

Article Overview

A 48V off-grid solar system with LiFePO4 batteries and a hybrid inverter provides efficient, reliable power for FTTH equipment.

Why 48V is Ideal for FTTH

A 48V system is preferred over 12V or 24V setups because it reduces current for the same power output, minimizing energy loss over long cable runs and allowing the use of thinner, cost-effective wiring . This is particularly important for FTTH deployments where stable DC power is critical for optical network terminals (ONTs) and other network devices. Lower current also reduces heat buildup and improves voltage stability, ensuring continuous operation of sensitive telecom equipment .

Core Components

o Solar Panels

- o Use 48V-compatible solar panels or connect 12V panels in series to achieve 48V output .
- o Panel wattage should match your daily energy consumption; for FTTH, typical loads are low (50-200W per node), but consider extra capacity for future expansion or additional network devices .

o Battery Bank

- o LiFePO4 (Lithium Iron Phosphate) batteries are recommended for off-grid 48V systems due to long cycle life, high discharge efficiency, and safety .
- o Choose managed batteries with BMS communication for precise state-of-charge monitoring, or self-managed batteries for simpler setups .
- o Battery capacity should cover at least 1-2 days of autonomy to handle cloudy periods or maintenance downtime.

o Hybrid Inverter

- o Converts DC from solar panels and batteries to AC if needed, and manages energy flow between solar, battery, and load .
- o For FTTH, a pure DC setup can be used to power 48V DC network equipment directly, improving efficiency by avoiding AC conversion losses.

o Charge Controller

- o An MPPT (Maximum Power Point Tracking) controller regulates voltage and current from the solar panels to the battery, preventing overcharging and optimizing energy harvest .

o Safety and Wiring

- o Include disconnect switches, fuses, and grounding to protect the system .



Off-grid power system 48V for FTTH use

o Use appropriately rated cables to handle the reduced current at 48V, which allows for thinner wires and lower installation costs .

System Design Considerations

- o Energy Budget: Calculate total FTTH load (e.g., ONTs, switches, routers) and add a safety margin.
- o Autonomy: Ensure battery capacity supports at least 24-48 hours without solar input.
- o Scalability: 48V systems allow easy expansion by adding panels or batteries in series without complex parallel wiring .
- o Efficiency: 48V systems operate at 92-95% efficiency, significantly higher than 12V systems, reducing resistive losses and improving reliability .

Example Setup

A typical off-grid 48V system for FTTH might include:

- o 12 x 195W monocrystalline panels (2340W total)
 - o 48V 100Ah LiFePO4 battery bank
 - o 5kW hybrid inverter (for AC backup if needed)
 - o 100A MPPT charge controller
 - o Pre-wired mounting and safety components for easy installation
- This configuration provides reliable, efficient power for FTTH nodes, supports future expansion, and ensures minimal downtime in remote or off-grid locations. By adopting a 48V off-grid system, FTTH deployments can achieve stable voltage, low energy loss, and long-term reliability, making it a practical solution for remote fiber networks .

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