# Testbed OpenRAN Brasil

# Ambiente Físico e Lógico

**META 2**

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Ecossistema de Infraestrutura do Testbed

# Especificação de Domínios

## Domínio Cloud e Edge

SERVIDOR TIPO I

Servidor OpenRAN Tipo I
- Tamanho: **1U ou 2U**
- CPU: **2 x 16 cores 32 threads 2,4Ghz+, Intel Silver ou Gold**
- Memória: **4 x 32GB com possibilidade de expansão - Total: 128GB**
- Discos: **2 x 480GB SSD, hot-pluggable**
- GPU: **Slot para GPU / FPGA PCI-E 16x com conector de energia PCI-E**
- Interfaces 1GbE: **4 x 1GbE - Intel ou Broadcom com Suporte a PXE e SR-IOV**
- Network Card 40GbE+: **2 x 40GbE ou 4 x 40GbE - Intel com Suporte a QSFP+, LAGG, DPDK, SR-IOV, DAC e AOC**
- SFP:
  - Cabo DAC - QSFP+ to QSFP+, 40GbE, Copper Twinax Direct Attach Cable, 5 Meter: **2 unidades**
- Mgmt: **Redfish (ou IPMI), suporte a SNMP**
- UEFI: **UEFI secure boot enabled**
- **Kit para instalação em Rack**
- **Garantia: mínimo 3 anos (Opcional)**
- **Valor Estimado (Placeholder): 130.000 BRL**

| OpenRAN Server Type I - Itens 1 e 2 | |
|---|---|
| Description | QTY |
| X12 Ultra 2U, 6x 2.5 Hybrid, X12DPU-6, 219ULTS-R1K62P | 1 |
| Intel Xeon Silver 4314 Processor 16-Core 2.4GHz 24MB Cache (135W) | 2 |
| 32GB DDR4 1.2V 3200 ECC REG | 4 |
| Samsung PM883,480GB,SATA 6Gb/s,V4 TLC VNAND,2.5",7mm | 2 |
| 2U Ultra Riser, 2 PCIe4.0 x16 and 1 PCIe3.0 x8 -- AOC-2UR668G4 | 1 |
| Ultra I/O bracket for SC829U, 219U (Square Opening) | 1 |
| 2x 40GbE QSFP+ Intel XL710, Gen3 x8 LP -- AOC-S40G-I2Q | 1 |
| 4x GbE RJ45 Intel i350-AM4, Gen3 x4 LP -- AOC-SGP-I4 | 1 |
| 2U LHS WIO Riser card with two PCI-E 4.0 x16 slots,HF,RoHS | 1 |
| GPU,2x4F/CPU to 2x4F/CPU,P4.2, 30CM,16AWG, 10A/pin, -40~105C | 1 |
| PWYCB,GPU,2x4F/CPU to two (2x3F+2x1F)/PCIe,P4.2, 20CM,16/20A | 1 |
| 1U Passive CPU VC HS for X12 ICX/CPX | 2 |
| Plastic X12 Air Shroud for SC219UL left GPU,RoHS | 1 |
| Plastic X12 Air Shroud for SC219UL right GPU,RoHS | 1 |
| Dummy memory DIMM spacer (set) for DDR3, DDR4,RoHS | 16 |
| 5M QSFP to QSFP Ethernet/InfiniBand QDR 26AWG | 2 |
| 5M 10GbE SFP+ to SFP+, Passive, Pull release | 2 |
| PWCD,US,IEC60320 C14 TO C13,6FT,14AWG,RoHS | 2 |

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# Especificação de Domínios

## Domínio Cloud e Edge

SERVIDOR TIPO II

**Servidor OpenRAN Tipo II**

- Tamanho: **1U ou 2U**
- CPU: **2 x Xeon Gold 6348 28 cores (2 socket)**
- Memória: **6 x 32GB com possibilidade de expansão - Total: 192GB**
- Discos: **2 x 480GB SSD, hot-pluggable**
- GPU: **Slot para GPU / FPGA PCI-E 16x com conector de energia PCI-E**
- Interfaces 1GbE: **4 x 1GbE - Intel ou Broadcom com Suporte a PXE e SR-IOV**
- Network Card 10GbE : **Intel Ethernet Converged Network Adapter X710DA4FH (Fortville) Quad port 10 GbE.**
- Network Card 40GbE+: **2 x 40GbE ou 4 x 40GbE - Intel suporte a QSFP+, LAGG, DPDK, SR-IOV, DAC e AOC**
- SFP:
    - Cabo DAC - SFP+ to SFP+, 10GbE, Copper Twinax Direct Attach Cable, 5 Meter: **2 unidades**
    - Cabo DAC - QSFP+ to QSFP+, 40GbE, Copper Twinax Direct Attach Cable, 5 Meter: **2 unidades**
- Mgmt: **Redfish (ou IPMI), suporte a SNMP**
- UEFI: **UEFI secure boot enabled**
- Crypto Card Accelerator: **Intel QuickAssist Adapter 8970**
    - **Referência:**
      https://www.cdw.com/product/intel-quickassist-adapter-8970-cryptographic-accelerator/5101079
- FPGA Cards: **FPGA Intel PAC N3000**
    - 10 Gbps, 25 Gbps (up to 100 GbE) with Dual Intel Ethernet Converged Network Adapter XL710
    - Intel FPGA PAC N3000 accelerates network traffic for up to 100 Gbps to support low-latency, high-bandwidth 5G applications.
    - Referência:
        - https://www.intel.com/content/www/us/en/products/sku/193920/intel-fpga-pac-n3000/specifications.html
- Garantia: mínimo 3 anos (Opcional)
- Kit para instalação em Rack

