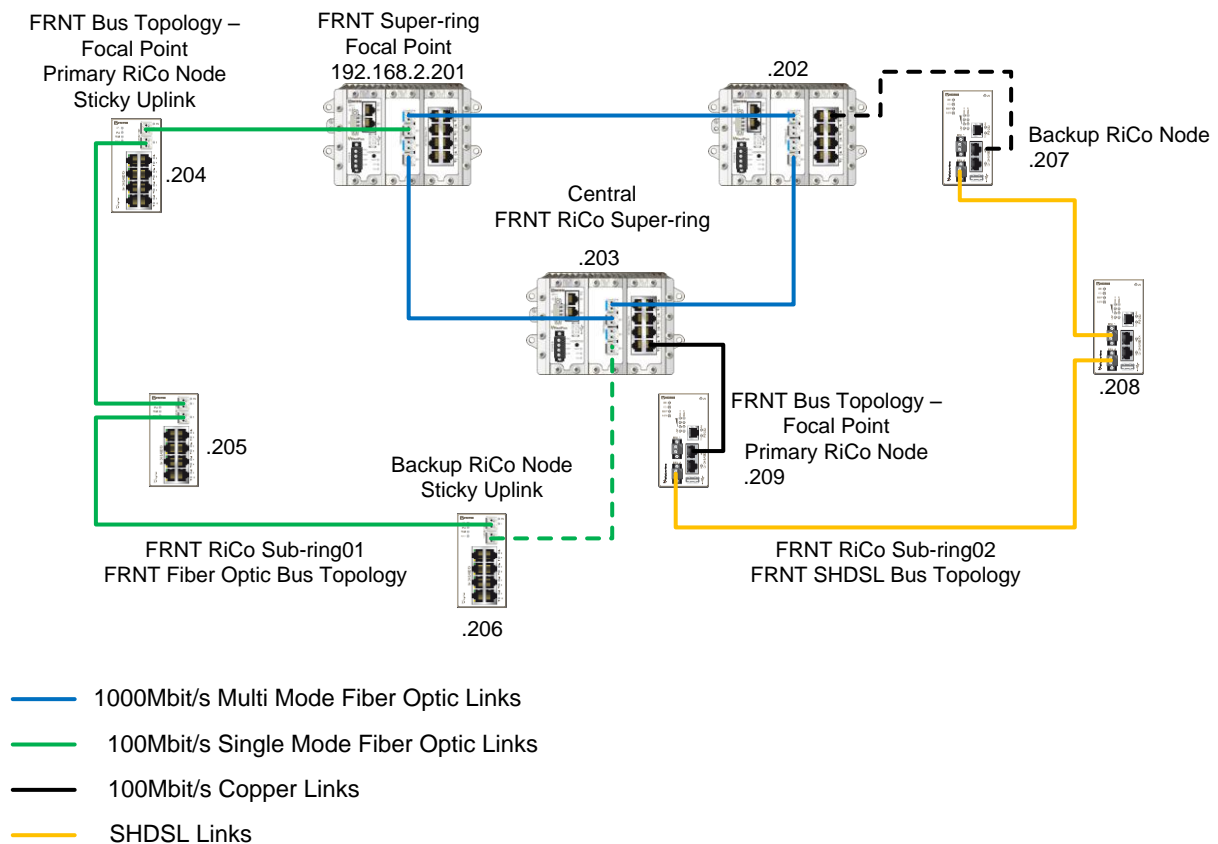
A single subnet is used and all switches have IP-addresses in the range of 192.168.2.201-192.168.2.209 and are referred to later on as its last octet e.g. 203 for the switch with IP-address 192.168.2.203.

Two types of Horseshoe Topologies are exemplified, sticky uplink and strict prioritized.

For more information regarding FRNT and the RiCo protocol see the "FRNT" and "Ring Coupling and Dual Homing" chapters of the WeOS Management Guide.

All configurations in this Application Note are made using WeOS version 4.20.0.

LAN Subnet:
192.168.2.0/24



Configuration

First do the basic configurations like hostname, location and set the clock correctly.

Configure the FRNT RiCo Super-ring

The central ring with RedFox switches acts as a RiCo Super-ring, meaning it does not have any RiCo nodes configured. So on these devices a standard FRNT ring is created.

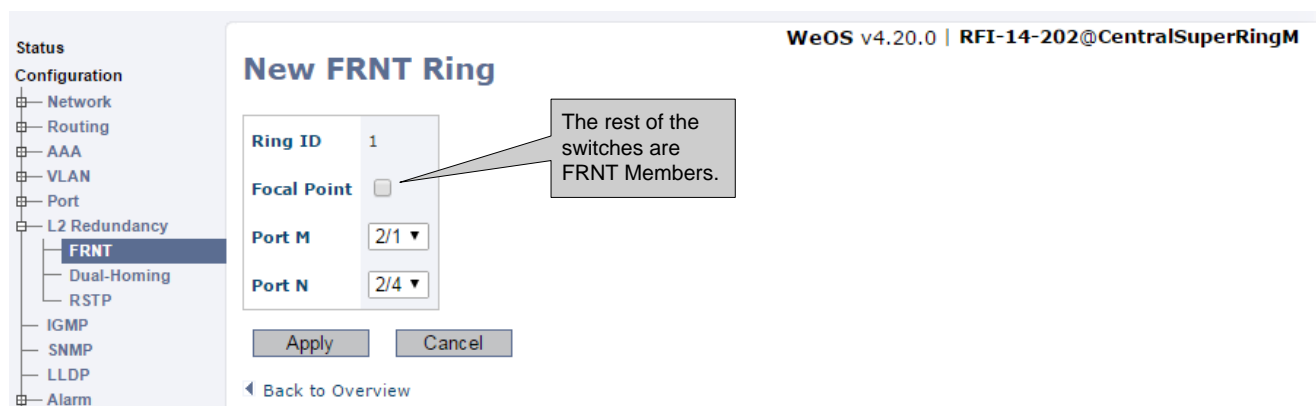
Enable FRNT on the Focal Point switch by configuring two FRNT ports.

