Alcatel-Lucent Enterprise OmniSwitch 6465 GOLDEN RFP

Version 8.9R3

Alcatel·Lucent
Enterprise

Contents

Alcatel-Lucent Enterprise OmniSwitch 6465 – GOLDEN RFP

1. Introduction

The Alcatel-Lucent OmniSwitch 6465 is a family of ruggedized, fully manageable and fan-less Gigabit Ethernet switches. Designed for Industrial Ethernet applications, these hardened ethernet family offers a range of DIN rail and 19" rack mountable switches that are ideal for a wide variety of Industrial applications such as Intelligent Transportation, Railway, smart cities and Utilities.

OS6465-P6   OS6465-P12

OS6465-P28

OS6465 switches are a family of hardened, compact, fan-less gigabit Ethernet switches that have been designed specifically for industrial applications. The switches run on the widely deployed and field proven Alcatel-Lucent Operating system that offers high security, reliability, performance and easy management. These switches are designed to operate in extended temperatures, offer higher EMI/EMC tolerance, a flexible range in power inputs options and high surge protection.

The OS6465 series offers HPoE (60W PoE) providing power to a range of new age devices from PTZ IP cameras on toll booths, LED lights and building management gateways in smart buildings to industrial control systems.

These switches are easy to deploy and offer out-of-the-box plug-and-play, Zero-touch provisioning, network automation and disaster recovery options. These switches support IEEE 1588v2 PTP for the nanosecond-level precision timing requirements of industrial devices and applications. With support for MACsec on all ports, OS6465 enables end-to-end encrypted networks.

The OS6465 family offers advanced system and network level resiliency features and convergence through standardized protocols in a space efficient form factor.

These versatile industrial switches are ideal for deployment in transportation and traffic control systems, utilities, IP surveillance systems and outdoor installations, to name a few.

Designed for Industrial applications
• Operates at a wider temperature range from -40˚C to +75˚C, withstands greater shock, vibrations, surge and EMI/EMC variance
• Redundant power supply inputs with standard 1x 3 terminal block
• Alarm relays to connect external alarm systems
• Compact DIN rail mountable design

Convection cooled fan-less models
• Fan-less operations increases resiliency and maximizes uptime for converged critical networks

Advanced Industrial PoE capabilities with support for HPoE (60 W) on all models
• Enables converged deployments and is ideal for all type of PoE application requirements from outdoor wireless APs, to PTZ surveillance cameras and video displays

Virtual Chassis to connect multiple switches for creating a single chassis-like entity
• Increases system redundancy, resiliency and system scalability while simplifying deployment, operations and management of the network

Hot-swappable, fully redundant power supplies
• Delivers redundant ring topologies using industry standard protocols
• Field upgradable, highly redundant network solution maximizes network uptime

Switch Backup & Restore
• Simplifying switch replacement in field and minimizing network downtime using USB drive. Encryption of USB ensures optimal security.

IEEE 1588v2 PTP support
• Support for peer-to-peer and end-to-end transparent clock provides precise nanosecond time synchronization for devices on industrial networks

Simplified installation and service provisioning
• Out-of-the-box Zero-touch provisioning and network automation with automatic protocol and topology discovery

MACsec Support
• MACsec encryption support provides a secure network access ensuring data confidentiality & integrity

OmniSwitch 6465 Links:
https://www.al-enterprise.com/en/products/switches/omniswitch-6465

2. OmniSwitch 6465 models and chassis components

2.1.OS6465-P6

The switch must support the following characteristics:

2.1.1.	Non-blocking architecture	C/PC/NC
2.1.2.	Fanless	C/PC/NC
2.1.3.	Support of the mounting options: DIN, Wall and Painel	C/PC/NC
2.1.4.	Redundant configuration of AC & DC power supplies	C/PC/NC
2.1.5.	Maximum height of 15 cm (5.9 in)	C/PC/NC
2.1.6.	Maximum width of 8 cm (3.15 in)	C/PC/NC
2.1.7.	Maximum depth (without power supplies) of 15 cm (5.9 in)	C/PC/NC
2.1.8.	Maximum weight (without power supplies) of 2.08 Kg (4.6 lbs)	C/PC/NC
2.1.9.	Minimum of 4 ports 10/100/1000 Base T RJ45	C/PC/NC
2.1.10.	All 10/100/1000 Base T RJ45 ports should support 30W PoE	C/PC/NC
2.1.11.	Minimum of 2 10/100/1000 Base T RJ45 ports should support 60W PoE	C/PC/NC
2.1.12.	Minimum of 2 100/1000 Base-X SFP ports	C/PC/NC
2.1.13.	MACsec on all ports	C/PC/NC
2.1.14.	Minimum support of 1 alarm relay contact (1 in, 1 out)	C/PC/NC
2.1.15.	The above minimum port count requirements cannot be combo ports. All ports must be capable to operate simultaneously	C/PC/NC
2.1.16.	Minimum PoE budget of 150W	C/PC/NC
2.1.17.	1588v2 on all ports	C/PC/NC
2.1.18.	surge protection of 6KV on all copper ports	C/PC/NC
2.1.19.	Stack (virtual chassis) up to 4 elements (manageable with single IP address) with dedicated ports to build stack or virtual chassis	C/PC/NC
2.1.20.	Minimum raw fabric throughput capacity (Gbps): 12 Gbps	C/PC/NC
2.1.21.	Minimum forwarding capacity (Mpps): 8 Mpps	C/PC/NC
2.1.22.	Operating Temperature: -40°C to 75°C (-40°F to 167°F)	C/PC/NC
2.1.23.	Humidity (operation): 5% to 95% non-condensing	C/PC/NC
2.1.24.	Maximum power consumption (idle) of 9.72W	C/PC/NC
2.1.25.	Maximum power consumption (full load) of 15.99W	C/PC/NC
2.1.26.	Minimum MTBF in hours (switch only): 1.452.904	C/PC/NC

2.1.27.	Minimum MTBF in hours (with two power supplies): 401.280	C/PC/NC

2.2. OS6465-P12

The switch must support the following characteristics:

2.2.1.	Non-blocking architecture	C/PC/NC
2.2.2.	Fanless	C/PC/NC
2.2.3.	Redundant configuration of AC & DC power supplies	C/PC/NC
2.2.4.	Support of the mounting options: DIN, Wall and Painel	C/PC/NC
2.2.5.	Maximum height of 15 cm (5.9 in)	C/PC/NC
2.2.6.	Maximum width of 8 cm (3.15 in)	C/PC/NC
2.2.7.	Maximum depth (without power supplies) of 15 cm (5.9 in)	C/PC/NC
2.2.8.	Maximum weight (without power supplies) of 2.13 Kg (4.6 lbs)	C/PC/NC
2.2.9.	Minimum of 8 ports 10/100/1000 Base T RJ45	C/PC/NC
2.2.10.	All 10/100/1000 Base T RJ45 ports should support 30W PoE	C/PC/NC
2.2.11.	Minimum of 4 10/100/1000 Base T RJ45 ports should support 60W PoE	C/PC/NC
2.2.12.	Minimum of 4 100/1000 Base-X SFP ports	C/PC/NC
2.2.13.	MACsec on all ports	C/PC/NC
2.2.14.	Minimum support of 1 alarm relay contact (1 in, 1 out)	C/PC/NC
2.2.15.	The above minimum port count requirements cannot be combo ports. All ports must be capable to operate simultaneously	C/PC/NC
2.2.16.	Minimum PoE budget of 240W	C/PC/NC
2.2.17.	1588v2 on all ports	C/PC/NC
2.2.18.	surge protection of 6KV on all copper ports	C/PC/NC
2.2.19.	Stack (virtual chassis) up to 4 elements (manageable with single IP address) with dedicated ports to build stack or virtual chassis	C/PC/NC
2.2.20.	Minimum raw fabric throughput capacity (Gbps): 24 Gbps	C/PC/NC
2.2.21.	Minimum forwarding capacity (Mpps): 17.9 Mpps	C/PC/NC
2.2.22.	Operating Temperature: -40°C to 75°C (-40ºF to 167ºF)	C/PC/NC
2.2.23.	Humidity (operation): 5% to 95% non-condensing	C/PC/NC
2.2.24.	Maximum power consumption (idle) of 11.79W	C/PC/NC
2.2.25.	Maximum power consumption (full load) of 18.71W	C/PC/NC
2.2.26.	Minimum MTBF in hours (switch only): 1,421,933	C/PC/NC
2.2.27.	Minimum MTBF in hours (with two power supplies): 399.336	C/PC/NC