| OpenRAN Server Type II - Itens 3 e 4 | |
|---|---|
| **Description** | **QTY** |
| X12 Ultra 2U, 6x 2.5 Hybrid, X12DPU-6, 219ULTS-R1K62P | 1 |
| Intel Xeon Gold 6348 Processor 28-Core 2.6GHz 42MB Cache (235W) | 2 |
| 32GB DDR4 1.2V 3200 ECC REG | 8 |
| Samsung PM883,480GB,SATA 6Gb/s,V4 TLC VNAND,2.5",7mm | 2 |
| 2U Ultra Riser, 2 PCIe4.0 x16 and 1 PCIe3.0 x8 -- AOC-2UR668G4 | 1 |
| Ultra I/O bracket for SC829U, 219U (Square Opening) | 1 |
| 2x 40GbE QSFP+ Intel XL710, Gen3 x8 LP -- AOC-S40G-I2Q | 1 |
| 4x GbE RJ45 Intel i350-AM4, Gen3 x4 LP -- AOC-SGP-I4 | 1 |
| [NR]Intel IQA89701G1P5QuickAssist100Gbps hardwareaccelerator☐ | 1 |
| 4x 10GbE SFP+ Intel XL710-BM1, Gen3 x8 LP -- AOC-STG-I4S | 1 |
| 2U LHS WIO Riser card with two PCI-E 4.0 x16 slots,HF,RoHS | 1 |
| NR]IntelVACC100G1P5 PCIeGen3x16vRAN AcceleratorACC100 Adapt☐ | 1 |
| 1U Passive CPU VC HS for X12 ICX/CPX | 2 |
| Plastic X12 Air Shroud for SC219UL left GPU,RoHS | 1 |
| Plastic X12 Air Shroud for SC219UL right GPU,RoHS | 1 |
| Dummy memory DIMM spacer (set) for DDR3, DDR4,RoHS | 12 |
| 5M QSFP to QSFP Ethernet/InfiniBand QDR 26AWG | 2 |
| 5M 10GbE SFP+ to SFP+, Passive, Pull release | 2 |
| PWCD,US,IEC60320 C14 TO C13,6FT,14AWG,RoHS | 2 |

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## Domínio Cloud e Edge

**SERVIDOR TIPO IV**

**Servidor OpenRAN Tipo IV**

- CPU: **Xeon Gold 6212U (Single Socket)**
- Memória: **4x 32GB com possibilidade de expansão - Total: 128**
- Discos: **2 x 480GB SSD, hot-pluggable**
- Interfaces 1GbE: **4 x 1GbE - Referência: Intel ou Broadcom 1GbE BASE-T Suporte a PXE e SR-IOV**
- Network Card 10GbE: **Intel Ethernet Converged Network Adapter X710DA4FH (Fortville) Quad port 10 GbE SFP+**
- SFP:
  - Cabo DAC - SFP+ to SFP+, 10GbE, Copper Twinax Direct Attach Cable, 5 Meter: **2 unidades**
- Mgmt: **Redfish (ou IPMI), suporte a SNMP**
- UEFI: **UEFI secure boot enabled**
- **Garantia: mínimo 3 anos (Opcional)**
- **Kit para instalação em Rack**
- **Valor estimado: 100.000 BRL**

| OpenRAN Server Type IV - Item 7 | |
|---|---|
| **Description** | **QTY** |
| IMM, 2x 2.5 HDD, 1x M.2 M-Key 22110/2280, 2x FHFL PCIe x16, AC Red | 1 |
| Intel Xeon Gold 6312U Processor 24-Core 2.4GHz 36MB Cache (185W) | 1 |
| 32GB DDR4 1.2V 3200 ECC REG | 4 |
| Samsung PM883,480GB,SATA 6Gb/s,V4 TLC VNAND,2.5",7mm | 2 |
| 2x GbE RJ45 Intel i350-AM2, Gen3 x4 LP -- AOC-SGP-I2 | 1 |
| 4x 10GbE SFP+ Intel XL710-BM1, Gen3 x8 LP -- AOC-STG-I4S | 1 |
| 5M 10GbE SFP+ to SFP+, Passive, Pull release | 2 |
| PWCD,US,IEC60320 C14 TO C13,6FT,14AWG,RoHS | 2 |

