ALL IP
CONVERGENCE

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*Edge Switch >> E7508*

**High-Capacity Backbone Switch**



**Overview**

E7508 is a high efficient multilayer switch that fulfills the HA (high availability) and resilience requirements expected from the enterprise network backbone or Telco's network edge equipment. As the customer demands arise you can equip the system with GE and 10GE interface modules in gradual fashion so that the system can provide 576Mbps of switching capacity and 428Mpps throughput. The switching and control part and power supply modules in the system are redundantly constructed with active-standby structure, which are accompanied by virtualization technology.

As an Edge grade switching platform E7508 supports the latest versions of unicast and multicast routing protocols for effective interworking with other facing networks. And with the high density service interfaces of 144GE/288GE ports E7508 can be directly associated with public network or construct its own network by building up local loop.

In order to effectively process the various types of traffic which are generated from the different user segments E7508 has adopted sophisticated QoS technology and policy rules. These implementation along with Netflow monitoring tools which is enabled by using an independent NP (Network Processor) can achieve the best optimized traffic processing quality.

**Features**

Flexible structure and operation

- High level of service reliability and resiliency is achieved by introducing redundancy scheme to construct Control and Switching parts combined with combinational power backup configuration.
- Due to the scalable expansion with smaller module, which provides better granularity, as per the expensive interface slots, the initial CAPEX burden can be addressed.
- All the duplex modules in the system support Hot swapping which enables non-

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stop operation while replacing any faulty module for repair.
- IEEE 802.3ad LACP supports to overcome the limitation on the bandwidth in-between hosts and improve resilience as a whole.
- BFD (Bidirectional Forwarding Detection) detects quickly any faults between forwarding engines without affecting negatively upon system performance.
- VRRP (Virtual Router Redundancy Protocol) is adopted to achieve the improved system reliability.

### QoS

- IEEE 802.1p based prioritization is implemented to process data traffic per its characteristics.
- CoS (Class of Service) classification which can be configured by administrator is available.
- 8 process queues are maintained per individual port, and the scheduling algorithms of SPQ, SDWRR, SPQ+SDWRR apply to each process queue.
- Secure Control Technology
  - 256 flow classification to CPU, Traffic to CPU rate-limit, 8 CPU queue
- With respect to egress traffic, rate shaping function can be applied to either port or process queue by unit of 1Mbps while guaranteeing the minimum bandwidth.
- DSCP marking and remarking are enabled.
- Traffic Metering and Counting
  - Single rate Three Color Marking(srTCM) and Two rate Three Color Marking (trTCM)
  - Byte/Packet Counter
  - QoS Remarking
  - Ingress/Egress Metering and Counting

### Layer 3 routing function

- Static routing configurations for IPv4/v6 are available.
- RIPv1/RIPv2/RIPng, OSPFv2/OSPFv3, BGP4 protocols are available.
- By use of PBR function the effective routing per traffic characteristics and the load balancing per ECMP (up to 8 paths) can be executed.
- Multicast protocols like IGMPv2/v3 (Internet Group Management Protocol), IGMP snooping, PIM (Protocol Independent Multicast), MLDv1/v2(Multicast Listener Discovery), and MLD snooping are supported.
- LER functionality for L3VPN
  - RFC 2547bis, L3VPN based on IP over MPLS tunnels
  - IP BGP VPN, L3VPN based on IP in IP, IP over GRE tunnels
  - IP Multicast VPN
- Multi-Protocol Label Switching
  - Ingress/Egress LER
  - Intermediate LSR, label swapping and MPLS proxy
  - E-LSP, L-LSP forwarding and QoS assignment
  - Fast Re-Route

Layer 2 switching function

- IEEE 802.1q VLAN is available.
- Port mirroring function supports to provide the packet from any specific port to another specified port so as to analyze.
- Loop detection function is available.
- IEEE 802.1d Spanning Tree Protocol and 802.1w Rapid Spanning Tree Protocol and MSTP are used to re-construct the traffic path in case the path has got problem.
- To effectively control the flooding of multicast packets IGMP snooping function can be utilized.

Security function

- RADIUS and TACACS+ servers are available for remote authentication.
- The system can initially prevent harmful traffic by use of ACL (Access Control List):
  - L2/L3/L4 and user define field lookup for IPv4/6
  - Ingress PCL / Egress PCL
- The system supports Control Plane Policing functions against TCP SYN attack, packet with Illegal address and illegal L4 header (TCP flag zero, and TCP/UDP port zero.)

Management function

- Both telnet and direct connection via console port are available for configuring operation environment.
- The protocols including SNMPv1/v2/v3(MIB I, II), CLI(Command Line Interface), and RMON (Remote Network Monitoring) for remote and local O&M activities are implemented.
- Automatic Shutdown function is activated in case any sub unit would be overheated and go beyond prearranged temperature limit.
- For better system operation NetFlow functionality is available for monitoring and sampling traffic which is implemented by adopting an NP solely for this purpose.

**Specification**

| E7508 Specification | |
|---|---|
| System Architecture & Console | .144-Ports 1000Base-X (SFP) or 100Base-FX(SFP) |
| | .144-Ports 10/100/1000Base-T |
| | .24-Ports 10G Base-R |
| | . 4 Power Module either in AC or DC (Optional) |
| Memory | 2 GB Main Memory, 128MB Flash Memory |
| Physical Dimension | 19" Rack Mount Type: - 482mm(H)x577mm(W)x433mm(D) |
| **Environment Conditions** | |
| Power source | DC ( Hot-swappable and Redundantly configured as N+1, N+N) DC source: -48 VDC |
| Power consumption | Maximum   912W |
| Operating temperature | 0℃~ +50℃ |
| Storage temperature | -20℃~ +60℃ |
| Performance(E7508) | |
| Switching Fabric | 576   Gbps non-blocking |
| Throughput | 428 Mpps wire-speed L2/L3 Switching/Routing |
| **Capacity** | |
| MAC Address | Up to 32K MAC Management |

| VLAN | Up to 4K VLAN |
| | Private VLAN, 802.1Q Tag VLAN (Max 4K Tag VLAN) |
| | Link Aggregation (802.3ad) : 255 group,  Max 8port/group |
| **Services and Features** | |
| Routing Protocol | RIP v1/v2, BGP v4, Static, OSPFv2/OSPFv3 |
| | Default gateway, Multiple Default gateway, MPLS, MPLS VPN |
| | Loop-back interface, VRRP |
| Filtering, Security & QoS | IEEE 802.1x support |
| | IEEE 802.1p QoS, ToS, Diff-serv support |
| | Congestion Management |
| | Virus Filtering : DoS prevention, Warm virus Filtering |
| | Subscriber Traffic control by ACLs (Access Control Lists) |
| Bandwidth Management | Hardware-based Rate Limiting |
| | Rate Limiting : 1Mbps per Gigabit port |
| | Egress Traffic Shaping per Port |
| | Ingress Traffic Policing per Flow/Packet |
| Management | SNMP v1/v2/v3, RMON, MIB-I/II |
| | NetFlow, |
| | Remote S/W Upgrade, Telnet, TFTP, FTP |
| | Port Mirroring |
| | CLI, Syslog, Access level control for administrator, |
| | RADIUS, TACACS+, SSH |
| Functions | STP(802.1D),  RSTP(802.1w), MSTP(802.1s) |
| | DHCP server & relay |
| | NTP (Network Time protocol) server & Client |
| | Jumbo Frame packet support : 10290byte (Giga) |
| Multicasting Protocol | IGMP v1, v2, v3, IGMP snooping, IGMP snooping fast leave, |
| | IGMP snooping suppression, IGMP proxy |
| | PIM-SM, PIM-SSM |

*Edge Switch >> E7505*

## High-Capacity Backbone Switch



**Overview**

E7505 is a high efficient multilayer switch that fulfills the HA (high availability) and resilience requirements expected from the enterprise network backbone or Telco's network edge equipment. As the customer demands arise you can equip the system with GE and 10GE interface modules in gradual fashion so that the system can provide 288Mbps of switching capacity and 214Mpps throughput.

The switching and control part and power supply modules in the system are redundantly constructed with active-standby structure, which are accompanied by virtualization technology.

As an Edge grade switching platform E7505 supports the latest versions of unicast and multicast routing protocols for effective interworking with other facing networks. And with the high density service interfaces of 72GE/144GE ports E7505 can be directly associated with public network or construct its own network by building up local loop.

In order to effectively process the various types of traffic which are generated from the different user segments E7505 has adopted sophisticated QoS technology and policy rules. These implementation along with Netflow monitoring tools which is enabled by using an independent NP(Network Processor) can achieve the best optimized traffic processing quality.

**Features**

Flexible structure and operation

• High level of service reliability and resiliency is achieved by introducing redundancy scheme to construct Control and Switching parts combined with combinational power backup configuration.
• Due to the scalable expansion with smaller module, which provides better granularity, as per the expensive interface slots, the initial CAPEX burden can be addressed.
• All the duplex modules in the system support Hot swapping which enables non-stop operation while replacing any faulty module for repair.
• IEEE 802.3ad LACP supports to overcome the limitation on the bandwidth in-between hosts and improve resilience as a whole.
• BFD (Bidirectional Forwarding Detection) detects quickly any faults between forwarding engines without affecting negatively upon system performance.

- VRRP (Virtual Router Redundancy Protocol) is adopted to achieve the improved system reliability.

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- CoS (Class of Service) classification which can be configured by administrator is available.
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- Secure Control Technology
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- DSCP marking and remarking are enabled.
- Traffic Metering and Counting
  - Single rate Three Color Marking(srTCM) and Two rate Three Color Marking (trTCM)
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  - IP BGP VPN, L3VPN based on IP in IP, IP over GRE tunnels
  - IP Multicast VPN
- Multi-Protocol Label Switching
  - Ingress/Egress LER
  - Intermediate LSR, label swapping and MPLS proxy
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packet with Illegal address and illegal L4 header (TCP flag zero, and TCP/UDP port zero.)

