Innovarpel 2025

TECHNICAL DAYS

DIGITAL TRANSFORMATION
& INDUSTRIAL CYBERSECURITY
IN THE OIL&GAS INDUSTRY

arpel 60 YEARS

JUNE, 24 & 25
Rio de Janeiro, Brazil

SMER - Use of Industrial Home Automation for Monitoring Communications in Gas Pipelines

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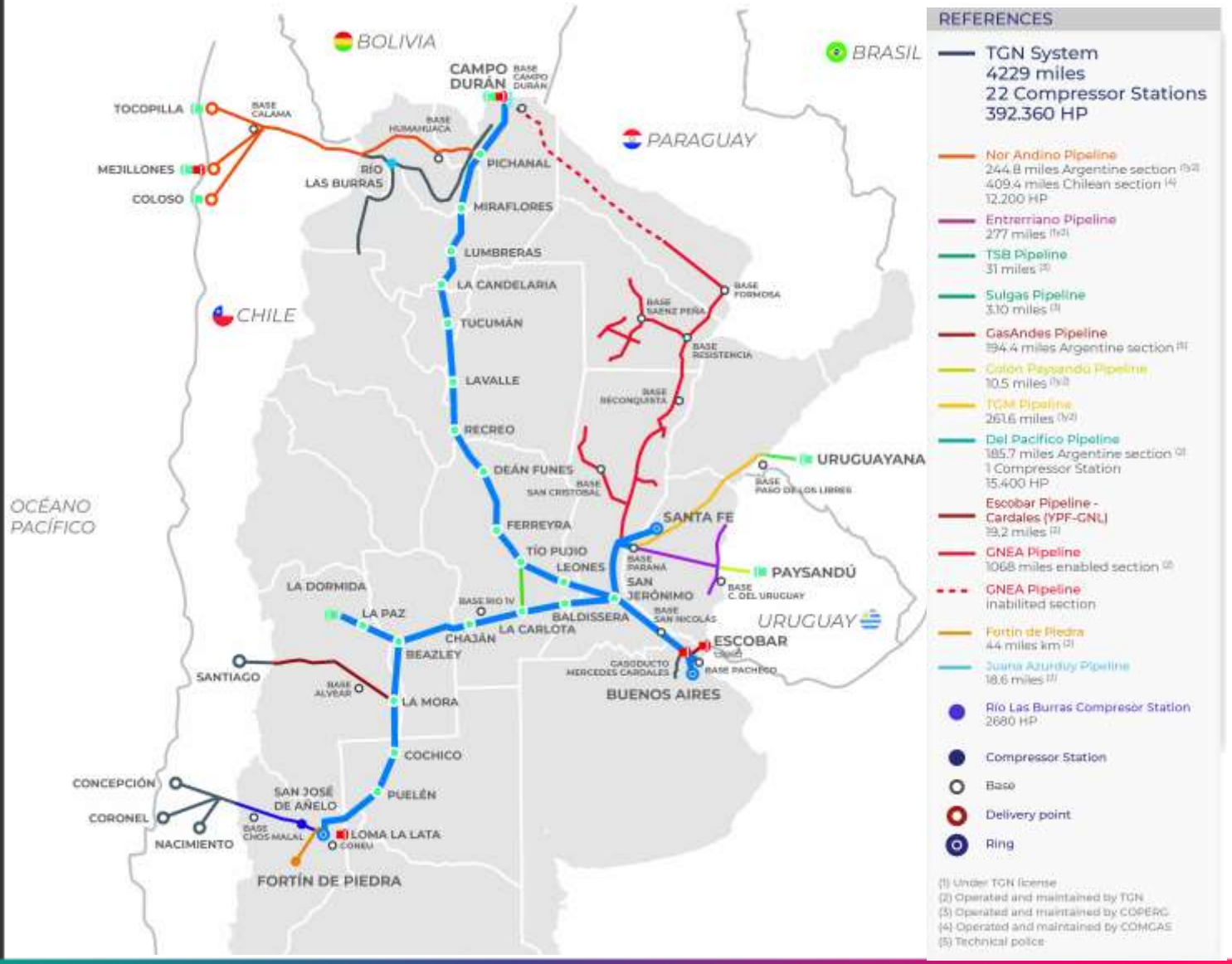
TGN

TGN System and Connected Gas Pipelines



+11.200 km of pipelines in operation, along **17 provinces** delivering natural gas to **8** of the 9 **distribution companies** in the country.

