

# Alcatel-Lucent OmniSwitch 6865

## Hardened Ethernet switches

The Alcatel-Lucent OmniSwitch 6865® is a family of ruggedized, advanced Layer 3, scalable Ethernet switches, designed to operate reliably in the harshest industrial environments and severe temperatures.



**OS6865-U12X**



**OS6865-P16X**



**OS6865-U28X**

OS6865 switches are rugged, high bandwidth switches that are ideal for industrial and mission-critical applications that require wider operating temperature ranges, stringent EMC/EMI requirements and an optimized feature set for high security, reliability, performance and easy management. These switches run on the widely deployed and field-proven Alcatel-Lucent Operating system offering SPB-M based VPNs and other advanced routing and switching capabilities.

The OS6865 series offers a unique mix of features to cater to the Hardened Ethernet applications such as IEEE 1588v2 PTP capabilities for timing requirements of industrial devices, HPoE for (75W PoE) for those power hungry devices on the

access network, SPB-M for fast, cost-efficient roll-out of VPN services on the edge and a comprehensive suite of security features to secure the network edge. These switches are easy to deploy with Alcatel Lucent's award winning Intelligent-Fabric technology which offers out-of-the-box plug-and-play, Zero-touch provisioning and network automation. The OS6865 family offers advanced system and network level resiliency features and convergence through standardized protocols.

These versatile industrial switches are ideal for deployment in transportation and traffic control systems, power utilities, video surveillance systems and outdoor installations.

FEATURES	BENEFITS
<ul style="list-style-type: none"> <li>Resilient ruggedized hardware design</li> </ul>	<ul style="list-style-type: none"> <li>Operates at a wider temperature range from -40°C to +74°C, withstands greater shock, vibrations, temperature and EMI/EMC variance</li> </ul>
<ul style="list-style-type: none"> <li>Convection cooled fan-less models</li> </ul>	<ul style="list-style-type: none"> <li>Fan-less operations increases resiliency and maximizes uptime for converged mission-critical networks</li> </ul>
<ul style="list-style-type: none"> <li>Advanced Industrial PoE capabilities with support for HPoE (75 W)</li> </ul>	<ul style="list-style-type: none"> <li>Enables converged deployments and is ideal for all type of PoE application requirements from outdoor wireless APs, to PTZ surveillance cameras and video displays</li> </ul>
<ul style="list-style-type: none"> <li>IEEE 1588v2 PTP support</li> </ul>	<ul style="list-style-type: none"> <li>Provides precise sub-microsecond time synchronization for slave devices</li> </ul>
<ul style="list-style-type: none"> <li>SPB-M Support for Scalable network virtualization architecture over standard Ethernet fabric</li> </ul>	<ul style="list-style-type: none"> <li>Optimizes/simplifies Layer 2 and Layer 3 network designs and reduces administration overhead</li> </ul>
<ul style="list-style-type: none"> <li>Virtual Chassis technology, to connect multiple switches to create a single chassis-like entity</li> <li>Auto-fabric technology to simplify installation and service provisioning</li> </ul>	<ul style="list-style-type: none"> <li>Increases system redundancy, resiliency and high availability while simplifying deployment, operations and management of the network</li> <li>Enables Zero-touch provisioning and network automation with auto-matic protocol and topology discovery</li> <li>Prevent human mistakes by automating standardized and replicable configurations</li> </ul>
<ul style="list-style-type: none"> <li>Built in resiliency &amp; redundancy</li> <li>Hot-swappable, fully redundant power supplies</li> <li>Delivers redundant ring topologies using industry standard protocols</li> </ul>	<ul style="list-style-type: none"> <li>Field upgradable, highly redundant network solution maximizes network uptime</li> </ul>
<ul style="list-style-type: none"> <li>SDN Ready <ul style="list-style-type: none"> <li>OpenFlow and OpenStack support</li> <li>Supports RESTful APIs commands &amp; MIBs</li> <li>Embedded scripting capabilities</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>The support of SDN allows creation of specialized services which ensures that your investment is ready for the future and enables interoperability with third-party solutions</li> <li>REST APIs provides access to all AOS CLI and with advanced embedded scripting capabilities using Python and Bash, it enables fast deployment of new network services and be able to continuously adopt new applications to support the business</li> </ul>

## Alcatel-Lucent OmniSwitch 6865 models

The OmniSwitch 6865 offers customers Gigabit fixed-configuration switches with up to 75 watts of PoE per port and power supply options that accommodate the most demanding requirements. The switches can be mounted on wall/panel or a 19-inch rack.

All the models have built-in 10 Gigabit SFP+ ports that support 10 Gigabits and 1000-X, a USB port and a console port.

All the models of OS6865 family support 4 ports of 75W PoE. OS6865-U28X model also provides dedicated 20G Virtual chassis ports. OS6865 switches offer a surge protection of 6KV on all copper ports.

OmniSwitch 6865 switches can form a Virtual Chassis between any models creating a single chassis-like entity using 10G SFP+ ports. Up to 8 switches can be connected in a Virtual Chassis configuration OS6865-U28X also has dedicated QSFP+ Virtual Chassis ports in rear.