Start configuration in the furthest end of the network if the switches are connected to each other. This is because an FRNT enabled port will not be opened towards a non-FRNT port, in-order to prevent uncontrolled loops on accidental miss-connections.

Port M is the blocked port when the ring is intact.



Enable FRNT on all Member switches in the RiCo Super-ring i.e. the rest of the RedFox switches.



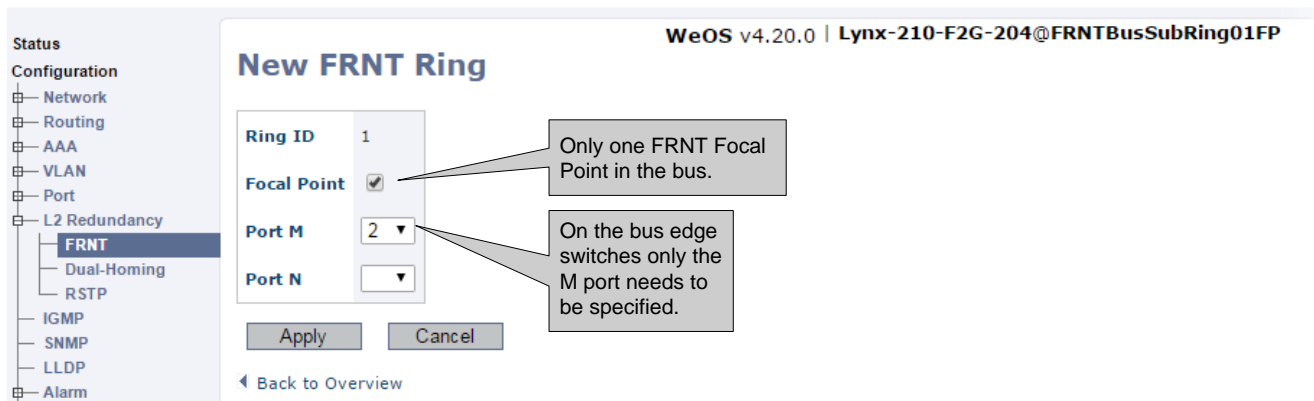
Configure FRNT Bus Topologies in the RiCo Sub-rings

From the RiCo Super-ring two Sub-rings are to be connected. The Sub-rings which normally are standard closed FRNT rings with configured RiCo nodes. These nodes handle the fail-over to the RiCo Super-ring.

However in the case of Horseshoe topologies it is not possible to close the Sub-rings so FRNT Bus Topologies must be configured. An FRNT Bus Topology has both its edge switches configured with the M port only.

Also start configuration in the furthest end of the FRNT Bus and work backwards.

Always configure one of the RiCo nodes of the FRNT Bus Topology switches as a Focal Point to ensure the fastest possible fail-over, preferably one of the edge switches.



Status WeOS v4.20.0 | Lynx-210-F2G-204@FRNTBusSubRing01FP

Configuration

- Network
- Routing
- AAA
- VLAN
- Port
- L2 Redundancy
 - FRNT**
 - Dual-Homing
 - RSTP
- IGMP
- SNMP
- LLDP
- Alarm

New FRNT Ring

Ring ID: 1

Focal Point:

Port M: 2

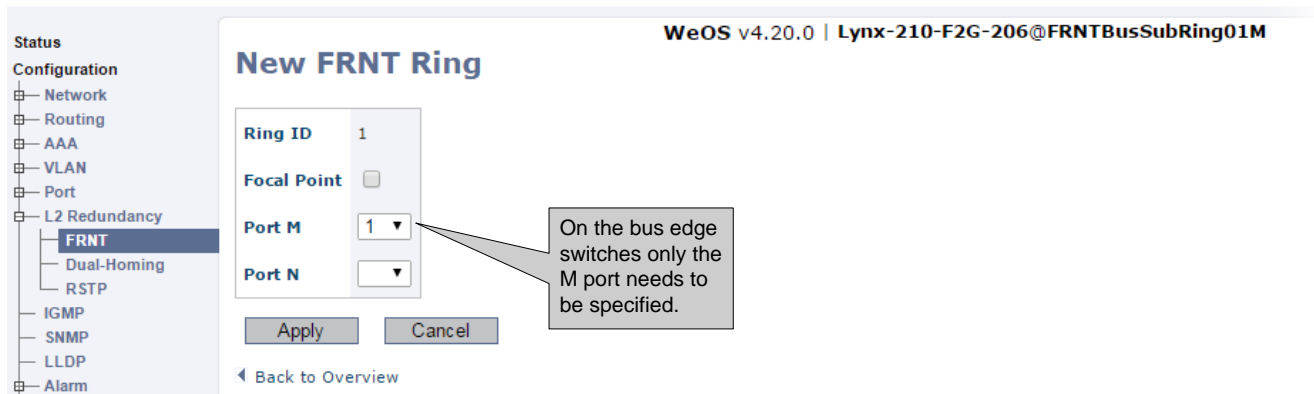
Port N: []

Buttons: Apply, Cancel

Back to Overview

Annotations:

- Only one FRNT Focal Point in the bus.
- On the bus edge switches only the M port needs to be specified.



Status WeOS v4.20.0 | Lynx-210-F2G-206@FRNTBusSubRing01M

Configuration

- Network
- Routing
- AAA
- VLAN
- Port
- L2 Redundancy
 - FRNT**
 - Dual-Homing
 - RSTP
- IGMP
- SNMP
- LLDP
- Alarm

New FRNT Ring

Ring ID: 1

Focal Point:

Port M: 1

Port N: []

Buttons: Apply, Cancel

Back to Overview

Annotation:

- On the bus edge switches only the M port needs to be specified.

Enable FRNT on all Member switches in the FRNT Bus Topology i.e. the rest of the Lynx switches with standard FRNT settings.