We transport **40%** of all **natural gas** injected into main pipelines in Argentina, which represents **20%** of the **energy matrix.**

We are the only operator with regional ties with **Bolivia, Uruguay, Chile y Brazil.**

22 compressor stations (392.360 HP).

O&M of **4.300 km of third-party gas pipelines.**

More than **130 customers.**

+30 years in the industry.

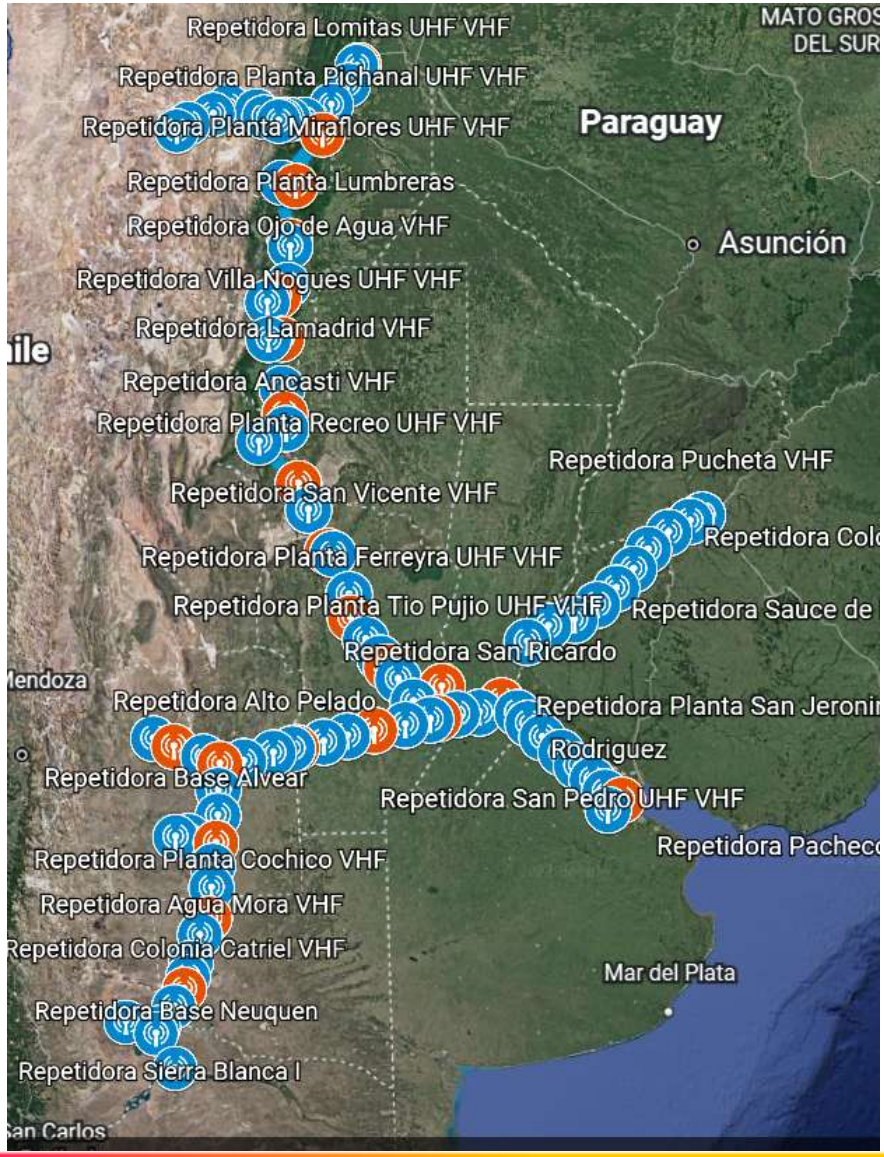
+700 employees

Communications Trunk Repeater Stations

96 sites
6500 m of mast/tower

- Max height: 120 m
- Min height: 6 m
- Avg height: 68 m

Microwave backbone
VHF
UHF
LoRaWAN



Site Subsystems

Power

Environmental Control

Tower

Communications

Security

Power

- Detailed monitoring of battery banks (cell-level voltage and temperature)

- Remote discharge testing and verification of the banks' internal effective resistance

