2025 WTR WORKSHOP TECNOLOGIAS DE REDE PoPRS

Open RAN: Fundamentos das Redes Móveis Abertas

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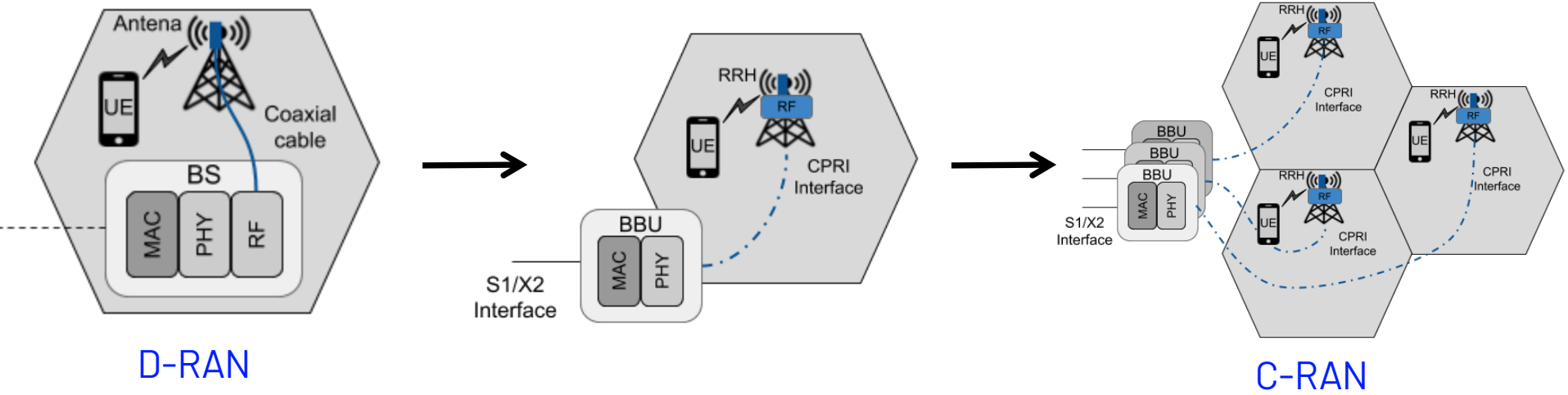
PPGCA UNISINOS

