

# IE220 Series

## Industrial Ethernet Layer 2+ Switches

The IE220 Series of Industrial Ethernet Layer 2+ switches are built for enduring performance in harsh environments, such as those found in OT networks and outdoor installations



### Overview

Allied Telesis IE220 Series switches are the perfect solution for access connectivity in unconditioned spaces and outside plant. They feature surge immunity on the copper ports to prevent damage from electrical spikes, common in outdoor applications, and are hardened to withstand tough environmental conditions such as wide-ranging temperatures, high humidity, and vibration.

Their low latency, high availability, large PoE capacity, and ability to deliver multiple video streams, makes them the best choice for critical physical security and surveillance applications.

The IE220 Series is ideal for many vertical markets and related applications, such as:

- ▶ **Building automation**  
Facility management including security and access control, fire protection, energy management, heating/ventilation/air-conditioning, and lighting control.
- ▶ **Smart cities**  
Public space and urban infrastructure that provides safety and security, parking management, environmental metering, lighting, and information kiosks.
- ▶ **Roadway transportation**  
Adaptive traffic control, telematics, and preventive maintenance.

### 10 Gigabit uplink connectivity

The IE220 Series SFP ports support 1/10 Gigabit Small-Form Factor Pluggables.

10 Gigabit uplink ports entail valuable and versatile connectivity, where high bandwidth backhauling and scalability is required.

### PoE++ sourcing

In video surveillance, more advanced solutions all require a powerful camera component. Now that artificial intelligence (AI), machine learning and deep learning have gained prominence, camera hardware is more power hungry: features like PTZ, heater blower, IR, multi-sensor, and analytics at the edge drain power.

The IE220 Series sources standard IEEE 802.3bt PoE++ up to 95W to meet the demand for high power of devices connected to the network. Backwards

compatibility to PoE, PoE+ and Hi-PoE is ensured.

### Distinctive PoE features

PoE power may be allocated dynamically, based on the current usage of each powered device.

The continuous PoE feature allows the switch to be restarted without affecting the supply of power to connected devices.

### Network resiliency

The IE220 Series supports highly stable and reliable ICT network switching, with recovery times down to 10ms.

Choices include Allied Telesis Ethernet Protection Switched Ring (EPSRing™), and the standards-based ITU-T G.8032 -Ethernet Ring Protection Switching (ERPS).

For high-availability automation networks based on Ethernet technology, the IE220 may be integrated in networks running Media Redundancy Protocol (MRP) as a Media Redundancy Client (MRC).

### Micro-segmentation Security

Micro-segmentation reduces the attack surface of your OT network and gives granular control of device-to-device communications. The IE220 Series supports SDN-based micro-segmentation solutions for more security, maintainability, and visibility than traditional security models.

### Network automation and orchestration

Powerful automation options include Allied Telesis Autonomous Management Framework™ Plus (AMF Plus), and open standard-based northbound API.

For easy integration into complex networks comprising physical, virtual, and multi-vendor devices, the IE220 Series feature:

- ▶ NETCONF/RESTCONF + YANG data modelling for network automation.
- ▶ OpenFlow v1.3 for Software Defined Networking (SDN) orchestration.

## Key Features

- ▶ 1/10 Gigabit uplink ports
- ▶ Surge immunity for outside plants
- ▶ AlliedWare Plus™ operating system
- ▶ Allied Telesis Autonomous Management Framework™ Plus (AMF Plus)
- ▶ OpenFlow v1.3 for SDN
- ▶ NETCONF/RESTCONF + YANG data modelling
- ▶ Web-based GUI and CLI management
- ▶ QoS with traffic shaping
- ▶ Efficient forwarding of multicast streams
- ▶ Static routing capability
- ▶ Extensive features for cybersecurity and denial of service prevention
- ▶ Active Fiber Monitoring™ (AFM)
- ▶ High Availability networking (EPSRing™, ITU-T G.8032, MRP client)
- ▶ Upstream Forwarding Only (UFO)
- ▶ IEEE 802.3bt PoE++ sourcing (up to 95W)
- ▶ Dynamic PoE power allocation
- ▶ Continuous PoE (CPoE)
- ▶ Extended operating temperature range: -40°C to 75°C
- ▶ Graceful thermal shutdown
- ▶ Fanless design
- ▶ Redundant power inputs
- ▶ Protection circuits
- ▶ Alarm output
- ▶ Certified for plenums

## Key Features

### Network Automation

- ▶ AMF Plus is a suite of tools providing centralized control and network automation, as well as visual intent-based network management. It has the intelligence to set-up, optimize, and maintain the network according to predefined goals and policies.
- ▶ Powerful features like centralized management, auto backup, auto upgrade, auto provisioning and auto recovery enable plug-and-play networking and zero touch management.
- ▶ Integration with our Vista Manager visual monitoring and management platform means AMF Plus<sup>1</sup> also provides intent-based features like:
  - Health monitoring to easily investigate, analyze and improve overall network health.
  - Smart ACLs to control and secure the resources that clients use in the network.
  - intent-based QoS to deal with network bandwidth contention.
- ▶ AMF Plus is scalable and can be either deployed integrated into Allied Telesis equipment, or on multi-tenant cloud architecture.

### Northbound Interfaces

- ▶ Open standard-based interfaces are supported to easily integrate with modern management systems.
- ▶ NETCONF/RESTCONF with YANG data modelling provide a standardized way to represent data and securely configure devices.
- ▶ OpenFlow is a key technology for SDN orchestration. SDN controllers and other tools support automated behavior in a network, and allow customized applications and services to be run.

### Micro-segmentation for Network Security

- ▶ Micro-segmentation enhances converged IT/OT network security by reducing the number of entry points for attackers or intruders. Isolating applications, data, and endpoints hampers the ability of intruders or malware to move within the network.
- ▶ SDN network orchestration enables self-learning Artificial Intelligence to propagate and adapt security policies to mitigate evolving cyber threats.