- Operation of motorized switchgear

- Monitoring of power sources, AC and DC consumption, and transformation systems

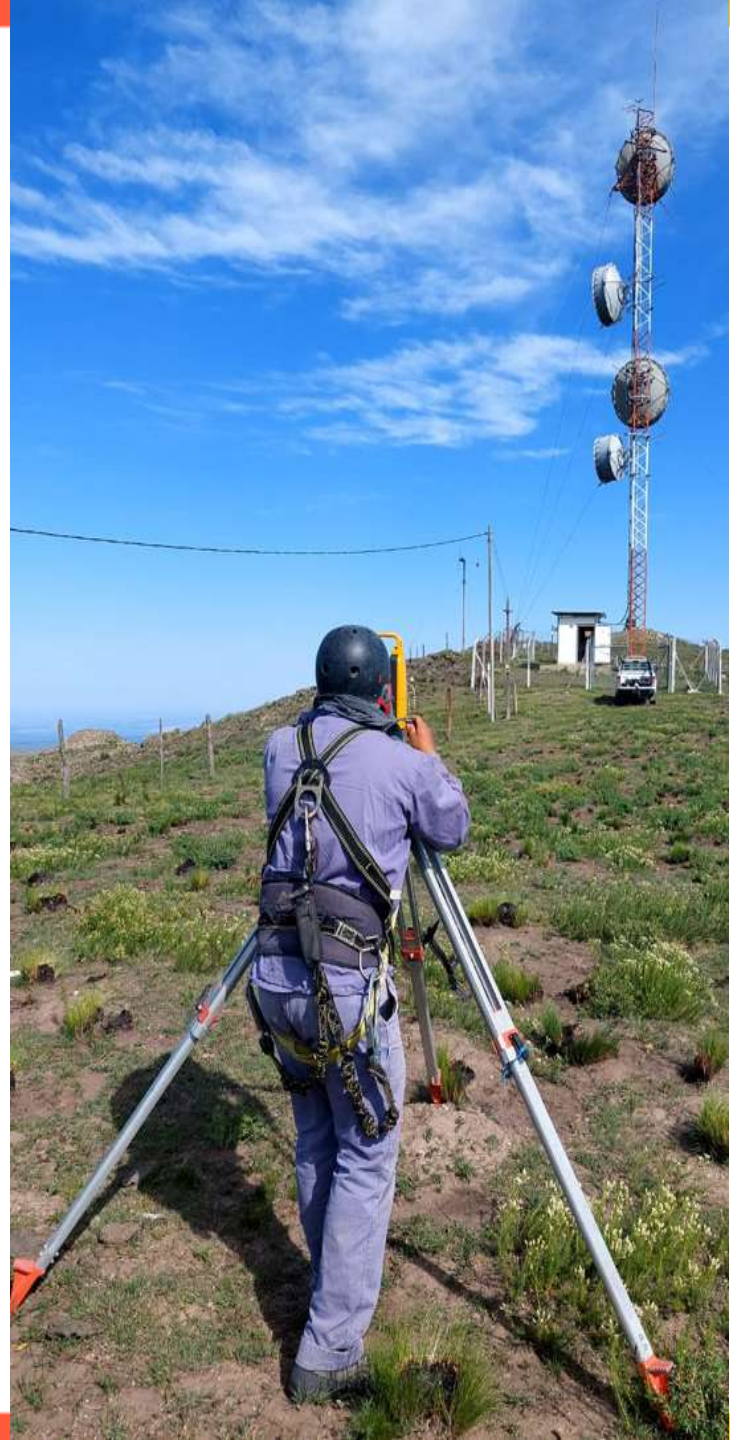
Environmental Control

- Air conditioner cycling control
- Motorized blinds and exhaust fan control
- Automated environmental control based on energy availability

