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Product Brief

Brocade® X8 Director

Powerful Foundation for Building Scalable Fabrics with Uncompromising Security

Highlights

- Scale more devices, applications, and workloads with up to 384 x 128G ports per chassis
- Maximize VM and application density with industry-leading 128G bandwidth for unmatched efficiency and utilization
- Enable faster response time and enhance user experience of enterprise AI and critical workloads with unmatched low latency
- Scale out efficiently using fewer chassis with up to 128 UltraScale ICL links, without sacrificing device ports
- Protect critical information from quantum computing and cybersecurity threats with advanced cryptographic algorithms, enhanced access controls, and integrated security
- Eliminate time-consuming, manual correlation of all application resources
- Learn and adapt to changing application demands by dynamic load balancing across virtual channels
- Simplify complex telemetry into actionable insights to improve performance, reduce downtime, and simplify operations
- Automatically monitor fabric behavior, detect anomalies, and self-correct before issues impact performance
- Design flexible architectures to increase agility with concurrent Fibre Channel, NVMe, or FICON storage connectivity
- Transport both Fibre Channel and IP storage traffic on the same fabric, utilizing AnyIO ports

Overview

The Brocade® X8 Director is a modular platform, purpose-built to power and secure large-scale storage environments. This director provides a stable, scalable, and high-performance foundation that supports growth, workload consolidation, and reliable operations, making it ideal for fueling and scaling mission-critical and enterprise AI workloads.

With up to 384 × 128G ports, the Brocade X8 Director delivers exceptional bandwidth and throughput required to support growing numbers of devices, applications, and workloads without compromising performance. High bandwidth and ultra-low latency eliminate I/O bottlenecks, delivering maximum performance for high-transaction workloads and next-generation storage. This performance headroom enables organizations to consolidate workloads onto fewer systems. To further maximize utilization, up to 128 UltraScale ICL links allow the director to scale efficiently with fewer chassis by preserving device ports for device connectivity. The Brocade X8 Director offers flexible deployment options, multiprotocol support, and mixed-blade capability, enabling organizations to adapt their infrastructure and optimize resources to meet the evolving requirements of next-generation storage and servers.

As workloads become more demanding, cyber threats become more sophisticated, and the spectrum of threats expands, it is essential to fortify the storage network against hidden risks. The network must deliver optimal performance, operate autonomously, streamline management, and protect critical data.

The Brocade X8 Director with Gen 8 technology combines 128G performance, quantum-safe security, and AI-powered autonomy to enable the most robust foundation for modern data center architectures. Integrated security featuring quantum-resistant encryption safeguards SAN fabrics against cybersecurity threats in the era of quantum computing. Embedded SAN AI technology modernizes SAN management, enabling the SAN to operate autonomously and efficiently.

By hardening the SAN against evolving security risks and enabling AI-powered autonomy to learn, adapt, and respond to changing environments, Brocade Gen 8 is the most secure, intelligent, and high-performance network for storage. This enables faster decision making, improves operational efficiency, and maintains high levels of resiliency.

The Brocade X8 Director is engineered to meet continuous data growth and demanding application requirements in large-scale Fibre Channel and IP storage environments. Its modular design delivers the capacity, throughput, and resiliency needed for all-flash and NVMe workloads, while enabling flexible, scalable SAN architectures.

Gen 8 Fibre Channel

Brocade Gen 8 Fibre Channel is a purpose-built storage network that secures, automates, and powers the SAN. It combines 128G performance with advanced security measures and embedded SAN AI technology to safeguard SAN fabrics against cybersecurity threats in the era of quantum computing, automate infrastructure management, and power enterprise AI and modern workloads.

The Brocade X8 Director with Gen 8 Fibre Channel provides a robust foundation for building a scalable fabric with uncompromising security. Ultra-low latency and 128G links provide the highest level of performance for mission-critical and enterprise AI workloads. With data-center-proven reliability, seamless scalability, integrated security, and embedded AI technology, the Brocade X8 Director maximizes the performance, security, and efficiency of storage investments and resources.