### Resiliency

- ▶ EPSRing™ and ITU-T G.8032 ERPS enable a protected ring capable of recovery within as little as 10ms. These features are perfect for high performance and high availability.
- ▶ High-availability automation networks are supported with Media Redundancy Protocol (MRP) as defined by IEC62439-2. MRP used in ring networks allows up to 50 devices to have guaranteed and deterministic switchover behavior. The IE220 Series includes the Media Redundancy Client (MRC) functionality. It reacts on the received control frame from the MRP Master, and detect and notify the status change on its ring ports.
- ▶ Spanning Tree Protocol compatible RSTP, MSTP, static Link Aggregation Group (LAG), and dynamic Link Aggregation Control Protocol (LACP) feature high availability in star topology.

### Quality of Service (QoS)

- ▶ Comprehensive low-latency wire-speed QoS provides flow-based traffic management with full classification, prioritization, traffic shaping and min/max bandwidth profiles. Enjoy boosted network performance and guaranteed delivery of business-critical services and applications.

### sFlow

- ▶ sFlow is an industry-standard technology for monitoring high-speed switched networks. It provides complete visibility into network use, enabling performance optimization, usage accounting/billing, and defense against security threats. Sampled packets sent to a collector ensure it always has a real-time view of network traffic.

### Active Fiber Monitoring (AFM)

- ▶ Active Fiber Monitoring prevents eavesdropping on fiber communications by monitoring received optical power. If an intrusion is detected, the link can be automatically shut down, or an operator alert can be sent.

### Link Layer Discovery Protocol – Media Endpoint Discovery (LLDP-MED)

- ▶ LLDP-MED extends LLDP basic network endpoint discovery and management functions. LLDP-MED allows for media endpoint specific messages, providing detailed information on power equipment, network policy, location discovery (for Emergency Call Services) and inventory.

### VLAN Mirroring (RSPAN)

- ▶ VLAN mirroring allows traffic from a port on a remote switch to be analyzed locally. Traffic being transmitted or received on the port is duplicated and sent across the network on a special VLAN.

### VLAN Translation

- ▶ VLAN Translation allows traffic arriving on a VLAN to be mapped to a different VLAN on the outgoing paired interface.

### VLAN Access Control List (ACLs)

- ▶ ACLs simplify access and traffic control across entire segments of the network. They can be applied to a VLAN as well as a specific port.

### Upstream Forwarding Only (UFO)

- ▶ UFO lets you manage which ports in a VLAN can communicate with each other, and which only have upstream access to services, for secure multi-user deployment.

### Dynamic Host Configuration Protocol (DHCP) Snooping

- ▶ DHCP servers allocate IP addresses to clients, and the switch keeps a record of addresses issued on each port. IP source guard checks against this DHCP snooping database to ensure only clients with specific IP and/or MAC address can access the network. DHCP snooping can be combined with other features, like dynamic ARP inspection, to increase security in Layer 2 switched environments, and also provides a traceable history, which meets the growing legal requirements placed on service providers.

### Power over Ethernet (PoE)

- ▶ With PoE, a separate power connection to media endpoints is not necessary. PoE provides flexibility and reduced cost by removing the need for a separate power connection to media endpoints. PoE++ supports higher power devices such as advanced security cameras, kiosks, POS terminals, Wi-Fi 6 access points, and LED light fixtures.
- ▶ The IE220 Series complies with the standard IEEE 802.3bt and maintains the backwards compatibility with previous methods. They feature the following PoE types:
  - IEEE 802.3af,
  - IEEE 802.3at Type 1 PoE @15.4W
  - IEEE 802.3at Type 2 PoE+ @30W
  - IEEE 802.3at 4PPoE Hi-PoE @60W
  - IEEE 802.3bt Type 3 PoE++ @60W
  - IEEE 802.3bt Type 4 PoE++ @95W
- ▶ You may configure the overall PoE power budget to match the real capabilities of the external Power Supply Unit (PSU).

The PoE power budget may be allocated automatically and dynamically, based on the current usage of each powered device.

- ▶ If the devices connected to a switch require more power than the switch can deliver, the switch will deny power to some ports, according to the assigned priority.

### Continuous PoE

- ▶ Continuous PoE allows the switch to be restarted without affecting the supply of power to connected devices. Smart lighting, security cameras, and other PoE devices will continue to operate during a software upgrade on the switch.

### Alarm Output

- ▶ Alarm Output are useful for security integration solutions. These respond to events instantly and automatically on a pre-defined event scheme. Alarm Output controls external devices upon an event, for example sirens and strobes.

### Alarm Monitoring and Trigger facility

- ▶ The IE220 Series alarm facility monitors the switch and responds to any problems. Examples of alarm events include:
  - Main power supply failure
  - Over-temperature
  - Port link down
  - System power budget exceeded
  - PoE device exceeds port power budget
- ▶ Triggers based on alarm events provide a smart mechanism that automatically changes the network configuration to reduce downtime.

### Protection Circuits

- ▶ The IE220 Series has optimized protection circuits to guard against the following abnormal conditions:
  - Reverse input voltage polarity
  - Over- and under-voltage
  - Over-current, peak-current and short-circuit
  - Over-temperature

<sup>1</sup> From AW+ 5.5.2-2 onwards, an AMF Plus license operating in the network provides all standard AMF network management and automation features, and also enables the AMF Plus intent-based networking features menu in Vista Manager EX (from version 3.10.1 onwards).

## Key Features

### Enhanced Thermal Shutdown

- ▶ The Enhanced Thermal Shutdown feature acts to restrict PoE power and services when the switch exceeds the safe operating temperature.
- ▶ The system restores operation when the temperature returns to acceptable levels.

### Dual power inputs

- ▶ The redundant power inputs provide higher system reliability and allow UPS emergency power over an extended period of time.