2.3.OS6465-P28

The switch must support the following characteristics:

2.3.1.	Non-blocking architecture	C/PC/NC
2.3.2.	Fanless	C/PC/NC
2.3.3.	Support of the 19' rack mounting	C/PC/NC
2.3.4.	Redundant configuration of AC & DC power supplies	C/PC/NC
2.3.5.	Maximum height of 4.4 cm (1.73 in)	C/PC/NC
2.3.6.	Maximum width of 44 cm (17.4 in)	C/PC/NC
2.3.7.	Maximum depth of 27 cm (10.62 in)	C/PC/NC
2.3.8.	Maximum weight (without power supplies) of 5.71 Kg (12.6 lbs)	C/PC/NC
2.3.9.	Minimum of 22 ports 10/100/1000 Base T RJ45	C/PC/NC
2.3.10.	All 10/100/1000 Base T RJ45 ports should support 30W PoE+	C/PC/NC
2.3.11.	Minimum of 8 10/100/1000 Base T RJ45 ports should support 60W HPoE	C/PC/NC
2.3.12.	Minimum of 2 100/1000 Base-X SFP ports	C/PC/NC
2.3.13.	Minimum of 4 1/10G SFP+ ports	C/PC/NC
2.3.14.	MACsec on all 10/100/1000Base-T RJ-45 ports	C/PC/NC
2.3.15.	MACsec on all 1/10G SFP+ ports	C/PC/NC
2.3.16.	Minimum support of 1 alarm relay contact (1 in, 1 out)	C/PC/NC
2.3.17.	The above minimum port count requirements cannot be combo ports. All ports must be capable to operate simultaneously	C/PC/NC
2.3.18.	Minimum PoE budget of 285W	C/PC/NC
2.3.19.	1588v2 on all RJ-45 and SFP+ ports	C/PC/NC
2.3.20.	surge protection of 6KV on all copper ports	C/PC/NC
2.3.21.	Stack (virtual chassis) up to 4 elements (manageable with single IP address) with dedicated ports to build stack or virtual chassis	C/PC/NC
2.3.22.	Minimum raw fabric throughput capacity (Gbps): 128 Gbps	C/PC/NC
2.3.23.	Minimum forwarding capacity (Mpps): 95.3 Mpps	C/PC/NC
2.3.24.	Operating Temperature: -40°C to 75°C (-40°F to 167°F)	C/PC/NC
2.3.25.	Humidity (operation): 5% to 95% non-condensing	C/PC/NC
2.3.26.	Maximum power consumption (idle) of 29W	C/PC/NC
2.3.27.	Maximum power consumption (full load) of 32.19W	C/PC/NC
2.3.28.	Minimum MTBF in hours (switch only): 2.103.668	C/PC/NC
2.3.29.	Minimum MTBF in hours (with two power supplies): 1.136.119	C/PC/NC

3. Resiliency and high availability functionalities

The switch must support the following

3.1.	Unified management & control	C/PC/NC
3.2.	Virtual chassis technology	C/PC/NC
3.3.	Virtual Chassis 1+N redundant supervisor manager	C/PC/NC
3.4.	Remote Virtual Chassis connection	C/PC/NC
3.5.	IEEE 802.1s Multiple Spanning Tree Protocol (MSTP) encompasses IEEE 802.1D Spanning Tree Protocol (STP) and IEEE 802.1w Rapid Spanning Tree Protocol (RSTP)	C/PC/NC
3.6.	Per-VLAN spanning tree (PVST+)	C/PC/NC
3.7.	1x1 STP mode	C/PC/NC
3.8.	IEEE 802.3ad/802.1AX Link Aggregation Control Protocol (LACP) and static LAG groups across modules	C/PC/NC
3.9.	Dual-home link support for sub-second link protection, without STP	C/PC/NC
3.10.	Virtual Router Redundancy Protocol (VRRP) with tracking capabilities	C/PC/NC
3.11.	IEEE protocol auto-discovery	C/PC/NC
3.12.	Redundant and hot-swappable power supplies	C/PC/NC
3.13.	Built-in CPU protection against malicious attacks	C/PC/NC
3.14.	ITU-T G.8032/Y1344 2010: Ethernet Ring Protection	C/PC/NC