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# Especificação de Domínios

## Domínio Cloud e Edge

**SERVIDOR TIPO III**

**Servidor OpenRAN Tipo III**
- **Tamanho: 1U ou 2U**
- CPU: **2 x Xeon Gold 6348 28 cores (2 socket)**
- Memória: **6 x 32GB com possibilidade de expansão - Total: 192GB**
- Discos: **2 x 480GB SSD, hot-pluggable**
- GPU: **Slot para GPU / FPGA PCI-E 16x com conector de energia PCI-E**
- Interfaces 1GbE: **4 x 1GbE - Intel ou Broadcom com Suporte a PXE e SR-IOV**
- Network Card 10GbE: **Intel Ethernet Converged Network Adapter X710DA4FH (Fortville) Quad port 10 GbE SFP+.**
- Network Card 40GbE: **2 x 40GbE ou 4 x 40GbE - Intel suporte a QSFP+, LAGG, DPDK, SR-IOV, DAC e AOC**
- SFP:
  - Cabo DAC - SFP+ to SFP+, 10GbE, Copper Twinax Direct Attach Cable, 5 Meter: **2 unidades**
  - Cabo DAC - QSFP+ to QSFP+, 40GbE, Copper Twinax Direct Attach Cable, 5 Meter: **2 unidades**
- Mgmt: **Redfish (ou IPMI), suporte a SNMP**
- UEFI: **UEFI secure boot enabled**
- **Garantia: mínimo 3 anos (Opcional)**
- **Kit para instalação em Rack**

| OpenRAN Server Type III - Itens 5 e 6 | |
|---|---|
| **Description** | **QTY** |
| X12 Ultra 2U, 6x 2.5 Hybrid, X12DPU-6, 219ULTS-R1K62P | 1 |
| Intel Xeon Gold 6348 Processor 28-Core 2.6GHz 42MB Cache (235W) | 2 |
| 32GB DDR4 1.2V 3200 ECC REG | 8 |
| Samsung PM883,480GB,SATA 6Gb/s,V4 TLC VNAND,2.5",7mm | 2 |
| 2U Ultra Riser, 2 PCIe4.0 x16 and 1 PCIe3.0 x8 -- AOC-2UR668G4 | 1 |
| Ultra I/O bracket for SC829U, 219U (Square Opening) | 1 |
| 2x 40GbE QSFP+ Intel XL710, Gen3 x8 LP -- AOC-S40G-I2Q | 1 |
| 4x GbE RJ45 Intel i350-AM4, Gen3 x4 LP -- AOC-SGP-I4 | 1 |
| 4x 10GbE SFP+ Intel XL710-BM1, Gen3 x8 LP -- AOC-STG-I4S | 1 |
| 2U LHS WIO Riser card with two PCI-E 4.0 x16 slots,HF,RoHS | 1 |
| GPU,2x4F/CPU to 2x4F/CPU,P4.2, 30CM,16AWG, 10A/pin, -40~105C | 1 |
| PWYCB,GPU,2x4F/CPU to two (2x3F+2x1F)/PCIe,P4.2, 20CM,16/20A | 1 |
| 1U Passive CPU VC HS for X12 ICX/CPX | 2 |
| Plastic X12 Air Shroud for SC219UL left GPU,RoHS | 1 |
| Plastic X12 Air Shroud for SC219UL right GPU,RoHS | 1 |
| Dummy memory DIMM spacer (set) for DDR3, DDR4,RoHS | 12 |
| 5M QSFP to QSFP Ethernet/InfiniBand QDR 26AWG | 2 |
| 5M 10GbE SFP+ to SFP+, Passive, Pull release | 2 |
| PWCD,US,IEC60320 C14 TO C13,6FT,14AWG,RoHS | 2 |

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# Especificação de Domínios

## Domínio Cloud e Edge

**SERVIDOR TIPO V**

**Servidor OpenRAN Tipo V**
- Tamanho: **1U ou 2U**
- CPU: **2 x 16 cores 32 threads 2,4Ghz+,** Intel Silver ou Gold
- Memória: **6 x 32GB com possibilidade de expansão - Total: 192GB**
- Discos:
  - **2 x 240GB SSD**
  - **2 x 1TB SSD, hot-pluggable*, Storage**
- GPU: **Slot para GPU / FPGA PCI-E 16x com conector de energia PCI-E**
- Interfaces 1GbE: **4 x 1GbE -** Intel ou Broadcom com Suporte a PXE e SR-IOV
- Network Card 40GbE: **2 x 40GbE ou 4 x 40GbE -** Intel suporte a QSFP+, LAGG, **DPDK, SR-IOV, DAC e AOC**
- SFP:
  - Cabo DAC - QSFP+ to QSFP+, 40GbE, Copper Twinax Direct Attach Cable, 5 Meter: **2 unidades**
- Mgmt: **Redfish (ou IPMI), suporte a SNMP**
- UEFI: **UEFI secure boot enabled**
- Garantia: **mínimo 3 anos (Opcional)**
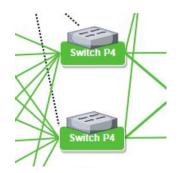- **Kit para instalação em Rack**
- **Valor estimado: 130.000 BRL**