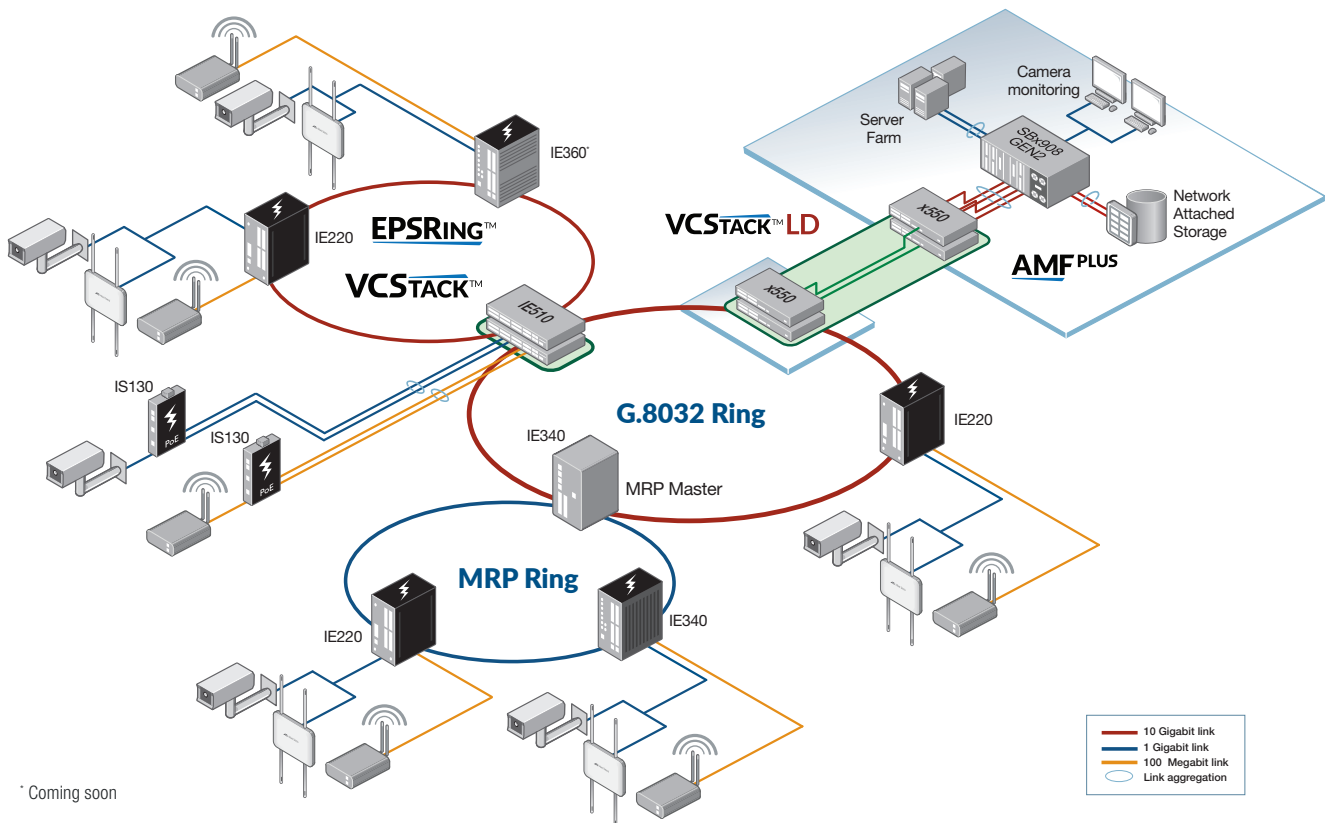
### Plenum rated

- ▶ The IE220 Series is UL 2043 certified for use in plenums, ducts and other space used for environmental air.
- UL 2043 validates that the IE220 Series characteristics are in accordance with the provisions of the National Electric Code NFPA 70; International Mechanical Code NFPA 5000, and Standard for the Installation of Air Conditioning and Ventilating Systems NFPA 90A.

### Premium Software License

- ▶ By default, the IE220 Series offers a comprehensive feature set that includes 1 Gigabit uplink connectivity, PoE+ power sourcing @30W, Layer 2 switching, static routing and IPv6 management features.
- The feature set can easily be upgraded with premium software licenses.

## Key Solutions



Media Redundancy Protocol (MRP), EPSRing and ERPS (ITU G.8032) provide high-speed resilient ring connectivity. This diagram shows how the IE Series can support a variety of ring network topologies.

The IE Series operates at a wide temperature range, and allows deployment in outdoor and harsh industrial environments.

PoE sourcing models support remotely controlled Pan, Tilt and Zoom (PTZ) video cameras, WiFi access points and more.

Management can be automated either with the Allied Telesis Autonomous Management Framework™ Plus (AMF Plus), or by third party tools via the open standard northbound interface.

## Specifications

PRODUCT	10/100T/1000 (RJ-45) COPPER PORTS	1/10G SFP+ PORTS	TOTAL PORTS	POE ENABLED PORTS	SWITCHING FABRIC	FORWARDING RATE
IE220-6GHX	4	2	6	2 x PoE++, 4 x PoE+	48Gbps	35.7Mpps
IE220-10GHX	8	2	10	4 x PoE++, 8 x PoE+	56Gbps	41.7Mpps

### Performance

RAM memory	512MB DDR SDRAM
ROM memory	128MB flash
MAC address	16K entries
Packet Buffer	2 MBytes (16 Mbits)
Priority Queues	8
Simultaneous VLANs	4K entries
VLANs ID range	1 – 4094
Jumbo frames	12KB L2 jumbo frames
Multicast groups	1,023 (Layer 2)

### Other Interfaces

Type	Serial console (UART)
Port no.	1
Connector	RJ-45 female

Type	USB2.0 (Host Controller Class)
Port no.	1
Connector	Type A receptacle

Type	Alarm output (1A @30Vdc)
Port no.	1
Connector	3-pin terminal block (form-c)

### Flexibility and Compatibility

- ▶ SFP+ ports support any combination of Allied Telesis 1Gbps and 10Gbps SFP modules listed in this document under Ordering Information

### Reliability

- ▶ Modular AlliedWare Plus™ operating system
- ▶ Protection circuits against abnormal operations
- ▶ Redundant power input
- ▶ Full environmental monitoring of temperature and internal voltages. SNMP traps alert network managers in case of any failure
- ▶ Enhanced thermal shutdown