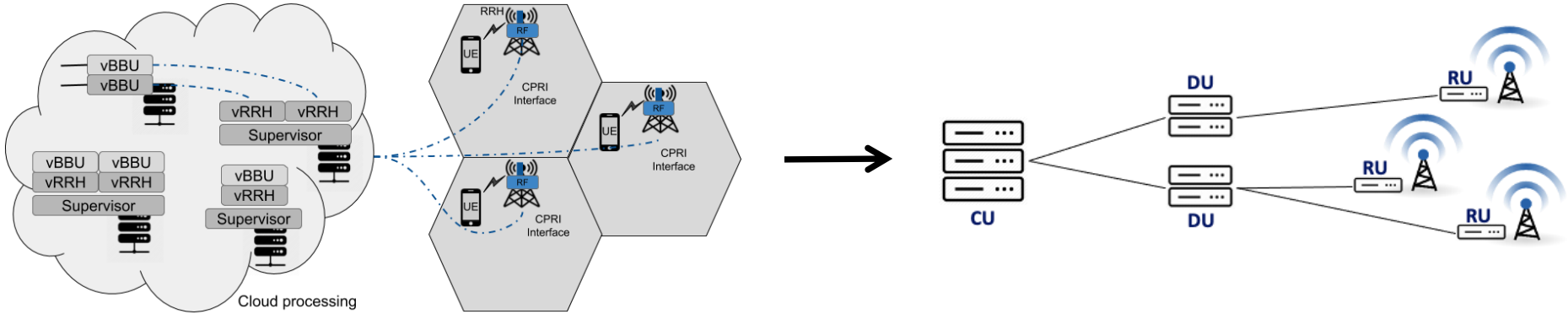
RNP

Evolução das Redes de Acesso



D-RAN

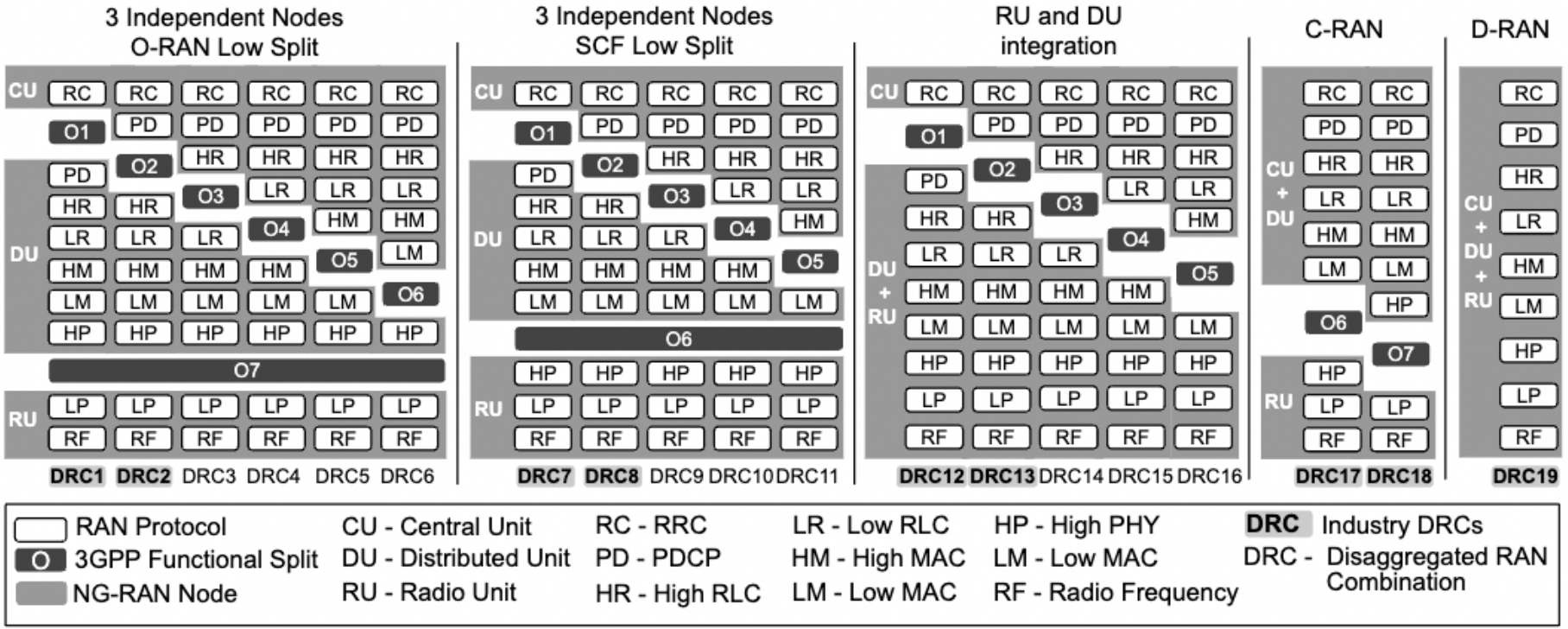
C-RAN



vRAN

Open RAN

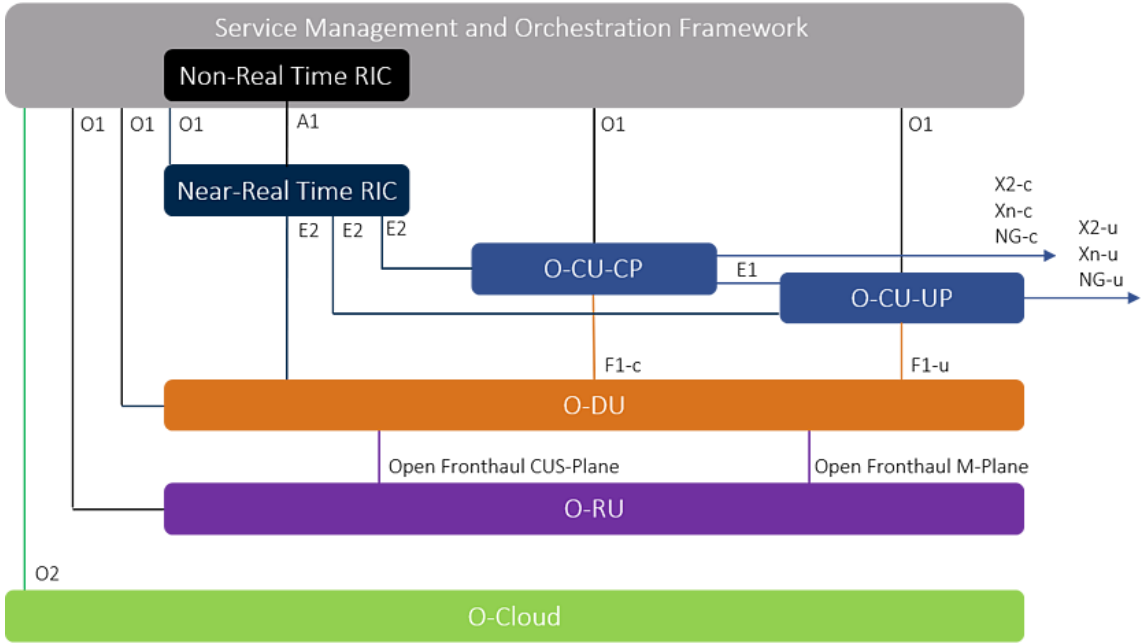