4. Layer-3 IPv4 routing protocols and features

The switch must support the following:

4.1.	Static routing	C/PC/NC
4.2.	Up to 256 IPv4 static routes	C/PC/NC
4.3.	Routing Information Protocol (RIP) v1 and v2	C/PC/NC
4.4.	Virtual Router Redundancy Protocol (VRRPv2)	C/PC/NC
4.5.	DHCP relay (including generic UDP relay)	C/PC/NC
4.6.	Address Resolution Protocol (ARP)	C/PC/NC
4.7.	Policy-based routing and server load balancing	C/PC/NC
4.8.	DHCP V4 server	C/PC/NC

5. Layer-3 IPv6 routing protocols and features

The switch must support the following:

5.1.	Internet Control Message Protocol version 6 (ICMPv6)	C / PC / NC
5.2.	Up to and 32 IPv6 static routes	C / PC / NC
5.3.	Static routing	C / PC / NC
5.4.	Virtual Router Redundancy Protocol version 3 (VRRPv3)	C / PC / NC
5.5.	Policy-based routing and server load balancing	C / PC / NC
5.6.	DHCPv6 server	C / PC / NC

6. IPv4/IPv6 multicast protocols and features

The switch must support the following:

6.1.	IGMPv1/v2/v3 snooping and Multicast Listener Discovery (MLD) v1/v2 for fast client joins and leaves of multicast streams and limit bandwidth-intensive video traffic to only the requestors	C / PC / NC

7. Layer-2 switching and services

The switch must support the following:

7.1.	Up to 16k MAC addresses	C / PC / NC
7.2.	Total number of IPv4 routes: 128	C / PC / NC
7.3.	Number of VLANs: 4,000	C / PC / NC
7.4.	Jumbo frame size: 9216 bytes (for 1 Gb/s)	C / PC / NC
7.5.	Ethernet services support using IEEE 802.1ad Provider Bridges (also known as Q-in-Q or VLAN stacking)	C / PC / NC
7.6.	Ethernet OAM (802.1ag): Connectivity Fault Management (L2 ping & Link trace)	C / PC / NC
7.7.	Ethernet in First mile: Link OAM (802.3ah)	C / PC / NC
7.8.	Ethernet network-to-network interface (NNI) and user network interface (UNI)	C / PC / NC
7.9.	Service VLAN (SVLAN) and Customer VLAN (CVLAN) support	C / PC / NC

7.10.	Service Access Point (SAP) profile identification (ID) defining values for ingress bandwidth sharing, rate limiting, CVLAN tag processing (translate or preserve), and priority mapping (inner to outer tag or fixed value).	C/PC/NC
7.11.	VLAN translation and mapping including CVLAN to SVLAN	C/PC/NC
7.12.	Port Mapping controlling communication between peer users	C/PC/NC
7.13.	DHCP Option 82: Configurable relay agent information	C/PC/NC
7.14.	Multiple VLAN Registration Protocol (MVRP)	C/PC/NC
7.15.	High Availability (HA) -VLAN allowing for sending traffic to send traffic intended for a single destination MAC address to multiple switch ports for Layer 2 clusters such as MS-NLB and active-active Firewall clusters	C/PC/NC
7.16.	Jumbo frame	C/PC/NC
7.17.	Bridge Protocol Data Unit (BPDU) blocking	C/PC/NC
7.18.	STP Root Guard	C/PC/NC
7.19.	Customer Provider Edge (CPE) test head traffic generator and analyzer tool	C/PC/NC
7.20.	TR-101 Point-to-Point Protocol over Ethernet (PPPoE) Intermediate Agent allowing for the PPPoE network access method	C/PC/NC
7.21.	IEC 62439- Media Redundancy Protocol (MRP)	C/PC/NC
7.22.	MRP - Media redundancy Interconnection Manager (MIM)	C/PC/NC
7.23.	IP Multicast VLAN (IPMV): Support the creation of separate dedicated VLANs built specifically for multicast traffic distribution.	C/PC/NC