### Diagnostic Tools

- ▶ Active Fiber Monitoring detects tampering on optical links
- ▶ Automatic link flap detection and port shutdown
- ▶ Built-In Self Test (BIST)
- ▶ Cable fault locator (TDR)
- ▶ Connectivity Fault Management (CFM), Continuity Check Protocol (CCP) for use with G.8032 ERPS
- ▶ Event logging via Syslog over IPv4
- ▶ Find-me device locator
- ▶ Optical Digital Diagnostic Monitoring (DDM)
- ▶ Ping polling and TraceRoute for IPv4 and IPv6
- ▶ Port and VLAN mirroring (RSPAN)
- ▶ sFlow
- ▶ TraceRoute for IPv4 and IPv6
- ▶ UniDirectional Link Detection (UDLD)

### IPv4 Features

- ▶ Black hole routing
- ▶ Static unicast and multicast routes for IPv4

### IPv6 Features

- ▶ Device management over IPv6 networks with SNMPv6, Telnetv6 and SSHv6

- ▶ IPv4 and IPv6 dual stack
- ▶ IPv6 hardware ACLs
- ▶ Static unicast routing for IPv6

### Management

- ▶ Allied Telesis Autonomous Management Framework™ Plus (AMF Plus) node
- ▶ NETCONF/RESTCONF northbound interface with YANG data modelling for network automation
- ▶ OpenFlow v1.3 for network orchestration
- ▶ Web-based Graphical User Interface (GUI)
- ▶ Industry-standard CLI with context-sensitive help
- ▶ Powerful CLI scripting engine
- ▶ Built-in text editor
- ▶ Event-based triggers allow user-defined scripts to be executed upon selected system events
- ▶ Link Layer Discovery Protocol (LLDP)
- ▶ Link Layer Discovery Protocol - Media Endpoint Discovery (LLDP-MED)
- ▶ SNMPv1/v2c/v3 support
- ▶ Comprehensive SNMP MIB support for standard based device management
- ▶ Console management port on the front panel for ease of access
- ▶ Front panel LEDs provide at-a-glance PSU status, PoE status, and fault information
- ▶ Eco-friendly mode allows ports and LEDs to be disabled to save power
- ▶ USB interface allows software release files, configurations, and other files to be stored for backup and distribution to other devices
- ▶ Recessed Reset button

### Quality of Service

- ▶ 8 priority queues with a hierarchy of high priority queues for real-time traffic, and mixed scheduling, for each switch port
- ▶ Policy and traffic shaping
- ▶ Extensive remarking capabilities
- ▶ IP precedence and DiffServ marking based on Layer 2, 3 and 4 headers
- ▶ Limit bandwidth per port or per traffic class down to 64kbps
- ▶ Policy-based QoS based on VLAN, port, MAC and general packet classifiers
- ▶ Policy-based storm protection
- ▶ Strict priority, weighted round robin or mixed scheduling
- ▶ Taildrop for queue congestion control
- ▶ Wirespeed traffic classification with low latency essential for VoIP and real-time streaming media applications

### Resiliency Features

- ▶ Control Plane Prioritization (CPP) ensures the CPU always has sufficient bandwidth to process network control traffic
- ▶ Dynamic link failover (host attach)

- ▶ Ethernet Protection Switching Ring (EPSR™) with SuperLoop Prevention (EPSR-SLP™)
- ▶ Ethernet Ring Protection Switching (ITU-T G.8032 ERPS)
- ▶ Link Aggregation Control Protocol (LACP)
- ▶ Loop protection: loop detection and thrash limiting
- ▶ Media Redundancy Protocol (IEC62439-2 MRP)
- ▶ Multiple Spanning Tree Protocol (MSTP)
- ▶ PVST+ compatibility mode
- ▶ Rapid Spanning Tree Protocol (RSTP)
- ▶ Router Redundancy Protocol (RRP) snooping
- ▶ Spanning Tree Protocol (STP) root guard
- ▶ Continuous Power over Ethernet (CPoE)

### Multicasting Features

- ▶ Internet Group Management Protocol (IGMPv1/v2/v3)
- ▶ IGMP snooping with fast leave
- ▶ IGMP query solicitation
- ▶ Multicast Listener Discovery (MLDv1/v2)
- ▶ MLDv2 for IPv6
- ▶ MLD snooping
- ▶ IGMP/MLD proxy (multicast forwarding)

### Security Features

- ▶ Access Control Lists (ACLs) based on layer 3 and 4 headers
- ▶ Auth-fail and guest VLANs
- ▶ Configurable ACLs for management traffic
- ▶ Authentication, Authorization and Accounting (AAA)
- ▶ BPDU protection
- ▶ DHCP snooping, IP source guard and Dynamic ARP Inspection (DAI)
- ▶ DoS attack blocking and virus throttling
- ▶ Dynamic VLAN assignment
- ▶ HTTP over TLS (HTTPTS)
- ▶ MAC address filtering and MAC address lockdown
- ▶ Network Access and Control (NAC) features manage endpoint security
- ▶ Password protected bootloader
- ▶ Port-based learn limits (intrusion detection)
- ▶ Private VLANs and port isolation for multiple customers using the same VLAN
- ▶ Secure Copy (SCP)
- ▶ Strong password security and encryption
- ▶ TACACS+ authentication and accounting
- ▶ Tri-authentication: MAC-based, web-based and IEEE 802.1X

### Virtual LAN Features

- ▶ Generic VLAN Registration Protocol (GVRP)
- ▶ Voice VLAN
- ▶ VLAN translation
- ▶ Upstream Forwarding Only (UFO)

## IE220 Series | Industrial Ethernet Layer 2+ Switches

### Services

- ▶ Domain Name System (DNS) client
- ▶ Dynamic Host Configuration Protocol (DHCP) client
- ▶ HyperText Transfer Protocol (HTTP/1.1)
- ▶ Network Time Protocol (NTPv4) for IPv4 and IPv6
- ▶ Simple Mail Transfer Protocol (SMTP)
- ▶ Secure Shell (SSHv2/v3)
- ▶ TELNET
- ▶ Trivial File Transfer Protocol (TFTP)

### Environmental Specifications

Operating temp. <sup>2</sup>	-40°C to 75°C (-40°F to 167°F)
Storage temp.	-40°C to 85°C (-40°F to 185°F)
Operating humidity	5% to 95% non-condensing
Storage humidity	5% to 95% non-condensing
Operating altitude	up to 3,000 m maximum (9,843 ft)

### Mechanical

EN 50021, EN 60715 Standardized mounting on rails

### Warranty

- ▶ Five-year limited hardware warranty. Refer to the Term & Policies page on the Allied Telesis web site.