Build High-Performance Fabrics with a Powerful Modular Building Block

The Brocade X8 Director is built upon years of innovation and leverages the core technology to consistently deliver five-nines availability in the world's most demanding data centers. Delivering nondisruptive software upgrades, hot-pluggable components, and a no-single-point-of-failure design, the Brocade X8 Director offers a highly resilient solution for today's enterprise-class storage environments. In modern IT infrastructure, humans are not fast enough to respond and maintain the uptime the environment requires, which drives the need for intelligent autonomy. Built-in congestion management ensures traffic flows smoothly and performance remains consistent, while self-healing capabilities maintain uptime even when issues arise. Set-and-forget automation eliminates the need for constant monitoring and manual intervention, reducing troubleshooting time and enabling IT teams to focus on strategic initiatives.

Organizations need to adapt to continuous data growth and seamlessly scale out their storage environments. Brocade UltraScale chassis connectivity leverages optical inter-chassis links (ICLs). These links can connect up to 12 Brocade Gen 7 or Gen 8 directors, enabling flatter, faster, and simpler fabrics that increase consolidation while reducing network complexity and costs.

UltraScale ICLs are octal small form-factor pluggable (OSFP) based and enable scalable core-edge and active-active full mesh chassis topologies. These high-density chassis topologies reduce interswitch cabling by 87.5%. UltraScale ICL connections reside on the core routing blades instead of consuming ports on the port blades, enabling up to 33% more device ports for server and storage connectivity. This maximizes overall port density within the smallest amount of rack space while freeing up front-facing device ports for server and storage connectivity.

The Brocade X8 Director delivers seamless FICON connectivity for mainframe storage environments. The Brocade X8 Director complements System Z mainframes by offering the industry's fastest, most reliable, and scalable FICON infrastructure, along with unique, innovative features—all of which help deliver the greatest ROI. Brocade, a Broadcom company, builds on more than 25 years of mainframe leadership that includes contributing to the FICON standard and authoring many FICON patents.

Two chassis options provide deployment flexibility:

- Brocade X8-8 Director (14U): Eight horizontal blade slots support up to 384 128G Fibre Channel ports, plus 16 UltraScale ICL ports for 128 chassis-to-chassis interconnect ports.
- Brocade X8-4 Director (9U): Four horizontal blade slots support up to 192 128G Fibre Channel ports, plus 8 UltraScale ICL ports for 64 chassis-to-chassis interconnect ports.

Each chassis slot can be populated with a port blade:

• FC128-48 Blade: 48 × 128G ports, supporting 128, 64, 32, and 16G Fibre Channel or 100, 50, 25, and 10GbE Ethernet speeds. This blade provides AnyIO ports, supporting Brocade Unified Storage Fabric (USF). These ports can be used to consolidate IP storage and Fibre Channel onto the same storage network, extending SAN services, centralized management, and dual-fabric resiliency to IP storage workloads. AnyIO ports share optics that can be used for Fibre Channel or Ethernet traffic using 128G SWL or LWL SFP+ optics to further optimize investment protection. For IP storage connectivity, the 24 AnyIO ports on each blade are Ethernet-capable and dynamically change to Ethernet speeds on a per-port basis when configured for IP storage.

Brocade Global Support

Brocade Global Support has the expertise to help organizations build resilient, efficient SAN infrastructures. Leveraging more than 30 years of expertise in storage networking, Global Support delivers world-class technical support, implementation, and migration services to enable organizations to maximize their hardware and software investments, accelerate new technology deployments, and optimize the overall performance of their network.

Defend the Data Center with Advanced Security

The Brocade X8 Director is designed with a cyber-resilient, quantum-safe architecture that fortifies the SAN to protect critical data and applications from quantum computing and cybersecurity threats. Brocade secures storage traffic through Fibre Channel isolation and role-based access controls, protecting against unauthorized access. The switch uses hardened Fabric OS and hardware, eliminating unnecessary access points, while validating hardware and software roots of trust to ensure only authenticated components operate within the system. These capabilities reduce the risk of hijacking and the installation of malicious software.

The Brocade X8 Director features Gen 8 technology, which protects SAN fabrics against cyber threats through quantum-resistant 256-bit encryption and advanced cryptographic algorithms. With post-quantum cryptography algorithms integrated, this switch is designed to be resistant to quantum attacks, protecting sensitive data and critical infrastructure from being decrypted by future quantum computers. In addition, the Brocade Gen 8 technology further hardens the SAN to minimize the attack surface with strong access controls and limited privileges using the industry-best practice, principle of least privilege architecture. This architecture grants users, applications, and systems only the minimum level of access or permissions necessary to perform their essential functions. Locking down access strengthens the overall system security and reduces vulnerabilities to security breaches, accidental errors, or intentional misuse of privileges.