Status WeOS v4.20.0 | Lynx-210-F2G-205@FRNTBusSubRing01M

Configuration

- Network
- Routing
- AAA
- VLAN
- Port
- L2 Redundancy
 - FRNT**
 - Dual-Homing
 - RSTP
- IGMP
- SNMP
- LLDP
- Alarm

New FRNT Ring

Ring ID: 1

Focal Point:

Port M: 1

Port N: 2

Buttons: Apply, Cancel

Back to Overview

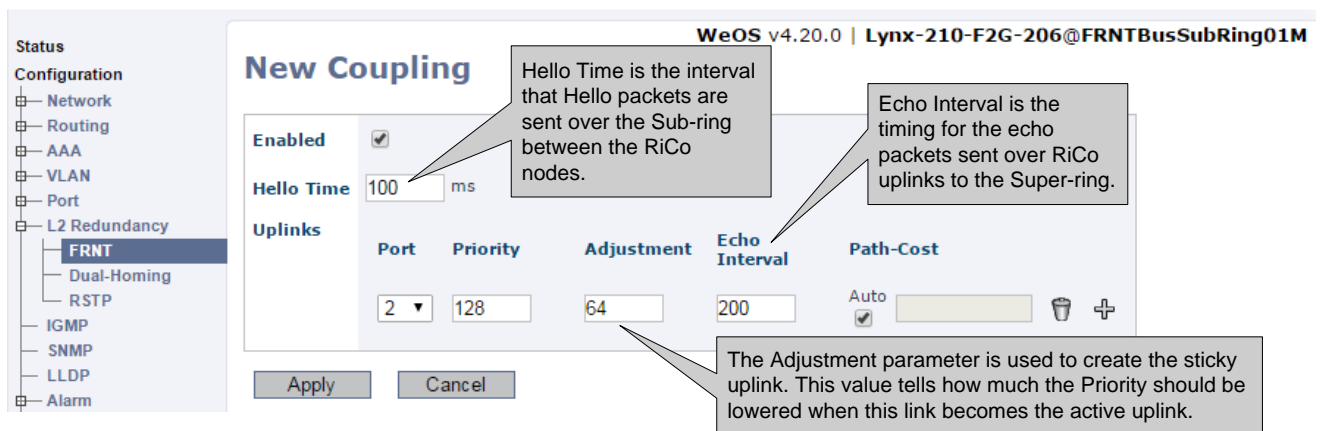
Complete the Horseshoes with RiCo Nodes

The connection towards the RiCo Super-ring is made with redundancy through the FRNT Ring Coupling protocol. In this network the FRNT Bus Topology edge switches will have the RiCo nodes configured.

The RiCo nodes can be configured with a sticky uplink meaning that if the active uplink fails the backup will take over and keep being the active uplink even if the previous active uplink comes back up again. This will avoid another fail-over as there is no fall-back activity needed.

If there is a preferred path to the RiCo Super-ring the uplink with the highest priority shall always become active when it comes back up after a failure.

In this example network the Lynx part, sub ring 01, will have sticky uplinks and the Wolverine (SHDSL) part, sub ring 02, will have a strict prioritized uplink.



WeOS v4.20.0 | Lynx-210-F2G-206@FRNTBusSubRing01M

New Coupling

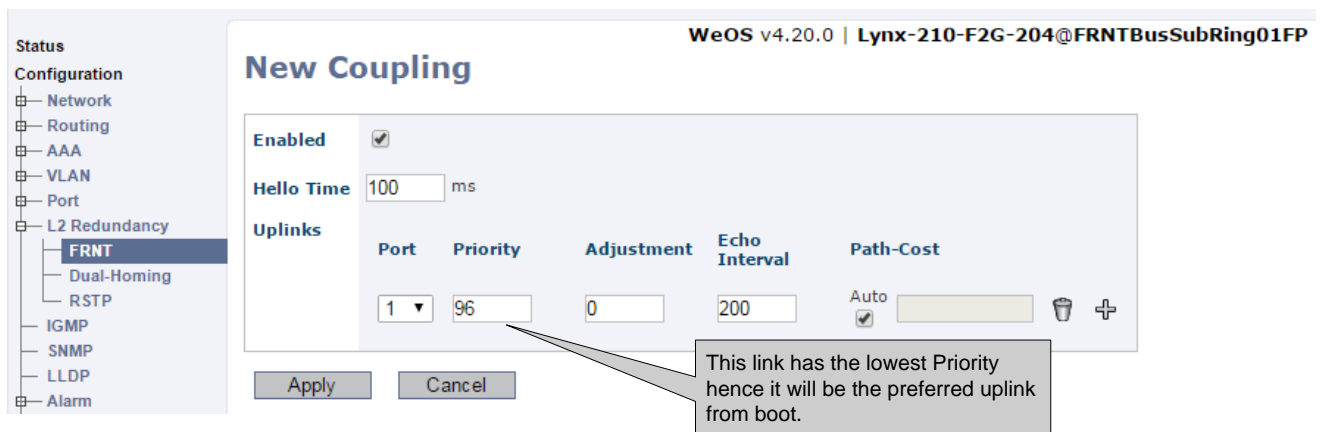
Enabled

Hello Time 100 ms

Uplinks	Port	Priority	Adjustment	Echo Interval	Path-Cost
	2	128	64	200	Auto

Apply Cancel

Callouts:
 - Hello Time is the interval that Hello packets are sent over the Sub-ring between the RiCo nodes.
 - Echo Interval is the timing for the echo packets sent over RiCo uplinks to the Super-ring.
 - The Adjustment parameter is used to create the sticky uplink. This value tells how much the Priority should be lowered when this link becomes the active uplink.



WeOS v4.20.0 | Lynx-210-F2G-204@FRNTBusSubRing01FP

New Coupling

Enabled

Hello Time 100 ms

Uplinks	Port	Priority	Adjustment	Echo Interval	Path-Cost
	1	96	0	200	Auto

Apply Cancel

Callout:
 - This link has the lowest Priority hence it will be the preferred uplink from boot.