Opções de desagregação



O-RAN definiu o split 7.2x

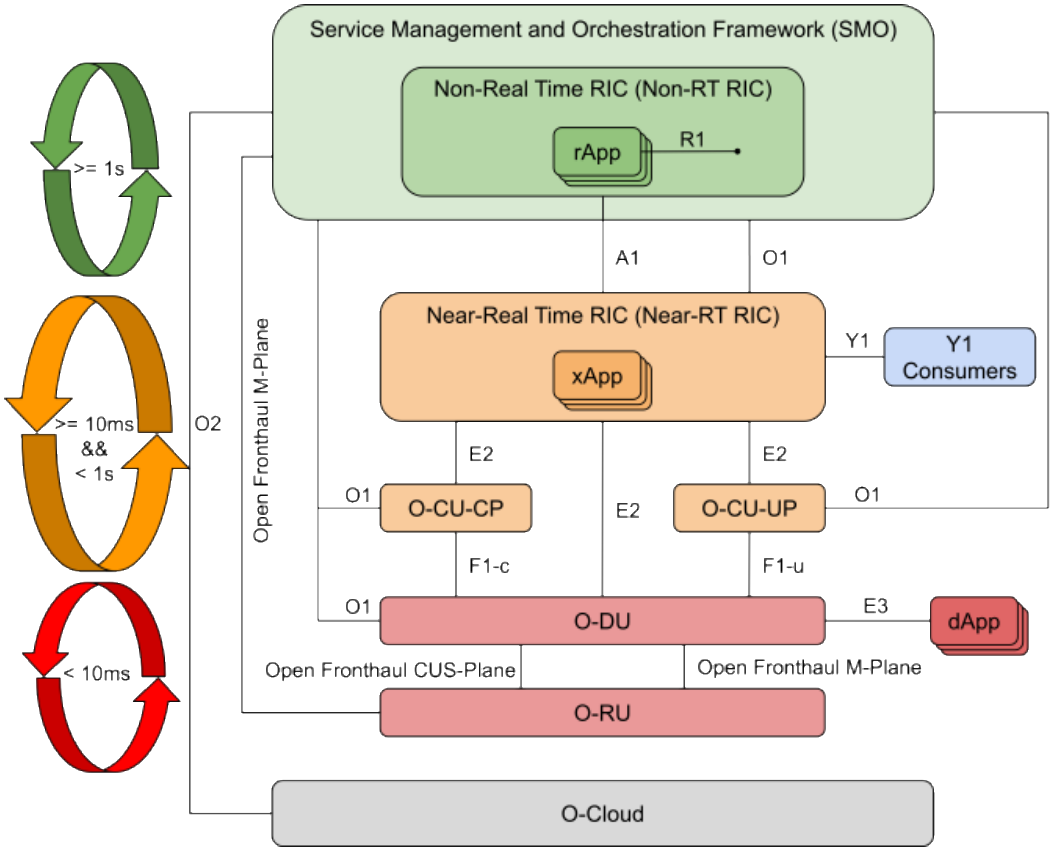
O-RAN ALLIANCE (2018): remodeling mobile networks to be smarter, open, virtualized, and fully

