

1. Configuração do Switch ToR

Index:	Minimum Requirements	General Topology	Interface Layout	Procedure	Validation, Backup and Saving
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This section contains instructions on how to install and configure the Top of Rack Switch (ToR Switch) inside the local FIBRE island, which is responsible for the control plane network of the local environment and to link the island to the FIBREnet backbone network.

ToR Switch Minimum Requirements

- A 24-port Gigabit Ethernet Switch with:
 - Remote Management support - mandatory
 - SNMPv2 enabled - mandatory
 - 4094 VLANs - mandatory
 - Q-in-Q support - mandatory
 - Selective Q-in-Q support - desirable
 - OpenFlow 1.0 support - desirable

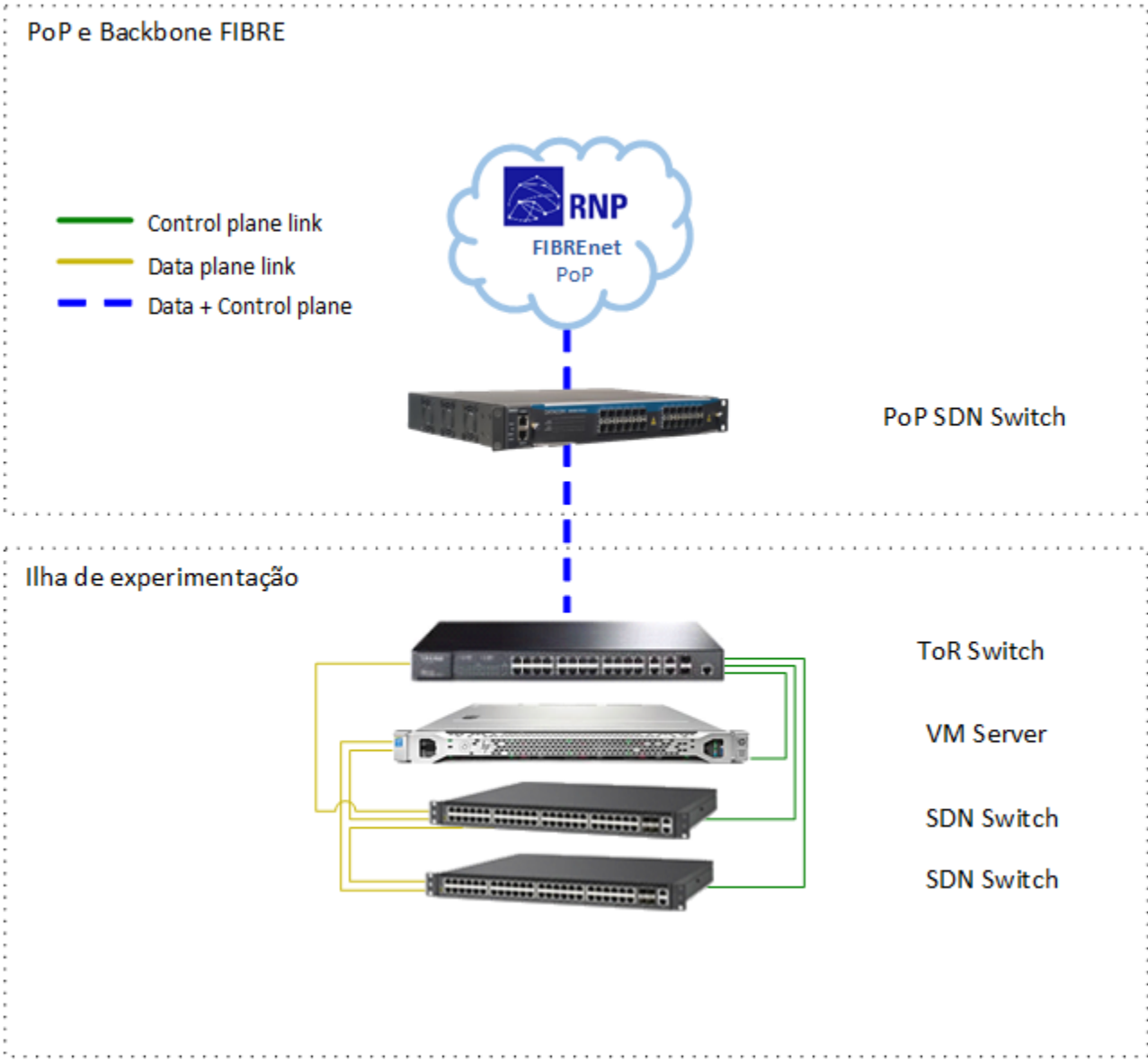
- A higher port density is desirable according to the quantity of resources the local FIBRE island will be offering.
 - A more basic switch, with VLANs support but no Q-in-Q required, can be used to extend the number of ports dedicated to island resources, through a cascade-style connection.