Management function

- Both telnet and direct connection via console port are available for configuring operation environment.
- The protocols including SNMPv1/v2/v3 (MIB I, II), CLI (Command Line Interface), and RMON (Remote Network Monitoring) for remote and local O&M activities are implemented.
- Automatic Shutdown function is activated in case any sub unit would be overheated and go beyond prearranged temperature limit.
- For better system operation NetFlow functionality is available for monitoring and sampling traffic which is implemented by adopting an NP solely for this purpose.

**Specification**

| E7505 Specification | |
|---|---|
| System Architecture & Console | 72-Ports 1000Base-X (SFP) or 100Base-FX(SFP) |
| | 72-Ports 10/100/1000Base-Tx |
| | 12-Ports 10G Base-R |
| | 2 Power Module either in AC or DC (Optional) |
| Memory | 2 GB Main Memory, 128MB Flash Memory |
| Physical Dimension | 19" Rack Mount Type: |
| | - 482mm(H)x 520mm(W)x 211mm(D) |
| **Environment Conditions** | |
| Power source | DC ( Hot-swappable and Redundantly configured as 1+1) |
| | DC source: -48 VDC |
| Power consumption | Maximum   456W |
| Operating temperature | 0℃~ +50℃ |
| Storage temperature | -20℃~ +60℃ |
| Performance(E7505) | |
| Switching Fabric | 288 Gbps non-blocking |
| Throughput | 214 Mpps wire-speed L2/L3 Switching/Routing |
| **Capacity** | |
| MAC Address | Up to 32K MAC Management |
| VLAN | Up to 4K VLAN |
| | Private VLAN, 802.1Q Tag VLAN (Max 4K Tag VLAN) |
| | Link Aggregation (802.3ad) : 255 group,   Max 8port/group |
| **Services and Features** | |
| Routing Protocol | RIP v1/v2, BGP v4, Static, OSPFv2/OSPFv3 |
| | Default gateway, Multiple Default gateway, MPLS, MPLS VPN |
| | Loop-back interface, VRRP |
| Filtering, Security & QoS | IEEE 802.1x support |
| | IEEE 802.1p QoS, ToS, Diff-serv support |
| | Congestion Management |
| | Virus Filtering : DoS prevention, Warm virus Filtering |
| | Subscriber Traffic control by ACLs (Access Control Lists) |
| Bandwidth Management | Hardware-based Rate Limiting |
| | Rate Limiting : 1Mbps per Gigabit port |
| | Egress Traffic Shaping per Port |

| | Ingress Traffic Policing per Flow/Packet |
|---|---|
| Management | SNMP v1/v2/v3, RMON, MIB-I/II<br>NetFlow<br>Remote S/W Upgrade, Telnet, TFTP, FTP<br>Port Mirroring<br>CLI, Syslog, Access level control for administrator,<br>RADIUS, TACACS+, SSH |
| Functions | STP(802.1D),   RSTP(802.1w), MSTP(802.1s)<br>DHCP server & relay<br>NTP (Network Time protocol) server & Client<br>Jumbo Frame packet support : 10290byte (Giga) |
| Multicasting Protocol | IGMP v1, v2, v3, IGMP snooping, IGMP snooping fast leave,<br>IGMP snooping suppression, IGMP proxy<br>PIM-SM, PIM-SSM |

### Layer 3 Switch >> P8824XG

**Gigabit Aggregation QoS L3 Switch**



- 20-Ports 1000Base-X(SFP) or 100Base-FX(SFP)
- 4-Ports 1000Base-X(SFP) or 10/100/1000Base-Tx (Combo Type)
- 2-Ports 10G Base-R(XFP)

**Overview**

P8824XG is a Gigabit L3 switch that delivers remarkable efficiency and reliability for robust switching at the CO aggregation or enterprise network edge. It is furnished with routing, multicasting, QoS (Quality of Service) functions suitable for IP-TV, mission critical data, and voice services.

Considering the connection possibility with existing device which have RJ-45 type connectors, P8824XG supports 4-Ports of 10/100/1000 Base-T interface as Combo Type. It basically has 24-Ports 1000 Base-X and optionally 2-Ports of 10Gbase-R (XFP type). Especially, in case of FX Module, the capacity expansion can be achieved by unit of port so that it can be helpful for scalable augmentation. All 24 ports of the switch are managed en bloc for efficiency, including power module insertion/extraction and Cisco-like CLI.

P8824XG is a 1U-sized switch applied for spatial efficiency and easy installation. System stability is optimized by supporting hardware based distributed switching and hot-swapping for each module, and system extension while operating is carried out without service interruption.

P8824XG makes use of high-speed non-blocking switch fabric. It also supports bandwidth management and QoS; therefore, service providers can offer differentiated IP services corresponding to applied service or SLA (Service Level Agreement). P8824XG's hardware-based multi-routing protocols provide never-before-seen functions among existing software-based routers.

**Scalable interface**

- Up to 24 Ports of SFP type Gigabit Ethernet Switch along with 4 100/1000Base-T Combo ports
- 2 slots for 10G Base-R interface module for Expansion

**Redundant Power for HA**

- Module Type of Power Supply Unit
- Dual configuration with either AC or DC
- Hot swapping enabled for continuous operation

**QoS feature**

- EEE 802.1p QoS, ToS, Diff-serv support
- Congestion Management
- Subscriber Traffic control by ACLs (Access Control Lists)
- Hardware-based Rate Limiting
- Rate Limiting: 1Mbps per Gigabit port
- Egress Traffic Shaping per Port
- Ingress Traffic Policing per Flow/Packet
- Hardware Based Symmetric & Asymmetric Rate Limiting

**L2 switching capability**

- Max. 4K VLAN
- Private VLAN, 802.1Q Tag VLAN (Max 4K Tag VLAN)
- Link Aggregation (802.3ad): 13 group, Max 8port/group
- 802.1v protocol base VLAN, VMAN(Ether9100, Q-in-Q)
- Max. 32K MAC Management
- STP(802.1D), RSTP(802.1w), PVSTP
- NAT
- DHCP server & relay
- NTP (Network Time protocol) server & Client
- Jumbo Frame packet support: 10290byte (Giga)

L3 routing ability

- RIP v1/v2, OSPF v2, BGP v4, Static
- Default gateway, Multiple Default gateway
- Loop-back interface, VRRP
- IGMP v1, v2, v3, IGMP snooping, IGMP snooping fast leave,
- IGMP snooping suppression, IGMP proxy
- PIM-SM, PIM-SSM

Security

- IEEE 802.1x support
- Filtering: Mac address, Mac address Count limit, Netbios, NBT,
- DHCP, Broadcast Storm, specific IP confirmation control, IP Packet
- Filtering, IP collision detection, IP Sub-network bandwidth blocking
- Virus Filtering: DoS prevention, Warm virus Filtering
- RADIUS, TACACS+, SSH

Management facility

- SNMP v1/v2, RMON, MIB-I/II
- sFlow, tcpDump
- Remote S/W Upgrade, Telnet, TFTP, FTP
- Port Mirroring
- CLI, Syslog, manager authority control function

Applications

- High-speed & high-capacity service for communication enterprises
- High-speed Internet service and intra-network environment for business and house subscribers
- Client-Server Network
- IPv6, routing, multicasting & QoS for IP-TV & TPS service
- Differentiated IP services corresponding to applied service or SLA (Service Level Agreement).

**Specification**

| P8824XG Specification | |
|---|---|
| System Architecture & Console | Gigabit Ethernet Switch : max 24 Port |
| | 20-Ports 1000Base-X (SFP) or 100Base-FX(SFP) |
| | 4-Ports 1000Base-X(SFP) or 10/100/1000Base-Tx (Combo Type) |
| | Expansion Module : 2-Ports 10G Base-R |
| | Dual AC/DC Power (Module Type) |
| Memory | 256MB Main Memory |
| | 32MB Flash Memory |
| Physical Dimension | 19" Rack Mount Type |
| | 44mm(H)x482.6mm(W)x335mm(D) |
| **Environment Conditions** | |

| Power | 110~220 VAC / 50~60 Hz, -44 ~ -52 VDC<br>(optional : Hot-swapping Redundant) |
|---|---|
| Power consumption | max 58.5 W |
| Operating temperature | 0℃~ +60℃ |
| Storage temperature | -20℃~ +70℃ |
| **Performance** | |
| Switching Fabric | 88 Gbps non-blocking |
| Throughput | 65.4 Mpps wire-speed L2/L3 Switching/Routing |
| **Capacity** | |
| MAC Address | Up to 32K MAC Management |
| VLAN | Up to 4K VLAN<br>Private VLAN, 802.1Q Tag VLAN (Max 4K Tag VLAN)<br>Link Aggregation (802.3ad) : 13 group,    Max 8port/group<br>802.1v protocol base VLAN, VMAN(Ether9100, Q-in-Q) |
| **Services and Features** | |
| Routing Protocol | RIP v1/v2, OSPF v2, BGP v4, Static<br>Default gateway, Multiple Default gateway<br>Loop-back interface, VRRP |
| Filtering,<br>  Security & QoS | IEEE 802.1x support<br>IEEE 802.1p QoS, ToS, Diff-serv support<br>Congestion Management<br>Filtering : Mac address, Mac address Count limit, Netbios, NBT,<br>DHCP, Broadcast Storm, Selective handling of specified IP address,    IP Packet filtering, Detection of IP address collision, IP Sub-network range blocking<br>Virus Filtering : DoS prevention, Warm virus Filtering<br>Subscriber Traffic control by ACLs (Access Control Lists) |
| Bandwidth Management | Hardware-based Rate Limiting<br>Rate Limiting : 1Mbps per Gigabit port<br>Egress Traffic Shaping per Port<br>Ingress Traffic Policing per Flow/Packet<br>Hardware Based Symmetric & Asymmetric Rate Limiting |
| Management | SNMP v1/v2, RMON, MIB-I/II<br>sFlow, tcpDump<br>Remote S/W Upgrade, Telnet, TFTP, FTP<br>Port Mirroring<br>CLI, Syslog, Access level control for administrator,<br>RADIUS, TACACS+, SSH |
| Functions | STP(802.1D),    RSTP(802.1w),    PVSTP<br>NAT<br>DHCP server & relay<br>NTP (Network Time protocol) server & Client<br>Jumbo Frame packet support : 10290byte (Giga) |
| Multicasting Protocol | IGMP v1, v2, v3, IGMP snooping, IGMP snooping fast leave,<br>IGMP snooping supression, IGMP proxy<br>PIM-SM, PIM-SSM |
| **Standards** | |