8. Security features

The switch must support the following:

8.1.	Autosensing IEEE 802.1X multiclient, multi-VLAN support	C/PC/NC
8.2.	MAC-based authentication for non-IEEE 802.1X hosts	C/PC/NC
8.3.	Web based authentication (captive portal): a customizable web portal residing on the switch	C/PC/NC
8.4.	Dynamically providing pre-defined policy configuration to authenticated clients — VLAN, ACL, BW	C/PC/NC
8.5.	Secure Shell (SSH) with public key infrastructure (PKI) support	C/PC/NC
8.6.	Terminal Access Controller Access- Control System Plus (TACACS+) client	C/PC/NC
8.7.	Centralized Remote Access Dial- In User Service (RADIUS) and Lightweight Directory Access Protocol (LDAP) administrator authentication	C/PC/NC

8.8.	Centralized RADIUS for device authentication and network access control authorization	C/PC/NC
8.9.	Learned Port Security (LPS) or MAC address lockdown	C/PC/NC
8.10.	Access Control Lists (ACLs); flow based filtering in hardware (Layer 1 to Layer 4)	C/PC/NC
8.11.	DHCP Snooping, DHCP IP and Address Resolution Protocol (ARP) spoof protection	C/PC/NC
8.12.	ARP poisoning detection	C/PC/NC
8.13.	IP Source Filtering as a protective and effective mechanism against ARP attacks	C/PC/NC
8.14.	Dynamic ARP Inspection is implemented by combining both DHCP snooping and IP source filtering capabilities	C/PC/NC
8.15.	Role-based authentication for routed domains	C/PC/NC
8.16.	The minimum password size range is 1-30 characters.	C/PC/NC
8.17.	Allows the switch to be authenticated as a supplicant device using X.509 certificates.	C/PC/NC

9. Quality of Service (QoS) features

The switch must support the following:

9.1.	Eight hardware based queues per port for flexible QoS management	C/PC/NC
9.2.	Flow-based QoS	C/PC/NC
9.3.	Flow-based traffic policing and bandwidth management	C/PC/NC
9.4.	32-bit IPv4/128-bit IPv6 non contiguous mask classification	C/PC/NC
9.5.	Egress traffic shaping	C/PC/NC
9.6.	DiffServ architecture	C/PC/NC
9.7.	Support for end- to-end head-of-line (E2EHOL) blocking prevention congestion avoidance	C/PC/NC
9.8.	EEE 802.3x Flow Control (FC)	C/PC/NC
9.9.	IEEE 802.1Qbb Priority-based Flow Control (PFC)	C/PC/NC
9.10.	Auto QoS for Generic Object-Oriented Substation Events (GOOSE) messages	C/PC/NC

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10. Manageability and configuration features

The switch must support the following:

10.1.	Intuitive CLI in a scriptable Python & BASH environment via console, Telnet or Secure Shell (SSH) v2 over IPv4/IPv6	C/PC/NC
10.2.	Powerful WebView Graphical Web Interface via HTTP and HTTPS over IPv4/IPv6	C/PC/NC
10.3.	This feature allows for a USB-to-Ethernet interface for switches that lack an OOB management port. This interface is treated just like an OOB interface. All functions and CLIs related to an OOB management port are applicable to the USB-to-Ethernet dongle.	C/PC/NC
10.4.	This feature allows for applying an ACL on the EMP port of the switch. It enables policy-based routing on the EMP ports. The configuration is enabled using the empacl policy-list type.	C/PC/NC
10.5.	Network Automation and Programmability Abstraction Layer with Multivendor (NAPALM) support	C/PC/NC
10.6.	Fully programmable RESTful web services interface with XML and JSON support. API enables access to CLI and individual MIB objects	C/PC/NC
10.7.	Full configuration and reporting using SNMPv1/2/3 to facilitate third party network management over IPv4/IPv6	C/PC/NC
10.8.	File upload using USB, TFTP, FTP, SFTP or SCP using IPv4/IPv6	C/PC/NC
10.9.	Human-readable ASCII-based configuration files for off-line editing, bulk configuration and out-of-the-box auto-provisioning	C/PC/NC
10.10.	Non-volatile memory for start-up configuration	C/PC/NC
10.11.	Multiple microcode image support with fallback recovery	C/PC/NC
10.12.	Dynamic Host Configuration Protocol (DHCP) relay for IPv4/IPv6	C/PC/NC
10.13.	IEEE 802.1AB Link Layer Discover Protocol (LLDP) with Media Endpoint Discover (MED) extensions	C/PC/NC
10.14.	Network Time Protocol (NTP)	C/PC/NC
10.15.	Boot from USB and/or external flash	C/PC/NC
10.16.	The equipment can work in a"thin client" mode. In this mode no configuration can be saved in the "Running" directory of the switch. A basic configuration with minimal network reachability configuration is stored on the switch running directory. The final configuration of a thin client is pushed by a Network Management System (NMS).	C/PC/NC
10.17.	Must support hitless upgrade of IP services	C/PC/NC

11. Monitoring and troubleshooting features

The switch must support the following

11.1.	Local (on the flash) and remote server logging (Syslog): event and command logging	C/PC/NC
11.2.	IP tools: ping and trace route	C/PC/NC
11.3.	Dying Gasp support via SNMP and syslog messages	C/PC/NC
11.4.	Loopback IP address support for management per service	C/PC/NC
11.5.	Policy- and port-based mirroring	C/PC/NC
11.6.	Remote port mirroring	C/PC/NC
11.7.	sFlow v5 and Remote Monitoring (RMON)	C/PC/NC
11.8.	Unidirectional Link Detection (UDLD), Digital Diagnostic Monitoring (DDM)	C/PC/NC

12. Compliance and certifications

12.1. Industrial environmental:

The switch must support the following

12.1.1.	IEC 60870-2-2 (operational temperature)	C/PC/NC
12.1.2.	IEC 60068-2-1 (temperature type test – cold)	C/PC/NC
12.1.3.	IEC 60068-2-2 (temperature type test – hot)	C/PC/NC
12.1.4.	IEC 60721-3-1: Class 1K5 (storage temperature)	C/PC/NC
12.1.5.	IEC 60068-2-30: 5% to 95% non-condensing humidity	C/PC/NC
12.1.6.	IEC 60255-21-2 (mechanical shock)	C/PC/NC
12.1.7.	IEC 60255-21-1 (vibration)	C/PC/NC

12.2. Industrial safety:

The switch must support the following

12.2.1.	UL 508	C/PC/NC
12.2.2.	UL 61010	C/PC/NC

12.2.3.	EN 50021	C/PC/NC
12.2.4.	Hazardous location - ISA 12.12.01 (UL 1604)	C/PC/NC
12.2.5.	Hazardous location - CSA22.2/213	C/PC/NC
12.2.6.	IP30	C/PC/NC

12.3. Industrial emission:

The switch must support the following

12.3.1.	EN 61805-3	C/PC/NC
12.3.2.	EN 55032 (Emission Standard)	C/PC/NC
12.3.3.	EN 61000-3-2	C/PC/NC
12.3.4.	EN 61000-3-3	C/PC/NC
12.3.5.	EN 55024/EN 55035 (Immunity Standard)	C/PC/NC
12.3.6.	EN 61000-4-2 to EN 61000-4-8	C/PC/NC
12.3.7.	EN 61000-4-11	C/PC/NC
12.3.8.	EN 61000-4-12	C/PC/NC
12.3.9.	EN 61000-4-16	C/PC/NC
12.3.10.	EN 61000-4-17	C/PC/NC
12.3.11.	EN 61000-4-29	C/PC/NC
12.3.12.	IEC 60255-5	C/PC/NC
12.3.13.	IEEE 61850-3	C/PC/NC