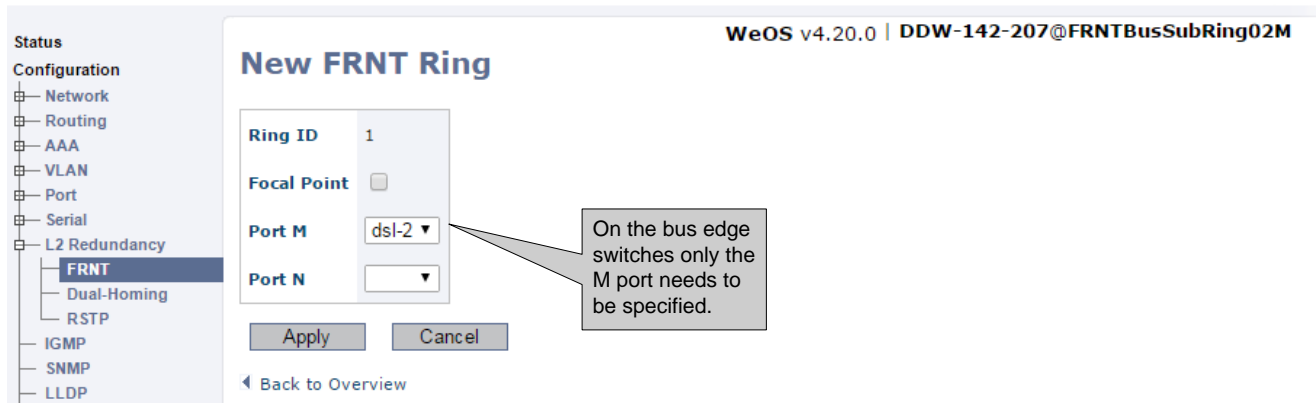
In the example above the first switch 206 is configured with a priority adjustment of 64. So if the primary RiCo node switch 204 has a failure in its active uplink the 206 switch will lower its priority with 64 thus ending up with an active priority of 64.

As this is lower than switch 204's priority of 96 it will ensure that switch 206 will keep the active uplink even when switch 204's link is back in full operation again.

Resulting in "zero" fail-over on link fall back.

Configure FRNT Bus Topologies in the RiCo Sub Rings

Configure the DDW-142 devices in the same way as the Lynx switches. On the FRNT Bus edge switches only port M is set.



WeOS v4.20.0 | DDW-142-207@FRNTBusSubRing02M

New FRNT Ring

Ring ID: 1

Focal Point:

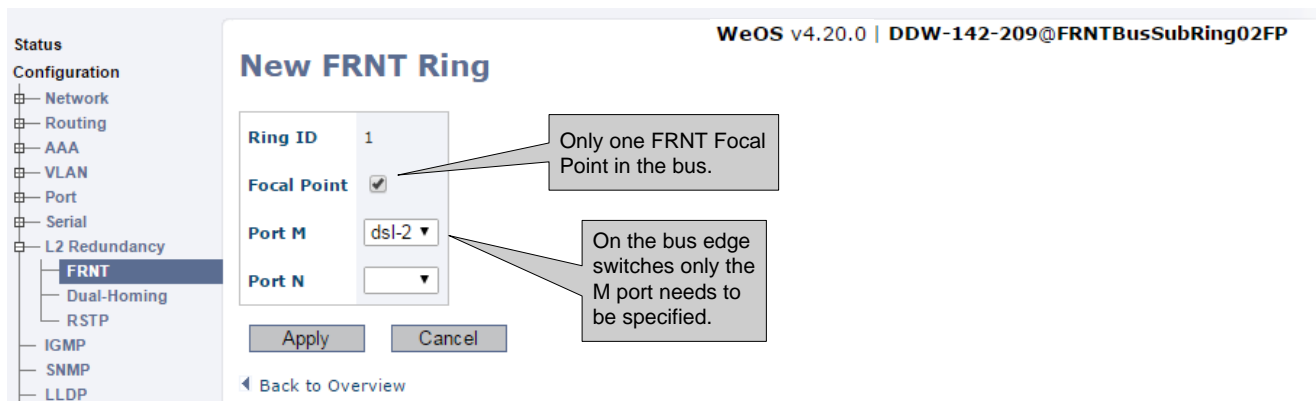
Port M: dsl-2

Port N:

Apply Cancel

Back to Overview

On the bus edge switches only the M port needs to be specified.



WeOS v4.20.0 | DDW-142-209@FRNTBusSubRing02FP

New FRNT Ring

Ring ID: 1

Focal Point:

Port M: dsl-2

Port N:

Apply Cancel

Back to Overview

Only one FRNT Focal Point in the bus.

On the bus edge switches only the M port needs to be specified.

Enable FRNT on all Member switches in the FRNT Bus Topology i.e. the rest of the DDW-142 devices with standard FRNT settings.



WeOS v4.20.0 | DDW-142-208@FRNTBusSubRing02M

New FRNT Ring

Ring ID: 1

Focal Point:

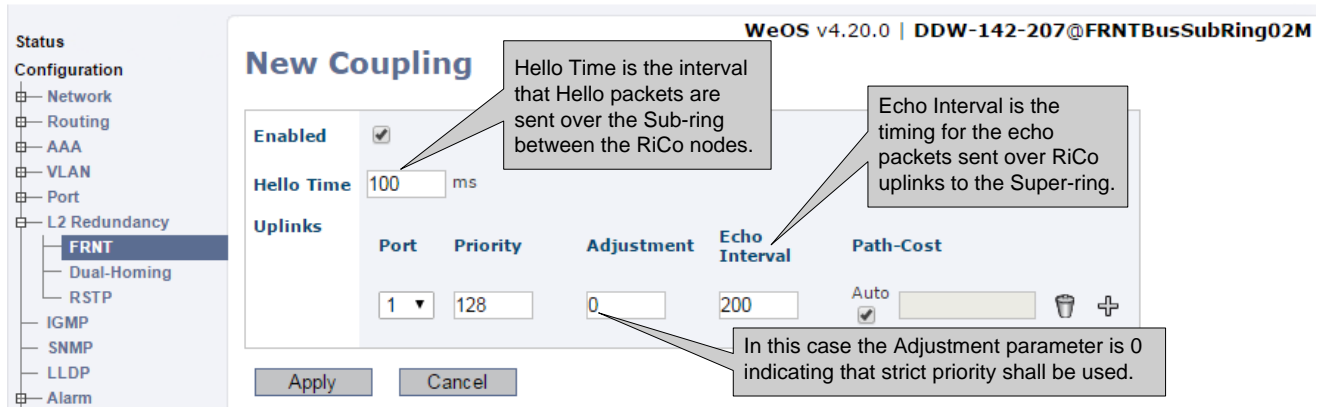
Port M: dsl-1/1

Port N: dsl-1/2

Apply Cancel

Back to Overview

The SHDSL edge devices at each end of the FRNT Bus Topology will also have the RiCo nodes configured. So proceed in the same way as for Sub-ring 01.



WeOS v4.20.0 | DDW-142-207@FRNTBusSubRing02M

New Coupling

Enabled

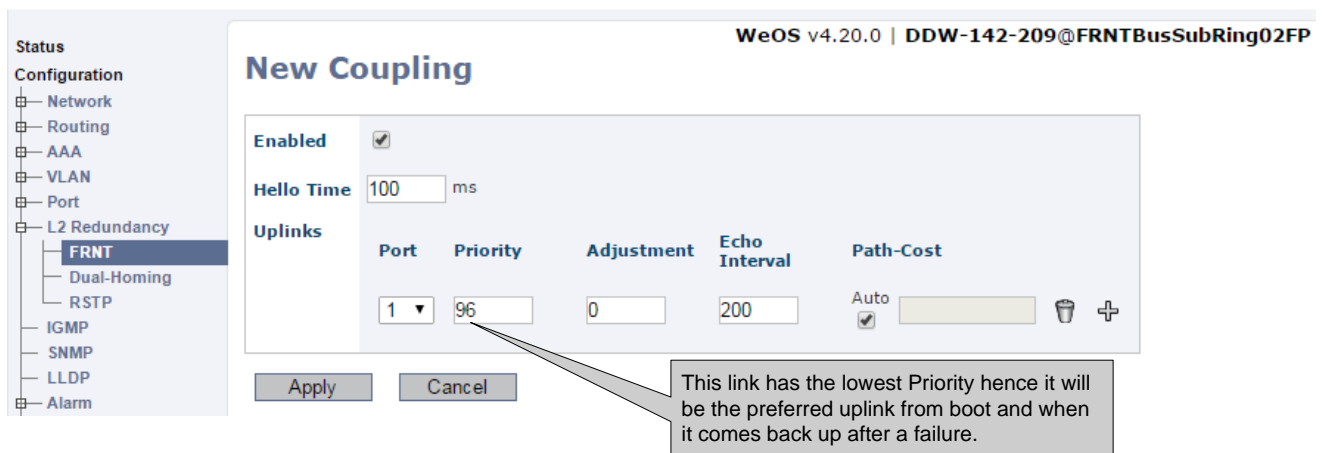
Hello Time 100 ms

Uplinks

Port	Priority	Adjustment	Echo Interval	Path-Cost
1	128	0	200	Auto

Apply Cancel

Callouts:
 - Hello Time is the interval that Hello packets are sent over the Sub-ring between the RiCo nodes.
 - Echo Interval is the timing for the echo packets sent over RiCo uplinks to the Super-ring.
 - In this case the Adjustment parameter is 0 indicating that strict priority shall be used.



WeOS v4.20.0 | DDW-142-209@FRNTBusSubRing02FP

New Coupling

Enabled

Hello Time 100 ms

Uplinks

Port	Priority	Adjustment	Echo Interval	Path-Cost
1	96	0	200	Auto

Apply Cancel

Callout:
 - This link has the lowest Priority hence it will be the preferred uplink from boot and when it comes back up after a failure.

In the example above the primary RiCo node 209 will always be the preferred uplink to the RiCo super ring. When it comes back after a link failure it will take back the active uplink from RiCo node 207 as it will always have the lowest priority.

The basic configuration of the WeOS Horseshoe Topologies is now completed. If needed VLANs and other functionality can now be added to the configuration.