| | |
|---|---|
| IEEE Standards | 802.1D Spanning Tree Protocol |
| | 802.1w RSTP |
| | 802.1p Priority Control |
| | 802.1Q VLAN |
| | 802.3 10Base-T Ethernet |
| | 802.3u 100Base-X Fast Ethernet |
| | 802.3x Flow Control |
| | 802.3ad Link Aggregation |
| | 802.3z 1000Base-X |
| IETF Standards | RFC 1058 RIP v1 |
| | RFC 1112 IGMP |
| | RFC 1723 RIP v2 |
| | RFC 1771 BGP4 |
| | RFC 768 UDP |
| | RFC 791 IP |
| | RFC 903 TCP |
| | RFC 2131 DHCP Server/Relay |
| | RFC 2328 OSPF v2 |
| | RFC 2236 IGMP v2 |
| | RFC 3376 IGMP v3 |
| | RFC 2362 PIM-SM |
| | RFC 3569 PIM-SSM |
| Management Standards & MIB | RFC 783 TFTP |
| | RFC 854 Telnet |
| | RFC 1157 SNMP v1 |
| | RFC 1213 MIB-I I |
| | RFC 1253 OSPF-MIB |
| | RFC 1493 Bridge-MIB |
| | RFC 1724 RIPv2-MIB |
| | RFC 1757 RMON-MIB |
| | RFC 1850 OSPF2-MIB |
| | RFC 1902 SNMP v2 |
| | RFC 1907 SNMP-MIB |

## *Layer 3 Switch >> P8424XG*

**Carrier-class Metro Ethernet L3 Gigabit Switch**



**Overview**

P8424XG is a high performance switch to be placed in the access segment of a metro IP network. P8424XG can support high speed broadband multimedia services covering all the levels of Layer 2/3/4. It is equipped with highly improved routing, multicasting and QoS (Quality of Service) features. P8424XG is intended to be placed between traffic aggregation switches and a high performance backbone switch to transmit data between them, allowing enterprises and service providers to build a gigabit backbone network conveniently.

P8424XG can handle bi-directional traffics between metro switches through the layer 2/3/4 switching function, since its layer 2 switching and layer 3 routing is based on hardware. It supports full duplex communication at each port, thus the available bandwidth of a link can be doubled since full duplex communication allows simultaneous transmission of data frames.

**Features**

- High speed and high capacity service for service providers
- Optimized solution for service providers to process high-capacity traffics at high speed
- Long distance connection based on various optical interfaces
- Various network topology such as Tree or Ring etc
- 48Gbps Non-Blocking Switch Fabric, Max. 36Mpps throughput
- 24port Giga Combo type: 24port 10/100/1000Base-TX and 24 SFP port
- 24 SFP port: Auto detection of 100Base-FX SFP and 1000Base-X SFP GBIC, Combination of 100M and Giga through Hot-Swapping function
- Stable hardware-based Wire-speed switching and routing
- The function module for switching and routing is implemented in hardware
- All the ports support wire-speed Ethernet packing transmission at Layer 2/3
- Layer 3 switching network structure with routing protocol built-in
- Performs Layer 3 switching for the communication inside internal LAN segment
- Wire-speed Internet Protocol(IP) switching and routing
  - RIP (Routing Information Protocol), OSPF (Open Shortest Path First), Static route, Default gateway, Multiple-default gateway, Loopback interface, BGP4 (Boarder Gateway Protocol), VRRP
- Wire-speed IP multicast routing
  - Increase the transmission efficiency by preventing unnecessary broadcasting through IGMP (Internet Group Multicast Protocol) Snooping.
- Hardware routing table
- Bandwidth Management
- Limits and guarantees subscriber traffic by SLA (Service Level Agreement) agreed upon subscription by 1Mpbs(Gigabit Port)
- Performs bandwidth management based on hardware to minimize internal delay
- Performs bandwidth limiting without affecting switching and routing performance
- Symmetric & Asymmetric Bandwidth Management
- Traffic Shaping per port
- VLAN (Virtual Local Area Network, IEEE 802.1Q)
- VLAN function complying to International standards
- Max. 4K VLAN supported
- VLAN Trunking that assigns several VLAN to a port

- Supports Tagged VLAN
- STP (Spanning Tree Protocol, IEEE 802.1D)
- Layer 2 STP complying with international standards
- Fast recovery upon problems through enhanced STP performance (RSTP : rapid STP, 802.1w)
- Supports PVST (Per VLAN STP)
- Policy-based Quality of Service (QoS)
- Various Traffic Classification (IEEE 802.1p)
- Defines in/out bandwidth for each user(IP, port)
- Defines bandwidth of max. 1,000 IP address or users
- Allows administrator to monitor traffics specified in the Traffic Classification
- Provides data to the monitoring equipment or self monitoring
- Monitoring of traffics that employees are using without letting them know about it
- Abnormal traffic detection
- ToS, Diff-Serv, QoS through various Priority Control
- Reliable network security through packet filtering and ACL
- Limits to allow only the users from specific IP addresses to access for unauthorized access blocking and operation management
- In/Out access control and permit for each IP user
- In/Out access control or permit for each port/application
- Limiting Source IP addresses
- DoS Attack Filtering
- Adjustment of packets in Well-Known ports upon DoS Attack
- Self alarming upon the occurrence of traffic and CPU load limit
- Management functions(Telnet, SNMP) in case of increase of load
- Notify of unauthorized access by displaying a banner of warning etc
- Vista LLTD(Link Layer Topology Discovery) blocking
- Filtering: Mac address, Mac address Count limit, Netbios, NBT, DHCP, Bradcast Storm, IP Packet filtering, IP collision detection, IP sub-network band blocking, specific IP check and control
- Various additional features
- Port trunking
  - Supports port trunking up to 8 of the ports that use same in/out interface device
  - Load Balancing for multiple trunking ports
- Link Aggregation(IEEE 802.3ad)
- DHCP (Dynamic Host Configuration Protocol) Server/Relay
  - No need to deploy additional server for DHCP service
  - Flexible IP management for each network by setting specific IP address range
  - Minimize IP address assignment error through DHCP service
  - DAI function: ARP modulation attack blocking, DHCP Snooping
- Broadcast Storm Filtering
- NAT(Network Address Translation)
- NTP(Network Time Protocol)
- Power redundancy for stable power supply
- Fast and convenient system configuration and operation
- Fast Cold booting that performs initial operation function
- System OS upgrade through TFTP, FTP and Flash
- Operation management familiar and convenient to operator
- CLI alike a Cisco product
- local and remote system management through Telnet
- Auto software upgrade from remote site
- Auto recovery of settings upon rebooting
- Syslog for stable operation management and diagnosis
- SNMP I/ II agent, RMON function for stable operation management and creation of statistics data by external network management
- Monitor traffics in a specific port through Port Mirroring
- Jumbo Frame packet: 9022byte(100M port), 10290byte(Gigabit port)
- Redundancy, attachable/detachable, hot swappable design of power module for seamless system maintenance
- Modular FAN that can be attached/detached for convenient maintenance

**Specification**

P8424XG hardware provides wire-speed switching service, while its software provides OAM (Operation, Administration and maintenance) and QoS (Quality of Service) to entire system.

| P8424XG Specification | |
|---|---|
| System Architecture | Gigabit Ethernet Switch . 24-Port 100base-FX/1000Base-X SFP Type, 24-Port 10/100/1000Base-Tx Combo Type . Dual AC/DC Power (Module Type) |
| Memory | 256MB Main Memory, 32MB Flash Memory |
| Physical Dimension | 19" Rack mountable size, 44mm(H) x 437mm(W) x 330mm(D) |
| **Environment Conditions** | |
| Power | AC, DC (Dual power supply) Hot-Swapping 110~220 VAC / 50~60 Hz, -42 ~ -52 VDC |
| Power consumption | Max. 65 W |
| Operating Temperature | 0℃～50℃ |
| Storage Temperature | 20℃～60℃ |
| **Media Interfaces** | |
| Interface Type | 100/1000Base-X SFP: Max. 24-Port G/E or 100Base-FX or 10/100/1000Base-Tx |
| Management port | RJ-45 port (10/100Mbps) |
| Console | RS-232C Serial Port (RJ-45 type) |
| **Performance** | |
| Switching Fabric | 48 Gbps non-blocking |
| Throughput | 36Mpps wire-speed L2/L3 Switching/Routing |
| **Capacity** | |
| MAC Address | 32K MAC Management |
| QoS | QoS Policing 1K & Traffic Policing Max 1K |
| VLAN | 4 K VLAN Overlap VLAN,  8021.Q Tag Vlan (Max 4K Tag Vlan) Link Aggregation (802.3ad) : 12 group,  Max 8port/group 802.1v protocol base VLAN, VMAN(Ether9100, Q-in-Q) |
| **Services and Features** | |
| Routing Protocol | RIP v1/v2, OSPF v2, BGP v4, Static, VRRP Default gateway, Multiple Default gateway Loop-back interface, PIM-SM, DVMRP |
| Filtering, Security & QoS | IEEE 802.1x support IEEE 802.1p QoS, ToS, Diff-serv support Congestion Management Filtering : Mac address, Mac address Count limt, Netbios, NBT, DHCP, Broadcast Storm, Specific IP check and control, IP Packet filtering, IP collision detection, IP Sub-network band blocking Virus Filtering : DoS prevention, Warm virus Filtering Subscriber Traffic control by ACLs (Access Control Lists) |
| Bandwidth Management | Hardware-based Rate Limiting Rate Limiting : 1Mbps per Gigabit port |