| OpenRAN Server Type V - Itens 8 e 9 | |
| --- | --- |
| **Description** | **QTY** |
| X12 Ultra 2U, 6x 2.5 Hybrid, X12DPU-6, 219ULTS-R1K62P | 1 |
| Intel Xeon Silver 4314 Processor 16-Core 2.4GHz 24MB Cache (135W) | 2 |
| 32GB DDR4 1.2V 3200 ECC REG | 8 |
| Samsung PM883 240GB SATA 6Gb/s V4 TLC 2.5" 7mm (1.3 DWPD) | 2 |
| Samsung PM883,960GB,SATA 6Gb/s,V4 TLC VNAND,2.5",7mm | 2 |
| 2U Ultra Riser, 2 PCIe4.0 x16 and 1 PCIe3.0 x8 -- AOC-2UR668G4 | 1 |
| Ultra I/O bracket for SC829U, 219U (Square Opening) | 1 |
| 2x 40GbE QSFP+ Intel XL710, Gen3 x8 LP -- AOC-S40G-I2Q | 1 |
| 4x GbE RJ45 Intel i350-AM4, Gen3 x4 LP -- AOC-SGP-I4 | 1 |
| 2U LHS WIO Riser card with two PCI-E 4.0 x16 slots,HF,RoHS | 1 |
| GPU,2x4F/CPU to 2x4F/CPU,P4.2, 30CM,16AWG, 10A/pin, -40~105C | 1 |
| PWYCB,GPU,2x4F/CPU to two (2x3F+2x1F)/PCIe,P4.2, 20CM,16/20A | 1 |
| 1U Passive CPU VC HS for X12 ICX/CPX | 2 |
| Plastic X12 Air Shroud for SC219UL left GPU,RoHS | 1 |
| Plastic X12 Air Shroud for SC219UL right GPU,RoHS | 1 |
| Dummy memory DIMM spacer (set) for DDR3, DDR4,RoHS | 12 |
| 5M QSFP to QSFP Ethernet/InfiniBand QDR 26AWG | 2 |
| PWCD,US,IEC60320 C14 TO C13,6FT,14AWG,RoHS | 2 |

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# Especificação de Domínios

## Domínio Cloud e Edge

**SERVIDOR TIPO V**

Servidor OpenRAN Tipo V
- Tamanho: **1U ou 2U**
- CPU: **2 x 16 cores 32 threads 2,4Ghz+**, Intel Silver ou Gold
- Memória: **6 x 32GB com possibilidade de expansão - Total: 192GB**
- Discos:
  - **2 x 240GB SSD**
  - **2 x 1TB SSD, hot-pluggable\*, Storage**
- GPU: **Slot para GPU / FPGA PCI-E 16x com conector de energia PCI-E**
- Interfaces 1GbE: **4 x 1GbE -  Intel ou Broadcom com Suporte a PXE e SR-IOV**
- Network Card 40GbE: **2 x 40GbE ou 4 x 40GbE  - Intel suporte a QSFP+, LAGG, DPDK, SR-IOV, DAC e AOC**
- SFP:
  - Cabo DAC - QSFP+ to QSFP+, 40GbE, Copper Twinax Direct Attach Cable, 5 Meter: **2 unidades**
- Mgmt: **Redfish (ou IPMI), suporte a SNMP**
- UEFI: **UEFI secure boot enabled**
- Garantia: **mínimo 3 anos (Opcional)**
- **Kit para instalação em Rack**
- **Valor estimado: 130.000 BRL**

