802.3bt Ultra PoE 60W 90W Port - Official Technical Overview & Hardware Datasheet

802.3bt ULTRA POWER OVER ETHERNET (UPOE+) PLATFORM OFFICIAL TECHNICAL OVERVIEW & HARDWARE DATASHEET

EXECUTIVE SUMMARY

The evolution of high-power edge devices — from PTZ cameras, 5G small cells, and digital signage to thin clients and LED lighting — demands a new class of Power over Ethernet (PoE) infrastructure. The 802.3bt Ultra PoE 60W / 90W per Port solution redefines the convergence of data and power delivery, providing up to 90W per port over standard Cat6a/Cat7 cabling. This datasheet details the hardware architecture, power budgeting engine, thermal design, and regulatory compliance of the next-generation PoE switching platform designed for smart buildings, industrial IoT, and enterprise campus deployments.



HARDWARE ARCHITECTURE & SILICON

The platform is engineered around a purpose-built PoE Power Sourcing Equipment (PSE) controller ASIC supporting IEEE 802.3bt Type 3 (60W) and Type 4 (90W) standards. Unlike conventional 30W (802.3at) designs, this architecture implements 4-pair simultaneous power delivery over all four twisted pairs of the structured cabling. Key silicon-level features include:

- Dual-signature PD detection for legacy and high-power devices
- Per-port real-time power metering with 1% accuracy
- Fast PoE shutdown and restart for overload protection (<50ms)
- Backward compatibility with 802.3af/at devices

POWER BACKPLANE & REDUNDANCY

The system integrates a hot-swappable power management backplane supporting N+1 power supply unit (PSU) redundancy. Each PSU delivers 1600W DC output, with a total system power budget up to 4800W (expandable). The hardware automatically negotiates per-port power allocation based on LLDP PoE negotiation or manual administrative profiles.

KEY FEATURES & ROUTING LOGIC

- Feature 1: 90W Per Port (Type 4) – Delivers full 90W to Powered Devices (PDs) over 100m distance using 4-pair class 8 configuration.
- Feature 2: Dynamic Power Budgeting – Hardware-based priority slicing (Critical, High, Low) ensures uninterrupted power to mission-critical endpoints during PSU failover or overload.
- Feature 3: Layer 3 PoE-Aware Switching – The forwarding plane integrates PoE state into access control lists (ACLs) and VLAN assignment; ports can be selectively powered down based on time-of-day or traffic inactivity.
- Feature 4: Ultra-Low Latency Forwarding – Sub-2.5µs cut-through switching for data traffic, independent of PoE load.
- Feature 5: Cable Diagnostics & Fault Protection – Hardware performs per-pair resistance and capacitance measurement, detecting cable degradation or short circuits before applying full 90W.

COMPLIANCE & STANDARDS

- IEEE 802.3bt (Type 3 & Type 4)
- IEEE 802.3af / 802.3at (backward compatibility)
- IEC 60950-1 / IEC 62368-1 (Safety)
- EN 55032 Class A (EMC)
- RoHS / REACH (Environmental)
- Energy Efficient Ethernet (EEE) 802.3az
- PoE++ classification signatures for pre-standard high-power devices

TECHNICAL SPECIFICATIONS

- PoE Standard: 802.3bt Type 3 (60W) / Type 4 (90W), 4-pair
- Maximum Per-Port Power: 90W (Class 8) / 60W (Class 6)
- Total PoE Power Budget: 1600W (standard) / 2400W (with second PSU)
- Number of High-Power Ports: 24 or 48 ports (auto-negotiated)
- Switching Fabric: 256 Gbps (non-blocking for 48-port model)
- Forwarding Rate: 190.48 Mpps
- Jumbo Frame: 12KB
- Operating Temperature: -5°C to +55°C (industrial SKU: -40°C to +75°C)
- Acoustic Noise: 45 dBA max @ 25°C ambient

Parameter	Specification
Form Factor	1RU Standard Rack-Mount (19-inch)
Switching Capacity	256 Gbps (non-blocking)
Power Supply	Dual Hot-Swappable Redundant AC (1600W / 2400W) or DC (-48V)
PoE Power Budget	1600W (expandable to 4800W with external power shelf)
Per-Port Max Power	90W (IEEE 802.3bt Type 4 Class 8)
Operating Temperature	-5°C to +55°C (standard) / -40°C to +75°C (industrial SKU)
MTBF (Telcordia SR-332)	280,000 hours @ 25°C

ORDERING SKU INFORMATION

- UPOE-4824BT: 48-port 802.3bt, 4 x 10G SFP+ uplinks, 1600W PSU (standard)

- UPOE-4824BT-HP: 48-port 802.3bt, 4 x 25G SFP28 uplinks, 2400W redundant PSUs, industrial temp

- UPOE-2424BT: 24-port 802.3bt, 4 x 10G SFP+ uplinks, 800W internal PSU

- PSU-1600AC: Spare 1600W AC power supply module (hot-swappable)

- PSU-2400DC: Spare 2400W DC power supply module for telco -48V

environments



LIFECYCLE & MTBF

The hardware design employs derated electrolytic capacitors and active cooling with dual ball-bearing fan trays (field-replaceable). Mean Time Between Failures (MTBF) calculated per Telcordia SR-332:

- 48-port 90W model: 280,000 hours (25°C)
- Industrial -40°C to +75°C model: 210,000 hours

All units include a limited 5-year hardware warranty with advanced replacement option for enterprise customers.

APPLICATION TOPOLOGIES

Ideal for: Smart building LED lighting grids (up to 90W per luminaire), PTZ surveillance with heaters/wipers, 5G small cell remote radios, digital interactive kiosks, and thin client zero-client deployments in healthcare and education.