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380V power supply for communication sites used in backbone networks



Overview

Abstract 380V DC distribution is becoming a necessary choice for new telecom and datacenter power infrastructure.

Key Takeaways

380V DC power systems offer high efficiency, reliability, and simplified distribution for telecom and datacom backbone networks.Overview

The 380V DC power supply is emerging as a standard for modern communication sites, including backbone network facilities and data centers. Unlike traditional AC or 48V DC systems, 380V DC provides a high-voltage direct current platform that reduces the number of conversion stages, improves energy efficiency, and supports higher power densities for network equipment . This architecture is particularly suitable for backbone networks where continuous uptime and reliability are critical .

Advantages
• Improved Efficiency: By reducing AC-to-DC and DC-to-DC conversions, 380V DC systems minimize energy losses and cooling requirements .

• Higher Power Density: Supports more equipment per rack or site, enabling compact and scalable deployments .

• Reliability and Availability: Fewer conversion stages and robust DC distribution improve system uptime, which is essential for mission-critical telecom infrastructure .

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• Integration with Renewable Energy: Many renewable sources, such as photovoltaics, naturally produce DC, making 380V DC systems compatible with green energy initiatives .

• Simplified Infrastructure: A single DC bus can power diverse equipment, including routers, switches, servers, and storage devices, reducing complexity .

Standards and Compliance

380V DC systems for telecom and datacom sites are governed by several standards to ensure safety, interoperability, and reliability:

• ETSI EN 300 132-3-1: Defines the DC bus voltage range (260–400V) for telecom applications .

• ETSI EN 301 605: Specifies earthing and bonding arrangements for DC systems .

• ITU-T and IEC Guidelines: Provide additional recommendations for DC power distribution and equipment compatibility .

• NEBS (Network Equipment-Building System): Ensures that power supplies meet carrier-grade requirements for temperature, vibration, EMC, and fault tolerance .

Deployment Considerations

• Step-Down Conversion: Many telecom devices still operate on 48V DC or lower voltages. Efficient DC-DC converters are used to step down from 380V to 48V, 12V, or other intermediate bus voltages while maintaining isolation and high efficiency .

• Backup and Redundancy: Integration with batteries and UPS systems ensures uninterrupted operation during outages .

• Environmental Robustness: Equipment must withstand temperature variations, EMI, and vibration, especially in outdoor or harsh environments .

• Monitoring and Maintenance: Continuous monitoring of voltage, current, and battery health is essential to maintain reliability and prevent downtime .

Practical Implementation

Modern communication sites often combine 380V DC distribution with modular power supplies and rack-mounted equipment. This approach allows operators to:

• Reduce the total number of power units and associated maintenance costs.

• Provide a unified power interface for both legacy 48V DC telecom equipment and newer high-voltage DC devices.

• Enable flexible integration of renewable energy sources and energy storage systems .

Conclusion

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Adopting a 380V DC power supply for backbone network communication sites enhances efficiency, reliability, and scalability. By following established standards and implementing proper step-down conversion and monitoring, operators can ensure continuous, high-quality service for critical telecom infrastructure while reducing operational costs and energy consumption .

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