| | |
|---|---|
| | Egress Traffic Shaping per Port<br>Ingress Traffic Policy per Flow/Packet<br>Hardware Based Symmetric & Asymmetric Rate Limiting |
| Management | SNMP v1/v2, RMON, MIB-I/II<br>sFlow, tcpDump, Remote S/W Upgrade, Telnet, TFTP, FTP<br>Port Mirroring, CLI, Syslog, Admin permission control,<br>RADIUS, TACACS+, SSH |
| Functions | STP(802.1D),   RSTP(802.1w),   PVSTP<br>DHCP server (IP address 2000+) & relay (2+)<br>NTP (Network Time protocol) server & Client, NAT<br>Jumbo Frame packet support : 10290byte (Giga) |
| Multicasting<br>Protocol | IGMP v1, v2, IGMP snooping, IGMP snooping fast leave, IGMP snooping suppression,<br>Multicast group 1,000+<br>PIM-SM, PIM-SSM |
| **Standards** | |
| IEEE Standards | 802.1D Spanning Tree Protocol<br>802.1w RSTP<br>802.1p Priority Control<br>802.1Q VLAN<br>802.3 10Base-T Ethernet<br>802.3u 100Base-X Fast Ethernet<br>802.3x Flow Control<br>802.3ad Link Aggregation<br>802.3z 1000Base-X |
| IETF Standards | RFC 1058 RIP v1<br>RFC 1112 IGMP<br>RFC 1723 RIP v2<br>RFC 1771 BGP4<br>RFC 768 UDP<br>RFC 791 IP<br>RFC 903 TCP<br>RFC 2131 DHCP Server/Relay<br>RFC 2328 OSPF v2<br>RFC 2236 IGMP v2<br>RFC 2362 PIM-SM<br>RFC 1075 DVMRP<br>RFC 3973 PIM-DM |
| Management<br>Standards<br>& MIB | RFC 783 TFTP<br>RFC 854 Telnet<br>RFC 1157 SNMP v1<br>RFC 1213 MIB-I I<br>RFC 1253 OSPF-MIB<br>RFC 1493 Bridge-MIB<br>RFC 1724 RIPv2-MIB<br>RFC 1757 RMON-MIB<br>RFC 1850 OSPF2-MIB<br>RFC 1902 SNMP v2<br>RFC 1907 SNMP-MIB |

*Layer 3 Switch >> P8124XG*

**Carrier-class Metro Ethernet L3 Gigabit Switch**



**Overview**

P8124XG is an aggregation switch that accommodates L2 and L3 subscriber lines in Metro Ethernet network environment. As the latest version in ubiQuoss' aggregation switch lineup Premier, 8124XG is designed to efficiently process high speed broadband traffic of various types of TPS applications. It has the form factor of box type which is also suitable for mounting onto a rack.

The most representative role of P8124XG is performing the reliable aggregation and distribution work. For this application P8124XG is typically installed at Telco's Central Office, Apartment Complex MDF, or outdoor station to be interconnected in the Metro Access Network where it accommodate subscriber traffics through the 100Mbps links, process and transfer the traffics to the high speed backbone switch or router. It handles the traffic in reverse stream at the same time. Most of these processes are executed in wire speed.

For better spatial adaptability and easy installation, P8124XG has the benefit in terms of size which is the smallest of same kind products. In order to maximize the system reliability and service availability, P8124XG has adopted hardware-based distributed switching and modular Hot-Swapping features, which enables an operator to extend the system without cease of operation.

P8124XG can be applied to construct the best optimized network meeting the customer's requirements quickly in cost effective manner, so that it helps operators to equip themselves with competitive advantages in terms of offering speed and price.

**Features**

Routing and Multicasting

- Routing protocols: Static route, RIP OSPFv2, BGPv4
- Multicasting protocols: IGMP v1/v2, IGMP Snooping, PIM-SM

Bandwidth management and QoS

- Hardware based bandwidth management per port
- Priority based traffic process per packet (QoS)
- Packet filtering (MAC filtering, NetBios filtering, DHCP filtering)
- Rate Limiting and guarantee with megabit resolution
- Hardware-based Rate Limiting (Traffic shaping)
- Symmetric and Asymmetric Rate Limiting

Handy O&M

- Cisco-like CLI, TFTP, Telnet, SNMP Ⅰ/Ⅱ agent, Sys log, RMON
- EMS(Elementary Management System), Port Mirroring
- DHCP Server & Relay

Performance

- 8.8Gbps Non-Blocking Switch Fabric
- Maximum 6.5 Mpps L2/L3 Wire-Speed Switching/Routing Throughput
- 16K MAC Addresses for L2 switching

- 4K VLAN

Available Interfaces

- Three (3) Slots for Interface modules
  - Optional module of 8 ports 10/100Base-TX (UTP)
  - Optional module of 8 ports 100Base-FX(MM/SM)
- Giga Combo ports: Two (2) ports of 1000Base-X(SX/LX/LH) SFP / two(2) ports of 1000Base-Tx
- Single core 100Base-FX module is also available

P8124XG Interface Type

| Items | Connector type | Transmission Distance | No. of ports |
|---|---|---|---|
| 1000BASE-SX (SFP) | SC Type | 550m | 2 (SFP) |
| 1000BASE-LX (SFP) | SC Type | 10Km | |
| | SC Type | 40Km | |
| 1000BASE-LH (SFP) | SC Type | 70Km | |
| 1000BASE-TX | RJ-45 | 100m | 2 |
| 100BASE-FX | LC-Type(MMF) | 2Km | -8 Ports per module -Max. 3 modules -Max. 24 Ports |
| | LC-Type(SMF) | 15Km | |
| | LC-Type(SMF) | 40Km | |
| 100Base-FX-1C | SC-Type(MMF) – 1C | 2Km | |
| | SC-Type(SMF) – 1C | 15Km | |
| | SC-Type(SMF) – 1C | 40Km | |
| 10/100BASE-TX | RJ-45 Type | 100m | |

Function and Feature

- STP (IEEE 802.1d), RSTP(Rapid STP, Recovery within 5 seconds), PVST(Per vLAN STP)
- Multi-VLAN(Overlapped VLAN)
- Link Aggregation, Port trunking
- Jumbo frame packet
- DHCP Server/Relay
- ACL (Access Control List)
- Hot swapping function (FX/TX module, Power unit module)
- NTP (Network Time Protocol)

Outstanding benefits

- Stepwise augmentation by equipping interface module of 8port unit
- Shutdown and blocking of the relevant spot rather than whole system when error occurs
- Ceaseless operation even while changing network connections due to Hot Swapping function
- Dual power units for better availability
- Hardware based bandwidth management
  - Limitation and guarantee of the user bandwidth according to SLA (Service Level Agreement) by resolution of 1Mbps unit. (Recommendation on resolution: Up to 10M by unit of 1Mbps, Above 10M, Unit of 10M)
  - In addition to Symmetric bandwidth allocation, Asymmetric method is also completed, which is suitable for the typical traffic pattern of high speed internet access traffic as well as TPS ones.

**Specification**

Hardware

| Hardware Specification | |
|---|---|
| System Architecture | Combo Giga Ports: 2 X 1000Base-X (SFP) / 2 X 1000Base-TX<br>3 slots : 10/100Base-TX module (8 ports) or 100Base-FX module (8 ports) |
| Main Processor | Power PC Processor |
| Memory | 256MB Main Memory<br>32MB Flash Memory<br>2MB for Boot |
| Physical Dimension | 19" Rack Mount Type<br>44mm(H) x 482.6mm(W) x 379mm(D) |
| **Environment** | |
| Power Supply | AC 100~220 VAC / 50~60 Hz<br>DC –48V |
| Power Consumption | 60W maximum |
| Suppression | 40db ~ 50db |
| Heating Value | 19cal /sec |
| Operating Temperature | -20 ~ 60℃ |
| Storage Temperature | -10 ~ 70℃ |
| Operating Humidity | 80% relative humidity |
| **Media Interface** | |
| Interface Type | 2 Combo Giga ports: 2 X 1000Base-X (SFP) / 2 X 1000BASE-TX<br>3 slots : 10/100Base-TX module (8 ports) / 100Base-FX module (8 ports) |
| Console | RS-232C Serial Port (RJ-45 type) |
| **Performance** | |
| Switch Fabric Performance | 8.8 Gbps non-blocking (Store and Forward) |
| Throughput | 6.5 Mpps wire-speed L2/L3 switching/routing |
| **Capacity** | |
| MAC Address | Up to 16K MAC Addresses Management |
| VLAN | 4K VLANs |
| **Services and Features** | |
| Routing Protocol | Static route, RIP, OSPFv2, BGPv4<br>ECMP (up to 8 next hops)<br>OSPFv3, BGP for IPv6 |
| IP Multicasting Protocol | IGMP v1/v2, IGMP snooping, PIM-SM |
| Bandwidth Management | Rate Limiting and guarantee with megabit resolution<br>Hardware-based Rate Limiting(Traffic shaping)<br>Symmetric and Asymmetric Rate Limiting |
| Security | System access control by ACL<br>Subscriber Traffic control by Packet Filtering<br>Invalid subscriber source ip drop by Packet Filtering |
| **Standards** | |
| Standard Protocols | IEEE 802.1D Spanning Tree Protocol<br>IEEE 802.1w RSTP |

| | |
|---|---|
| | IEEE 802.1p Priority Control |
| | IEEE 802.1Q VLAN |
| | IEEE 802.3u 100Base-X Fast Ethernet |
| | IEEE 802.3x Flow Control |
| | IEEE 802.3z 1000Base-X Gigabit Ethernet |
| | IEEE 802.3ad Link Aggregation |
| | IETF RFC 768 UDP |
| | IETF RFC 791 IP |
| | IETF RFC 793 TCP |
| | IETF RFC 826 ARP |
| | IETF RFC 959 FTP |
| | IETF RFC 1058 RIP v1 |
| | IETF RFC 1112 IGMP |
| | IETF RFC 1723 RIP v2 |
| | IETF RFC 2131 DHCP |
| | IETF RFC 2178 OSPF v2 |
| | IETF RFC 2236 IGMP v2 |
| | IETF RFC 2338 VRRP |
| | IETF RFC 2362 PIM-SM |
| | IETF RFC 2710 MLD for IPv6 |
| | IETF RFC 2740 OSPFv3 |
| Operating and Management | IETF RFC 783 TFTP |
| | IETF RFC 854 Telnet |
| | IETF RFC 1157 SNMP v1 |
| | IETF RFC 1213 MIB-I I |
| | IETF RFC 1724 RIPv2-MIB |
| | IETF RFC 1757 RMON-MIB |
| | IETF RFC 1850 OSPF-MIB |
| | IETF RFC 1902 SNMP v2 |
| | IETF RFC 1907 SNMP-MIB |