<sup>2</sup> Refer to the Installation Guide for more details on the safety approved power ratings and thermal conditions.

<sup>3</sup> Test was applied using the power supply AT-IE048-480-20.

<sup>4</sup> Certification/test in progress.

COMPLIANCE	
Compliance Mark	CE, FCC, ICES, RCM, TEC <sup>3</sup> , UKCA, UL, VCCI
Environmental Compliance	RoHS, China-RoHS, JGSSI, REACH, SCIP, TSCA, WEEE
Safety <sup>2</sup>	IEC 60950-22 AS/NZS 62368-1 CSA/UL 62368-1 EN/IEC/UL 62368-1
Electromagnetic Immunity	EN 55035
Harmonic current emission	EN/IEC 61000-3-2 <sup>3</sup>
Voltage fluctuation and flicker	EN/IEC 61000-3-3 <sup>3</sup>
Electrostatic discharge (ESD)	EN/IEC 61000-4-2
Radiated susceptibility (RS)	EN/IEC 61000-4-3
Electrical fast transient (EFT)	EN/IEC 61000-4-4
Lighting/surge immunity (Surge)	EN/IEC 61000-4-5, installation class 3 for outdoor
Conducted immunity (CS)	EN/IEC 61000-4-6
Power frequency magnetic fields	EN/IEC 61000-4-8
AC voltage dips and interruption	EN/IEC 61000-4-11 <sup>3</sup>
DC voltage dips and Interruption	EN/IEC 61000-4-29
Electromagnetic Emissions	AS/NZS CISPR 32, class A CISPR 32, class A EN 55032, class A FCC 47 CFR Part 15, subpart B, class A ICES 003 class A VCCI class A
Industry	
Traffic controller assemblies	NEMA TS 2
Installation in air-handling space	UL 2043
Freefall	IEC60068-2-31
Shock	IEC60068-2-27
Vibration	IEC60068-2-6
Connector unmating endurance	IEC 60512-99-002, under PoE++ electrical load <sup>4</sup>

### Physical Specifications

PRODUCT	WIDTH X DEPTH X HEIGHT	WEIGHT	ENCLOSURE	MOUNTING	PROTECTION RATE
IE220-6GHX	65 x 137 x 155 mm (2.56 x 5.39 x 6.12 in)	DIN rail: 1.57 kg (3.46 lbs) Wall mount: 1.45 kg (3.20 lbs)	Aluminium/Sheet Metal shell	DIN rail, wall mount	IP30
IE220-10GHX	65 x 137 x 155 mm (2.56 x 5.39 x 6.12 in)	DIN rail: 1.60 kg (3.53 lbs) Wall mount: 1.49 kg (3.28 lbs)	Aluminium/Sheet Metal shell	DIN rail, wall mount	IP30

### Power Characteristics

PRODUCT	INPUT VOLTAGE <sup>5</sup>	COOLING	NO POE LOAD			FULL POE LOAD <sup>6</sup>		
			MAX POWER CONSUMPTION	MAX HEAT DISSIPATION	NOISE	MAX POWER CONSUMPTION	MAX HEAT DISSIPATION	NOISE
IE220-6GHX	37~57V DC	fanless	17.4W	59.5 BTU/hr	-	204W	80.3 BTU/hr	-
IE220-10GHX	37~57V DC	fanless	18.5W	63.3 BTU/hr	-	266W	87.7 BTU/hr	-

### Power over Ethernet Sourcing Characteristics

PRODUCT	ENABLED POE PORTS			MAX POE POWER BUDGET <sup>7</sup>	MAX POE SOURING PORTS			
	POE+	HI-POE	POE++		POE+ (30W)	HI-POE (60W)	POE++ (60W)	POE++ (90W)
IE220-6GHX	4	2	2	180W	4	2	2	2
IE220-10GHX	8	4	4	240W	8	4	4	2

<sup>5</sup> PoE sourcing equipment requires:  
48Vdc to enable IEEE802.3at Type 1 (PoE).  
54Vdc to enable IEEE802.3at Type 2 (PoE+), IEEE802.3bt Type 3 (PoE++) and IEEE802.3bt Type 4 (PoE++).

<sup>6</sup> The Max Power consumption at full PoE load includes the powered device's consumption and margin. The cooling requirements of the switch are smaller than the power draw, because most of the load is dissipated at the PoE powered device and along the cabling. Use these wattage and BTU ratings for facility capacity planning.

<sup>7</sup> The PoE power budget is shared among all ports; we recommend configuring the dynamic PoE power allocation to optimize the power distribution

## Standards and Protocols

### AlliedWare Plus Operating System

Version 5.5.3-1

### Authentication

RFC 1321 MD5 Message-Digest algorithm  
 RFC 1828 IP authentication using keyed MD5

### Encryption (Management Traffic Only)

FIPS 180-1 Secure Hash standard (SHA-1)  
 FIPS 186 Digital signature standard (RSA)  
 FIPS 46-3 Data Encryption Standard (DES and 3DES)

### Ethernet

IEEE 802.2 Logical Link Control (LLC)  
 IEEE 802.3 Ethernet  
 IEEE 802.3ab 1000BASE-T  
 IEEE 802.3ae10 Gigabit Ethernet  
 IEEE 802.3af Power over Ethernet (PoE)  
 IEEE 802.3at Power over Ethernet (PoE+)  
 IEEE 802.3az Energy Efficient Ethernet (EEE)  
 IEEE 802.3bt Power over Ethernet (PoE+)  
 IEEE 802.3u 100BASE-X  
 IEEE 802.3x Flow control - full-duplex operation  
 IEEE 802.3z 1000BASE-X

