COMMANDO Marshall C3500 Series Routing Switches

Data Sheet

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Product Overview

COMMANDO Marshall C3500 Series switches are L3+ Core and Data Center Series Routing Switches which are fully managed having 1G or 10G Fiber/ 1GE or 10GE copper Ethernet switchports along with fixed with Small Form-Factor Pluggable (SFP, SFP+, SFP28, QSFP+, QSFP28) and perpetual PoE/PoE+ or Non PoE models or 24/32 ports SFP+ models along with physical stacking up to 16 switches with recommended stack cables of 50cm. Perpetual PoE/PoE+ with PoE budget for 24 port switch 600W and 48 port switch 800W for PoE power with no power downtime for network resiliency and high availability, delivering robust performance and intelligent switching for growing networks. This series switches are easy to deploy, use, manage and designed exclusively for enterprise-class core and aggregation layer data center switches, specially built for Security, IoT, and Cloud networking needs of growing businesses, data centers and high-end campus networks comes with inbuilt dual power input AC as well as DC.

It has high performance 100G / 40G / 25G/ 10G / 1G/ 1GE switches designed based on COMMANDO's sixth generation Ethernet switching technology with Carrier Grade high-performance which helps it to meet the requirement of Metro/Enterprise/Data Center/HCI networks. COMMANDO Marshall C3500 meets the requirements of next generation Enterprise, Data Center, Metro and HCI (Hyper-Converged Infrastructure) networks which includes VRRP, VRRP load balancing, BFD for VRRP, BFD for BGP/IS-IS/OSPF/Static route, MPLS L2 and L3 VPN, BFD for VXLAN, Segment Routing (SR), QoS Traffic classification based on Layer 2, Layer 3, Layer 4, and priority information Actions including ACL, CAR, and re-marking, Queue scheduling modes such as PQ, WFQ, and PQ+WRR, Congestion avoidance mechanisms, including WRED and tail drop, Traffic shaping, O&M Network-wide path detection, SNMPv1/v2c/v3, Zero Touch Provisioning (ZTP), 802.1x authentication, RADIUS and TACACS+ authentication for login, DoS, ARP, MAC address attacks, broadcast storms, heavy-traffic and ICMP attack defenses and Remote Network Monitoring (RMON) with high performance and scalability along with rich L3 features. It also supports VSF (Virtual Switching Framework) with strong multicast, high reliability network with comprehensive QoS and enhanced Security with abundant IPv6 Support.

It can be deployed in harsh environments to deliver hassle free mission-critical services for next-generation, high-performance core networking setup designed for data center networks and high-end campus networks. It also provides stable, reliable, and secure high-performance Layer 2, Layer 3 and data center switching capabilities to help build an elastic, virtualized, and high-quality network. VXLAN to build a non-blocking large Layer 2 network, which allows for large-scale VM migration and flexible service deployment. These switches support comprehensive virtualization capabilities along with data center service features can also be used for surveillance requirements.

The switches come with fixed uplink modules with speed 1, 10, 25, 40 and 100 Gigabit (SFP, SFP+, SFP28, QSFP+, QSFP28) Fiber Network Module as well as 1GE/10GE Copper Network Modules and are latest development of Gigabit Layer 3 Core and Data center Switch with up to 100G uplink, Intelligent managed Switches designed for networks requiring High performance, High port density, High uplink bandwidth, Flexibility, Fault Tolerance, and Advanced Software features for maximum Return on Investment (ROI). These

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switches have Security features, and advanced Quality of Service (QoS), ideal for all organizations considering reliable, affordable and advanced Core and Data center feature with CLI and Web managed, Advanced PoE/PoE+, Scripting capabilities and Layer 3 routing, Automatic MDIX and Auto-negotiation on all ports select the right transmission modes (half or full duplex) as well as data transmission for crossover or straight-through cables dynamically. It can save up to 58% of power consumption, making it an eco-friendly solution for your business network.

A stack system separates the control plane from the data plane. This eliminates the risk of single points of failure and greatly improves system reliability. The single virtual switch, enabling customers to have a single management plane and control plane for up to 768 access ports with full PoE/PoE+ capability, power and fan redundancy, stacking bandwidth up to 3456Gbps, Fixed uplinks, Layer 3 feature support, and cold patching for the digital workplace, these are optimized for today's data center surveillance, mobile and IoT needs. Multiple switches up to 16 in a stack system are virtualized into one logical device, making it possible to build a scalable, easy to manage data center network platform.