	GIGABIT PORTS (RJ45)	SFP PORTS	1G/10G SFP+ PORTS	75W HPOE/ POE+ PORTS	DESCRIPTION
OS6865-P16X	12	2	2	4/8	Fixed-configuration hardened fan-less half-rack width 2RU chassis with twelve 10/100/1000 Base-T PoE+ ports, four of which can support 75W HPoE, two 1000 Base-X SFP ports and two fixed SFP+ (1G/10G) ports
OS6865-U12X	4	6	2	4/-	Fixed-configuration hardened fan-less half-rack width 2RU chassis with four 100/1000 Base-X SFP, two 1000 Base-X SFP, two fixed SFP+ (1G/10G) ports and four 10/100/1000 Base-T 75W HPoE ports.
OS6865-U28X	4	20	4	4/-	Fixed-configuration hardened fan-less full-rack width 1RU chassis with twenty 100/1000 Base-X SFP, four fixed SFP+ (1G/10G) ports, four 10/100/1000 Base-T 75W HPoE ports and two 20G VFL QSFP+ ports.

## Technical specifications

### OmniSwitch 6865 models

PRODUCT MATRIX	OS6865-P16X	OS6865-U12X	OS6865-U28X
Operating temperature*	-40°C to 74°C (-40°F to 165°F)	-40°C to 74°C (-40°F to 165°F)	-40°C to 74°C (-40°F to 165°F)
Fans	0	0	0
File system flash	2 GB	2 GB	2 GB
RAM	2 GB	2 GB	2 GB
Altitude	13,000 ft	13,000 ft	13,000 ft
Storage temperature	-40°C to 85°C (-40°F to 185°F)	-40°C to 85°C (-40°F to 185°F)	-40°C to 85°C (-40°F to 185°F)
Humidity (operating & storage)	5% to 95% non-condensing	5% to 95% non-condensing	5% to 95% non-condensing
USB port	1	1	1
Console port	1	1	1
Max raw fabric capacity	224 Gb/s	224 Gb/s	224 Gb/s
Switching capacity	68 Gb/s	60 Gb/s	208 Gb/s
Weight (no PS attached)	5.07 kg (11.18 lb)	5.17 Kg (11.40lb)	6.28 Kg (13.85 lbs)
Height	8.81 cm (3.47 in)	8.81 cm (3.47 in)	4.39cm (1.73 in)
Width	21.56 cm (8.49 in)	21.56 cm (8.49 in)	43.99 cm (17.32 in)
Depth (no PS attached)	26 cm (10.24 in)	26 cm (10.24 in)	27 cm (10.63 in)
1588v2 Capable Ports	16	12	28
20G QSFP+ VFL ports	0	0	2
Maximum PoE Budget**	300 W	300 W	280 W
Installation Options	DIN/wall/panel, 19" rack	DIN/wall/panel, 19" rack	19" rack
Power Consumption (idle)***	30 W	29 W	49.6 W
Power Consumption (full load)***	45 W	35.9 W	75.9 W
Heat Dissipation (BTU/hr)***	102.3	98.9	170.6
Maximum surge protection on ports****	6 KV	6 KV	6 KV
MTBF (with 1 AC power supply)	767,181 h	827, 848 h	709,199 h
MTBF (with 2 AC power supply)	1,044,414 h	1,141,692 h	952,763 h

\* With airflow. In a sealed enclosure, without airflow, -40°C to +65 °C

\*\* With 2 x AC or 2 x DC (48 V input) power supplies operating at -40°C to 60°C. Please refer to HW user's guide for more information on PoE budget.

\*\*\* Power consumption measured at 120 VAC input. Full L2 traffic load measurement does not include PoE power consumption. Heat dissipation measured at idle:

1 watt = 3.41214 BTU/h

\*\*\*\* On copper ports

### Power supplies

OmniSwitch 6865 supports 1+1 redundant, hot-swappable fan-less power supplies. It also supports power load-sharing between the primary and backup power supplies

to provide extended PoE budgets. There is no interruption of service when a new power supply is installed or an existing one replaced. The power supplies can be installed directly at the back of the switch or

can be connected with a cable (included) and mounted independently using a Power tray. In a redundant configuration, power supplies can be installed in any manner AC+AC, AC+DC or DC+DC.

PS MODELS	OS6865-BP	OS6865-BP-D
Description	Modular AC power supply. Provides up to 180 W of system & PoE power to one OS6865 switch	Modular DC power supply. Provides up to 180 W (48 V input)/140 W (24 V input) of system and PoE power to one OS6865 switch
Dimensions (H x W x L)	5.1 cm x 9.5 cm x 18.1 cm (2 in x 3.74 in x 7.12 in)	5.1 cm x 9.5 cm x 18.1 cm (2 in x 3.74 in x 7.12 in)
Weight	1.42 Kg (3.14 lbs)	1.42 Kg (3.14 lbs)
Input voltage	100 VAC to 240 VAC	-20 VDC to -72 VDC
Input Current	3A/100 V to 127 VAC 1.5A/200 V to 240 VAC	9A/-20 V to -28 VDC 6A/-36 V to -72 VDC
Max output power/current	180 W/3.22A	180 W/3.22A @ -36 to -72 VDC Input 140 W/2.5 A @ -20 to -28 VDC Input
Surge Protection	4 KV (Surge level 4)	4 KV (Surge level 4)
Fans	0	0

## Product specifications and measurements

### Per-port LEDs

- Non-PoE ports - green: link/activity
- PoE ports - amber: link/activity

### System LEDs

- OK: green/amber operational status of the switch
- VC: green/amber master or slave role in VC configuration. Number of blinks between each solid color state indicates chassis-id
- PS1: Green/Amber - status for the primary power supply
- PS2: Green/Amber - status for the backup power supply

