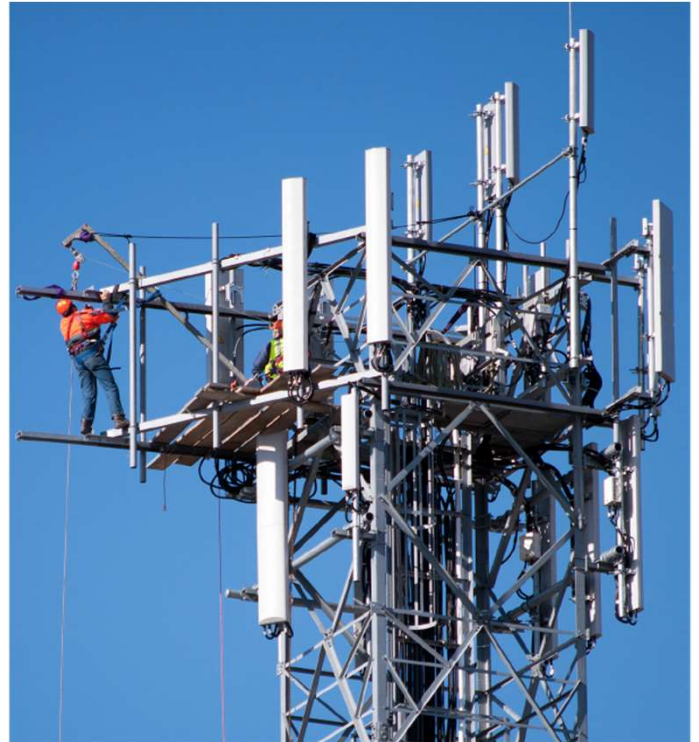


One Cabinet, Multiple Operators: Redefining Telecom Efficiency and Infrastructure Sharing

■ Background

Southeast Asia has emerged as a dynamic region for telecom infrastructure development, driven by rapid expansions in 4G coverage and the initiation of 5G pilot programs. During field assessments in Manila, Philippines, our team identified a recurring infrastructure inefficiency: telecom towers typically housed 3–5 separate outdoor power cabinets belonging to different network operators, due to incompatible power systems. This fragmented arrangement consumed 30–50% more space, created visual clutter, and led to unnecessary redundancy in resources.

In response, a leading telecom infrastructure provider requested a consolidated "one-cabinet-multi-tenant" solution capable of serving four operators independently. This innovative design aimed to simplify infrastructure, reduce space requirements, and maintain stringent security standards unique to each operator.



■ Challenges

The development team faced three critical technical challenges:

Spatial Constraints and Complexity:

Integrating independent power modules, metering, and backup systems for each tenant into a compact cabinet required precise three-dimensional stacking. With over 150 internal cables, designers had to guarantee safe separation ($\geq 50\text{mm}$) between high-voltage and low-voltage lines while ensuring convenient maintenance access.

Environmental Durability:

The Philippines' local climate—with an annual rainfall of approximately 3,000mm, temperatures regularly hitting 35–45°C, and salt corrosion risks—demanded robust protection. Traditional passive cooling solutions risked overheating, while typical forced-air cooling methods compromised waterproofing, challenging the team to achieve effective thermal management alongside IP55 protection.

Cost-Reliability Optimization:

The client sought a 30% reduction in lifecycle costs compared to conventional solutions. This target required extended lifespans for critical components (including a minimum 10-year service life for lithium batteries), modular design principles to reduce maintenance costs, and recalibrated supply-chain strategies to balance component affordability with reliability.

■ Solutions

Through extensive scenario analysis and iterative design refinement, the following optimized solutions were implemented:

Intelligent Thermal Control System:

An advanced thermal management solution featuring integrated temperature sensors and stepless variable-speed fans automatically adjusts cooling performance based on real-time temperature monitoring—enhancing cooling during temperature peaks while conserving energy during cooler periods.

Physical and Electrical Isolation:

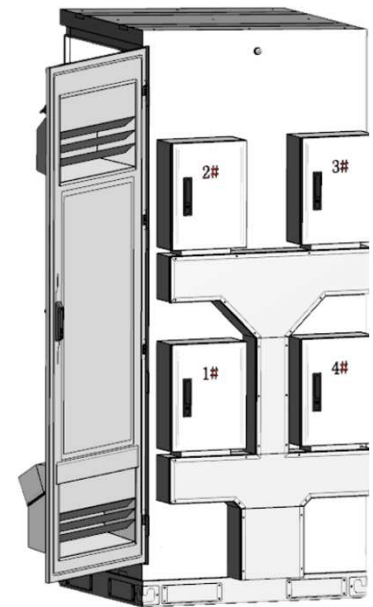
Four dedicated power distribution compartments, each with independent access controls, were positioned strategically within the cabinet. This allowed parallel, secure, and isolated operations for multiple telecom operators, preventing data breaches or cross-operator interference.

Dual-Mode Power Supply:

Incorporating high-efficiency power modules (achieving 96% conversion efficiency) paired with LiFePO4 battery packs provided stable power. An intelligent system ensured instantaneous battery backup activation (within 0.3 seconds) during power disruptions, significantly enhancing reliability.

Enhanced Outdoor Protection:

The cabinet met IP55 standards through a combination of labyrinth-style drainage channels and dual-layer silicone seals, successfully passing rigorous tests—including 72-hour simulated rainfall exposure and extensive temperature cycling (-40°C to 75°C).



Multi-tenant outdoor cabinet

■ Results

After six months of design optimization and two rigorous rounds of prototype validation, the final product achieved significant breakthroughs compared to traditional configurations:

67% Reduction in cabinet spatial footprint.

55% Faster on-site installation, significantly lowering deployment times.

40% Improvement in maintenance staff inspection efficiency.

USD 12,000 Annual Savings per station on electricity expenditures.

Moreover, the successful deployment of this innovative multi-tenant power cabinet in Manila has catalyzed a new infrastructure-sharing model, setting a powerful benchmark for sustainable telecom development throughout the region.

PROSE