Brocade SANnav Management Portal captures Monitoring and Alerting Policy Suite (MAPS) alerts to further enhance security by enabling real-time monitoring of the SAN's security configuration, fabric health, and performance. It automates security assessments and helps you maintain best practices, providing alerts for security configuration inconsistencies or issues. Daily security assessments from Brocade Support Link (BSL) services provide a clear and continuous picture of your SAN's health, security posture, and compliance with best practices. These proactive measures help detect vulnerabilities early and offer guidance on how to address them, ensuring that your enterprise data remains secure against both cyber threats and operational disruptions.

Figure 1: The Brocade X8 Director: Purpose-Built to Power and Secure Large-Scale Storage Environments

Maximizing Investments

To help optimize technology investments, Brocade, a Broadcom company, and its partners offer complete solutions that include professional services, technical support, and education.

For more information, contact a Brocade sales partner or visit: www.broadcom.com/brocade

Modernize SAN Management with AI-Powered Autonomy

Brocade Gen 8 technology offers a comprehensive suite of features that maximize network uptime, simplify SAN management, and provide unprecedented visibility and insight across the storage network. The Brocade X8 Director with Gen 8 technology is equipped with embedded SAN AI technology, which automates application infrastructure management and offers a robust analytics architecture that reduces the need for manual administration, ensuring a resilient network that remains stable and efficient even as workloads and infrastructure complexity continue to grow. Brocade Gen 8 technology modernizes SAN management with AI-powered autonomy that learns, adapts, and responds to potential issues using intelligence and automation technologies developed over three decades in the most demanding IT environments.

With SAN Fabric Intelligence (SAN FI), administrators can eliminate time-consuming, manual correlation of all application resources. This advanced feature combines monitoring, troubleshooting, and cross-correlation of servers, storage, virtual machines (VMs), and fabric connections to provide a comprehensive view of the fabric. Utilizing SAN FI provides administrators with complete, end-to-end visibility for all connected devices and components within your SAN fabric and the ability to drill down into points of interest to accelerate troubleshooting and drive smarter management decisions. This automation helps alleviate the chronic understaffing of IT infrastructure teams, providing a significantly faster response time than a human could achieve.

With self-optimizing capabilities, Brocade technology utilizes actionable intelligence to maximize performance. Real-time monitoring of health and performance characteristics enables the network to make smarter decisions on traffic prioritization, congestion management, and notification, ensuring optimal network performance for applications and storage.

Brocade Adaptive Traffic Optimizer guarantees critical application performance by automatically prioritizing traffic. When traffic characteristics in the fabric change, the performance groups dynamically adapt to provide the optimal performance group configuration for the individual fabric. This advanced capability classifies and separates traffic with similar characteristics, such as protocol, speed, and latency. Additionally, Adaptive Traffic Optimizer can help avoid application performance impacts by automatically isolating traffic that is adversely impacting other flows.

Brocade Gen 8 leverages extensive data collection capabilities coupled with powerful analytics to quickly understand the health and performance of the environment and identify any potential impacts or trending problems. Built-in intelligence automatically collates millions of data points from across the fabric and simplifies complex telemetry into actionable insights to improve performance, reduce downtime, and simplify operations. In addition, autonomous SAN features monitor fabric behavior, detect anomalies, and self-correct before issues impact performance.