- Models currently in operation:
 - Datacom DM4100 48-port Switch
 - Dell N2024 24-port Switch

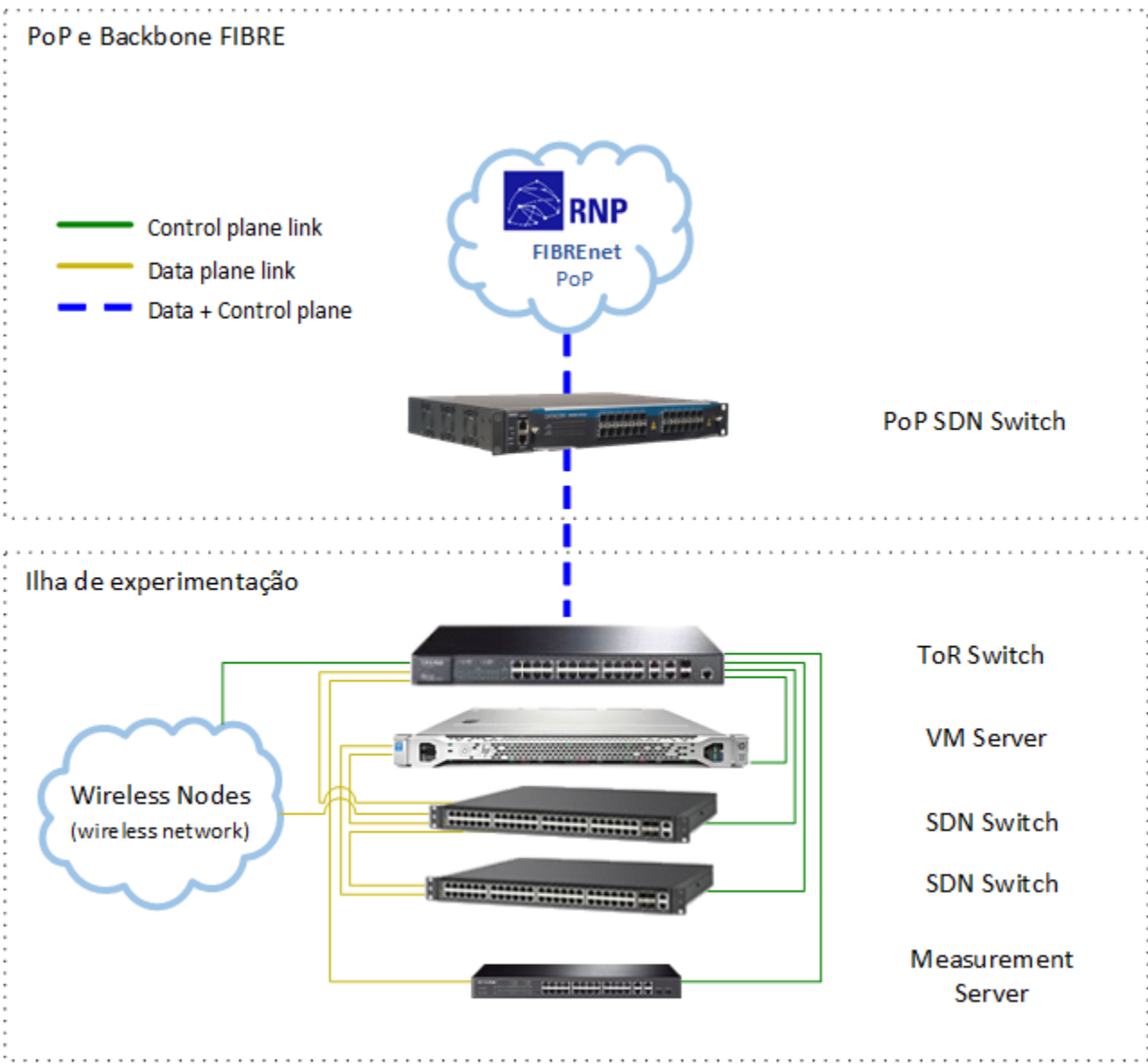
- Models currently under homologation:
 - Dell PowerConnect 5548 48-port Switch
 - Extreme X440-G2-24p-10GE4 24-port Switch