### Scalability numbers and speeds

- Wire rate at layer 2 and layer 3 on all ports
- Virtual Fabric Link (VFL) ports raw capacity: 42 Gb/s or 84 Gb/s aggregate
- Jumbo frame size: 9 216 bytes (for 1/10 Gb/s)
- Total number of MAC addresses: 48,000
- Total number of IPv4 routes: 64,000
- Number of VLANs: 4,000

### Virtual Chassis

- Number of units in a VC: 2. Scalable up to 8 in future.
- DAC cables for VC connection: 40 cm, 1m, 3m

## Compliance and certifications

### Commercial Safety

- UL 60950-1, 2nd Ed.
- IEC 60950-1; all national deviations and amendments
- EN 60950-1; all deviations
- CAN/CSA-C22.2 No. 60950-1-03
- NOM-019 SCFI, Mexico
- AS/NZ TS-001 and 60950:2000, Australia
- UL-AR, Argentina
- UL-GS Mark, Germany
- CU, EAC, Russia
- ANATEL, Brazil
- CCC, China
- KCC Korea
- BSMI, Taiwan
- EN 60825-1 Laser
- EN 60825-2 Laser
- CDRH Laser
- RoHS & WEEE directives compliant

### Commercial EMI/EMC

- 47 CRF FCC Part 15: 2015 Subpart B (Class A) VCCI (Class A, with UTP Cables)
- ICES-003:2012 Issue 5, Class A
- AS/NZS 3548 (Class A) - C-Tick
- CE marking for European countries (Class A)
- CE Emission
  - EN50581 (RoHS Recast)
  - EN 55022 (EMI & EMC requirement)
  - EN 55024 (Immunity Characteristics)
  - EN 61000-3-2 (Harmonic Current emissions)
  - EN 61000-3-3
  - EN 61000-4-2
  - EN 61000-4-3
  - EN 61000-4-4
  - EN 61000-4-5 (Surge Immunity, Class 4)
  - EN 61000-4-6
  - EN 61000-4-8
  - EN 61000-4-11
- IEEE802.3: Hi-pot Test (2.25 KV DC on all Ethernet Ports)

### Industrial

#### Industrial Environmental

- IEC 60870-2-2 (operational temperature)
- IEC 60068-2-1 (temperature type test - cold)
- IEC 60068-2-2 (temperature type test - hot)
- IEC 60721-3-1: Class 1K5 (storage temperature)
- IEC 60068-2-30: 5% to 95% non-condensing humidity
- IEC 60255-21-2 (mechanical shock)
- IEC 60255-21-1 (vibration)

#### Industrial Safety

- UL 508
- UL 61010
- EN 50021
- Hazardous Location
  - ISA 12.12.01/UL 1604
  - CSA22.2/213
- IP30

#### Industrial Emission

- EN 61805-3
- EN 55032 (Emission Standard)
- EN 61000-3-2
- EN 61000-3-3
- EN 55024 (Immunity Standard)
- EN 61000-4-2 to EN 61000-4-8
- EN 61000-4-11
- EN 61000-4-12
- EN 61000-4-16

- EN 61000-4-17
- EN 61000-4-29
- IEC 60255-5
- IEEE 1613

#### Industry Specific Electric Power Substation

- IEEE 1613, Section 4 to 8
- IEC 61850-3

#### Railway Applications

- EN 50121-4
- EN 62236-4
- EN 61000-6-4

#### Intelligent Transportation (Road)

- NEMA TS-2

#### Marine\*

- DNV 2.4\*
- IEC 60945

#### Federal certifications

- FIPS 140-2
- Common Criteria EAL2
- Common Criteria NDcPP
- JITC

\* In Process. Contact for availability

## Detailed product features

### Simplified manageability and configuration

- Zero-touch provisioning and network automation. Out-of-the box plug-and-play Auto-Fabric for automated discovery of configuration server, topology & protocols and automated switch configuration. Works with any non-Alcatel-Lucent device that supports Shortest Path Bridging-MAC, SPBM), 802.1ak (MVRP), 802.3ad/802.1AX (Link Aggregation Control Protocol, LACP)
- Intuitive CLI in a scriptable Python & BASH environment via console, Telnet or Secure Shell (SSH) v2 over IPv4/IPv6
- Powerful WebView Graphical Web Interface via HTTP and HTTPS over IPv4/IPv6
- Fully programmable RESTful web services interface with XML and JSON support. API enables access to CLI and individual mib objects
- Supported by ProActive Lifecycle Manager (PALM) which quickly and easily generates an inventory list of Alcatel-Lucent Enterprise Wi-Fi and LAN switching products on your network, provides status in terms of software lifecycle, hardware lifecycle, warranty, and support status. Current maintenance release, recommended replacement for EOL products, and latest release notes are available as well through an easy-to-use web interface
- Integrated with Alcatel-Lucent OmniVista® products for network management