| OpenRAN Server Type V - Itens 8 e 9 | |
|---|---|
| **Description** | **QTY** |
| X12 Ultra 2U, 6x 2.5 Hybrid, X12DPU-6, 219ULTS-R1K62P | 1 |
| Intel Xeon Silver 4314 Processor 16-Core 2.4GHz 24MB Cache (135W) | 2 |
| 32GB DDR4 1.2V 3200 ECC REG | 8 |
| Samsung PM883 240GB SATA 6Gb/s V4 TLC 2.5" 7mm (1.3 DWPD) | 2 |
| Samsung PM883,960GB,SATA 6Gb/s,V4 TLC VNAND,2.5",7mm | 2 |
| 2U Ultra Riser, 2 PCIe4.0 x16 and 1 PCIe3.0 x8 -- AOC-2UR668G4 | 1 |
| Ultra I/O bracket for SC829U, 219U (Square Opening) | 1 |
| 2x 40GbE QSFP+ Intel XL710, Gen3 x8 LP -- AOC-S40G-I2Q | 2 |
| 4x GbE RJ45 Intel i350-AM4, Gen3 x4 LP -- AOC-SGP-I4 | 1 |
| 2U LHS WIO Riser card with two PCI-E 4.0 x16 slots,HF,RoHS | 1 |
| GPU,2x4F/CPU to 2x4F/CPU,P4.2, 30CM,16AWG, 10A/pin, -40~105C | 1 |
| PWYCB,GPU,2x4F/CPU to two (2x3F+2x1F)/PCIe,P4.2, 20CM,16/20A | 1 |
| 1U Passive CPU VC HS for X12 ICX/CPX | 2 |
| Plastic X12 Air Shroud for SC219UL left GPU,RoHS | 1 |
| Plastic X12 Air Shroud for SC219UL right GPU,RoHS | 1 |
| Dummy memory DIMM spacer (set) for DDR3, DDR4,RoHS | 12 |
| 5M QSFP to QSFP Ethernet/InfiniBand QDR 26AWG | 2 |
| PWCD,US,IEC60320 C14 TO C13,6FT,14AWG,RoHS | 2 |

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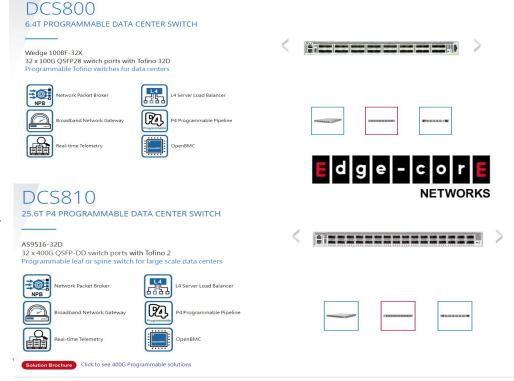
## Domínio Pacote



**P4 Programmable Pipeline**

**32 x 100G QSFP28 switch ports with Tofino 32Q**

**Real-time Telemetry**
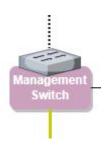
**User Plan Function**
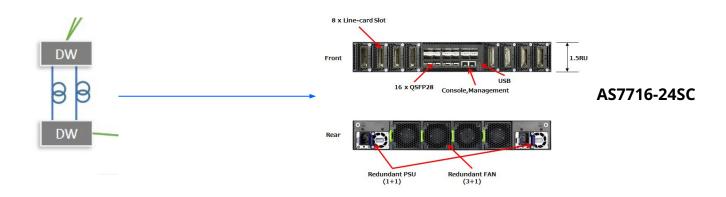
**Dual e Quad P4 Pipelines**

### DCS800
**6.4T PROGRAMMABLE DATA CENTER SWITCH**

Wedge 100BF-32X
32 x 100G QSFP28 switch ports with Tofino 32D
Programmable Tofino switches for data centers

- Network Packet Broker
- Broadband Network Gateway
- Real-time Telemetry
- L4 Server Load Balancer
- P4 Programmable Pipeline
- OpenBMC

### DCS810
**25.6T P4 PROGRAMMABLE DATA CENTER SWITCH**

AS9516-32D
32 x 400G QSFP-DD switch ports with Tofino 2
Programmable leaf or spine switch for large scale data centers

- Network Packet Broker
- Broadband Network Gateway
- Real-time Telemetry
- L4 Server Load Balancer
- P4 Programmable Pipeline
- OpenBMC

**Solution Brochure** Click to see 400G Programmable solutions

**Edge-corE NETWORKS**

27/09/2022

# Especificação de Domínios

## Gerenciamento

S9600-72XC Front and Rear Views



ufiSpace

# Especificação de Domínios

## Domínio WDM



AS7716-24SC

# Especificação de Domínios

## Domínio FTTX

OLT

ONT



**OLT Combo (GPON e XGS-PON)**
- Tamanho: **1U**
- Quantidade de Portas:
  - 2 portas QSFP28
  - 16 portas Any-PON (GPON ou XGS-PON)
    - Portas combo (Suporte a GPON e XGS-PON)
- Certificado: VOLTHA 2.9 (Certification Program)
  - https://docs.voltha.org/master/release_notes/voltha_2.9.html
- Transceivers:
  - Transceiver QSFP28: 01 unidade(s)
  - Transceiver XGS-PON para OLT Combo: 01 unidade(s)
  - Transceiver GPON para OLT Combo: 01 unidade(s)
- Valor estimado por unidade: 45.000 BRL