Fonte: https://www.o-ran.org

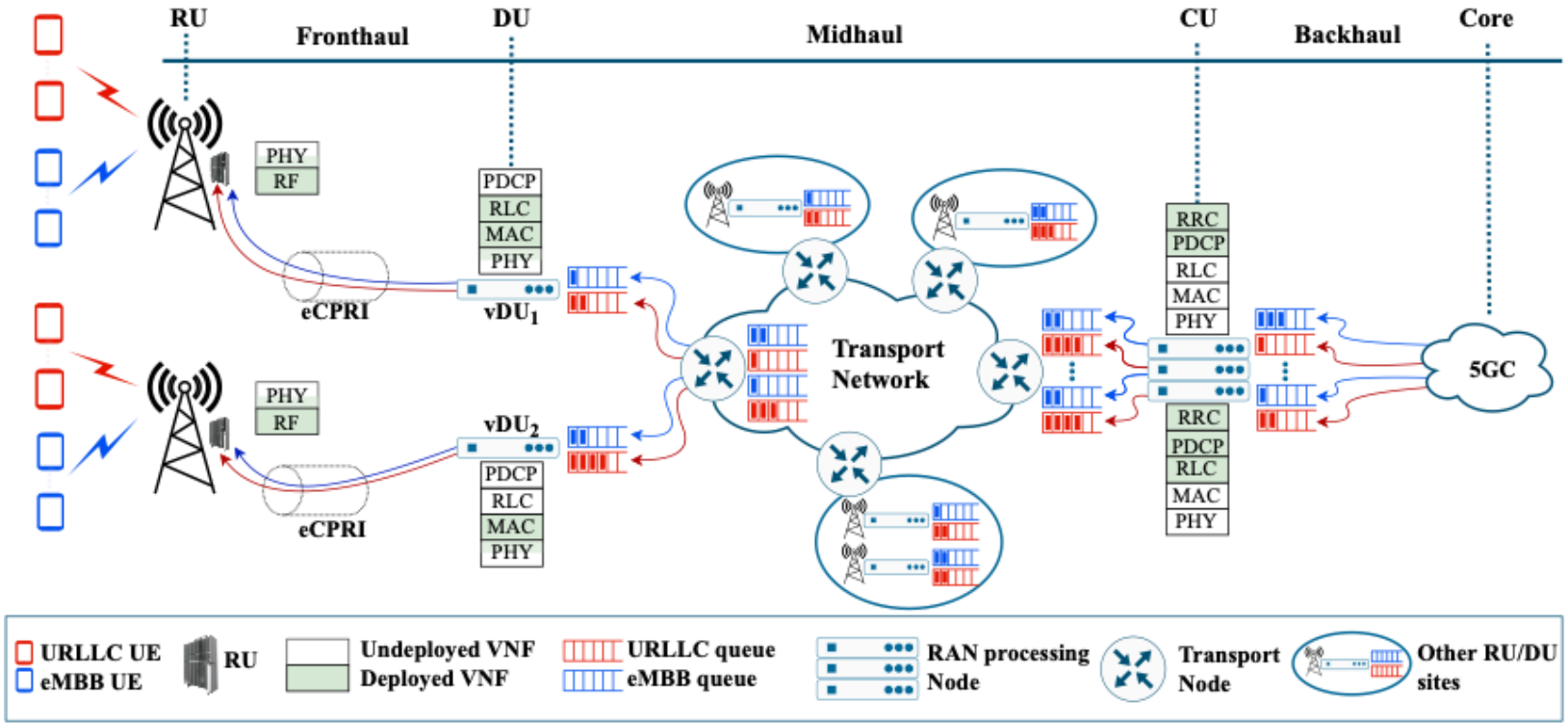


WG	Topic
1	Use cases and overall architecture
2	Non-real-time RIC and A1 Interface
3	Near-real-time RIC and E2 Interface
4	Open Fronthaul Interface
5	Open F1, W1, E1, X2, Xn Interfaces
6	Cloudification and Orchestration
7	White-box Hardware
8	Stack reference design
9	xHaul transport

RAN Intelligent Controller



Cenário de nova geração de redes móveis



Open RAN no Brasil – Programa OpenRAN@Brasil

Phase 1

R&D on management, control and automation layers

- Service Management and Orchestration (SMO)
- RAN Intelligent Controller (RIC)
- SDN, P4 and DWDM in the transport layer
- SD-PON in the Fronthaul
- CLOUD/EDGE computing orchestration

Testbed building

- 2 sites
  - Campinas (CPQD)
  - Rio de Janeiro (RNP)
- Composed of open and disaggregated domains (packet, optical and wireless)

Academia and startup open calls

Status: running
Duration: 36 months
Budget: 32 M

Phase 2

R&D on Hardware

- Development of own Radio Unit (RU)
- Motivation:
  - Most expensive part of the architecture
  - Few vendors

R&D in Software

- RIC xApps/rApps

R&D in Cybersecurity

Status: running
Duration: 30 months
Budget: 30 M

Phase 3

Testbed expansion

- At least one site in each region in Brazil
- Relevant market verticals

Status: submitted
Duration: 36 months
Budget: 40 M

Trabalhos desenvolvidos e publicados

Santos et al. “Managing O-RAN Networks: xApp Development From Zero to Hero”, IEEE Communications Surveys and Tutorials, 2025, doi: 10.1109/COMST.2025.3539687