- Full configuration and reporting using SNMPv1/2/3 to facilitate third-party network management over IPv4/IPv6
- Integrated with Nokia 5620 Service Aware Manager (SAM) ® application for network management.
- File upload using USB, TFTP, FTP, SFTP or SCP using IPv4/IPv6
- Human-readable ASCII-based configuration files for off-line editing, bulk configuration and out-of-the-box auto-provisioning
- Fully programmable OpenFlow 1.3.1 and 1.0 agent for control of native OpenFlow and hybrid ports
- Non-volatile memory for start-up configuration
- Multiple microcode image support with fallback recovery
- Dynamic Host Configuration Protocol (DHCP) relay for IPv4/IPv6
- IEEE 802.1AB Link Layer Discover Protocol (LLDP) with Media Endpoint Discover (MED) extensions
- Network Time Protocol (NTP)
- DHCPv4 and DHCPv6 server managed by Nokia VitalQIP® DNS/DHCP IP Address Management
- Dynamic PoE allocation delivers only the power needed up to the total power budget for most efficient power consumption
- Configurable per-port PoE priority, max power and time-of-day policy for PoE power allocation

### Monitoring and troubleshooting

- Local (on the flash) and remote server logging (Syslog): event and command logging
- IP tools: ping and trace route
- Dying Gasp support via SNMP and syslog messages
- Loopback IP address support for management per service
- Management virtual routing and forwarding (VRF) support
- Policy- and port-based mirroring
- Remote port mirroring
- sFlow v5 and Remote Monitoring (RMON)
- Unidirectional Link Detection (UDLD), Digital Diagnostic Monitoring (DDM), and Time Domain Reflectometry (TDR)

### Resiliency and high availability

- Unified management, control and virtual chassis technology
- Virtual Chassis 1+N redundant supervisor manager

- Virtual Chassis In-Service Software Upgrade (ISSU)
- Remote Virtual Chassis - Up to 10-km fault-tolerant remote stacking supported
- Smart continuous switching technology
- ITU-T G.8032/Y1344 2010: Ethernet Ring Protection
- 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)
- Per-VLAN spanning tree (PVST+) and 1x1 STP mode
- IEEE 802.3ad/802.1AX Link Aggregation Control Protocol (LACP) and static LAG groups across modules
- Dual-home link support for sub-second link protection without STP
- Virtual Router Redundancy Protocol (VRRP) with tracking capabilities
- IEEE protocol auto-discovery
- Bidirectional Forwarding Detection (BFD) for fast failure detection and reduced re-convergence times in a IPv4/IPv6 routed environment
- Redundant and hot-swappable power supplies
- Built-in CPU protection against malicious attacks
- Split Virtual Chassis protection: Auto-detection and recovery of Virtual Chassis splitting due to one or more VFL or stack element failures

### Advanced security

#### Access control

- Alcatel-Lucent Access Guardian framework for comprehensive user-policy-based NAC
- Autosensing IEEE 802.1X multi-client, multi-VLAN support
- MAC-based authentication for non-IEEE 802.1X hosts
- Web based authentication (captive portal): a customizable web portal residing on the switch
- User Network Profile (UNP) simplifies NAC by dynamically providing pre-defined policy configuration to authenticated clients – VLAN, ACL, BW
- Secure Shell (SSH) with public key infrastructure (PKI) support
- Terminal Access Controller Access-Control System Plus (TACACS+) client
- Centralized Remote Access Dial-In User Service (RADIUS) and Lightweight Directory Access Protocol (LDAP) administrator authentication
- Centralized RADIUS for device authentication and network access control

authorization

- Learned Port Security (LPS) or MAC address lockdown
- Access Control Lists (ACLs); flow-based filtering in hardware (Layer 1 to Layer 4)
- DHCP Snooping, DHCP IP and Address Resolution Protocol (ARP) spoof protection
- ARP poisoning detection
- IP Source Filtering as a protective and effective mechanism against ARP attacks
- Bring Your Own Device (BYoD) provides on-boarding of Guest, IT/non-IT issued and silent devices. Restriction/Remediation of traffic from non-compliant devices. Uses RADIUS CoA to dynamically enforce User Network Profiles based on Authentication, Profiling, Posture check of devices.
- Private VLAN
- LLDP Security mechanism for rogue device detection and restriction

### Network Control

- LGS CodeGuardian solution is available on OmniSwitch® 6865, hardening it at both the software source code and binary executable levels to enhance overall network security.
- CodeGuardian protects networks from intrinsic vulnerabilities, code exploits, embedded malware, and potential back doors that could compromise mission-critical operations.

For additional information on CodeGuardian visit

<http://enterprise.alcatel-lucent.com>

### QoS

- Priority queues: Eight hardware-based queues per port for flexible QoS management
- Traffic prioritization: Flow-based QoS Flow-based traffic policing and bandwidth management
- 32-bit IPv4/128-bit IPv6 non-contiguous mask classification
- Egress traffic shaping
- DiffServ architecture
- Congestion avoidance: Support for end-to-end head-of-line (E2E-HOL) blocking prevention, IEEE 802.1Qbb Priority-based Flow Control (PFC) and IEEE 802.3x Flow Control (FC)

### Layer-3 routing and multicast

#### IPv4 routing

- Multiple VRF & inter-VRF route leaking
- Static routing
- Routing Information Protocol (RIP) v1 and v2
- Open Shortest Path First (OSPF) v2 with Graceful Restart

- Intermediate System to Intermediate System (IS-IS) with Graceful Restart
- Border Gateway Protocol (BGP) v4 with Graceful Restart
- Generic Routing Encapsulation (GRE) and IP/IP tunneling
- Virtual Router Redundancy Protocol (VRRPv2)
- DHCP relay (including generic UDP relay)
- Address Resolution Protocol (ARP)
- Policy-based routing and server load balancing
- DHCPv4 server