### IPv4 Features

RFC 768 User Datagram Protocol (UDP)  
 RFC 791 Internet Protocol (IP)  
 RFC 792 Internet Control Message Protocol (ICMP)  
 RFC 793 Transmission Control Protocol (TCP)  
 RFC 826 Address Resolution Protocol (ARP)  
 RFC 894 Standard for the transmission of IP datagrams over Ethernet networks  
 RFC 919 Broadcasting Internet datagrams  
 RFC 922 Broadcasting Internet datagrams in the presence of subnets  
 RFC 932 Subnetwork addressing scheme  
 RFC 950 Internet standard subnetting procedure  
 RFC 951 Bootstrap Protocol (BootP)  
 RFC 1027 Proxy ARP  
 RFC 1035 DNS client  
 RFC 1042 Standard for the transmission of IP datagrams over IEEE 802 networks  
 RFC 1071 Computing the Internet checksum  
 RFC 1122 Internet host requirements  
 RFC 1191 Path MTU discovery  
 RFC 1256 ICMP router discovery messages  
 RFC 1518 An architecture for IP address allocation with CIDR  
 RFC 1519 Classless Inter-Domain Routing (CIDR)  
 RFC 1542 Clarifications and extensions for BootP  
 RFC 1591 Domain Name System (DNS)  
 RFC 1812 Requirements for IPv4 routers  
 RFC 1918 IP addressing  
 RFC 2581 TCP congestion control

### IPv6 Features

RFC 1981 Path MTU discovery for IPv6  
 RFC 2460 IPv6 specification  
 RFC 2464 Transmission of IPv6 packets over Ethernet networks  
 RFC 3484 Default address selection for IPv6  
 RFC 3587 IPv6 global unicast address format  
 RFC 3596 DNS extensions to support IPv6  
 RFC 4007 IPv6 scoped address architecture  
 RFC 4193 Unique local IPv6 unicast addresses  
 RFC 4213 Transition mechanisms for IPv6 hosts and routers  
 RFC 4291 IPv6 addressing architecture  
 RFC 4443 Internet Control Message Protocol (ICMPv6)  
 RFC 4861 Neighbor discovery for IPv6  
 RFC 4862 IPv6 Stateless Address Auto-Configuration (SLAAC)  
 RFC 5014 IPv6 socket API for source address selection  
 RFC 5095 Deprecation of type 0 routing headers in IPv6  
 RFC 5175 IPv6 Router Advertisement (RA) flags option  
 RFC 6105 IPv6 Router Advertisement (RA) guard

## Management

AT Enterprise MIB including AMF Plus MIB and traps  
 Optical DDM MIB  
 SNMPv1, v2c and v3  
 ANSI/TIA-1057 Link Layer Discovery Protocol-Media Endpoint Discovery (LLDP-MED)  
 IEEE 802.1AB Link Layer Discovery Protocol (LLDP)  
 RFC 1155 Structure and identification of management information for TCP/IP-based Internets  
 RFC 1157 Simple Network Management Protocol (SNMP)  
 RFC 1212 Concise MIB definitions  
 RFC 1213 MIB for network management of TCP/IP-based Internets: MIB-II  
 RFC 1215 Convention for defining traps for use with the SNMP  
 RFC 1227 SNMP MUX protocol and MIB  
 RFC 1239 Standard MIB  
 RFC 2011 SNMPv2 MIB for IP using SMIv2  
 RFC 2012 SNMPv2 MIB for TCP using SMIv2  
 RFC 2013 SNMPv2 MIB for UDP using SMIv2  
 RFC 2578 Structure of Management Information v2 (SMIv2)  
 RFC 2579 Textual conventions for SMIv2  
 RFC 2580 Conformance statements for SMIv2  
 RFC 2674 Definitions of managed objects for bridges with traffic classes, multicast filtering and VLAN extensions  
 RFC 2741 Agent extensibility (AgentX) protocol  
 RFC 2819 RMON MIB (groups 1,2,3 and 9)  
 RFC 2863 Interfaces group MIB  
 RFC 3176 sFlow: a method for monitoring traffic in switched and routed networks  
 RFC 3411 An architecture for describing SNMP management frameworks  
 RFC 3412 Message processing and dispatching for the SNMP  
 RFC 3413 SNMP applications  
 RFC 3414 User-based Security Model (USM) for SNMPv3  
 RFC 3415 View-based Access Control Model (VACM) for SNMP  
 RFC 3416 Version 2 of the protocol operations for the SNMP  
 RFC 3417 Transport mappings for the SNMP  
 RFC 3418 MIB for SNMP  
 RFC 3621 Power over Ethernet (PoE) MIB  
 RFC 3635 Definitions of managed objects for the Ethernet-like interface types  
 RFC 3636 IEEE 802.3 MAU MIB  
 RFC 4022 MIB for the Transmission Control Protocol (TCP)  
 RFC 4113 MIB for the User Datagram Protocol (UDP)  
 RFC 4188 Definitions of managed objects for bridges  
 RFC 4292 IP forwarding table MIB  
 RFC 4293 MIB for the Internet Protocol (IP)  
 RFC 4318 Definitions of managed objects for bridges with RSTP  
 RFC 4560 Definitions of managed objects for remote ping, traceroute and lookup operations  
 RFC 5424 The Syslog protocol

## Multicast Support

IGMP query solicitation  
 IGMP snooping (IGMPv1, v2 and v3)  
 IGMP snooping fast-leave  
 IGMP/MLD multicast forwarding (IGMP/MLD proxy)  
 MLD snooping (MLDv1 and v2)  
 RFC 2236 Internet Group Management Protocol v2 (IGMPv2)  
 RFC 2710 Multicast Listener Discovery (MLD) for IPv6  
 RFC 2715 Interoperability rules for multicast routing protocols  
 RFC 3306 Unicast-prefix-based IPv6 multicast addresses  
 RFC 3376 IGMPv3  
 RFC 3590 Source Address Selection for the Multicast Listener Discovery (MLD) Protocol  
 RFC 3810 Multicast Listener Discovery v2 (MLDv2) for IPv6  
 RFC 4541 IGMP and MLD snooping switches  
 RFC 4604 Using IGMPv3 and MLDv2 for source-specific multicast