Brocade X8 Director Specifications

System Architecture	
Chassis	Single Chassis: • Brocade X8-8: Nonblocking architecture X8-8 Director with 8 128G 48-port blades: 62Tb/s of aggregate chassis bandwidth (384 device ports with a 128G data rate plus 16 UltraScale ICL ports with 8 x Gen 8) • Brocade X8-4: Nonblocking architecture X8-4 Director with 4 128G 48-port blades: 31Tb/s of aggregate chassis bandwidth (192 device ports with a 128G data rate plus 8 UltraScale ICL ports with 8 x Gen 8) Each provides support for (E, F, D, M, SIM, and EX) Fibre Channel ports using Fibre Channel blades.
Control Processor	Redundant (active/standby) control processor blades
Scalability	Full-fabric architecture of 239 switches
Certified Maximum	6000 active devices per switch; 56 switches, 19 hops in Brocade FOS fabrics; larger fabrics certified as required
Fibre Channel Blades	Brocade FC128-48 port blade provides 48 ports of 128/64/32/16G Fibre Channel and up to 24 ports of 100/50/25/10GbE IP connectivity
Performance	Brocade FC128-48 Port Blade: • Fibre Channel: 112.2Gb/s line speed, full duplex; 57.8Gb/s line speed, full duplex; 28.05Gb/s line speed, full duplex; 14.025Gb/s line speed, full duplex; autosensing of 128, 64, 32, and 16G port speeds depending on SFPs used. • AnyIO Ports: 24 AnyIO ports can be configured as Fibre Channel or IP. Supports 128, 64, 32 and 16G Fibre Channel or 100, 50, 25, and 10GbE IP speeds. The 128G SWL and LWL SFP+ transceivers support 100, 50, 25, and 10GbE speeds. The 64G SWL SFP+ transceiver supports 25GbE and 10GbE speeds.
ISL Trunking	Frame-based trunking with up to eight 128G SFP+ ports per ISL trunk; up to 1024Gb/s per ISL trunk between switches using 128, 64, 32, or 16G ports; Exchange-based load balancing across ISLs with DPS included in Brocade FOS.
Ultrascale ICL Trunking	Dedicated chassis-to-chassis linkage through connectors on the inter-chassis link (ICL) blades, forming trunks from up to four color-coded OSFP ports between two Brocade ICLX8-4 chassis and up to eight color-coded OSFP ports between Brocade ICLX8-8 chassis.
Multichassis with Ultrascale ICL Ports	Up to 4608 Fibre Channel ports; UltraScale ICL ports (16 for 8-slot or 8 per 4-slot chassis, optical OSFP) connect up to 9 chassis in a full-mesh topology or up to 12 chassis in a core-edge topology.
Slot Bandwidth	6144Gb/s providing line-rate performance for the Brocade FC128-48 blade
Maximum Fibre Channel Frame Size	2112-byte payload
Frame Buffers	40,000 per switching ASIC
Classes of Service	Class 2, Class 3, Class F (interswitch frames)
Fibre Channel Ports	FC128-48: F_Port, E_Port, EX_Port, M_Port, SIM, and D_Port ICLX8-8 and ICLX8-4 CR Blades: E_Port, EX_Port, and D_Port Self discovery is based on switch type (U_Port) with an optional port type control.
AnyIO Ports	FC128-48 Port Blade: 24 ports on the blade. Ports 24-47 are Ethernet capable and support Ethernet speeds up to 100GbE. X8-8 Chassis: Up to 192 100GbE Ethernet ports supported with eight FC128-48 port blades X8-4 Chassis: Up to 96 100GbE Ethernet ports supported with four FC128-48 port blades
Ultrascale ICL Ports	Brocade X8 UltraScale ICL ports use OSFP transceivers connected via optical fiber cables. • Brocade X8 Gen 8 ICL port using a 100m OSFP requires MPO-16 fiber cable connectors and MMF cable, limited to 100m at Gen 8 ICL data rate. • Brocade X8 Gen 8 ICL to Brocade X7 Gen 7 ICL requires OSFP-to-2x QSFP breakout cable connectors. Refer to the *Brocade High-Density Cabling Design Guide* for a list of qualified cabling vendors. • Brocade X8 Gen 8 ICL port using a 2-km OSFP requires two SMF LC-LC fiber cable connectors, limited to 2 km at Gen 8 ICL data rate.
Data Traffic Types	Fabric switches supporting unicast
Media Types	Brocade FC128-48 Port Blade: • 128G FC SFP+ LC connector: SWL, LWL, ELWL • 64G FC SFP+ LC connector: SWL, LWL, ELWL Inter-Chassis Link (ICL) Blades, Brocade ICLX8-8 and ICLX8-4: • Gen 8 FC OSFP MMF, OSFP connector: SWL 100m • Gen 8 FC OSFP SMF, LCx2 connector: LWL 2 km Refer to the *Brocade High-Density Cabling Design Guide* for a list of qualified cable vendors. All Brocade transceivers are PC/UPC compatible.
USB	One USB port per control processor for firmware download, SupportSave, and configuration upload or download
Fabric Services	BB Credit Recovery; Brocade Advanced Zoning (Default Zoning, Port/WWN Zoning, Peer Zoning); Congestion Signaling; Dynamic Path Selection (DPS); Extended Fabrics; Fabric Performance Impact Notification (FPIN); Fabric Vision; FDMI; FICON CUP; Flow Vision; F_Port Trunking; FSPF; Integrated Routing; ISL Trunking; Management Server; Name Server; NPIV; NTP v3; Port Decommission/Fencing; QoS; Registered State Change Notification (RSCN); Target-Driven Zoning; Traffic Optimizer; Virtual Fabrics (Logical Switch, Logical Fabric); SAN Fabric Intelligence; VMID+ and AppServer
Long Distance	Fibre Channel, in-flight compression (Brocade LZO) and encryption (AES-GCM-256 encryption on FC ISLs [E_Port]); support for DWDM MAN connectivity