#### **IPv6 routing**

- Multiple VRF & Inter-vrf route leaking
- Internet Control Message Protocol version 6 (ICMPv6)
- Static routing
- Routing Information Protocol Next Generation (RIPng)
- Open Shortest Path First (OSPF) v3 with Graceful Restart
- Intermediate System to Intermediate System (IS-IS) with Graceful Restart
- Multi-Topology IS-IS (M-ISIS)
- BGP v4 multiprotocol extensions for IPv6 routing (MP-BGP)
- Graceful Restart extensions for OSPF and BGP
- Virtual Router Redundancy Protocol version 3 (VRRPv3)
- Neighbor Discovery Protocol (NDP)
- Policy-based routing and server load balancing
- DHCPv6 server
- DHCPv6 Relay Agent

#### **IPv4/IPv6 multicast**

- Internet Group Management Protocol (IGMP) v1/v2/v3 snooping
- Protocol Independent Multicast – Sparse-Mode (PIM-SM), Source Specific Multicast (PIM-SSM)
- Protocol Independent Multicast – Dense-Mode (PIM-DM), Bidirectional Protocol Independent Multicast (PIM-Bidir)
- Distance Vector Multicast Routing Protocol (DVMRP)
- Multicast Listener Discovery (MLD) v1/v2 snooping
- PIM to DVMRP gateway support

#### **Fluent network for voice, video and data**

- SIP profile for QoS, priority tuning for end-to-end processing\*
- Multicast DNS Relay: Bonjour protocol support for wired Airgroup

#### **Advanced Layer-2 services**

- Ethernet services support using IEEE 802.1ad Provider Bridges (also known as Q-in-Q or VLAN stacking)
- Fabric virtualization services IEEE 802.1aq Shortest Path Bridging (SPB-M)
- Ethernet network-to-network interface (NNI) and user network interface (UNI)
- Service Access Point (SAP) profile identification
- Service VLAN (SVLAN) and Customer VLAN (CVLAN) support
- VLAN translation and mapping including CVLAN to SVLAN
- Port mapping
- DHCP Option 82: Configurable relay agent information
- Multiple VLAN Registration Protocol (MVRP)
- HA-VLAN for Layer 2 clusters such as MS-NLB and active-active Firewall clusters
- Jumbo frame support
- Bridge Protocol Data Unit (BPDU) blocking
- STP Root Guard
- STP Loop-Guard
- Loopback Detection to auto-detect and prevent L2 loops

#### **Supported standards**

##### **IEEE standards**

- IEEE 802.1D STP
- IEEE 802.1p CoS
- IEEE 802.1Q VLANs
- IEEE 802.1ab (LLDP)
- IEEE 802.1ag (OA&M)
- IEEE 802.1ad Provider Bridges Q-in-Q/VLAN stacking
- IEEE 802.1ak (Multiple VLAN Registration Protocol (MVRP))
- IEEE 802.1aq Shortest Path Bridging (SPB)
- IEEE 802.1s MSTP
- IEEE 802.3i 10BASE-T
- IEEE 802.1w RSTP
- IEEE 802.3x Flow Control
- IEEE 802.3z Gigabit Ethernet
- IEEE 802.3ab 1000Base-T
- IEEE 802.3ac VLAN Tagging
- IEEE 802.3ad/802.1AX Link Aggregation
- IEEE 802.3ae 10 GigE
- IEEE 802.3af Power over Ethernet
- IEEE 802.3at PoE Plus
- IEEE 802.3az Energy Efficient Ethernet (EEE)
- IEEE 802.1x-2004
- IEEE 1588-2008 (PTP)

#### **ITU-T recommendations**

- ITU-T G.8032/Y.1344 2010: Ethernet Ring Protection (ERPv2)

#### **IETF RFCs**

##### **IPv4**

- RFC 2003 IP/IP Tunneling
- RFC 2131 Dynamic Host Configuration Protocol (DHCPv4)
- RFC 2784 GRE Tunneling
- RFC 4022/2452 MIB for IPv4 TCP
- RFC 4087 IP Tunnel MIB
- RFC 4113/2454 MIB for IPv4 UDP
- RFC 4292/4293 IPv4 MIBs

##### **OSPF**

- RFC 1765 OSPF Database Overflow
- RFC 1850/2328/4570 OSPF v2 and MIB
- RFC 2154 OSPF MD5 Signature
- RFC 2370/3630 OSPF Opaque LSA
- RFC 2740/5340 OSPFv3 for IPv6
- RFC 3101 OSPF NSSA Option
- RFC 3623/5187 OSPF Graceful Restart
- RFC 5838 MIB for OSPFv3
- RFC 4552 Authentication for OSPFv3

##### **RIP**

- RFC 1058 RIP v1
- RFC 1722/1723/2453/1724 RIP v2 and MIB
- RFC 1812/2644 IPv4 Router Requirements
- RFC 2080 RIPng for IPv6

##### **BGP**

- RFC 1269/1657/4273 BGP v3 and v4 MIB
- RFC 1403/1745 BGP/OSPF Interaction
- RFC 1771-1774/2842/2918/3392/4271 BGP v4
- RFC 1965 BGP AS Confederations
- RFC 1966/2796 BGP Route Reflection
- RFC 1997/1998/4360 BGP