Configuration Files RedFox

```
# \\ Westermo WeOS v4.20.0, CLI Format v1.19
# RedFox RFI-14P-F4G, art.no. 3641-3200 ser.no. 1167
```

```
aaa
    username admin hash $1$r6mXNVvD$JaDxe9xNk/MI7Ebdk7B0q.
    end

system
    hostname RFI-14-201
    location "CentralSuperRingFP"
    timezone Europe/Stockholm
    end

fdb
    mac 01:00:5e:00:00:01 port cpu, all
    mac 01:00:5e:00:00:02 port cpu, all
    mac 01:00:5e:00:00:04 port cpu, all
    mac 01:00:5e:00:00:05 port cpu, all
    mac 01:00:5e:00:00:06 port cpu, all
    mac 01:00:5e:00:00:09 port cpu, all
    mac 01:00:5e:00:00:0a port cpu, all
    mac 01:00:5e:00:00:0d port cpu, all
    mac 01:00:5e:00:00:0e port cpu, all
    mac 01:00:5e:00:00:12 port cpu, all
    mac 01:00:5e:00:00:18 port cpu, all
    mac 01:00:5e:00:00:66 port cpu, all
    mac 01:00:5e:00:00:6b port cpu, all
    mac 01:00:5e:00:00:fb port cpu, all
    end

alarm
    trigger 1 frnt
        ring 1
        severity active warning inactive notice
        condition high
        action 1
        end
    action 1
        target snmp log led digout
        end
    end

port 1/1-2/1,2/3-3/8
    speed-duplex auto
    end

port 2/2
    speed-duplex 100-full
    end

frnt 1
    focal-point
    ring-ports 2/1, 2/4
    end

no spanning-tree

vlan 1
    name vlan1
    untagged ALL
    end

iface vlan1 inet static
    distance 1
    primary
    management ssh http https ipconfig snmp
    address 192.168.2.201/24
    end

snmp-server
    rocommunity public
    no rwcommunity
    trapcommunity trap
    end

ntp
    end
```

```
# \\ Westermo WeOS v4.20.0, CLI Format v1.19
# RedFox RFI-14P-F4G, art.no. 3641-3200 ser.no. 1190
```

```
aaa
    username admin hash $1$r6mXNVvD$JaDxe9xNk/MI7Ebdk7B0q.
    end

system
    hostname RFI-14-202
    location "CentralSuperRingM"
    timezone Europe/Stockholm
    end

fdb
    mac 01:00:5e:00:00:01 port cpu, all
    mac 01:00:5e:00:00:02 port cpu, all
    mac 01:00:5e:00:00:04 port cpu, all
    mac 01:00:5e:00:00:05 port cpu, all
    mac 01:00:5e:00:00:06 port cpu, all
    mac 01:00:5e:00:00:09 port cpu, all
    mac 01:00:5e:00:00:0a port cpu, all
    mac 01:00:5e:00:00:0d port cpu, all
    mac 01:00:5e:00:00:0e port cpu, all
    mac 01:00:5e:00:00:12 port cpu, all
    mac 01:00:5e:00:00:18 port cpu, all
    mac 01:00:5e:00:00:66 port cpu, all
    mac 01:00:5e:00:00:6b port cpu, all
    mac 01:00:5e:00:00:fb port cpu, all
    end

alarm
    trigger 1 frnt
        ring 1
        severity active warning inactive notice
        condition high
        action 1
        end
    action 1
        target snmp log led digout
        end
    end

port ALL
    speed-duplex auto
    end

frnt 1
    no focal-point
    ring-ports 2/1, 2/4
    end

no spanning-tree

vlan 1
    name vlan1
    untagged ALL
    end

iface vlan1 inet static
    distance 1
    primary
    management ssh http https ipconfig snmp
    address 192.168.2.202/24
    end

snmp-server
    rocommunity public
    no rwcommunity
    trapcommunity trap
    end

ntp
    end
```

Configuration Files RedFox and Lynx

```
# \\ Westermo WeOS v4.20.0, CLI Format v1.19
# RedFox RFI-14P-F4G, art.no. 3641-3200 ser.no. 1291
```

```
aaa
    username admin hash $1$r6mXNVvD$JaDxe9xNk/MI7Ebdk7B0q.
    end

system
    hostname RFI-14-203
    location "CentralSuperRingM"
    timezone Europe/Stockholm
    end

fdb
    mac 01:00:5e:00:00:01 port cpu, all
    mac 01:00:5e:00:00:02 port cpu, all
    mac 01:00:5e:00:00:04 port cpu, all
    mac 01:00:5e:00:00:05 port cpu, all
    mac 01:00:5e:00:00:06 port cpu, all
    mac 01:00:5e:00:00:09 port cpu, all
    mac 01:00:5e:00:00:0a port cpu, all
    mac 01:00:5e:00:00:0d port cpu, all
    mac 01:00:5e:00:00:0e port cpu, all
    mac 01:00:5e:00:00:12 port cpu, all
    mac 01:00:5e:00:00:18 port cpu, all
    mac 01:00:5e:00:00:66 port cpu, all
    mac 01:00:5e:00:00:6b port cpu, all
    mac 01:00:5e:00:00:fb port cpu, all
    end

alarm
    trigger 1 frnt
        ring 1
        severity active warning inactive notice
        condition high
        action 1
        end
    action 1
        target snmp log led digout
        end
    end

port 1/1-2/3,3/1-3/8
    speed-duplex auto
    end

port 2/4
    speed-duplex 100-full
    end

frnt 1
    no focal-point
    ring-ports 2/1, 2/2
    end

no spanning-tree

vlan 1
    name vlan1
    untagged ALL
    end

iface vlan1 inet static
    distance 1
    primary
    management ssh http https ipconfig snmp
    address 192.168.2.203/24
    end

snmp-server
    rocommunity public
    no rwcommunity
    trapcommunity trap
    end

ntp
    end
```

```
# \\ Westermo WeOS v4.20.0, CLI Format v1.19
# Lynx L210-F2G, art.no. 3643-0105-007 ser.no. 21535
```

```
aaa
    username admin hash $1$r6mXNVvD$JaDxe9xNk/MI7Ebdk7B0q.
    end

system
    hostname Lynx-210-F2G-204
    location "FRNTBusSubRing01FP"
    timezone Europe/Stockholm
    end

fdb
    mac 01:00:5e:00:00:01 port cpu, all
    mac 01:00:5e:00:00:02 port cpu, all
    mac 01:00:5e:00:00:04 port cpu, all
    mac 01:00:5e:00:00:05 port cpu, all
    mac 01:00:5e:00:00:06 port cpu, all
    mac 01:00:5e:00:00:09 port cpu, all
    mac 01:00:5e:00:00:0a port cpu, all
    mac 01:00:5e:00:00:0d port cpu, all
    mac 01:00:5e:00:00:0e port cpu, all
    mac 01:00:5e:00:00:12 port cpu, all
    mac 01:00:5e:00:00:18 port cpu, all
    mac 01:00:5e:00:00:66 port cpu, all
    mac 01:00:5e:00:00:6b port cpu, all
    mac 01:00:5e:00:00:fb port cpu, all
    end

alarm
    trigger 1 frnt
        ring 1
        severity active warning inactive notice
        condition high
        action 1
        end
    action 1
        target snmp log led digout
        end
    end

port 1-2
    speed-duplex 100-full
    end

port 3-10
    speed-duplex auto
    end

frnt 1
    focal-point
    ring-ports 2
    coupling 1
        hello-time 100
        uplink eth 1
        priority 96
    end

no spanning-tree

vlan 1
    name vlan1
    untagged ALL
    end

iface vlan1 inet static
    distance 1
    primary
    management ssh http https ipconfig snmp
    address 192.168.2.204/24
    end

snmp-server
    rocommunity public
    no rwcommunity
    trapcommunity trap
    end

ntp
    end
```

