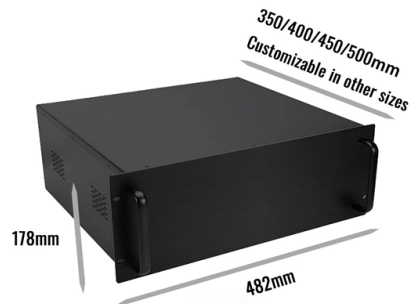


VLAN partitioning for photovoltaic power station switches



Overview

Adding Solar VLAN | Laurence's BlogWe are getting solar panels installed and the system comes with an inverter that uses a WiFi module to connect to a VLAN.

Key Takeaways

VLAN partitioning in PV power stations improves network reliability, separates control and monitoring traffic, and enhances scalability and security. Key Principles of VLAN Partitioning

1. **Separate Subnets for Different Functions** In large-scale PV plants, devices such as inverters, plant controllers, monitoring systems, and safety devices should be grouped into separate VLANs or subnets. For example, the SMA Fuel Save Controller and Power Plant Controller can operate on different subnets to isolate control traffic from monitoring or safety systems, reducing interference and improving network security.
2. **Managed Switches and Redundancy** Use managed switches that support redundancy protocols like Media Redundancy Protocol (MRP) or Rapid Spanning Tree Protocol (RSTP). VLANs can be applied within these switches to logically segment traffic while maintaining a redundant ring or mesh topology. This ensures high availability, as a failure in one switch or link does not disrupt the entire network.
3. **Device Grouping and String Planning** Plan a small number of devices per network string to increase reliability. Each VLAN can correspond to a logical group of devices (e.g., a set of inverters or a cluster of monitoring devices). This minimizes the impact of a single device failure on upstream devices.
4. **Traffic Segregation**

- Control VLANs: For plant controllers and SC-COM devices, ensuring low-latency, reliable communication.
 - Monitoring VLANs: For data collection and transmission to portals like Sunny Portal.
 - Safety VLANs: For CCTV, intrusion detection, or emergency shutdown systems, isolated from operational traffic .
5. Cable and Fiber Considerations Ensure that VLANs are supported by high-quality cabling and fiber infrastructure. Maximum cable lengths for 100 Mbit/s Ethernet should be observed, and fiber reserves should be doubled to allow for future expansion or repairs .
6. Scalability and Hierarchical Design For very large PV plants, multiple VLANs can be organized hierarchically. For instance, each cluster of inverters or a section of the plant can have its own VLAN, with inter-VLAN routing handled by core switches. This mirrors the cluster partitioning approach used in distribution networks to manage voltage and reactive power control efficiently .

Recommended VLAN Strategy

- VLAN 10: Central inverter control
 - VLAN 20: Plant monitoring and data acquisition
 - VLAN 30: Safety and security systems
 - VLAN 40: Maintenance and engineering access
- Each VLAN should have its own IP subnet, and routing between VLANs should be controlled via firewalls or access control lists to prevent unauthorized access.

Summary

VLAN partitioning in PV power station switches enhances network reliability, security, and manageability. By separating control, monitoring, and safety traffic, using managed switches with redundancy protocols, and planning device groups carefully, operators can ensure high availability and efficient communication across large-scale PV plants .

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VLANs in Industrial Networks — Segmenting Traffic for Performance ...

Virtual Local Area Networks (VLANs) provide an elegant solution. By dividing a single physical Ethernet network into

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This document is for preliminary research. Verify specifications against current standards, product documentation and project requirements.