##### **Communities Attribute**

- RFC 2042/5396 BGP New Attribute
- RFC 2385 BGP MD5 Signature
- RFC 2439 BGP Route Flap Damping
- RFC 2545 BGP-4 Multiprotocol Extensions for IPv6 Routing
- RFC 2858/4760 Multiprotocol Extensions for BGP-4
- RFC 3065 BGP AS Confederations
- RFC 4456 BGP Route Reflection
- RFC 4486 Subcodes for BGP Cease Notification
- RFC 4724 Graceful Restart for BGP
- RFC 3392/5492/5668/6793 BGP 4-Octet ASN
- RFC 5082 Generalized TTL Security Mechanism (GTSM)



## IS-IS

- RFC 1142/1195/3719/3787/5308 IS-IS v4
- RFC 2763/2966/3567/3373 Adjacencies and route management
- RFC 5120 M-ISIS: Multi Topology IS-IS
- RFC 5306 Graceful Restart
- RFC 5309/draft-ietf-isis-igp-p2p-over-lan Point to point over LAN
- RFC 6329 IS-IS Extensions Supporting IEEE 802.1aq SPB
- RFC 5304 IS-IS Cryptographic Authentication
- RFC 5310 IS-IS Generic Cryptographic Authentication

## IP Multicast

- RFC 1075/draft-ietf-idmr-dvmrp-v3-11.txt DVMRP
- RFC 2362/4601/5059 PIM-SM
- RFC 2365 Multicast
- RFC 2710/3019/3810/MLD v2 for IPv6
- RFC 2715 PIM and DVMRP interoperability
- RFC 2933 IGMP MIB
- RFC 3376 IGMPv3 (includes IGMP v2/v1)
- RFC 3569 Source-Specific Multicast (SSM)
- RFC 3973 Protocol Independent Multicast-Dense Mode (PIM-DM)
- RFC 4541 Considerations for IGMP and MLD Snooping Switches
- RFC 5015 BiDIR PIM
- RFC 5060 Protocol Independent Multicast MIB
- RFC 5132 Multicast Routing MIB
- RFC 5240 PIM Bootstrap Router MIB

## IPv6

- RFC 1981 Path MTU Discovery
- RFC 2460 IPv6 Specification
- RFC 2461 NDP
- RFC 2464 IPv6 over Ethernet
- RFC 2465 MIB for IPv6: Textual Conventions (TC) and General Group
- RFC 2466 MIB for IPv6: ICMPv6 Group
- RFC 2711 Router Alert Option
- RFC 3056 6to4 Tunnels
- RFC 3315 Dynamic Host Configuration Protocol for IPv6 (DHCPv6)
- RFC 3484 Default Address Selection
- RFC 3493/2553 Basic Socket API
- RFC 3542/2292 Advanced Sockets API
- RFC 3587/2374 Global Unicast Address Format
- RFC 3595 TC for IPv6 Flow Label
- RFC 3596/1886 DNS for IPv6
- RFC 4007 Scoped Address
- RFC 4022/2452 MIB for IPv6 TCP
- RFC 4087 IP Tunnel MIB

- RFC 4113/2454 MIB for IPv6 UDP
- RFC 4193 Unique Local Addresses
- RFC 4213/2893 Transition Mechanisms
- RFC 4291/3513/2373 Addressing Architecture (uni/any/multicast)
- RFC 4292/4293 IPv6 MIBs
- RFC 4301/2401 Security Architecture
- RFC 4302/2402 IP Authentication Header
- RFC 4303/2406 IP Encapsulating Security Payload (ESP)
- RFC 4308 Cryptographic Suites for IPsec
- RFC 4443/2463 ICMPv6
- RFC 4861/2461 Neighbor Discovery
- RFC 4862/2462 Stateless Address Autoconfiguration
- RFC 5095 Deprecation of Type 0 Routing Headers in IPv6

## Manageability

- RFC 854/855 Telnet and Telnet options
- RFC 959/2640 FTP
- RFC 1350 TFTP Protocol
- RFC 1155/2578-2580 SMI v1 and SMI v2
- RFC 1157/2271 SNMP
- RFC 1212/2737 MIB and MIB-II
- RFC 1213/2011-2013 SNMP v2 MIB
- RFC 1215 Convention for SNMP Traps
- RFC 1573/2233/2863 Private Interface MIB
- RFC 1643/2665 Ethernet MIB
- RFC 1867 Form-based File Upload in HTML
- RFC 1901-1908/3416-3418 SNMP v2c
- RFC 2096 IP MIB
- RFC 2131 DHCP Server/Client
- RFC 2388 Returning Values from Forms: multipart/form-data
- RFC 2396 Uniform Resource Identifiers (URI): Generic Syntax
- RFC 2570-2576/3410-3415/3584 SNMP v3
- RFC 2616 /2854 HTTP and HTML
- RFC 2667 IP Tunneling MIB
- RFC 2668/3636 IEEE 802.3 MAU MIB
- RFC 2674 VLAN MIB
- RFC 3023 XML Media Types
- RFC 3414 User-based Security Model
- RFC 3826 (AES) Cipher Algorithm in the SNMP User-based Security Model
- RFC 4122 A Universally Unique Identifier (UUID) URN Namespace
- RFC 4234 Augmented BNF for Syntax Specifications: ABNF
- RFC 4251 Secure Shell Protocol Architecture