System Architecture (cont.)	
FICON	FICON Logical Switch, FICON CUP, FICON cascading
Unified Storage Fabric (USF)	IP storage support with the IPS logical switch is available on the Brocade X8-8 and X8-4 Directors with the Brocade FC128-48 port blade
Maximum IPS Frame Size	X8 Directors support IPS jumbo frames (9k)
System Components	
Classes of Service	Class 2, Class 3, Class F (interswitch frames)
ANSI Fibre Channel Protocol	FC-PH (Fibre Channel Physical and Signaling Interface standard)
Port-To-Port Latency	Local switching: 580 ns at 128G with dual forward error correction (FEC) Blade-to-blade: 1.74 µs
High Availability	
Architecture	Nonblocking shared memory; passive backplane; redundant active/passive control processor; redundant active/active core switching blades; single chassis ID (CID) card with built in redundancy. Card is not field replaceable.
Chassis Power	Brocade X8-8 • All six 3000W power supplies are required to support N+N redundancy • Chassis ships with Core Processing (CP) and Core Routing (CR) blades only • Offers optional airflow directions: nonport-side intake (NPI) or nonport-side exhaust (NPE) • PSU and fan assemblies with matching airflow direction must be ordered separately Brocade X8-4 • All four 3000W power supplies are required to support N+N redundancy • Chassis ships with Core Processing (CP) and Core Routing (CR) blades only • Offers optional airflow directions: nonport-side intake (NPI or nonport-side exhaust (NPE) • PSU and fans with matching airflow direction must be ordered separately
Cooling	Brocade X8-8 • Requires 3 fan tray assemblies for a 2+1 redundancy. A failure condition is 1 failed fan from any fan tray. • Each assembly contains 4 fans for a total of 12 fans. The system requires 11 of 12 functioning fans for operation in the Brocade X8-8. One fan tray assembly can be hot-swapped and should be replaced immediately in the event of a failure. Brocade X8-4 • Requires 3 fan tray assemblies for a 2+1 redundancy. A failure condition is 1 failed fan from any fan tray. • Each assembly contains 2 fans for a total of 6 fans. The system requires 5 of 6 functioning fans for operation in the Brocade X8-4. One fan assembly can be hot-swapped and should be replaced immediately in the event of a failure.
Airflow	Nonport-side intake (NPI) to port-side exhaust and port-side intake to nonport-side exhaust (NPE) options are available. Airflow directions on PSUs and fan assemblies must match in airflow direction (NPI or NPE).
Solution Availability	Designed to provide 99.999% uptime with nondisruptive capabilities, hot-pluggable components and a no-single-point-of-failure design. • Includes redundant: power supplies, fans, CID cards, processors, core switching, ICL blades, port blades, and optics • Includes online diagnostics and nondisruptive firmware download and activation
Management	
Management	Brocade Web Tools; Brocade SANnav Management Portal and SANnav Global View; command-line interface (CLI); HTTPS; RESTful API; SSH; SNMP v1/v3 (FE MIB, FC Management MIB); trial licenses for add-on capabilities
Security	AES-GCM-256 encryption on FC ISLs (E_Port); Device Connection Control (DCC); DH-CHAP (between switches and end devices); Fabric Configuration Server (FCS); Federated Authentication; FCAP switch authentication; FIPS 140-3 compliant; HTTPS; IP filtering; OpenLDAP; port binding; principle of least privilege architecture; user-defined role-based access control (RBAC); Secure Boot; Secure Copy (SCP); Secure Syslog; SFTP; SSH v2; Switch Binding; TLS v1.3; PQC algorithms; Trusted FOS Certificates (TruFOS); USGv6 compliant
Management Access	1/10Gb/s Ethernet (RJ-45) per control processor; serial console port (RJ-45) and one USB per control processor module; DHCP/DHCPv6; call-home integration enabled through Brocade SANnav Management Portal
Diagnostics	Active Support Connectivity (ASC) and Brocade Support Link (BSL); built-in flow generator; ClearLink optics and cable diagnostics, including link traffic/latency/distance; Fabric Performance Impact Monitoring (FPI); flow mirroring; dual forward error correction (FEC); frame viewer; IO Insight for SCSI and NVMe monitoring; Monitoring and Alerting Policy Suite (MAPS); nondisruptive daemon restart; optics health monitoring; POST and embedded online/offline diagnostics, including environmental monitoring, FCping, and Pathinfo (FC traceroute); power monitoring; RAStrace logging; Rolling Reboot Detection (RRD); SAN Fabric Intelligence (SAN FI); Syslog/Audit Log; VM Insight