## Quality of Service (QoS)

IEEE 802.1p Priority tagging  
 RFC 2211 Specification of the controlled-load network element service  
 RFC 2474 DiffServ precedence for eight queues/port  
 RFC 2475 DiffServ architecture  
 RFC 2597 DiffServ Assured Forwarding (AF)  
 RFC 2697 A single-rate three-color marker  
 RFC 2698 A two-rate three-color marker  
 RFC 3246 DiffServ Expedited Forwarding (EF)

## Resiliency Features

IEC 62439-2 Media Redundancy Protocol (MRP)  
 IEEE 802.3ad Static and dynamic link aggregation  
 IEEE 802.1ag CFM Continuity Check Protocol (CCP)  
 IEEE 802.1AX Link aggregation (static and LACP)  
 IEEE 802.1D MAC bridges  
 IEEE 802.1s Multiple Spanning Tree Protocol (MSTP)  
 IEEE 802.1w Rapid Spanning Tree Protocol (RSTP)  
 ITU-T G.8032 / Y.1344 Ethernet Ring Protection Switching (ERPS)

## Security Features

SSH remote login  
 SSLv2 and SSLv3  
 TACACS+ Accounting, Authentication, Authorization (AAA)  
 IEEE 802.1X Authentication protocols (TLS, TTLS, PEAP and MD5)  
 IEEE 802.1X Multi-suplicant authentication  
 IEEE 802.1X Port-based network access control  
 RFC 2818 HTTP over TLS ("HTTPS")  
 RFC 2865 RADIUS authentication  
 RFC 2866 RADIUS accounting  
 RFC 2868 RADIUS attributes for tunnel protocol support  
 RFC 2986 PKCS #10: certification request syntax specification v1.7  
 RFC 3579 RADIUS support for Extensible Authentication Protocol (EAP)  
 RFC 3580 IEEE 802.1x RADIUS usage guidelines  
 RFC 3748 Extensible Authentication Protocol (EAP)  
 RFC 4251 Secure Shell (SSHv2) protocol architecture  
 RFC 4252 Secure Shell (SSHv2) authentication protocol  
 RFC 4253 Secure Shell (SSHv2) transport layer protocol  
 RFC 4254 Secure Shell (SSHv2) connection protocol  
 RFC 5176 RADIUS CoA (Change of Authorization)  
 RFC 5246 Transport Layer Security (TLS) v1.2  
 RFC 5280 X.509 certificate and Certificate Revocation List (CRL) profile  
 RFC 5425 Transport Layer Security (TLS) transport mapping for Syslog  
 RFC 5656 Elliptic curve algorithm integration for SSH  
 RFC 6125 Domain-based application service identity within PKI using X.509 certificates with TLS  
 RFC 6614 Transport Layer Security (TLS) encryption for RADIUS  
 RFC 6668 SHA-2 data integrity verification for SSH

## Services

RFC 854 Telnet protocol specification  
 RFC 855 Telnet option specifications  
 RFC 857 Telnet echo option  
 RFC 858 Telnet suppress go ahead option  
 RFC 1091 Telnet terminal-type option  
 RFC 1350 The TFTP protocol (revision 2)  
 RFC 1985 SMTP service extension  
 RFC 2049 MIME  
 RFC 2131 DHCPv4 (client)  
 RFC 2132 DHCP options and BootP vendor extensions  
 RFC 2616 Hypertext Transfer Protocol - HTTP/1.1  
 RFC 2821 Simple Mail Transfer Protocol (SMTP)  
 RFC 2822 Internet message format  
 RFC 3046 DHCP relay agent information option (DHCP option 82)  
 RFC 3315 Dynamic Host Configuration Protocol for IPv6 (DHCPv6)  
 RFC 3396 Encoding Long Options in the Dynamic Host Configuration Protocol (DHCPv4)  
 RFC 4330 Simple Network Time Protocol (SNTP) version 4  
 RFC 4954 SMTP Service Extension for Authentication  
 RFC 5905 Network Time Protocol (NTP) version 4

## IE220 Series | Industrial Ethernet Layer 2+ Switches

### VLAN Support

IEEE 802.1ad Provider bridges (VLAN stacking, Q-in-Q)  
 IEEE 802.1Q Virtual LAN (VLAN) bridges  
 IEEE 802.1v VLAN classification by protocol and port  
 IEEE 802.3ac VLAN tagging

### Feature Licenses

NAME	DESCRIPTION	INCLUDES
AT-FL-IE2-L1-01	IE220 Series Layer 1 premium license	<ul style="list-style-type: none"> <li>▶ 10G uplink ports</li> <li>▶ Hi-PoE sourcing</li> <li>▶ PoE++ sourcing</li> </ul>
AT-FL-IE2-L2-01	IE220 Series Layer 2 premium license	<ul style="list-style-type: none"> <li>▶ EPSR Master</li> <li>▶ ITU-T G.8032, Ethernet CFM</li> <li>▶ VLAN translation</li> <li>▶ VLAN double tagging (QinQ)</li> </ul>
AT-FL-IE2-NBI-1	IE220 Series, Northbound Interface premium license	<ul style="list-style-type: none"> <li>▶ NETCONF + YANG data models</li> <li>▶ RESTCONF + YANG data models</li> <li>▶ OpenFlow 1.3</li> </ul>

## Ordering Information

### Switches

The DIN rail and wall mount kits are included.  
 The management serial console cable is NOT included.