Tower

- Real-time monitoring of tilt and torsion

- Automated beaconing control upon primary power failure



Communications

Monitoring Parameters of Communication Systems

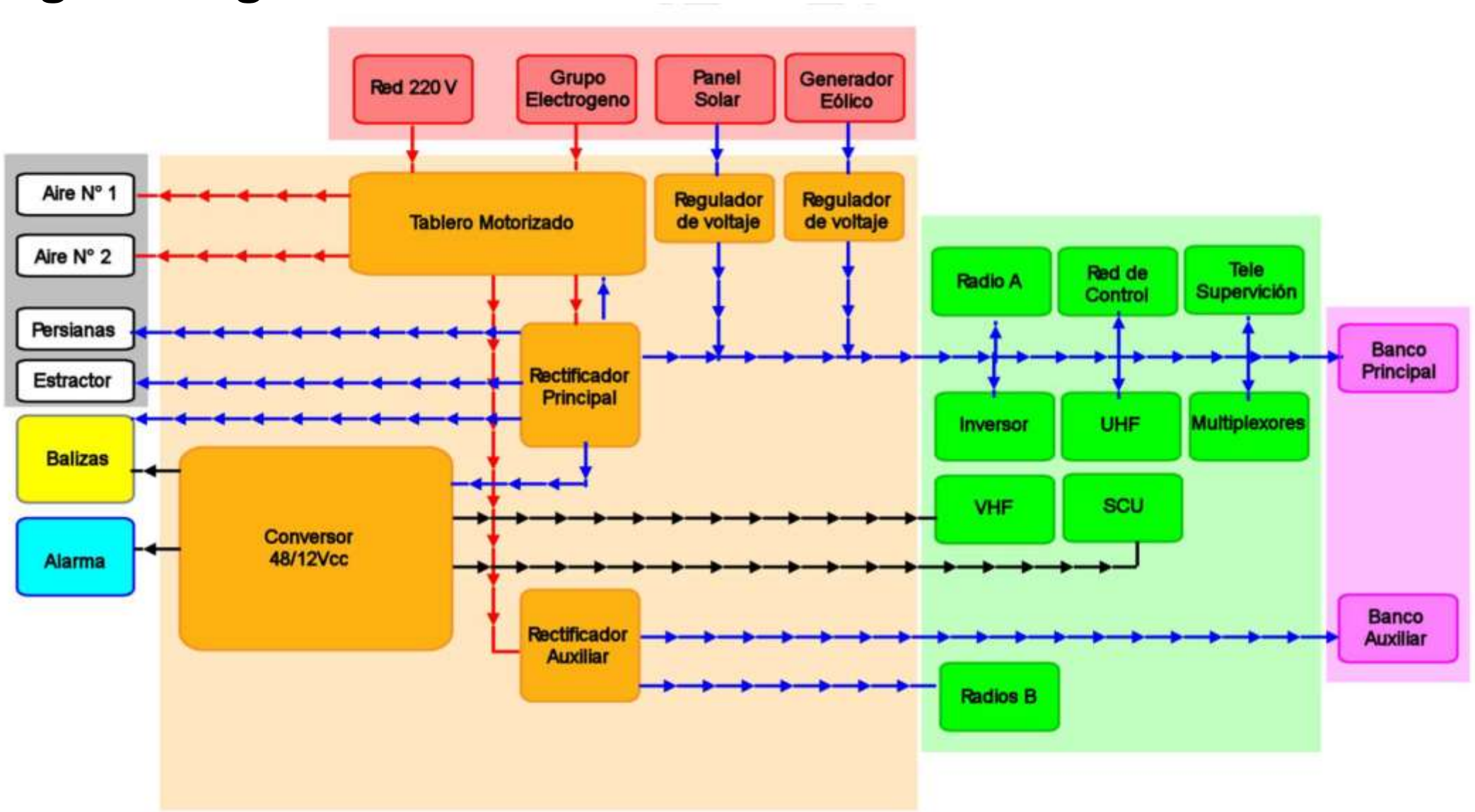
- Microwave backbone
- VHF repeater stations
- UHF SCADA master stations
- Control network
- Corporate network

