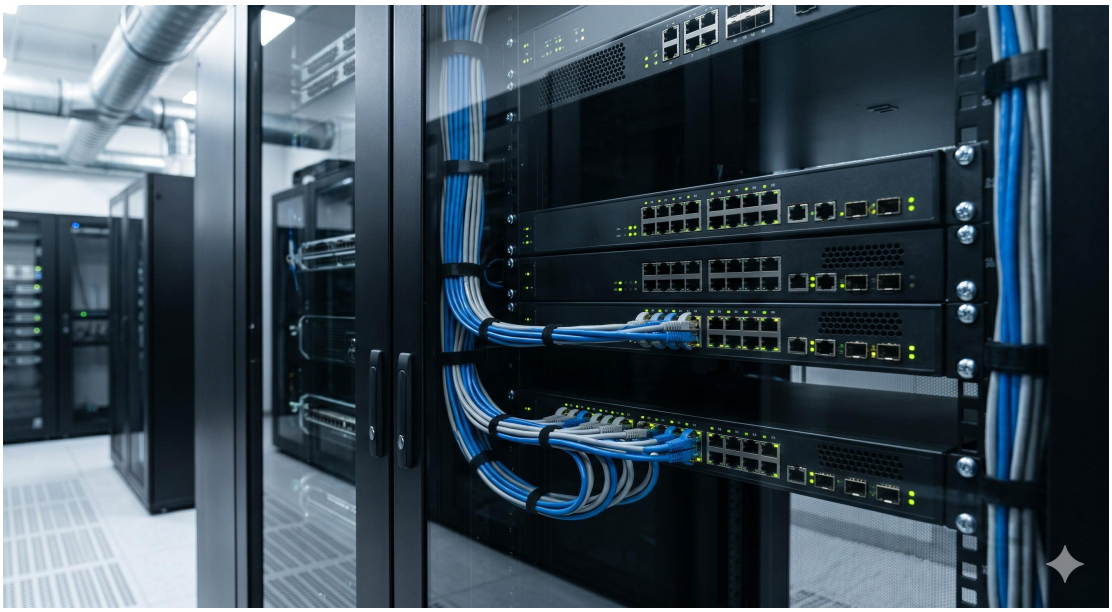
Carrier-Grade Routing Solution Brief: Deploying surge protection 6KV port isolation

CARRIER-GRADE ROUTING SOLUTION BRIEF: DEPLOYING SURGE PROTECTION 6KV PORT ISOLATION

TARGET NETWORK POSITIONING

The ever-increasing density of active Ethernet connections in both access and aggregation layers has exposed a critical vulnerability: conducted surge events propagating through unprotected data interfaces. Designed for telecom central offices, hardened edge aggregation sites, and industrial campus backbones, the Sentinel-6K series integrates per-port 6KV surge protection with galvanic isolation barriers. This platform eliminates the need for external surge suppressor racks, reduces mean-time-to-repair (MTTR), and guarantees service continuity under lightning-induced transients (combination waveform 1.2/50µs – 8/20µs) per IEC 61000-4-5.



HARDWARE-LEVEL FAILOVER REDUNDANCY

Every Sentinel-6K chassis implements a dual-plane power distribution network with hot-swappable AC/DC power supplies (1+1) and N+1 fan tray modules. The port isolation architecture physically separates each Ethernet PHY into independent floating islands, preventing common-mode surge currents from crossing between adjacent ports or propagating into the backplane. Redundant grounding lugs (M6) are provided on the chassis rear, and isolated transient drain paths ensure that 6KV differential and common-mode surges are diverted to earth without affecting neighboring links.

PROTOCOL SUPPORT MATRIX

- Layer 2: 802.1Q VLAN, 802.1ad Q-in-Q, GVRP, MSTP, RSTP

- Layer 3: Static routes, OSPFv2/v3, BGP-4, ISIS, ECMP, VRRP

- MPLS: LDP, MPLS-TP, VPLS, VPWS

- Security: Port-based surge isolation with independent spark gaps, no shared TVS arrays

- Management: SNMPv3, NETCONF, RESTCONF, RADIUS/TACACS+

CORE PARAMETERS

- Surge Protection Rating: ± 6KV (Line-to-Earth) & ± 6KV (Line-to-Line), Combination Wave 1.2/50μs-8/20μs

- Port Isolation Technology: Per-port floating ground plane + gas discharge tube + transient voltage suppression

- Leakage Current: <5μA per port after clamping

- Response Time: <1ns (TVS stage) + <100ns (GDT firing)

- Port-to-Port Insulation Resistance: >10 MΩ at 500VDC

Parameter	**Specification**
Form Factor	1RU Rack-mountable (19-inch EIA standard)
Switching Capacity	128 Gbps (non-blocking)
Power Supply	Dual Hot-Swappable Redundant AC (100-240V, 50/60Hz) or DC (-48V)
Port Configuration	24x Gigabit RJ-45 with 6KV surge protection + 4x 10G SFP+ uplinks

Operating Temperature	-20°C to +70°C (industrial grade)
Ingress Protection	IP40 (front panel), IP30 (overall chassis)
Surge Compliance	IEC 61000-4-5 (6KV), GR-1089-CORE

LIFECYCLE ASSURANCE (MTBF)

Mean Time Between Failures (Telcordia SR-332, Ground Benign, 40°C): 520,000 hours

Mean Time To Repair (MTTR): <30 minutes (hot-swappable power and fan modules)

Surge event endurance: >1,000 strikes at rated 6KV without performance degradation per port

TARGET BACKBONE TOPOLOGIES

- Carrier Ethernet NID (Network Interface Device) with last-mile lightning exposure

- Industrial control networks (IEC 61850 substations) with 6KV isolation between bays

- Outdoor fiber-to-the-home (FTTH) aggregation switches with copper handoff ports

- Military/defense communication shelters requiring per-port transient containment

- Smart city traffic controller cabinets with mixed power and data grounding conditions



DEPLOYMENT NOTE: For installations exceeding 6KV exposure risk (e.g., direct lightning strike zones), external Tier-1 surge suppressors are recommended upstream. Sentinel-6K internal protection is designed for conducted transients entering via data cables up to 20 meters external exposure.