Software

| Software | |
|---|---|
| Security | Packet Filtering, Access List, VLAN |
| User access control | Mac address Filtering, Limiting on number of Clients |
| IP resource management | DHCP Server, DHCP Relay, NTP |
| Communication mode | Half duplex and Full duplex |
| Switching method | Store and Forward |
| Data Processing method | Longest Prefix Match(Network Metch) |
| OAM | CLI, ftp, Telnet SNMP, RMON |

*Layer 2 Switch >> E5024*

**Gigabit L2 Workgroup Switch**



**Overview**

E5024 is a Layer2 Gigabit Ethernet workgroup switch that provides Layer 2 Ethernet switching and high-speed high-capacity broadband multimedia service of up to 1Gbps and is applied in access areas of Metro Ethernet or FTTx based network subscribers.　Suitable for direct connection to a subscriber terminal or an aggregation switch, it provides high performance switching service, which can be implemented economically based upon 1000Mbps link speed.

E5024 can have up to twenty-four 1000base-T (UTP RJ-45) ports and two optional modules that support either up to two 1000Base-T or 1000Base-X /100Base-FX (SFP), 1.25G/2.5G PON ports. All ports of E5024 switch support full duplex communication, allowing both directions of traffic to flow at the same time, so the link bandwidth extension is actually doubled.

Besides the LAN switching functions, E5024 also provides QoS and multicasting and has increased the level of security with 802.1x. Also, all ports support wire speed, and in case of using an uplink port as FTTx PON, a broadband of 1.25Gbps/2.5Gbps per port can be supported.

E5024 supports hardware-based bandwidth management and Quality of Service functionality, which enable corporate users and ISPs to provide differentiated internet services in the environment of next generation network.

**Features**

- 24/16/8 ports 1000Base-T (Fixed)
- 2 Optional Slot Uplink Module(Hot-Swappable) : 100Base-FX, 1000Base-Tx, 1000Base-X
- Uplink Module
  - 1 port Combo : 100Base-FX/1000Base-X (SFP) or 1000Base-T (RJ-45)
  - 1 port EPON 1.25G
  - 1 port GPON 2.5G (SFP Tranceiver Type)
- Power: 110~220 VAC / 50~60 Hz
- 56Gbps Non-Blocking Switch Fabric
- 38Mpps Throughput
- 128MB Main Memory, 32MB Flash Memory
- Max. 16K MAC Address Support for Switching
- 256 VLANs Support
- Filtering: DHCP, NetBios, NBT, Mac, IP Packet Filtering, IP-Subnetwork range blocking, Selective handling of specified IP address, Detection of IP address collision
- Alert when traffic/CPU load threshold reached
- MAC address falsification & flooding prevention (static MAC, MAC count)
- Multicast/broadcast flooding prevention (broadband controlled & auto-lift after a period of time)
- Secure Network: DoS prevention, Warm virus Filtering
- IEEE 802.1p, IEEE802.1Q, IEEE802.1D
- Rate Limit: @ 1Mbps (100M & Gigabit port)
- Egress Traffic Shaping (Rate Limit) per port
- Ingress Traffic Policing per flow/packet

- VLAN, Multi VLAN, STP, RSTP, IGMP snooping & query
- Max. 128 ACL for QoS standards and filtering
- Gateway IP Address Resolution Protocol (GARP)
- IGMP v1/v2, IGMP Snooping, IGMP Snooping Proxy Reporting supported
- SNMP trap for up/down linking and system initialization
- TFTP, CLI, Telnet, Syslog, SNMP I/II, RMON, Port Mirroring

Application

- L2 Workgroup Switch over Metro Ethernet Network
- MDU over FTTH PON network
- Dynamic and Distributed Service, Contents and Applications Delivery to the MAN
- Enabling ISPs to construct Wireless broadband access networks
- Support intra-network environment for business and/or factory where power supply is not prepared.

Specification

| E5024 Specification | |
|---|---|
| System Architecture & Console | 24/16/8 fixed 1000Base-T ports & 2 uplink slots (Expansion Module) (Auto-negotiation, Auto-Sensing, Auto MDI/MDIX) 2 Expansion Module: 1 Port per Module - 100Base-FX/1000Base-X (SFP) or 1000Base-T(RJ-45) RS-232C Serial Console Port (RJ-45 type) |
| Memory | 128MB Main Memory 32MB Flash Memory |
| Physical Dimension | 19" Rack Mount Type, 1RU 44mm(H)x482.6mm(W, Rack Guide included)x220mm(D) |
| **Environment Conditions** | |
| Power | 110~220 VAC / 50~60 Hz |
| Power consumption | Max. 40W |
| Operating temperature | 0℃~ 50℃ (-20~60℃) |
| Storage temperature | -30℃~ 70℃ |
| Performance | |
| Switching Fabric | 56Gbps non-blocking |
| Throughput | 38Mpps wire-speed L2 Switching |
| Capacity | |
| MAC Address | Up to 16K MAC Management |
| VLAN | 256 VLAN (VLAN ID range 1~4094) Private Edge VLAN,    8021.Q Tagged-VLAN Link Aggregation (802.3ad): 13 group,    Max 8 port/group |
| **Services and Features** | |
| Filtering, Security & QoS | IEEE 802.1p QoS, Diff-serv support, Congestion Management Filtering: Mac address,    Mac address Count limit, Netbios, NBT,TCP    Sync cookies, TCP RST-UNKnown, Martian-Filter, DHCP, Broadcast Storm, selective handling of specified IP address, IP Packet filtering, detection of IP address collision Virus Filtering: DoS prevention, Warm virus Filtering Subscriber Traffic control by ACLs (Access Control Lists) Queue: 8, SPQ, WRR, SPQ+WFO |

| | Service differentiation for Control Packet (Ping, Telnet, SNMP, FTP, TFT, etc) |
|---|---|
| Management | SNMP v1/v2, RMON, MIB-I/II, log flash, Subscriber (Block/unblock), Last MAC Management, Remote S/W Upgrade, Telnet, TFTP, FTP, Port Mirroring, CLI, Syslog, Access level control for administrator<br>Radius, TACAS+ |
| Functions | STP(802.1D), RSTP(802.1w), Self-Loop controlled<br>DHCP relay/DHCP snooping, DHCP option 82<br>Storm-control (L2DLF,Broadcast,Multicast),<br>Flood-Guard (pps control), CPU Filter(IP+TCP/UDP PORT NO)<br>NTP (Network Time protocol) Client<br>Jumbo Frame packet support: 9022byte<br>Stacking & IP Clustering: 8 Clustering |
| Multicasting Protocol | IGMP v2.0,<br>IGMP snooping, 255 snoop Table, IGMP query, IGMP Join/Leave Suppression,<br>IGMP Fast Leave, IGMP Static Join, IGMP proxy reporting |
| **Standards** | |
| IEEE Standards | 802.1D Spanning Tree Protocol<br>802.1w RSTP<br>802.1p Priority Control<br>802.1Q VLAN<br>802.3 10Base-T Ethernet<br>802.3u 100Base-X Fast Ethernet<br>802.3x Flow Control<br>802.3ad Link Aggregation<br>802.3z 1000Base-X Gigabit Ethernet |
| IETF Standards | RFC 768 UDP<br>RFC 791 IP<br>RFC 903 TCP<br>RFC 2131 DHCP Relay<br>RFC 2236 IGMP v2<br>RFC 1112 IGMP |
| Management Standards & MIB | RFC 783 TFTP<br>RFC 854 Telnet<br>RFC 1157 SNMP v1<br>RFC 1213 MIB-I I<br>RFC 1493 Bridge-MIB<br>RFC 1757 RMON-MIB<br>RFC 1902 SNMP v2<br>RFC 1907 SNMP-MIB<br>RFC 1643 Ethernet-like Internet MIB |

## Layer 2 Switch >> E5016

**Gigabit L2 Workgroup Switch**



**Overview**

E5016 is a Layer2 Gigabit Ethernet workgroup switch that provides Layer 2 Ethernet switching and high-speed high-capacity broadband multimedia service of up to 1Gbps and is applied in access areas of Metro Ethernet or FTTx based network subscribers.    Suitable for direct connection to a subscriber terminal or an aggregation switch, it provides high performance switching service, which can be implemented economically based upon 1000Mbps link speed.

E5016 can have up to sixteen 1000base-T (UTP RJ-45) ports and two optional modules that support either up to two 1000Base-T or 1000Base-X /100Base-FX (SFP), 1.25G/2.5G PON ports.    All ports of E5016 switch support full duplex communication, allowing both directions of traffic to flow at the same time, so the link bandwidth extension is actually doubled.