General Topology

General topology and connections for an initial island setup:



General topology and connections for a complete island:



Interface Layout

Standard bayface and interfaces for the DM4100:

	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48
eth 1/	Internet	Ofsw-1c	Ofsw-3c			Perf-2	lcar1-m	lcar2-m	lcar3-m	lcar4-m	lcar5-m													UD
eth 1/	Dom0-c	Ofsw-1d	Ofsw-2c	Ofsw-4c		Perf-1	lcar1-c	lcar2-c	lcar3-c	lcar4-c	lcar5-c													UC
	1	3	5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47

Procedure

Before the Switch configuration - Firmware upgrade:

To execute a local firmware upgrade, is necessary to configure a TFTP server on a notebook. It's recommended to use the "Tftpd32 4.0" software related in the example below. All the example is for the DM4100 Switch:

1. Create a new folder, download and copy the new firmware file to it, from: ftp://200.130.15.187/Firmware_DM4100/
2. Download and decompress the Tftpd32 server application: <ftp://200.130.15.187/Tftpd32/>
3. Configure a secondary IP address in the notebook ethernet interface: 10.0.0.1/24.
4. Execute the Tftpd32 server e configure it in the main screen:
Current Directory: [fill in wit the entire filepath for the new firmware file]
Server interface: 10.0.0.1
5. Connect the notebook ethernet interface to the mgmt-eth interface on the Datacom switch (cat RJ-45).
6. Access the equipment console and execute the following commands (this example is for the firmware file "DM4100_48P_OF_1.0.8.im" – substitute the file name if applicable):

```
!  
configure  
!  
interface vlan 1  
ip address 10.0.0.2/24  
no shutdown  
end  
!  
copy tftp 10.0.0.1 DM4100_48P_OF_1.0.8.im firmware  
!
```

7. Verify if the new version is marked as the next firmware to load (S Flag):

```
!  
show firmware  
!
```

8. Execute an equipment reboot and verify wether the new version is active (R Flag):

```
!  
reboot  
...  
show firmware  
!
```

9. End

Configuration steps for the ToR Switch:

All the examples are for the DM4100 Switch.

The initial configuration assumes the island is connected via VPN.

The 11th step is a "migration" step, to switch the connection from the VPN to the dedicated backbone called FIBREnet:

1. Hostname
2. Timezone
3. SSH server, Telnet and HTTP
4. SNMP server
5. Routing and Default Gateway
6. NTP
7. Interfaces
8. VLANs
9. STP
10. Users
11. VPN to FIBREnet migration

1. Hostname - replace the "[island-name]" string by the institution acronym:

```
!  
hostname tor-[island-name].fibrec.org.br  
!
```

2. Timezone - the clock timezone is set to UTC -3, with name "BRT"

```
!  
clock timezone BRT -3  
!
```

3. SSH server, Telnet and HTTP - it is recommended to disable telnet access, as the SSH is the standard in FIBRE's network.

```
!  
ip ssh host-key generate  
! here a new key will be generated !  
!  
no ip telnet server  
ip http server  
ip http secure-server  
!  
ip ssh server  
!
```