**OLT XGS-PON**
- Tamanho: **1U**
- Quantidade de Portas:
  - 4 portas QSFP28
  - 16 portas XGS-PON
- Certificado: VOLTHA 2.9 (Certification Program)
  - https://docs.voltha.org/master/release_notes/voltha_2.9.html
- Transceivers:
  - Transceiver QSFP28: 01 unidade(s)
  - Transceiver XGS-PON para OLT XGS-PON: 01 unidade(s)
- Valor estimado por unidade: 45.000 BRL

**Edge-corE NETWORKS**

XGS- PON ASXVOLT16

GPON RTL1600X

**Radisys**

XG-99XS

**CIG**

PM4264

**Radisys**

# Especificação de Domínios

## Domínio RAN



**Foxconn Indoor RRU RPQN-7801E**

Small Cell Open Ran
- SFP: **1 x Suporte SFP 10G**
- Porta: **1 x porta Gigabit**
- Frequência: **3.3Ghz ~ 3.8Ghz**
- Duplex: **TDD**
- Banda 3GPP: **n78**
- Antena: **MIMO 4x4**
- Ganho antena: **>= 4dBi**
- Potência: **>= 24dBm**
- BW: **10 Mhz ~ 100 Mhz**
- O-RAN: **C-Plane / U-Plane / S-Plane / M-Plane**
- 3GPP: **3GPP Release 16**
- Grau de proteção: **IP3X**
- Montagem: **Kit de montagem em parede / Teto**
- Cabeça de rádio para Small Open RAN: **Foxconn Sub6 - Intel Arria10 based Indoor 4x4 MIMO RRH (with power adapter)**

| ID Outlook | |
|---|---|

| Highlight | |
|---|---|
| Radio | 5G NR TDD |
| MSR | Band n78/n79 |
| FPGA | Intel Arria10 |
| Throughput | up to 1.6Gbps |
| Dimension | 260mm×242mm×76.5mm (L×W×H) |
| Weight | < 4.5Kg |
| Power | < 60W |

**Technical Specification**

**Hardware Configuration**
| | |
|---|---|
| Fronthaul interface | O-RAN option 7.2 over 10Gbps RJ45/SFP+ |
| Internal Antenna | 5G NR*4 |
| Power Supplier | 12V DC/5A input and PoE++ |
| Memory | DDR4 8Gb, microSD |
| External interface | 1Gbps RJ45, microUSB, Power Jack |

**3GPP R15**
| | |
|---|---|
| Frequency | 7800I (3.3-3.6GHz) |
| | 7801I (3.7-3.8GHz) |
| | 7901I (4.8-4.9GHz) |
| chBW | 100 MHz |
| Capacity | 1.6 Gbps |
| Tx/Rx Paths | 4T4R; 4 data streams |
| Max Output Power | 24dBm (per RF connector) |
| Antenna Gain | ~ 5dBi |

**Synchronization**
| | |
|---|---|
| Frequency Stability | ±0.1ppm |
| Frequency Synchronization | PTP(IEEE1588v2) |

**Network Features** | SSH, IPv4

**Environmental**
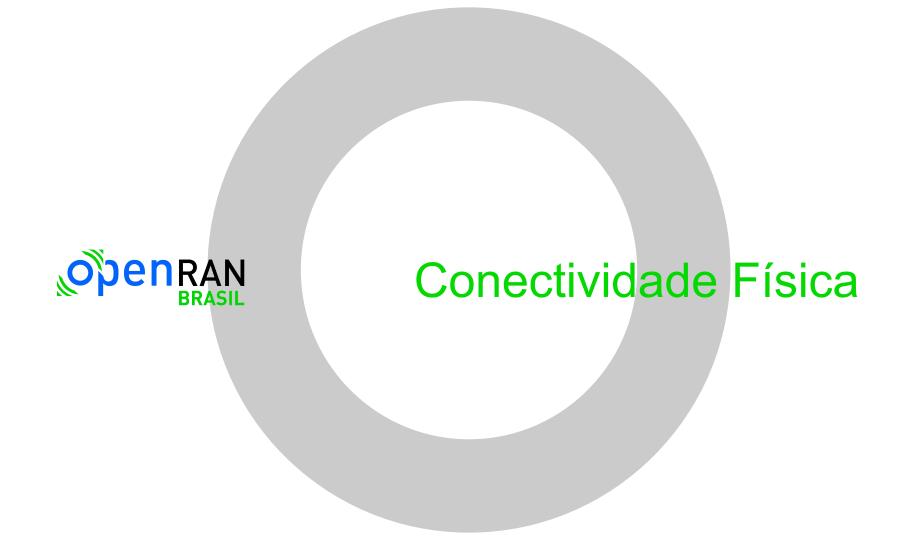| | |
|---|---|
| Ingress protection | Class IP30 |
| Working temperature | 0°C~+40°C |
| Mounting | Wall-mount, Ceiling-mount |