Automatic switching of microwave radio transmitters

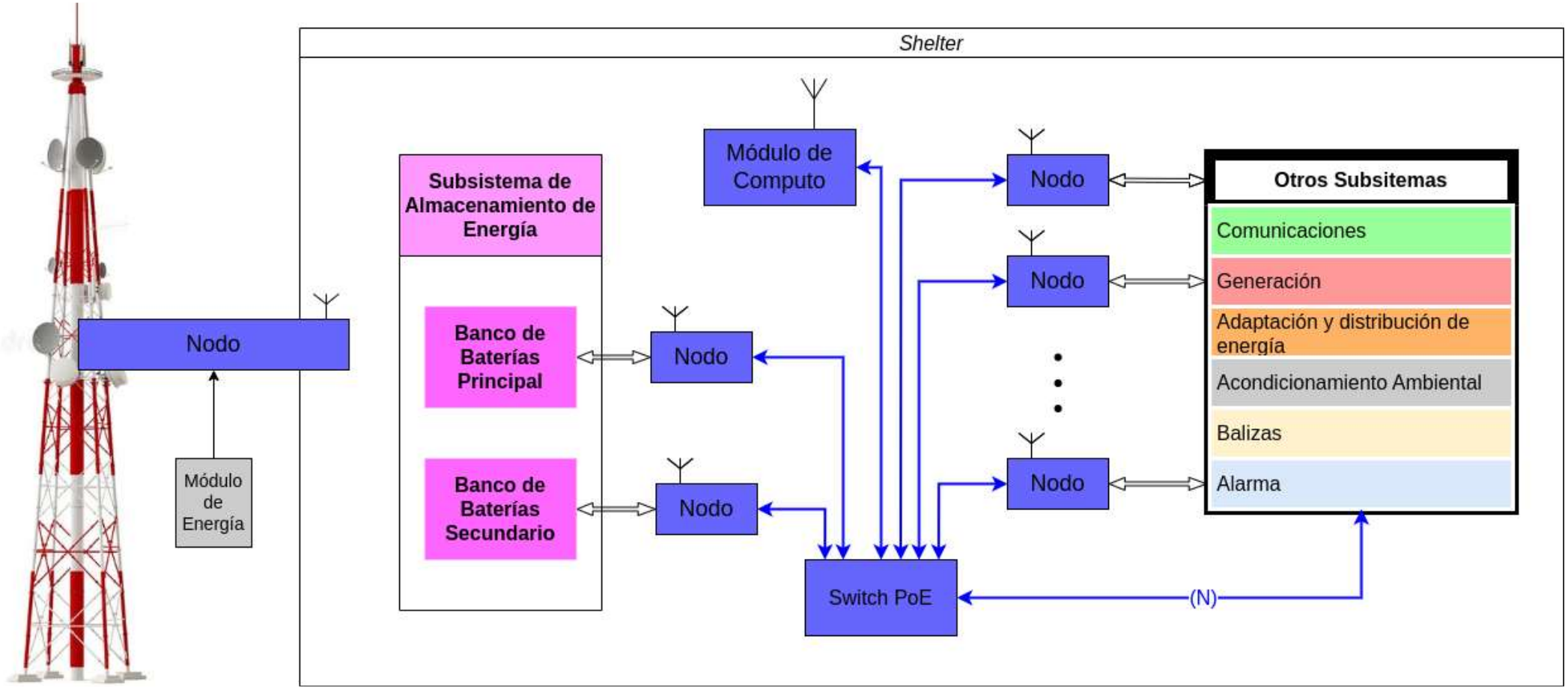
Security

- Presence detection
- Door-open detection
- Security cameras
- Vibration-sensor alarm
- Station emergency
- Local audible and visual alert