PIRES et al. “Optimizing Energy Consumption for vRAN Placement in O-RAN Systems With Flexible Transport Networks”, IEEE Open Journal Of The Communications Society, 2025, doi: 10.1109/OJCOMS.2025.3568689

Nahum et al. “Intent-based Radio Scheduler for RAN Slicing: Learning to Deal with Different Network Scenarios”, IEEE Transactions on Mobile Computing, 2025, doi: 10.1109/TMC.2025.3614453

Bruno et al. “Evaluating the Deployment of a Disaggregated Open RAN Controller on a Distributed Cloud Infrastructure”, IEEE Transactions on Network and Service Management, 2024, doi: 10.1109/TNSM.2024.3386902

Arnhold et al. “Network Slicing Support by Fronthaul Interface in Disaggregated Radio Access Networks: A Survey”, IEEE Transactions on Network and Service Management, 2024, doi: 10.1109/TNSM.2024.3400019

Almeida et al. “RIC-O: Efficient placement of a disaggregated and distributed RAN Intelligent Controller with dynamic clustering of radio nodes”, IEEE Journal on Selected Areas in Communications, 2023, doi: 10.1109/JSAC.2023.3336159

Morais et al. “PlaceRAN: optimal placement of virtualized network functions in Beyond 5G radio access networks”, IEEE Transactions on Mobile Computing, 2022, doi: 10.1109/TMC.2022.3171525

Almeida et al. “Optimal joint functional split and network function placement in virtualized RAN with splittable flows”, IEEE Wireless Communications Letters, 2022, doi: 10.1109/LWC.2022.3172878

Morais et al. “OPlaceRAN - A Placement Orchestrator for Virtualized Next-Generation of Radio Access Network”,. IEEE Transactions on Network and Service Management, 2022, doi: 10.1109/TNSM.2022.3222298

Obrigado!

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PATROCÍNIO

APOIO

REALIZAÇÃO