- RFC 4252 The Secure Shell (SSH) Authentication Protocol
- RFC 4253 SSH Transport Layer Protocol
- RFC 4254 SSH Connection Protocol
- RFC 4627 JavaScript Object Notation (JSON)
- RFC 6585 Additional HTTP Status Codes

## Security

- RFC 1321 MD5
- RFC 1826/1827/4303/4305 Encapsulating Payload (ESP) and crypto algorithms
- RFC 2104 HMAC Message Authentication
- RFC 2138/2865/2868/3575/2618 RADIUS Authentication and Client MIB
- RFC 3576 Dynamic Authorization Extensions to RADIUS
- RFC 2139/2866/2867/2620 RADIUS Accounting and Client MIB
- RFC 2228 FTP Security Extensions
- RFC 2284 PPP EAP
- RFC 2869/2869bis RADIUS Extension
- RFC 3162 RADIUS and IPv6
- RFC 4301 Security Architecture for IP
- RFC 5517 Private VLAN

## Security - With Common Criteria enabled

- RFC 5280 - Internet X.509 PKI Certificate and CRL Profile
- RFC 2560 - X.509 Internet PKI Online Certificate Status Protocol - OCSP
- RFC 2986 - PKCS #10: Certification Request Syntax Specification v 1.7
- RFC 5246 - TLS Protocol v 1.2
- RFC 4346 - TLS Protocol v 1.1
- RFC 3268 - AES Cipher suites for TLS
- RFC 6125 - Representation and Verification of Domain-Based Application Service Identity within Internet PKIX Certificates in the Context of TLS
- draft-ietf-radext-radsec-12 - TLS encryption for RADIUS

## QoS

- RFC 896 Congestion Control
- RFC 1122 Internet Hosts
- RFC 2474/2475/2597/3168/3246 DiffServ
- RFC 2697 srTCM
- RFC 2698 trTCM
- RFC 3635 Pause Control

## Others

- RFC 791/894/1024/1349 IP and IP Ethernet
- RFC 792 ICMP
- RFC 768 UDP
- RFC 793/1156 TCP/IP and MIB
- RFC 2581 TCP Congestion Control

- RFC 826 ARP
- RFC 919/922 Broadcasting Internet Datagram
- RFC 925/1027 Multi-LAN ARP/Proxy ARP
- RFC 950 Subnetting
- RFC 951 BOOTP
- RFC 1151 RDP
- RFC 1191 Path MTU Discovery
- RFC 1256 ICMP Router RADIUS Discovery
- RFC 1305/2030 NTP v3 and Simple NTP
- RFC 1493 Bridge MIB
- RFC 1518/1519 CIDR
- RFC 1541/1542/2131/3396/3442 DHCP
- RFC 1757/2819 RMON and MIB
- RFC 2581 TCP Congestion Control
- RFC 2131/3046 DHCP/BootP Relay
- RFC 2132 DHCP Options
- RFC 2251 LDAP v3
- RFC 2338/3768/2787 VRRP and MIB
- RFC 3021 Using 31-bit Prefixes
- RFC 3060 Policy Core
- RFC 3176 sFlow
- RGC 3621 Power Ethernet MIB