#### AT-IE220-6GHX-xx

4x 10/100/1000T, 2x 1G/10G SFP+,  
 Industrial Ethernet, Layer 2+ Switch  
 PoE++ Support

#### AT-IE220-10GHX-xx

8x 10/100/1000T, 2x 1G/10G SFP+  
 Industrial Ethernet, Layer 2+ Switch  
 PoE++ Support

Where xx = 80 standard Country of Origin  
 980 TAA compliant Country of Origin

### Power Supply

#### AT-DRB50-48-1

50W @48Vdc, Industrial AC/DC power supply  
 DIN rail mount

#### AT-IE048-240-20

240W @48Vdc, Industrial AC/DC power supply  
 DIN rail mount (5 years warranty)

#### AT-IE048-480-20

480W @48Vdc, Industrial AC/DC power supply  
 DIN rail mount (5 years warranty)

#### AT-SDR120-48

120W @48Vdc, Industrial AC/DC power supply  
 DIN rail mount

#### AT-SDR240-48

240W @48Vdc, Industrial AC/DC power supply  
 DIN rail mount

#### AT-SDR480-48

480W @48Vdc, Industrial AC/DC power supply  
 DIN rail mount

### Supported SFP Modules

Refer to the installation guide for the recommended Max.  
 Operating Temperature according to the selected SFP  
 module.

#### 10Gbps SFP Modules

##### AT-SP10BD10/I-12

10 km, 10G BiDi SFP, LC, SMF, I-Temp  
 (1270 Tx/1330 Rx)

##### AT-SP10BD10/I-13

10 km, 10G BiDi SFP, LC, SMF, I-Temp  
 (1330 Tx/1270 Rx)

##### AT-SP10BD20-12

20 km, 10G SFP, LC, SMF, TAA  
 (1270 Tx/1330 Rx)

##### AT-SP10BD20-13

20 km, 10G SFP, LC, SMF, TAA  
 (1330 Tx/1270 Rx)

##### AT-SP10BD40/I-12

40 km, 10G SFP, LC, SMF, I-Temp, TAA  
 (1270 Tx/1330 Rx)

##### AT-SP10BD40/I-13

40 km, 10G SFP, LC, SMF, I-Temp, TAA  
 (1330 Tx/1270 Rx)

##### AT-SP10BD80/I-14

80 km, 10G SFP, LC, SMF, I-Temp, TAA  
 (1490 Tx/1550 Rx)

##### AT-SP10BD80/I-15

80 km, 10G SFP, LC, SMF, I-Temp, TAA  
 (1550 Tx/1490 Rx)

##### AT-SP10ER40a/I

40 km, 10G SFP, LC, SMF,1550 nm, I-Temp, TAA

##### AT-SP10LRa/I

10 km, 10G SFP, LC, SMF,1310 nm, I-Temp, TAA

#### AT-SP10SR

300 m, 10G SFP, LC, MMF,850 nm, TAA

#### AT-SP10SR/I-90

300 m, 10G SFP, LC, MMF,850 nm, I-Temp, TAA

#### AT-SP10TM

20 m, 1/10G SFP, RJ-45, I-Temp, TAA

#### AT-SP10ZR80/I

80 km, 10G SFP, LC, SMF,1550 nm, I-Temp

#### 1000Mbps SFP Modules

##### AT-SPBD10-13

10 km, 1G BiDi SFP, LC, SMF, (1310 Tx/1490 Rx)

##### AT-SPBD10-14

10 km, 1G BiDi SFP, LC, SMF, (1490 Tx/1310 Rx)

##### AT-SPBD20-13/I

20 km, 1G BiDi SFP, SC, SMF, I-Temp,  
 (1310 Tx/1490 Rx)

##### AT-SPBD20-14/I

20 km, 1G BiDi SFP, SC, SMF, I-Temp,  
 (1490 Tx/1310 Rx)

##### AT-SPBD20LC/I-13

20 km, 1G BiDi SFP, LC, SMF, I-Temp, TAA,  
 (1310 Tx/1490 Rx)

##### AT-SPBD20LC/I-14

20 km, 1G BiDi SFP, LC, SMF, I-Temp, TAA,  
 (1490 Tx/1310 Rx)

##### AT-SPBD40-13/I

40 km, 1G BiDi SFP, LC, SMF, I-Temp,  
 (1310 Tx/1490 Rx)

##### AT-SPBD40-14/I

40 km, 1G BiDi SFP, LC, SMF, I-Temp,  
 (1490 Tx/ 1310 Rx)

## IE220 Series | Industrial Ethernet Layer 2+ Switches

### AT-SPEX/E-90

2 km, 1000EX SFP, LC, MMF, 1310 nm, Ext. Temp, TAA

### AT-SPLX10a

10 km, 1000LX SFP, LC, SMF, 1310 nm, TAA

### AT-SPLX10/I

10 km, 1000LX SFP, LC, SMF, 1310 nm, I-Temp

### AT-SPLX10/E-90

10 km, 1000LX SFP, LC, SMF, 1310 nm, Ext. Temp, TAA

### AT-SPLX40

40 km, 1000LX SFP, LC, SMF, 1310 nm

### AT-SPLX40/E-90

40 km, 1000LX SFP, LC, SMF, 1310 nm, Ext. Temp, TAA

### AT-SPSX-90

550 m, 1000SX SFP, LC, MMF, 850 nm, TAA

### AT-SPSX/I-90

550 m, 1000SX SFP, LC, MMF, 850 nm, I-Temp, TAA

### AT-SPSX/E-90

550 m, 1000SX SFP, LC, MMF, 850 nm, Ext. Temp, TAA

### AT-SPTX-90

100 m, 10/100/1000T SFP, RJ-45, TAA

### AT-SPTX/I

100 m, 10/100/1000T SFP, RJ-45, I-Temp

### AT-SPZX120/I

120 km, 1000LX SFP, LC, SMF, 1550 nm, I-Temp, TAA

## Passive Interconnection Cables

### AT-SP10TW1

Twinax direct attach cable (1 meter)

### AT-SP10TW3

Twinax direct attach cable (3 meter)

### AT-SP10TW7

Twinax direct attach cable (7 meter)

## Accessories

### AT-VT-Kit3

Management cable (USB to serial console)