Logical Diagram



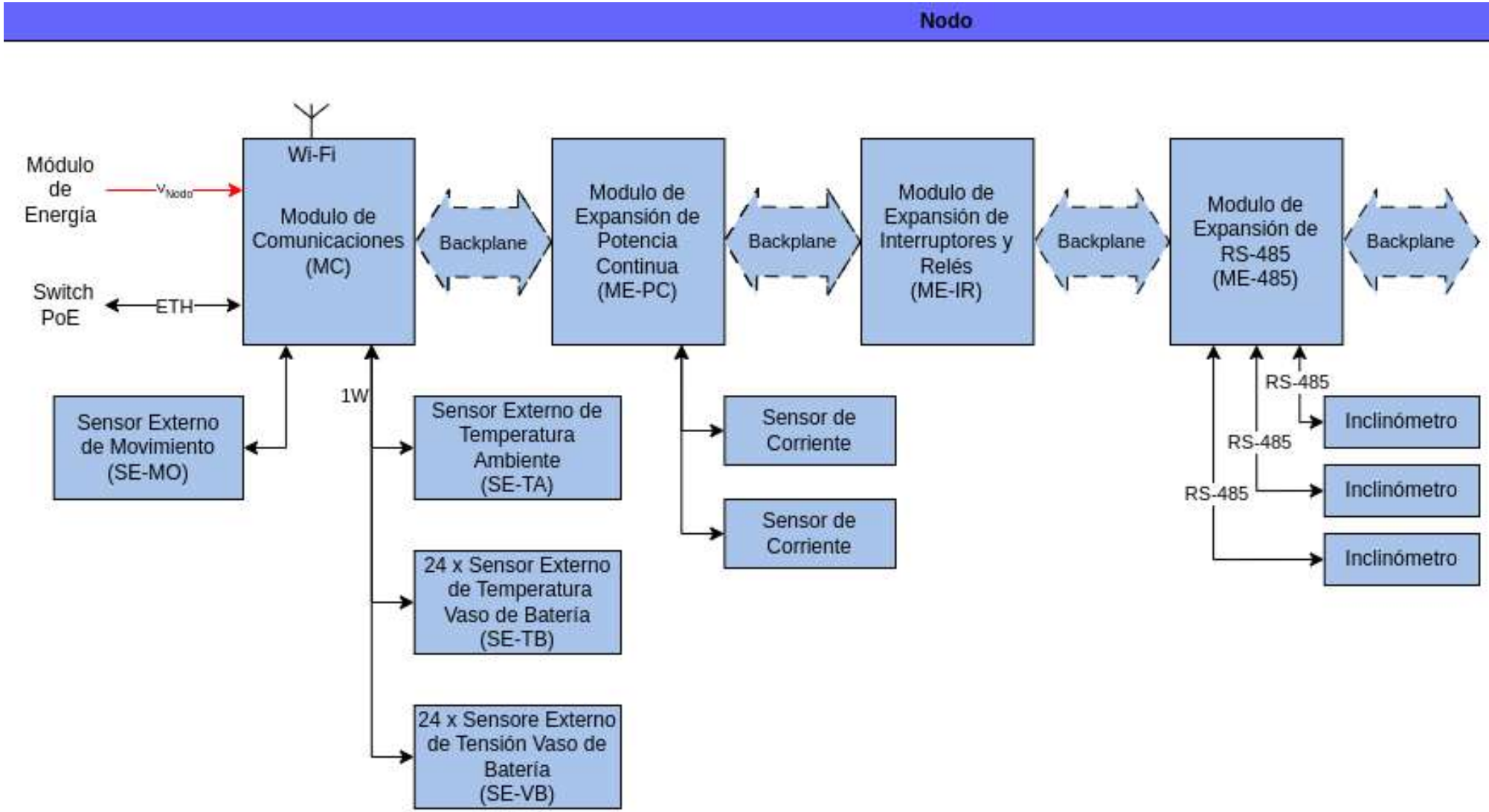
System Architecture



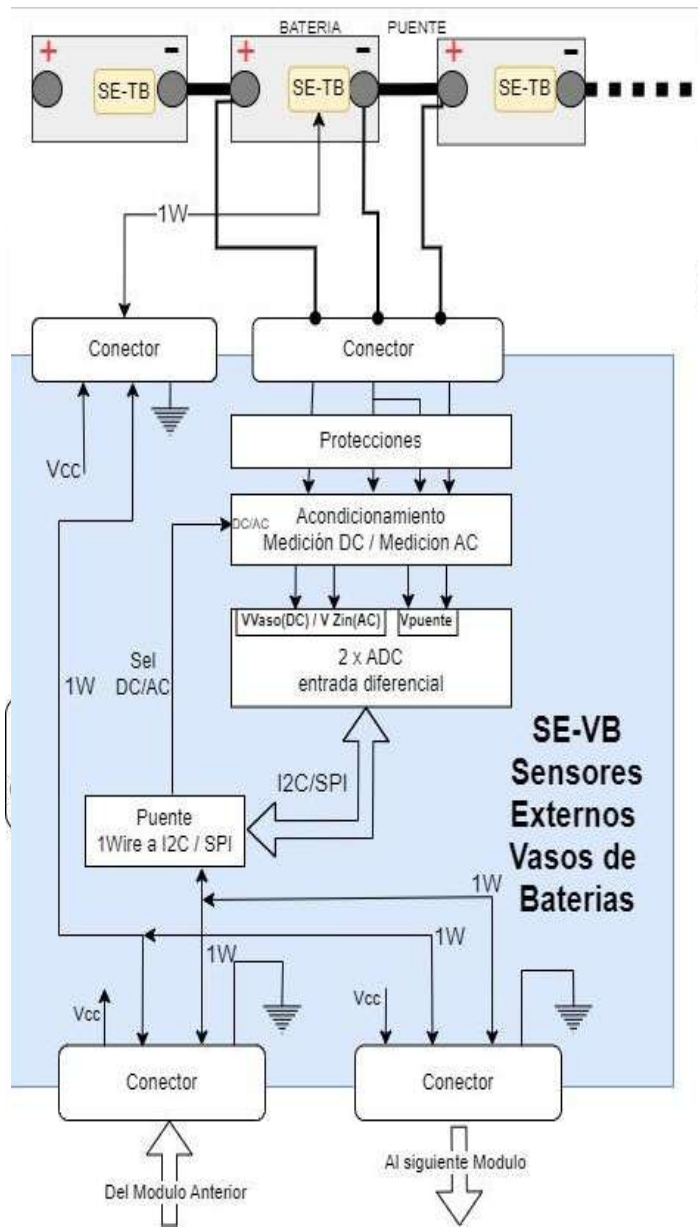
SW **Node:** TASMOTA **Compute Module:** docker MQTT influxdb Node-RED Grafana