Configuration Files Lynx

```
# \\ Westermo WeOS v4.20.0, CLI Format v1.19
# Lynx L210-F2G, art.no. 3643-0105-007 ser.no. 21260
```

```
aaa
    username admin hash $1$r6mXNVvD$JaDxe9xNk/MI7Ebdk7B0q.
    end

system
    hostname Lynx-210-F2G-205
    location "FRNTBusSubRing01M"
    timezone Europe/Stockholm
    end

fdb
    mac 01:00:5e:00:00:01 port cpu, all
    mac 01:00:5e:00:00:02 port cpu, all
    mac 01:00:5e:00:00:04 port cpu, all
    mac 01:00:5e:00:00:05 port cpu, all
    mac 01:00:5e:00:00:06 port cpu, all
    mac 01:00:5e:00:00:09 port cpu, all
    mac 01:00:5e:00:00:0a port cpu, all
    mac 01:00:5e:00:00:0d port cpu, all
    mac 01:00:5e:00:00:0e port cpu, all
    mac 01:00:5e:00:00:12 port cpu, all
    mac 01:00:5e:00:00:18 port cpu, all
    mac 01:00:5e:00:00:66 port cpu, all
    mac 01:00:5e:00:00:6b port cpu, all
    mac 01:00:5e:00:00:fb port cpu, all
    end

alarm
    trigger 1 frnt
        ring 1
            severity active warning inactive notice
            condition high
            action 1
        end
    action 1
        target snmp log led digout
    end

port 1-2
    speed-duplex 100-full
    end

port 3-10
    speed-duplex auto
    end

frnt 1
    no focal-point
    ring-ports 1, 2
    end

no spanning-tree

vlan 1
    name vlan1
    untagged ALL
    end

iface vlan1 inet static
    distance 1
    primary
    management ssh http https ipconfig snmp
    address 192.168.2.205/24
    end

snmp-server
    rocommunity public
    no rwcommunity
    trapcommunity trap
    end

ntp
    end
```

```
# \\ Westermo WeOS v4.20.0, CLI Format v1.19
# Lynx L210-F2G, art.no. 3643-0105 ser.no. 1073
```

```
aaa
    username admin hash $1$r6mXNVvD$JaDxe9xNk/MI7Ebdk7B0q.
    end

system
    hostname Lynx-210-F2G-206
    location "FRNTBusSubRing01M"
    timezone Europe/Stockholm
    end

fdb
    mac 01:00:5e:00:00:01 port cpu, all
    mac 01:00:5e:00:00:02 port cpu, all
    mac 01:00:5e:00:00:04 port cpu, all
    mac 01:00:5e:00:00:05 port cpu, all
    mac 01:00:5e:00:00:06 port cpu, all
    mac 01:00:5e:00:00:09 port cpu, all
    mac 01:00:5e:00:00:0a port cpu, all
    mac 01:00:5e:00:00:0d port cpu, all
    mac 01:00:5e:00:00:0e port cpu, all
    mac 01:00:5e:00:00:12 port cpu, all
    mac 01:00:5e:00:00:18 port cpu, all
    mac 01:00:5e:00:00:66 port cpu, all
    mac 01:00:5e:00:00:6b port cpu, all
    mac 01:00:5e:00:00:fb port cpu, all
    end

alarm
    trigger 1 frnt
        ring 1
            severity active warning inactive notice
            condition high
            action 1
        end
    action 1
        target snmp log led digout
    end

port 1-2
    speed-duplex 100-full
    end

port 3-10
    speed-duplex auto
    end

frnt 1
    no focal-point
    ring-ports 1
    coupling 1
        hello-time 100
        uplink eth 2
        priority 128 adjust 64
    end

no spanning-tree

vlan 1
    name vlan1
    untagged ALL
    end

iface vlan1 inet static
    distance 1
    primary
    management ssh http https ipconfig snmp
    address 192.168.2.206/24
    end

snmp-server
    rocommunity public
    no rwcommunity
    trapcommunity trap
    end

ntp
    end
```