**Software Defined Networking (SDN)**

- OpenFlow Switch Specification v1.3.1
- OpenFlow Switch Specification v1.0.0

## Ordering information

PART NUMBER	DESCRIPTION
<b>OmniSwitch 6865 models</b>	
OS6865-P16X	OS6865-P16X: Hardened Gigabit Ethernet L3 fixed configuration fan-less chassis with 12 RJ-45 10/100/1000 Base-T PoE+ ports out of which 4 are 75W HPoE ports, two 1000 Base-X SFP ports, two SFP+ (1G/10G) ports, RS-232 Console (RJ45) and USB port. The bundle includes the chassis pre-installed with fully featured AOS software & advanced IP routing SW (IPv4/IPv6), one AC power supply, country-specific power cord, user manuals access card, power supply tray and hardware for mounting in a 19" rack
OS6865-P16XD	OS6865-P16XD: Hardened Gigabit Ethernet L3 fixed configuration fan-less chassis with 12 RJ-45 10/100/1000 Base-T PoE+ ports out of which 4 are 75W HPoE ports, 2 1000 Base-X SFP ports, 2 SFP+ (1G/10G) ports, RS-232 Console (RJ45) and USB port. The bundle includes the chassis pre-installed with fully featured AOS software & advanced IP routing SW (IPv4/IPv6), one DC power supply, user manuals access card, power tray and hardware for mounting in a 19" rack
OS6865-U12X	OS6865-U12X: Hardened Gigabit Ethernet L3 fixed configuration fan-less chassis with four 100/1000 Base-X SFP ports, two 1000 Base-X SFP Ports, four 10/100/1000 Base-T 75W HPoE ports, two SFP+ (1G/10G) ports, RS-232 Console (RJ45) and USB port. The bundle includes the chassis pre-installed with fully featured AOS software & advanced IP routing SW (IPv4/IPv6), one AC power supply, country-specific power cord, user manuals access card, power tray and hardware for mounting in a 19" rack.
OS6865-U12XD	OS6865-U12XD: Hardened Gigabit Ethernet L3 fixed configuration fan-less chassis with four 100/1000 Base-X SFP ports, two 1000 Base-X SFP ports, four 10/100/1000 Base-T 75W HPoE ports, two SFP+ (1G/10G) ports, RS-232 Console (RJ45) and USB port. The bundle includes the chassis pre-installed with fully featured AOS software & advanced IP routing SW (IPv4/IPv6), one DC power supply, user manuals access card, power tray and hardware for mounting in a 19" rack.
OS6865-U28X	OS6865-U28X: Hardened Gigabit Ethernet L3 fixed configuration fan-less chassis in a 1U form factor with 20 100/1000 Base-X SFP ports, four SFP+ (1G/10G) ports, four 10/100/1000 Base-T 75W HPoE ports, RS-232 Console (RJ45), USB, and two 20G VFL QSFP+ ports. The bundle includes the chassis pre-installed with fully featured AOS software & advanced IP routing SW (IPv4/IPv6), one AC power supply, country-specific power cord, user manuals access card, power tray and hardware for mounting in a 19" rack.
OS6865-U28XD	OS6865-U28XD: Hardened Gigabit Ethernet L3 fixed configuration fan-less chassis in a 1U form factor with 20 100/1000 Base-X SFP ports, four SFP+ (1G/10G) ports, four 10/100/1000 Base-T 75W HPoE ports, RS-232 Console (RJ45), USB, and two 20G VFL QSFP+ ports. The bundle includes the chassis pre-installed with fully featured AOS software & advanced IP routing SW (IPv4/IPv6), one DC power supply, user manuals access card, power tray and hardware for mounting in a 19" rack.
<b>OmniSwitch 6865 power supplies</b>	
OS6865-BP	OS6865-BP modular AC backup power supply. Provides system & PoE power to one OS6865 switch. Ships with country specific power cord
OS6865-BP-D	OS6865-BP modular DC backup power supply. Provides system & PoE power to one OS6865 switch
<b>OmniSwitch 6865 accessories</b>	
OS6865-CBL-40	OS6865 20 Gigabit direct attached copper cable (40 cm, QSFP+) for Virtual Chassis connections, for OS6865-U28X
OS6865-CBL-100	OS6865 20 Gigabit direct attached copper cable (1m, QSFP+) for Virtual Chassis connections, for OS6865-U28X
OS6865-CBL-300	OS6865 20 Gigabit direct attached copper cable (3m, QSFP+) for Virtual Chassis connections, for OS6865-U28X
OS6865-TRAY-1U	Spare Power Supply tray kit with 1RU brackets for mounting two PS trays side-by-side in a 19" rack for OS6865-U28X
OS6865-DIN-MNT	DIN rail mounting kit for OS6865-P16X & OS6865-U12X switches. Includes universal mounting brackets and 2 brackets with DIN clip attached.
OS6865-REAR-MNT	Mounting bracket & Side mounting rails kit to secure OS6865-U28x with the rear of a 19" rack



PART NUMBER	DESCRIPTION
<b>OmniSwitch 6865 transceivers</b>	
iSFP-100-MM	100Base-FX industrial transceiver with an LC type interface. This transceiver is designed for use over multimode fiber.
iSFP-100-SM15	100Base-FX industrial transceiver with an LC type interface. This transceiver is designed for use over single-mode fiber up to 15 km
iSFP-100-LC-SM40	100Base-FX Industrial SFP transceiver with an LC type interface. This transceiver is designed for use over single mode fiber optic cable up to 40KM.
iSFP-GIG-T	1000Base-T industrial Gigabit Ethernet Transceiver (SFP MSA). SFP works at 1000 Mb/s speed and full-duplex mode
iSFP-GIG-SX	1000Base-SX industrial Gigabit Ethernet industrial optical transceiver (SFP MSA)
iSFP-GIG-LX	1000Base-LX industrial Gigabit Ethernet optical transceiver (SFP MSA)
iSFP-GIG-LH40	1000Base-LH industrial Gigabit Ethernet optical transceiver (SFP MSA). Typical reach of 40 km on 9/125 µm SMF
iSFP-GIG-LH70	1000Base-LH industrial Gigabit Ethernet optical transceiver (SFP MSA). Typical reach of 70 km on 9/125 µm SMF
iSFP-GIG-BX-U	1000Base-BX SFP bi-directional transceiver with an LC type of interface. Designed for use over single mode fiber optic on a single strand link up to 10 km. Transmits 1310 nm and receives 1490 nm optical signal.
iSFP-GIG-BX-D	1000Base-BX SFP bi-directional transceiver with an LC type of interface. Designed for use over single mode fiber optic on a single strand link up to 10 km. Transmits 1310 nm and receives 1490 nm optical signal.
<b>10G transceivers</b>	
iSFP-10G-LR	10 Gigabit industrial optical transceiver (SFP+). Supports monomode fiber over 1310 nm wavelength (nominal) with an LC connector. Typical reach of 10 km
iSFP-10G-ER	10 Gigabit industrial optical transceiver (SFP+). Supports monomode fiber over 1550 nm wavelength (nominal) with an LC connector. Typical reach of 40 km
<b>SFP+ direct attached cables</b>	
iSFP-10G-C1M	10 Gigabit industrial direct attached copper cable (1 m, SFP+)
iSFP-10G-C3M	10 Gigabit industrial direct attached copper cable (3 m, SFP+)
iSFP-10G-C7M	10 Gigabit industrial direct attached copper cable (7 m, SFP+)

## Warranty

The OmniSwitch 6865 family comes with a Limited Lifetime Warranty.

## Services and support

For more information about our Professional services, Support services, and Managed services, please go to <http://enterprise.alcatel-lucent.com/?services=EnterpriseServices&page=directory>.