**FOXCONN**

# Especificação de Domínios

## Domínio Sincronização (FrontHaul)



- IEEE 1588-2008 (PTP) Grand Master e Boundary Clock
- Interfaces:
    - **2x IEEE 1588-2008 (PTP) 100Base-TX, 1000Base-T**
    - 1000Base-X with Synchronous Ethernet (electrical RJ45 & optical SFP)
- Gerenciamento remoto
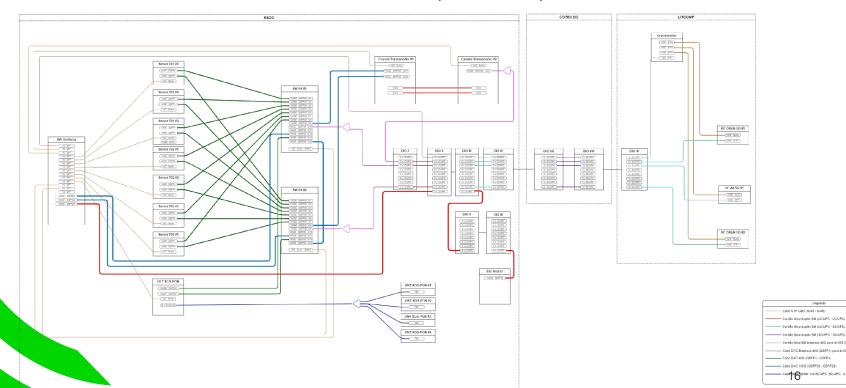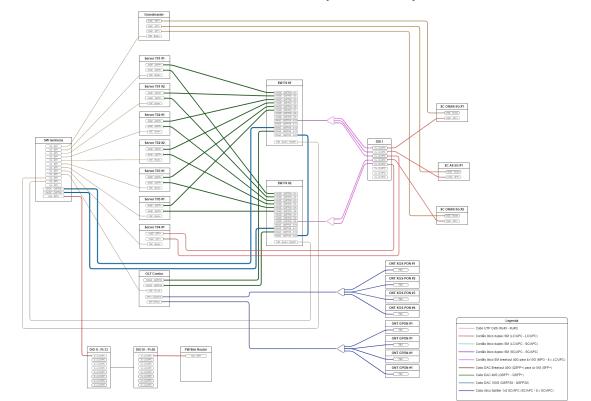- **Valor estimado por unidade: 35.000 BRL**

**Falcon-RX**
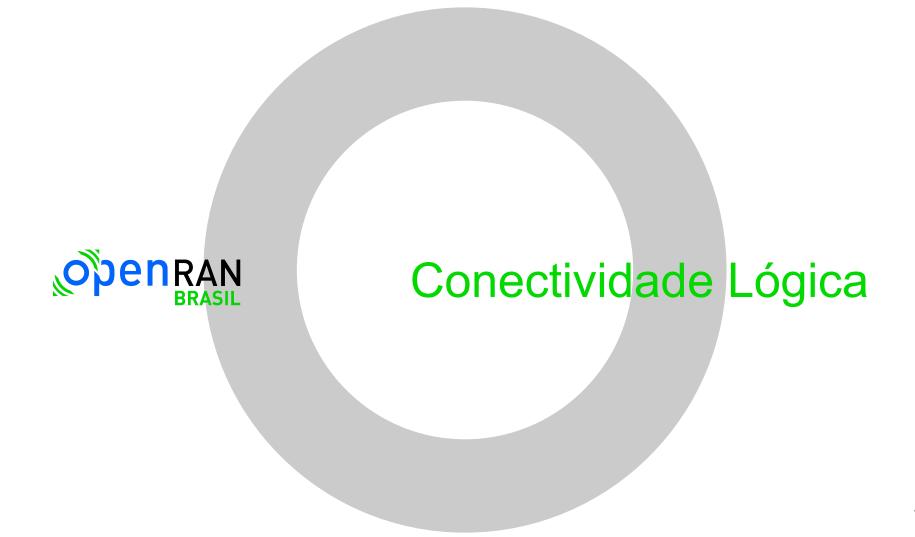
Conectividade Física

# Conectividade Física

- Planta de Conectividade Física (PoP-RJ)