12.4. Electrical Power Substation

The switch must support the following

12.4.1.	IEEE 1613, Section 4 to 8	C/PC/NC
12.4.2.	IEC 61850-3	C/PC/NC

12.5. Railway Substation

The switch must support the following

12.5.1.	EN 50121 - 4	C/PC/NC
12.5.2.	EN 50155:2017	C/PC/NC
12.5.3.	EN 61373	C/PC/NC
12.5.4.	EN 62236-4	C/PC/NC
12.5.5.	EN61000-6-4	C/PC/NC
12.5.6.	EN61000-6-2	C/PC/NC

12.6.   Intelligent transportation (road)

The switch must support the following

12.6.1.	NEMA TS - 2	C/PC/NC

12.7.   Marine

The switch must support the following

12.7.1.	DNVGL-CG-0339	C/PC/NC
12.7.2.	IEC 60945:2002	C/PC/NC

12.8.   Federal

The switch must support the following

12.8.1.	Trade Agreements Act (TAA)	C/PC/NC

12.9.   Commercail EMI/EMC

The switch must support the following

12.9.1.	47 CRF FCC Part 15: 2015 Subpart B (Class A)VCCI (Class A, with UTP Cables)	C/PC/NC
12.9.2.	ICES–003:2012 Issue 5, Class A	C/PC/NC
12.9.3.	AS/NZS 3548 (Class A) – C-Tick	C/PC/NC

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12.9.4.	CE marking for European countries (Class A)	C/PC/NC

12.10. CE Emission

The switch must support the following

12.10.1.	EN50581 (RoHS Recast)	C/PC/NC
12.10.2.	EN 55032 (EMI & EMC requirement)	C/PC/NC
12.10.3.	EN 55024 (Immunity Characteristics	C/PC/NC
12.10.4.	EN 61000-3-2(Harmonic Current emissions)	C/PC/NC
12.10.5.	EN 61000-3-3	C/PC/NC
12.10.6.	EN 61000-4-2	C/PC/NC
12.10.7.	EN 61000-4-3	C/PC/NC
12.10.8.	EN 61000-4-4	C/PC/NC
12.10.9.	EN 61000-4-5 (Surge Immunity, Class 4)	C/PC/NC
12.10.10	EN 61000-4-6	C/PC/NC
12.10.11	EN 61000-4-8	C/PC/NC
12.10.12	EN 61000-4-9	C/PC/NC
12.10.13	EN 61000-4-11	C/PC/NC
12.10.14	IEEE802.3: Hi-pot Test (2.25 KV DC on all Ethernet Ports)	C/PC/NC

12.11. CE Commercial safety

The switch must support the following

12.11.1.	UL 60950-1, 2nd Ed	C/PC/NC
12.11.2.	IEC 60950-1; all national deviations and amendments	C/PC/NC
12.11.3.	EN 60950-1; all deviations	C/PC/NC
12.11.4.	CAN/CSA-C22.2 No. 60950-1-03	C/PC/NC
12.11.5.	NOM-019 SCFI, Mexico	C/PC/NC
12.11.6.	AS/NZ TS-001 and 60950:2000, Australia	C/PC/NC
12.11.7.	UL-AR, Argentina	C/PC/NC
12.11.8.	UL-GS Mark, Germany	C/PC/NC

12.11.9.	ANATEL, Brazil	C/PC/NC
12.11.10	CCC, China	C/PC/NC
12.11.11	KCC Korea	C/PC/NC
12.11.12	BSMI, Taiwan	C/PC/NC
12.11.13	EN 60825-1 Laser	C/PC/NC
12.11.14	EN 60825-2 Laser	C/PC/NC
12.11.15	CDRH Laser	C/PC/NC
12.11.16	RoHS & WEEE directives compliant	C/PC/NC
12.11.17	REACH directive	C/PC/NC

12.12.   Security features

The switch must support the following:

12.12.1.	The switch proposed must possess a Common Criteria certification, ensuring compliance with internationally recognized security standards.	C/PC/NC
12.12.2.	The switch proposed must hold a valid Federal Information Processing Standards (FIPS) certification, meeting the designated FIPS publication 140-2.	C/PC/NC

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12.13.   Video surveillance

The switch must support the following:

12.13.1.	The switch support plugins that enable remote troubleshooting for common camera issues directly from the video surveillance management system.	C/PC/NC

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