Besides the LAN switching functions, E5016 also provides QoS and multicasting and has increased the level of security with 802.1x.    Also, all ports support wire speed, and in case of using an uplink port as FTTx PON, a broadband of 1.25Gbps/2.5Gbps per port can be supported.

E5016 supports hardware-based bandwidth management and Quality of Service functionality, which enable corporate users and ISPs to provide differentiated internet services in the environment of next generation network.

**Features**

- 16/8 ports 1000Base-T (Fixed)
- 1 Optional Slot Uplink Module(Hot-Swappable) : 100Base-FX, 1000Base-Tx, 1000Base-X
- Uplink Module
    - 1 port Combo : 100Base-FX/1000Base-X (SFP) or 1000Base-T (RJ-45)
    - 1 port EPON 1.25G
    - 1 port GPON 2.5G (SFP Tranceiver Type)
- Power: 110~220 VAC / 50~60 Hz
- 56Gbps Non-Blocking Switch Fabric
- 38Mpps Throughput
- 128MB Main Memory, 32MB Flash Memory
- Max. 16K MAC Address Support for Switching
- 256 VLANs Support
- Filtering: DHCP, NetBios, NBT, Mac, IP Packet Filtering, IP-Subnetwork range blocking, Selective handling of specified IP address, Detection of IP address collision
- Alert when traffic/CPU load threshold reached
- MAC address falsification & flooding prevention (static MAC, MAC count)
- Multicast/broadcast flooding prevention (broadband controlled & auto-lift after a period of time)
- Secure Network: DoS prevention, Warm virus Filtering
- IEEE 802.1p, IEEE802.1Q, IEEE802.1D
- Rate Limit: @ 1Mbps (100M & Gigabit port)
- Egress Traffic Shaping (Rate Limit) per port
- Ingress Traffic Policing per flow/packet

- VLAN, Multi VLAN, STP, RSTP, IGMP snooping & query
- Max. 128 ACL for QoS standards and filtering
- Gateway IP Address Resolution Protocol (GARP)
- IGMP v1/v2, IGMP Snooping, IGMP Snooping Proxy Reporting supported
- SNMP trap for up/down linking and system initialization
- TFTP, CLI, Telnet, Syslog, SNMP I/II, RMON, Port Mirroring

Application

- L2 Workgroup Switch over Metro Ethernet Network
- MDU over FTTH PON network
- Dynamic and Distributed Service, Contents and Applications Delivery to the MAN
- Enabling ISPs to construct Wireless broadband access networks
- Support intra-network environment for business and/or factory where power supply is not prepared.

Specification

| E5016 Specification | |
|---|---|
| System Architecture & Console | 24/16/8 fixed 1000Base-T ports<br>(Auto-negotiation, Auto-Sensing, Auto MDI/MDIX)<br>1 Expansion Module: 1 Port per Module<br>- 100Base-FX/1000Base-X (SFP) or 1000Base-T(RJ-45)<br>RS-232C Serial Console Port (RJ-45 type) |
| Memory | 128MB Main Memory<br>32MB Flash Memory |
| Physical Dimension | 19" Rack Mount Type, 1RU<br>44mm(H)x482.6mm(W, Rack Guide included)x220mm(D) |
| **Environment Conditions** | |
| Power | 110~220 VAC / 50~60 Hz |
| Power consumption | Max. 40W |
| Operating temperature | 0℃~ 50℃ (-20~60℃) |
| Storage temperature | -30℃~ 70℃ |
| **Performance** | |
| Switching Fabric | 56Gbps non-blocking |
| Throughput | 38Mpps wire-speed L2 Switching |
| **Capacity** | |
| MAC Address | Up to 16K MAC Management |
| VLAN | 256 VLAN (VLAN ID range 1~4094)<br>Private Edge VLAN,   8021.Q Tagged-VLAN<br>Link Aggregation (802.3ad): 13 group,   Max 8 port/group |
| **Services and Features** | |
| Filtering, Security & QoS | IEEE 802.1p QoS, Diff-serv support, Congestion Management<br>Filtering: Mac address,   Mac address Count limit, Netbios, NBT,TCP   Sync cookies, TCP RST-UNKnown, Martian-Filter, DHCP, Broadcast Storm, selective handling of specified IP address, IP Packet filtering, detection of IP address collision Virus Filtering: DoS prevention, Warm virus Filtering<br>Subscriber Traffic control by ACLs (Access Control Lists)<br>Queue: 8, SPQ, WRR, SPQ+WFO |

| | |
|---|---|
| | Service differentiation for Control Packet (Ping, Telnet, SNMP, FTP, TFT, etc) |
| Management | SNMP v1/v2, RMON, MIB-I/II, log flash, Subscriber (Block/unblock), Last MAC Management, Remote S/W Upgrade, Telnet, TFTP, FTP, Port Mirroring, CLI, Syslog, Access level control for administrator Radius, TACAS+ |
| Functions | STP(802.1D), RSTP(802.1w), Self-Loop controlled DHCP relay/DHCP snooping, DHCP option 82 Storm-control (L2DLF,Broadcast,Multicast), Flood-Guard (pps control), CPU Filter(IP+TCP/UDP PORT NO) NTP (Network Time protocol) Client Jumbo Frame packet support: 9022byte Stacking & IP Clustering:    8 Clustering |
| Multicasting Protocol | IGMP v2.0, IGMP snooping, 255 snoop Table, IGMP query, IGMP Join/Leave Suppression, IGMP Fast Leave, IGMP Static Join, IGMP proxy reporting |
| **Standards** | |
| IEEE Standards | 802.1D Spanning Tree Protocol 802.1w RSTP 802.1p Priority Control 802.1Q VLAN 802.3 10Base-T Ethernet 802.3u 100Base-X Fast Ethernet 802.3x Flow Control 802.3ad Link Aggregation 802.3z 1000Base-X Gigabit Ethernet |
| IETF Standards | RFC 768 UDP RFC 791 IP RFC 903 TCP RFC 2131 DHCP Relay RFC 2236 IGMP v2 RFC 1112 IGMP |
| Management Standards & MIB | RFC 783 TFTP RFC 854 Telnet RFC 1157 SNMP v1 RFC 1213 MIB-I I RFC 1493 Bridge-MIB RFC 1757 RMON-MIB RFC 1902 SNMP v2 RFC 1907 SNMP-MIB RFC 1643 Ethernet-like Internet MIB |

## Layer 2 Switch >> P3624

### L2 Fast Ethernet Workgroup Switch
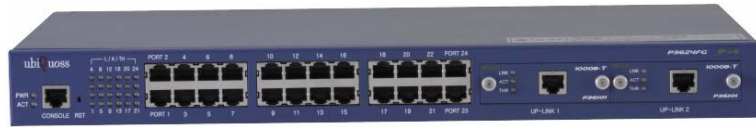


### Overview

P3624FG switch is a Metro Ethernet based work group L2 switch being used in the segment of access network and providing broadband multimedia service. It is suitable for connecting directly to subscriber's terminal, aggregation switch or IP DSLAM so that high performance switching service can be implemented economically based upon 10/100Mbps link speed. Because it can support wire-speed switching function and various services, P3624FG is the most appropriate solution for the medium size networks which generates high traffic volumes. P3624FG also has the advanced network management functions and switching functions that follow world standard.

P3624FG can have twenty-four 10/100base-TX (UTP) ports and two optional modules which can carry either up to two 100Base-FX ports, 1000Base-T, 1000Base-X (GBIC), and 1000Base-X (SFP) ports. All ports of P3624FG switch support full duplex communication. Because full duplex communication type allows the both directions of traffic to flow at the same time, the link bandwidth can be effectively extended twice.

P3624FG adopts a high speed non-blocking switch fabric. This chipset makes internal delay as little as possible by processing the arriving packets in parallel manner. And it maximizes data integrity through Store-and-Forward switching method. In other words every packet that arrives at any port will be stored in the buffer of the port and checked up for integrity before transferred to destination port. Therefore it can prevent some data error from being spread over the network.
P3624FG supports hardware-based bandwidth management and Quality of Service functionality, which enables corporate users and ISPs to provide differentiated internet services in the environment of next generation network.

### Features

- Up to 24 10/100Base-TX ports (Fixed)
- 2 Option Slot Module : 100Base-FX, 1000Base-Tx, 1000Base-X, GPON, EPON
- Power : AC/DC
- 12.8 Gbps Non-Blocking Switch Fabric
- Max 6.5 Mpps L2 Switching, 64MB Main Memory, 16MB Flash Memory
- Up to 16K MAC Address Support for Switching
- Up to 256 VLANs Support
- Filtering : DHCP, NetBios, NBT, Mac, Broadcast Storm, IP Packet Filtering, IP-Subnetwork range blocking, Selective handling of specified IP address, Detection of IP address collision
- Secure Network : DoS prevention, Warm virus Filtering
- IEEE 802.1p, IEEE802.1Q, IEEE802.1D, IEEE802.3x
- Rate Limit : @ 1Mbps (100M & Gigabit port)
- Egress Traffic Shaping (Rate Limit) per Port
- Ingress Traffic policing per flow/packet
- VLAN, Multi VLAN, STP, RSTP, IGMP snooping & query
- Port Trunking, Link Aggregation(802.3ad), Port enable/disable, Stacking
- TFTP, CLI, Telnet, Syslog, SNMP Ⅰ/Ⅱ, RMON, Port Mirroring.