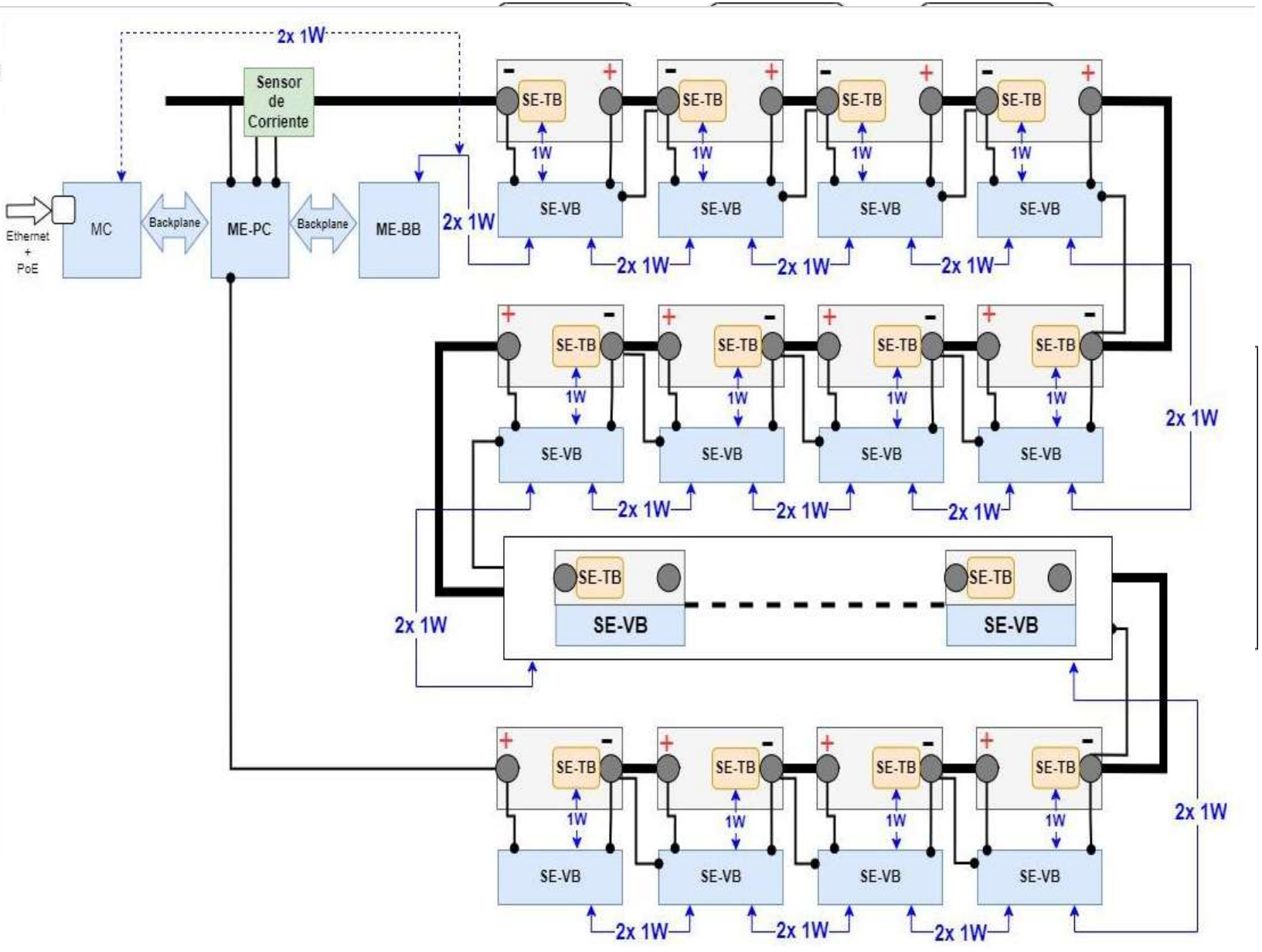
M . I . N . G Stack

Node Architecture



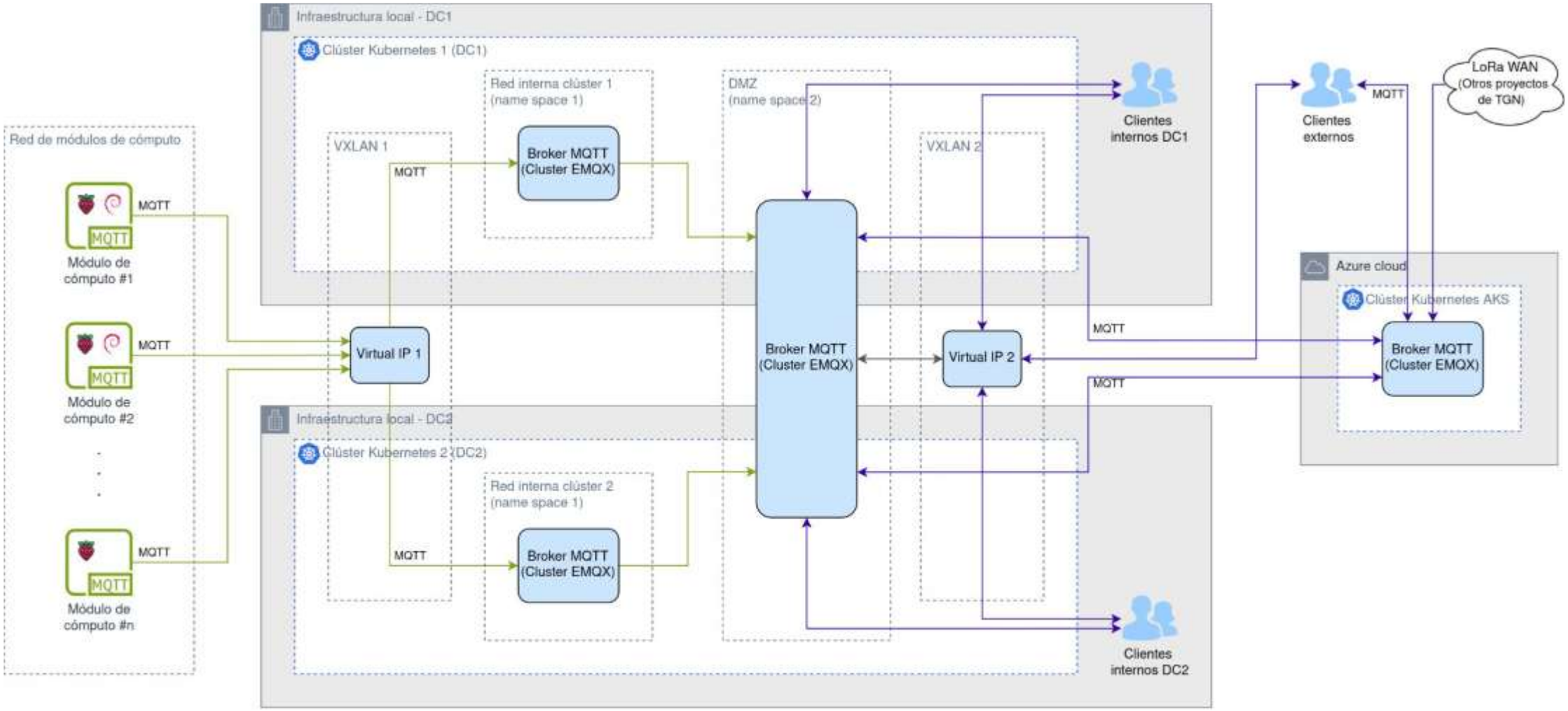
Module Architecture





On-Site Installation

High-Availability Hybrid Architecture



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Remote Operation of Humanoid Robots in High-Risk Environments

Muchas Gracias

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