4. SNMP server - the SNMP server is configured with local operator's contact info, equipment location and the official FIBRE read-only community. It is recommended to disable the public community.

```
!  
ip snmp-server  
ip snmp-server contact [Operator's e-mail address, or fibre-rnp@rt.rnp.br]  
ip snmp-server location [Institution Acronym, City, UF]  
no ip snmp-server community public ro  
ip snmp-server community FIBRE-BR ro  
!ip snmp-server community !@FIBRE-BR#$ ro  
!
```

5. Routing - initially, a default route to the VPN template is created in order to forward the internal traffic through the VPN gateway.

```
!  
ip routing  
!  
ip route 10.0.0.0/8 10.[Institution-ID].0.70  
!
```

6. NTP - the NTP server is configured for timestamp synchronization:

```
!  
ntp client  
ntp poll 3600  
ntp server 10.128.0.150  
!
```

7. VLANs - The [Institution-ID] number utilized in the IP addressing is defined in this [document](#). The recommendation is to use the VLAN ID 60 for the island's control plane and VLAN 50 for the CMC icarus control network.

```
!  
vlan qinq  
!  
interface vlan 10  
name Internet  
set-member tagged ethernet 1/1  
set-member untagged ethernet 1/2  
!  
interface vlan 50  
name Rede CMC  
set-member untagged ethernet 1/14  
set-member untagged ethernet 1/16  
set-member untagged ethernet 1/18  
set-member untagged ethernet 1/20  
set-member untagged ethernet 1/22  
!  
interface vlan 60  
name Rede Controle  
ip address 10.[Institution-ID].0.1/24  
set-member tagged ethernet 1/1  
set-member untagged ethernet 1/4  
set-member untagged ethernet 1/5  
set-member untagged ethernet 1/6  
set-member untagged ethernet 1/7  
set-member untagged ethernet 1/11  
set-member untagged ethernet 1/12  
set-member untagged ethernet 1/13  
set-member untagged ethernet 1/15  
set-member untagged ethernet 1/17  
set-member untagged ethernet 1/19  
set-member untagged ethernet 1/21  
!  
interface vlan 3220  
name FIBREnet Controle
```

```
no ip address
set-member tagged ethernet 1/47
!
interface vlan 3221
name FIBREnet Dados
set-member untagged ethernet 1/3
set-member tagged ethernet 1/48
!
vlan-group 1
vlan-group 1 vlan all
!
```