### Application

- Dynamic and Distributed Service, Contents and Applications Delivery to the MAN
- Enabling ISPs to construct broadband access networks
- Support intra-network environment for business and/or home user
- Virtual Private Leased Line Service, Client-Server Network, SOHO Network
- FTTx GPON/EPON ONU as a Multi Dwelling Unit
- Stacking Configuration Available

**Specification**

| P3624 Specification | |
|---|---|
| System Architecture & Console | 24 fixed 10/100Base-TX ports<br>(Auto-negotiation, Auto-Sensing, Auto MDI/MDIX)<br>2 Expansion Module : 1 Port per Option Module<br>100Base-FX, 1000Base-X(GBIC), 1000Base-X(SFP), 1000Base-TX,<br>GPON, EPON<br>RS-232C Serial Port (RJ-45 type) |
| Memory | 64MB Main Memory<br>16MB Flash Memory |
| Physical Dimension | 19" Rack Mount Type<br>44mm(H)x482.6mm(W)x260mm(D)<br>Max 4Kg |
| **Environment Conditions** | |
| Power | AC, DC |
| Input power and frequency | 110~220 VAC / 50~60 Hz, -44 ~ -52 VDC |
| Power consumption | Max 16.64 W |
| Operating temperature | 0℃ ~ +60℃ |
| Storage temperature | -20℃ ~ +70℃ |
| **Performance** | |
| Switching Fabric | 12.8 Gbps non-blocking |
| Throughput | 6.5 Mpps wire-speed L2 Switching |
| Capacity | |
| MAC Address | Up to 16K MAC Management |
| VLAN | Up to 256 VLAN<br>Private Edge VLAN,    8021.Q Tag Vlan (Max 256 Tag Vlan)<br>Link Aggregation (802.3ad) : 13 group,    Max 8 port/group |
| **Services and Features** | |
| Filtering, Security, QoS | IEEE 802.1p QoS, Diff-serv support<br>Congestion Management<br>Filtering : Mac address, Mac address Count limit, Netbios, NBT, DHCP, Broadcast Storm, Selective handling of specified IP address,    IP Packet filtering, Detection of IP address collision, IP Sub-network range blocking<br>Virus Filtering : DoS prevention, Warm virus Filtering<br>Subscriber Traffic control by ACLs (Access Control Lists) |
| Bandwidth Management | Hardware-based Rate Limiting<br>Rate Limiting : 1Mbps per Ethernet port<br>Rate Limiting : 1Mbps per Gigabit port<br>Egress Traffic Shaping per Port<br>Ingress Traffic Policing per Flow/Packet<br>Hardware Based Symmetric & Asymmetric Rate Limiting |

| | |
|---|---|
| Management | SNMP v1/v2, RMON, MIB-I/II |
| | Remote S/W Upgrade, Telnet, TFTP, FTP, Port Mirroring |
| | CLI, Syslog, Access level control for administrator, |
| | RADIUS |
| Functions | STP(802.1D), RSTP(802.1w) |
| | DHCP relay/DHCP snooping |
| | NTP (Network Time protocol) Client |
| | Jumbo Frame packet support : 9022byte |
| | Stacking & IP Clustering : Max 8 Stacking |
| Multicasting Protocol | IGMP v2.0, |
| | IGMP snooping, IGMP proxy-reporting |

**Standards**

| | |
|---|---|
| IEEE Standards | 802.1D Spanning Tree Protocol |
| | 802.1w RSTP |
| | 802.1p Priority Control |
| | 802.1Q VLAN |
| | 802.3 10Base-T Ethernet |
| | 802.3u 100Base-X Fast Ethernet |
| | 802.3x Flow Control |
| | 802.3ad Link Aggregation |
| | 802.3z 1000Base-X Gigabit Ethernet |
| IETF Standards | RFC 768 UDP |
| | RFC 791 IP |
| | RFC 903 TCP |
| | RFC 2131 DHCP Relay |
| | RFC 2236 IGMP v2 |
| | RFC 1112 IGMP |
| Management Standards & MIB | RFC 783 TFTP |
| | RFC 854 Telnet |
| | RFC 1157 SNMP v1 |
| | RFC 1213 MIB-I I |
| | RFC 1493 Bridge-MIB |
| | RFC 1757 RMON-MIB |
| | RFC 1902 SNMP v2 |
| | RFC 1907 SNMP-MIB |
| | RFC 1643 Ethernet-like Internet MIB |

## Layer 2 Switch >> PoE Switch >> E3002F-24P

**Fast Ethernet L2 Workgroup PoE Switch**



**Overview**

E3002F-24P is a Layer2 Fast Ethernet workgroup PoE (Power over Ethernet) switch that passes power and data on Ethernet cabling so that there is no need to supply electrical power to network equipment for wireless AP or wired LAN. PoE provides flexibility on installation space of such network equipment, and significantly reduces the installation cost.   Its efficient network structure is especially useful for networks such as IP Surveillance Network, Wireless LAN Network and Train Rail/Expressway network.

Suitable for direct connection to a WiFi AP, IP surveillance terminal, transportation network terminal, it provides high performance switching service with electrical power through Ethernet cable (CAT 5e), which can be implemented economically based upon 100Mbps link speed.

E3002F-24P can have up to twenty-four PoE embedded (PSE, IEEE802.3af) fixed 100base-TX (UTP RJ-45) ports and two optional modules that support either up to two 1000Base-T or 1000Base-X /100Base-FX(SFP), 1.25G/2.5G PON ports. All ports of E3002F-24P switch support full duplex communication, allowing both directions of traffic to flow at the same time, so the link bandwidth extension is actually doubled.

Besides the LAN switching functions, E3002F-24P also provides QoS and multicasting and has increased the level of security with 802.1x. Also, all ports support wire speed, and in case of using an uplink port as FTTx PON, a broadband of 1.25Gbps/2.5Gbps per port can be supported.

E3002F-24P supports hardware-based bandwidth management, and Quality of Service functionality, which enable corporate users and ISPs to provide differentiated internet services in the environment of next generation network.

**Features**

- Fixed 24 ports 100Base-TX with PoE embedded (PSE, IEEE802.3af) (Configure a number of PoE ports such as 24 ports POE)
- 2 Optional Slot Uplink Modules(Hot-Swappable) : 100Base-FX, 1000Base-Tx, 1000Base-X
- Uplink Module
    - 1 port Combo : 100Base-FX/1000Base-X (SFP) or 1000Base-T (RJ-45)
    - 1 port EPON 1.25G
    - 1 port GPON 2.5G
- Power: 110~220 VAC / 50~60 Hz
- 9.6Gbps Non-Blocking Switch Fabric
- 6.5Mpps Throughput
- 128MB Main Memory, 32MB Flash Memory
- 16K MAC Address Support for L2 Switching
- 256 VLANs Support
- Filtering: DHCP, NetBios, NBT, Mac, IP Packet Filtering, IP-Subnetwork range blocking, Selective handling of specified IP address, Detection of IP address collision
- Alert when traffic/CPU load threshold reached
- MAC address falsification & flooding prevention (static MAC, MAC count)
- Multicast/broadcast flooding prevention (broadband controlled & auto-lift after a

period of time)
- Secure Network: DoS prevention, Warm virus Filtering
- IEEE 802.1p, IEEE802.1Q, IEEE802.1D
- Rate Limit: @ 64Kbps
- Egress Traffic Shaping (Rate Limit) per port
- Ingress Traffic Policing per flow/packet
- VLAN, Multi VLAN, STP, RSTP, IGMP snooping & query
- Max. 128 ACL for QoS standards and filtering
- Gateway IP Address Resolution Protocol (GARP)
- IGMP v1/v2, IGMP Snooping, IGMP Snooping Proxy Reporting supported
- SNMP trap for up/down linking and system initialization
- TFTP, CLI, Telnet, Syslog, SNMP I/II, RMON, Port Mirroring

Application

- IP Surveillance network
- Wireless LAN Network
- Train Rail/Expressway Network
- Dynamic and Distributed Service, Contents and Applications Delivery to the MAN
- Enabling ISPs to construct Wireless broadband access networks
- Support intra-network environment for business and/or factory where power supply is not prepared.

Specification

| E3002F-24P Hardware Specification | |
|---|---|
| System Architecture & Console | 24 fixed 100Base-TX ports with POE embedded(PSE) & 2 uplink slots for Expansion Module (Auto-negotiation, Auto-Sensing, Auto MDI/MDIX) 2 Expansion Module: 1 Port per Module - 100Base-FX/1000Base-X (SFP) or 1000Base-T (RJ-45) RS-232C Serial Console Port (RJ-45 type) |
| POE | 24 ports PoE (PSE, IEEE 802.3af) – Max 17 port support with Full load(15.4W) |
| Memory | 128MB Main Memory 32MB Flash Memory |
| Physical Dimension | 19" Rack Mount Type, 1RU 44mm(H)x482.6mm(W, Rack Guide included) x360mm(D) |
| **Environment Conditions** | |
| Power | AC |
| Input power & frequency | AC: 110~220 VAC / 50~60 Hz |
| Power consumption | Max. 318.5W (36W when PSE is not used) |
| Operating temperature | -20℃ ~ 60℃ |
| Storage temperature | -30℃ ~ 70℃ |
| **Performance** | |
| Switching Fabric | 12.8Gbps non-blocking |
| Throughput | 6.5Mpps wire-speed L2 Switching |
| Capacity | |
| MAC Address | Up to 16K MAC Management |