Mechanical Specifications	
Enclosure	Brocade X8-8: 14U rack-mountable chassis with 14 blade slots; 27 in. to 31 in. and 22 in. to 27 in. rail kits for the four-post rack Brocade X8-4: 9U rack-mountable chassis with 10 blade slots; 27 in. to 31 in. rail, 22 in. to 27 in. rail kits for the four-post rack
Mounting	Rack-mountable in a standard 19-inch EIA cabinet
Size	Brocade X8-8 Height: 61.8 cm (24.3 in., 14U) Width: 44.2 cm (17.4 in.) Depth: 68.7 cm (27.0 in.) Brocade X8-4 Height: 39.6 cm (15.6 in., 9U) Width: 44.2 cm (17.4 in.) Depth: 68.7 cm (27.0 in.)
System Weight	Brocade X8-8: Empty chassis weight: 99.6 lb; fully loaded chassis weight: 257.5 lb Brocade X8-4: Empty chassis weight: 86.4 lb; fully loaded chassis weight: 183.9 lb
Environment	
Temperature	Operating: 0°C to 40°C (32°F to 104°F) Non-operating: –25°C to 70°C (–13°F to 158°F)
Humidity	Operating: 5% to 93% RH non-condensing at 40°C (104°F) with a maximum gradient of 10% per hour Non-operating: 10% to 93% RH non-condensing at 70°C (158°F)
Altitude	Up to 3000m (9842 ft)
Shock	Operating: 10g, 11 ms, half-sine wave Non-operating: 20g, 11 ms, half-sine wave
Vibration	Operating: 5 Hz to 10 Hz at +5 dB/Oct; 10 Hz to 200 Hz at 0.0005 G2/Hz; 200 Hz to 500 Hz at –5 dB/Oct; scale 0.5 Grms Non-operating: 3 Hz to 10 Hz at +5 dB/Oct; 10 Hz to 200 Hz at 0.0065 G2/Hz; 200 Hz to 500 Hz at –5 dB/Oct; scale 1.12 Grms
Heat Dissipation	Brocade X8-8: 128G SWL 384-port configuration, including ICLs: typical: 13,652 Btu/hr; max.: 24,687 Btu/hr; power consumed: typical: 4000W; max.: 7233W *Note: Input power is at 200 VAC with full PSU redundancy* Brocade X8-4: 128G SWL 192-port configuration, including ICLs: typical: 6641 Btu/hr; max.: 12,190 Btu/hr; power consumed: typical: 1946W; max.: 3571 *Note: Input power is at 200 VAC with full PSU redundancy*
Power	
Supported Power Range	Standard AC power supplies 3000W PSU Input Voltage Standard AC input: Range: 90 VAC to 264 VAC auto-volt; Nominal: 100 VAC to 240 VAC Power: 85 VAC to 132 VAC: 1500W; 180 VAC to 264 VAC: 3000W 80 PLUS Titanium certified
Inrush Current	<50A maximum, peak
Frequency	50 Hz to 60 Hz (Nominal: 50 Hz to 60 Hz)

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X8-Director-PB101 June 16, 2026