- Planta de Conectividade Física (CPQD)
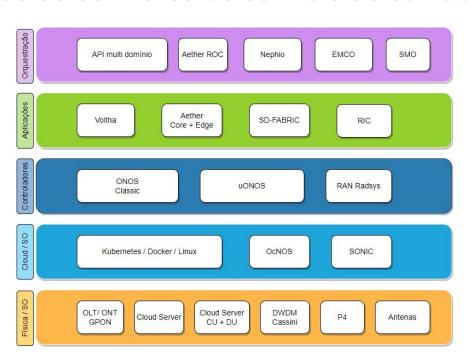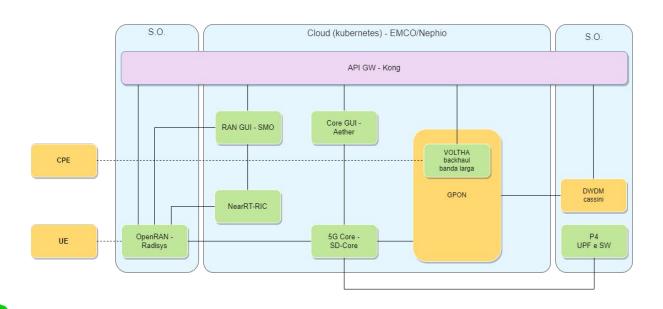
Conectividade Lógica
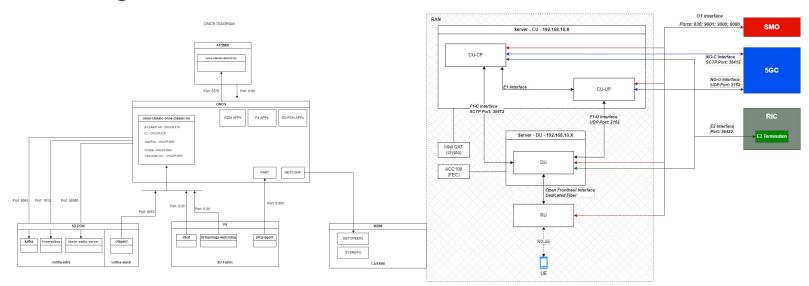
# Conectividade Lógica

- Conectividade de softwares de controle de camadas superiores

# Conectividade Lógica

- Conectividade de softwares de controle de camadas superiores

# Conectividade Lógica

- Design e Planejamento de Conectividade, Endereçamento e Portas Lógicas:

# Conectividade Lógica

- Design e Planejamento de Conectividade, Endereçamento e Portas Lógicas:

# Conectividade Lógica
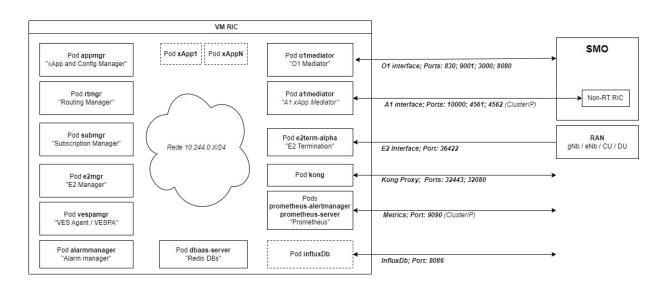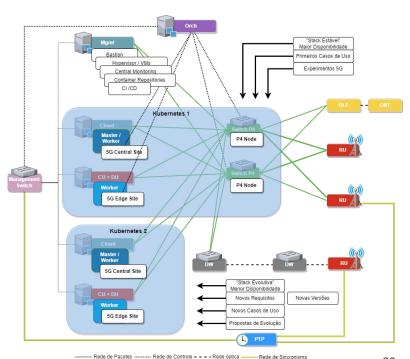
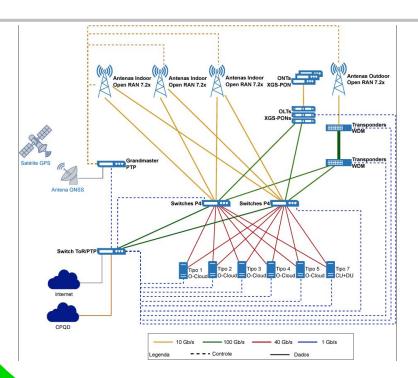- Design e planejamento de recurso de nuvem e edge:
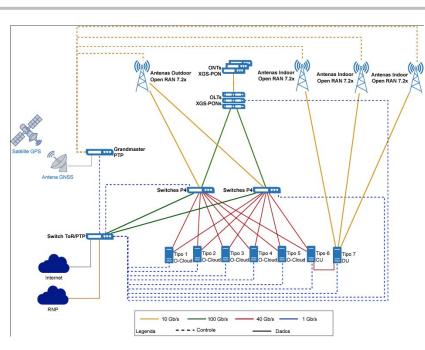
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Testbed OpenRAN V1.0

# Testbed OpenRAN Ver 1.0



CBPF - PoP-RJ (RNP)

CPQD - CPS

# ROADMAP

- Emulação de Topologia via Switch P4
  - Enlaces Virtuais (atraso e perda de pacote, customizáveis)
- Gerador de tráfego
  - Granaludade 10, 25 e 40 Gbps
- Domínio FTTH
  - OLT XGS-PON (2.5/10 Gbps)
  - ONT XGS-PON (2.5/10Gbps)
- Orquestração de experimento

**Obrigado!**

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