| | |
|---|---|
| VLAN | Up to 256 VLAN (VLAN ID range 1~4094)<br>Private Edge VLAN,    8021.Q Tagged-VLAN<br>Link Aggregation (802.3ad): 13 group,    Max 8 port/group |
| **Services and Features** | |
| Filtering,  Security  & QoS | IEEE 802.1p QoS, Diff-serv support, Congestion Management<br>Filtering: Mac address,    Mac address Count limit, Netbios, NBT,TCP    Sync cookies, TCP RST-UNKnown, Martian-Filter, DHCP, Broadcast Storm, selective handling of specified IP address, IP Packet filtering, detection of IP address collision Virus Filtering: DoS prevention, Warm virus Filtering<br>Subscriber Traffic control by ACLs (Access Control Lists)<br>Queue: 8, SPQ, WRR, SPQ+WFO<br>Service differentiation for Control Packet (Ping, Telnet, SNMP, FTP, TFT, etc) |
| Management | SNMP v1/v2, RMON, MIB-I/II, log flash, Subscriber (Block/unblock),<br>Last MAC Management, Remote S/W Upgrade, Telnet, TFTP, FTP, Port Mirroring, CLI, Syslog, Access level control for administrator<br>Radius, TACAS+ |
| Functions | STP(802.1D), RSTP(802.1w), Self-Loop controlled<br>DHCP relay/DHCP snooping, DHCP option 82<br>Storm-control (L2DLF,Broadcast,Multicast),<br>Flood-Guard (pps control), CPU Filter(IP+TCP/UDP PORT NO)<br>NTP (Network Time protocol) Client<br>Jumbo Frame packet support: 9022byte<br>Stacking & IP Clustering:    8 Clustering |
| Multicasting Protocol | IGMP v2.0,<br>IGMP snooping, 255 snoop Table, IGMP query, IGMP Join/Leave Suppression, IGMP Fast Leave, IGMP Static Join, IGMP proxy reporting |
| **Standards** | |
| IEEE Standards | 802.1D Spanning Tree Protocol<br>802.1w RSTP<br>802.1p Priority Control<br>802.1Q VLAN<br>802.3 10Base-T Ethernet<br>802.3af PoE<br>802.3u 100Base-X Fast Ethernet<br>802.3x Flow Control<br>802.3ad Link Aggregation<br>802.3z 1000Base-X Gigabit Ethernet |
| IETF Standards | RFC 768 UDP<br>RFC 791 IP<br>RFC 903 TCP<br>RFC 2131 DHCP Relay<br>RFC 2236 IGMP v2<br>RFC 1112 IGMP |
| Management Standards & MIB | RFC 783 TFTP<br>RFC 854 Telnet<br>RFC 1157 SNMP v1<br>RFC 1213 MIB-II<br>RFC 1493 Bridge-MIB<br>RFC 1757 RMON-MIB<br>RFC 1902 SNMP v2<br>RFC 1907 SNMP-MIB |

| | RFC 1643 Ethernet-like Internet MIB |
|---|---|

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*Layer 2 Switch >> PoE Switch >> E3002F-8PF*

**Fast Ethernet L2 Workgroup PoE Switch**



**Overview**

E3002F-8PF is a Layer2 Fast Ethernet workgroup PoE (Power over Ethernet) switch that passes power and data on Ethernet cabling so that there is no need to supply electrical power to network equipment for wireless AP or wired LAN. PoE provides flexibility on installation space of such network equipment, and significantly reduces the installation cost. Its efficient network structure is especially useful for networks such as IP Surveillance Network, Wireless LAN Network and Train Rail/Expressway network.

Suitable for direct connection to a WiFi AP, IP surveillance terminal, transportation network terminal, it provides high performance switching service with electrical power through Ethernet cable (CAT 5e), which can be implemented economically based upon 100Mbps link speed.

E3002F-8PF can have up to 8 PoE embedded (PSE, IEEE802.3af) fixed 100base-TX (UTP RJ-45) ports and two optional modules that support either up to two 1000Base-T or 1000Base-X /100Base-FX(SFP), 1.25G/2.5G PON ports. All ports of E3002F-8PF switch support full duplex communication, allowing both directions of traffic to flow at the same time, so the link bandwidth extension is actually doubled.

E3002F-8PF supports hardware-based bandwidth management, and Quality of Service functionality, which enable corporate users and ISPs to provide differentiated internet services in the environment of next generation network.

**Features**

- Fixed 8 ports 100Base-TX with PoE embedded (PSE, IEEE802.3af)
- 2 Optional Slot Uplink Modules(Hot-Swappable) : 100Base-FX, 1000Base-T, 1000Base-X
- Uplink Module
  - 1 port Combo : 100Base-FX/1000Base-X (SFP) or 1000Base-T (RJ-45)
  - 1 port EPON 1.25G
- Power: 110~220 VAC / 50~60 Hz
- 5.6Gbps Non-Blocking Switch Fabric
- 4.1Mpps Throughput
- 128MB Main Memory, 32MB Flash Memory
- 16K MAC Address Support for L2 Switching
- 256 VLANs Support
- Filtering: DHCP, NetBios, NBT, Mac, IP Packet Filtering, IP-Subnetwork range blocking, Selective handling of specified IP address, Detection of IP address collision
- Alert when traffic/CPU load threshold reached
- MAC address falsification & flooding prevention (static MAC, MAC count)
- Multicast/broadcast flooding prevention (broadband controlled & auto-lift after a period of time)
- Secure Network: DoS prevention, Warm virus Filtering
- IEEE 802.1p, IEEE802.1Q, IEEE802.1D
- Rate Limit: @ 64Kbps
- Egress Traffic Shaping (Rate Limit) per port
- Ingress Traffic Policing per flow/packet

- VLAN, Multi VLAN, STP, RSTP, IGMP snooping & query
- Max. 128 ACL for QoS standards and filtering
- Gateway IP Address Resolution Protocol (GARP)
- IGMP v1/v2, IGMP Snooping, IGMP Snooping Proxy Reporting supported
- SNMP trap for up/down linking and system initialization
- TFTP, CLI, Telnet, Syslog, SNMP I/II, RMON, Port Mirroring

Application

- IP Surveillance network
- Wireless LAN Network
- Train Rail/Expressway Network
- Dynamic and Distributed Service, Contents and Applications Delivery to the MAN
- Enabling ISPs to construct Wireless broadband access networks
- Support intra-network environment for business and/or factory where power supply is not prepared.

## Specification

| E3002F-8PF | Hardware Specification |
|---|---|
| System Architecture & Console | 8 fixed 100Base-TX ports with POE embedded(PSE) & 2 uplink slots for Expansion Module (Auto-negotiation, Auto-Sensing, Auto MDI/MDIX) <br> 2 Expansion Module: 1 Port per Module <br> - 100Base-FX/1000Base-X (SFP) or 1000Base-T (RJ-45) <br> RS-232C Serial Console Port (RJ-45 type) |
| PoE | 8 ports PoE (PSE, IEEE 802.3af) <br> Max. 108.3W <br> – Max 6 ports support with Full load(15.4W) |
| Memory | 128MB Main Memory <br> 32MB Flash Memory |
| Physical Dimension | 19” Rack Mount Type, 1RU <br> 44mm(H)x482.6mm(W, Rack Guide included) x360mm(D) |
| **Environment Conditions** | |
| Power | AC |
| Input power & frequency | AC: 110~220 VAC / 50~60 Hz |
| Power consumption | Max. 128.4W (36W when PSE is not used) |
| Operating temperature | -20℃ ~ 60℃ |
| Storage temperature | -30℃ ~ 70℃ |
| **Performance** | |
| Switching Fabric | 5.6 Gbps non-blocking |
| Throughput | 4.16 Mpps wire-speed L2 Switching |
| **Capacity** | |
| MAC Address | Up to 16K MAC Management |
| VLAN | Up to 4K VLAN (VLAN ID range 1~4094) <br> Private Edge VLAN,  8021.Q Tagged-VLAN <br> Link Aggregation (802.3ad): 13 group,  Max 8 port/group |
| **Services and Features** | |
| Filtering, | IEEE 802.1p QoS, Diff-serv support, Congestion Management |

| Security & QoS | Filtering: Mac address, Mac address Count limit, Netbios, NBT,TCP Sync cookies, TCP RST-UNKnown, Martian-Filter, DHCP, Broadcast Storm, selective handling of specified IP address, IP Packet filtering, detection of IP address collision Virus Filtering: DoS prevention, Warm virus Filtering<br>Subscriber Traffic control by ACLs (Access Control Lists)<br>Queue: 8, SPQ, WRR, SPQ+WFO<br>Service differentiation for Control Packet (Ping, Telnet, SNMP, FTP, TFT, etc) |
|---|---|
| Management | SNMP v1/v2, RMON, MIB-I/II, log flash, Subscriber (Block/unblock), Last MAC Management, Remote S/W Upgrade, Telnet, TFTP, FTP, Port Mirroring, CLI, Syslog, Access level control for administrator<br>Radius, TACAS+ |
| Functions | STP(802.1D), RSTP(802.1w), Self-Loop controlled<br>DHCP relay/DHCP snooping, DHCP option 82<br>Storm-control (L2DLF,Broadcast,Multicast),<br>Flood-Guard (pps control), CPU Filter(IP+TCP/UDP PORT NO)<br>NTP (Network Time protocol) Client<br>Jumbo Frame packet support: 9022byte<br>Stacking & IP Clustering: 8 Clustering |
| Multicasting Protocol | IGMP v2.0,<br>IGMP snooping, 255 snoop Table, IGMP query, IGMP Join/Leave Suppression, IGMP Fast Leave, IGMP Static Join, IGMP proxy reporting |
| **Standards** | |
| IEEE Standards | 802.1D Spanning Tree Protocol<br>802.1w RSTP<br>802.1p Priority Control<br>802.1Q VLAN<br>802.3 10Base-T Ethernet<br>802.3af PoE<br>802.3u 100Base-X Fast Ethernet<br>802.3x Flow Control<br>802.3ad Link Aggregation<br>802.3z 1000Base-X Gigabit Ethernet |
| IETF Standards | RFC 768 UDP<br>RFC 791 IP<br>RFC 903 TCP<br>RFC 2131 DHCP Relay<br>RFC 2236 IGMP v2<br>RFC 1112 IGMP |
| Management Standards & MIB | RFC 783 TFTP<br>RFC 854 Telnet<br>RFC 1157 SNMP v1<br>RFC 1213 MIB-II<br>RFC 1493 Bridge-MIB<br>RFC 1757 RMON-MIB<br>RFC 1902 SNMP v2<br>RFC 1907 SNMP-MIB<br>RFC 1643 Ethernet-like Internet MIB |