Configuration Files DDW-142

```
# \\ Westermo WeOS v4.20.0, CLI Format v1.19
# Wolverine DDW-142, art.no. 3642-0300-005 ser.no. 5476
```

```
aaa
    username admin hash $1$r6mXNVvD$JaDxe9xNk/MI7Ebdk7B0q.
    end

system
    hostname DDW-142-207
    location "FRNTBusSubRing02M"
    timezone Europe/Stockholm
    end

fdb
    mac 01:00:5e:00:00:01 port cpu, all
    mac 01:00:5e:00:00:02 port cpu, all
    mac 01:00:5e:00:00:04 port cpu, all
    mac 01:00:5e:00:00:05 port cpu, all
    mac 01:00:5e:00:00:06 port cpu, all
    mac 01:00:5e:00:00:09 port cpu, all
    mac 01:00:5e:00:00:0a port cpu, all
    mac 01:00:5e:00:00:0d port cpu, all
    mac 01:00:5e:00:00:0e port cpu, all
    mac 01:00:5e:00:00:12 port cpu, all
    mac 01:00:5e:00:00:18 port cpu, all
    mac 01:00:5e:00:00:66 port cpu, all
    mac 01:00:5e:00:00:6b port cpu, all
    mac 01:00:5e:00:00:fb port cpu, all
    end

alarm
    trigger 1 frnt
        ring 1
        severity active warning inactive notice
        condition high
        action 1
        end
    action 1
        target snmp log led digout
        end
    end

port eth 1-2
    speed-duplex auto
    end

port dsl 1
    no co
    emf
    end

port dsl 2
    co
    speed auto
    noise-margin normal
    emf
    end

port serial 1
    enable
    end

frnt 1
    no focal-point
    ring-ports dsl 2
    coupling 1
        hello-time 100
        uplink eth 1
        priority 128
        end
    end

no spanning-tree

vlan 1
    name vlan1
    untagged ALL
    end

iface vlan1 inet static
    distance 1
    primary
    management ssh http https ipconfig snmp
    address 192.168.2.207/24
    end

snmp-server
    rocommunity public
    no rwcommunity
    trapcommunity trap
    end

ntp
    end
```

```
# \\ Westermo WeOS v4.20.0, CLI Format v1.19
# Wolverine DDW-142, art.no. 3642-0300-005 ser.no. 5476
```

```
aaa
    username admin hash $1$r6mXNVvD$JaDxe9xNk/MI7Ebdk7B0q.
    end

system
    hostname DDW-142-208
    location "FRNTBusSubRing02M"
    timezone Europe/Stockholm
    end

fdb
    mac 01:00:5e:00:00:01 port cpu, all
    mac 01:00:5e:00:00:02 port cpu, all
    mac 01:00:5e:00:00:04 port cpu, all
    mac 01:00:5e:00:00:05 port cpu, all
    mac 01:00:5e:00:00:06 port cpu, all
    mac 01:00:5e:00:00:09 port cpu, all
    mac 01:00:5e:00:00:0a port cpu, all
    mac 01:00:5e:00:00:0d port cpu, all
    mac 01:00:5e:00:00:0e port cpu, all
    mac 01:00:5e:00:00:12 port cpu, all
    mac 01:00:5e:00:00:18 port cpu, all
    mac 01:00:5e:00:00:66 port cpu, all
    mac 01:00:5e:00:00:6b port cpu, all
    mac 01:00:5e:00:00:fb port cpu, all
    end

alarm
    trigger 1 frnt
        ring 1
        severity active warning inactive notice
        condition high
        action 1
        end
    action 1
        target snmp log led digout
        end
    end

port eth 1-2
    speed-duplex auto
    end

port dsl 1-2
    no co
    emf
    end

port serial 1
    enable
    end

frnt 1
    no focal-point
    ring-ports dsl 1, dsl 2
    end

no spanning-tree

vlan 1
    name vlan1
    untagged ALL
    end

iface vlan1 inet static
    distance 1
    primary
    management ssh http https ipconfig snmp
    address 192.168.2.208/24
    end

snmp-server
    rocommunity public
    no rwcommunity
    trapcommunity trap
    end

ntp
    end
```


Configuration Files DDW-142

```
# \V Westermo WeOS v4.20.0, CLI Format v1.19
# Wolverine DDW-142, art.no. 3642-0300-001 ser.no. 1155
```

```
aaa
    username admin hash $1$r6mXNVvD$JaDxe9xNk/MI7Ebdk7B0q.
    end

system
    hostname DDW-142-209
    location "FRNTBusSubRing02FP"
    timezone Europe/Stockholm
    end

fdb
    mac 01:00:5e:00:00:01 port cpu, all
    mac 01:00:5e:00:00:02 port cpu, all
    mac 01:00:5e:00:00:04 port cpu, all
    mac 01:00:5e:00:00:05 port cpu, all
    mac 01:00:5e:00:00:06 port cpu, all
    mac 01:00:5e:00:00:09 port cpu, all
    mac 01:00:5e:00:00:0a port cpu, all
    mac 01:00:5e:00:00:0d port cpu, all
    mac 01:00:5e:00:00:0e port cpu, all
    mac 01:00:5e:00:00:12 port cpu, all
    mac 01:00:5e:00:00:18 port cpu, all
    mac 01:00:5e:00:00:66 port cpu, all
    mac 01:00:5e:00:00:6b port cpu, all
    mac 01:00:5e:00:00:fb port cpu, all
    end

alarm
    trigger 1 frnt
        ring 1
        severity active warning inactive notice
        condition high
        action 1
        end
    action 1
        target snmp log led digout
        end
    end

port eth 1-2
    speed-duplex auto
    end

port dsl 1
    no co
    emf
    end

port dsl 2
    co
    speed auto
    noise-margin normal
    emf
    end

port serial 1
    enable
    end

frnt 1
    focal-point
    ring-ports dsl 2
    coupling 1
        hello-time 100
        uplink eth 1
        priority 96
        end
    end

no spanning-tree

vlan 1
    name vlan1
    untagged ALL
    end

iface vlan1 inet static
    distance 1
    primary
    management ssh http https ipconfig snmp
    address 192.168.2.209/24
    end

snmp-server
    rocommunity public
    no rwcommunity
    trapcommunity trap
    end

ntp
end
```


Revision history for version 1.0

Revision	Rev by	Revision note	Date
00	ML	First version	170119
01			
02			
03			
04			
05			
06			
07			



H E A D O F F I C E

Sweden

Westermo
SE-640 40 Stora Sundby
Tel: +46 (0)16 42 80 00
Fax: +46 (0)16 42 80 01
info@westermo.se
www.westermo.com

Sales Units

Westermo Data Communications

China

sales.cn@westermo.com
www.cn.westermo.com

France

infos@westermo.fr
www.westermo.fr

Germany

info@westermo.de
www.westermo.de

North America

info@westermo.com
www.westermo.com

Singapore

sales@westermo.com.sg
www.westermo.com

Sweden

info.sverige@westermo.se
www.westermo.se

United Kingdom

sales@westermo.co.uk
www.westermo.co.uk

Other Offices



For complete contact information, please visit our website at www.westermo.com/contact or scan the QR code with your mobile phone.