8. Interfaces:

```
!
interface ethernet 1/1
description VMServer1 controle
no shutdown
!
interface ethernet 1/2
description Internet Uplink
switchport native vlan 10
no shutdown
!
interface ethernet 1/3
description OFSwitch1 dados (pronto)
switchport native vlan 3221
no shutdown
!
interface ethernet 1/4
description OFSwitch1 c (pronto)
switchport native vlan 60
no shutdown
!
interface ethernet 1/5
description OFSwitch2 c (netfpga1)
switchport native vlan 60
no shutdown
!
interface ethernet 1/6
description OFSwitch3 c (netfpga2)
switchport native vlan 60
no shutdown
!
interface ethernet 1/7
description OFSwitch4 c (netfpga3)
switchport native vlan 60
no shutdown
!
interface ethernet 1/8
shutdown
!
interface ethernet 1/9
shutdown
!
interface ethernet 1/10
shutdown
!
interface ethernet 1/11
description Perfsonar int1
switchport native vlan 60
no shutdown
!
interface ethernet 1/12
description Perfsonar int2
switchport native vlan 60
no shutdown
```

```
!  
interface ethernet 1/13  
  description icarus1 c  
  switchport native vlan 60  
  no shutdown  
!  
interface ethernet 1/14  
  description icarus1 cmc  
  switchport native vlan 50  
  no shutdown  
!  
interface ethernet 1/15  
  description icarus2 c  
  switchport native vlan 60  
  no shutdown  
!  
interface ethernet 1/16  
  description icarus2 c  
  switchport native vlan 50  
  no shutdown  
!  
interface ethernet 1/17  
  description icarus3 cmc  
  switchport native vlan 60  
  no shutdown  
!  
interface ethernet 1/18  
  description icarus3 c  
  switchport native vlan 50  
  no shutdown  
!  
interface ethernet 1/19  
  description icarus4 c  
  switchport native vlan 60  
  no shutdown  
!  
interface ethernet 1/20  
  description icarus4 cmc  
  switchport native vlan 50  
  no shutdown  
!  
interface ethernet 1/21  
  description icarus5 c  
  switchport native vlan 60  
  no shutdown  
!  
interface ethernet 1/22  
  description icarus5 cmc  
  switchport native vlan 50  
  no shutdown  
!  
interface ethernet 1/23  
  shutdown  
!  
interface ethernet 1/24  
  shutdown  
!  
interface ethernet 1/25  
  shutdown  
!  
interface ethernet 1/26  
  shutdown  
!  
interface ethernet 1/27  
  shutdown  
!  
interface ethernet 1/28  
  shutdown  
!  
interface ethernet 1/29  
  shutdown
```



```
!  
interface ethernet 1/30  
shutdown  
!  
interface ethernet 1/31  
shutdown  
!  
interface ethernet 1/32  
shutdown  
!  
interface ethernet 1/33  
shutdown  
!  
interface ethernet 1/34  
shutdown  
!  
interface ethernet 1/35  
shutdown  
!  
interface ethernet 1/36  
shutdown  
!  
interface ethernet 1/37  
shutdown  
!  
interface ethernet 1/38  
shutdown  
!  
interface ethernet 1/39  
shutdown  
!  
interface ethernet 1/40  
shutdown  
!  
interface ethernet 1/41  
shutdown  
!  
interface ethernet 1/42  
shutdown  
!  
interface ethernet 1/43  
shutdown  
!  
interface ethernet 1/44  
shutdown  
!  
interface ethernet 1/45  
shutdown  
!  
interface ethernet 1/46  
shutdown  
!  
interface ethernet 1/47  
description FIBREnet Controle  
no shutdown  
!  
interface ethernet 1/48  
description FIBREnet Dados  
no shutdown  
!
```

9. STP (Spanning Tree configuration for the FIBREnet standard is not used anymore):

```
!  
!spanning-tree 1  
!spanning-tree 1 vlan-group 1  
!
```

10. Users - is mandatory to create the default FIBRE users within the equipment and their respective permissions. This information can be requested by e-mail along the island installation. Furthermore, the local island team is allowed to create any other user account, according to the local policies.

```
!  
! request user info via e-mail and create users  
!
```

11. VPN to FIBREnet migration - skip this step if the island is going to use a VPN connection. These configurations needs to be applied in order to migrate the island federal connection from the VPN to the dedicated backbone links known as FIBREnet. A Default Gateway can be configured in this step, if the local network uses a firewall or another gateway for internet connection. This changes in the ToR Switch has to be made in conjunction with another configuration changes in Dom0 following the same objective. It's recommended to access the equipments via console or the island network (10.[Institution-ID].0.1) to prevent any loss of session connectivity during the activity.

```
ip default-gateway [internet-gateway-ip-address]  
!  
ip route 10.0.0.0/8 192.168.0.136  
no ip route 10.0.0.0/8 10.[institution-ID].0.70  
!  
interface vlan 3220  
 ip address 192.168.0.[Institution-ID]/24  
!
```

Validation, Backup and Saving

It's recommended to save the configuration already made at this point, in a separate file for backup and in the switch's startup configuration file:

```
!  
show firmware  
!  
show running-config  
!  
! Salvar a saída num arquivo texto e guardá-lo como backup  
! Salvar a configuração na startup-config com o comando:  
!  
copy running-config startup-config  
!
```

Next step: [2. Virtualization Server](#)