These switches are powerful and flexible enough for users to deploy wireless access points, surveillance cameras, IP phones and other PoE/PoE+ supported devices over longer distance up to 250 meters. It provides easy device rack and wall-mounting, on boarding, configuration, monitoring, and troubleshooting. These fully managed switches can provide Layer 3 Core and Data Center features as well as supports IEEE 802.3af-compliant PoE (Power over Ethernet) and 802.3at-compliant PoE+ (Power over Ethernet plus). Each switchport is capable to deliver either 15.4 W PoE or 30 W PoE+ power on all ports. PoE/PoE+ capable models provide power across all access ports for wireless APs, security cameras, and other IoT devices with power budget 600W-800W. Designed for operational simplicity to lower total cost of ownership, they enable scalable, secure, and energy-efficient business operations with intelligent and automated services. These switches come with lifetime free software upgrades and patching to enhance features and supports patching, which provides fixes for critical bugs and security vulnerabilities between regular maintenance upgrades. This support allows customers to add new features and upgrades without having to pay a single dollar.

It offers robust QoS, to optimize traffic on your Business Network, these switches provide (Port-based/802.1p/DSCP) QoS to keep latency-sensitive video and voice traffic jitter-free moving smoothly. Additionally, port-based, tag-based VLAN, Voice VLANs can improve security and meet more network segmentation requirements. This series switches also have provisioning of QOS, Static routing, IPV6 features. Moreover, with its innovative energy-efficient technology, can save up to 58% of power consumption, making it an green-energy eco-friendly perfect solution for your business network.

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Product Highlights

COMMANDO Marshall C3500 Series Managed Core L3+ capable routing switches are Carrier Grade high-performance switch which helps it to meet the requirement of Metro/Enterprise/Data Center/HCI networks. Full feature software Licensee free for Lifetime

Full feature software Licensee free for Lifetime

- **Full featured without license installations:** COMMANDO MarshallOS switches comes with inbuilt free for lifetime for across all model that provides you with an easier, faster, and more consistent experience across the COMMANDO portfolio and across your company for inbuilt all license installation.

- **No Activation key required:** No requirement of PAK (Product Activation Key) to activate L3+ and Data center features.

- **Operational Flexibility:** Free patching to enhance features for enhanced version of MarshallOS, with the objective of providing a free licensing solution that does not interrupt the operations of network.

- **Limitless term period for consumption:** For limitless time, permanent and without an expiration date and limitless term period software features can be used. You can consume all features for whatever period you like.

Higher serviceability and return on investment

- **Lower CAPEX:** Ensures network scalability and reduces investment in devices. Lowers Total Cost of Ownership with no license requirement (Lowers Capex).

- **Lower OPEX:** No licenses charges for L3+ and data center features for lifetime. No license fees (Lowers OpEx) lifetime free software upgrades and patching to enhance features and supports patching, which provides fixes for critical bugs and security vulnerabilities between regular maintenance upgrades.

- **Dual input power Option:** Dual input power AC as well as DC inbuilt So, unlike major mainstream brands have capability of dual power or RPS but originally it comes with single AC supply only. For DC power input you required to purchase very specific DC power modules and adapter as well as power cable. DC power supply with major mainstream brands cost extra money while in COMMANDO switches it is freely available and also this DC supply do not have specific requirement of cable and adapter for DC power input it comes with standard specification which is commonly used.

- **Uninterrupted service:** Inbuilt DC power supply can give uninterrupted power supply which is vital for mission critical network operation. No need to spend extra money for dual power supply AC as well DC and also no separate special DC Adapter and cable required to provide power via DC as well AC power input.

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- **Zero cost of switch maintenance:** Lower CTO It can use one physical switch to implement multiple logical switches saves space in a data center equipment room and reduces the cost of device maintenance.

- **VXLAN and EVPN:** Enable Flexible Expansion Within and Across Data Centers.

- **Supports Border Gateway Protocol:** (2 bytes as well as 4 bytes AS numbers), Ethernet VPN (BGP-EVPN), which can run as the VXLAN control plane to simplify VXLAN deployment. BGP-EVPN triggers automatic VXLAN tunnel setup between virtual tunnel endpoints (VTEPs), removing the need for full mesh tunnel configuration. BGP-EVPN also reduces flooding of unknown traffic by advertising MAC routes on the control plane. With this protocol, large Layer 2 networks can be established for data centers.

- **Use Open standard protocols:** It is interoperable with devices from other vendors, enabling long-term network evolution.

- **Supports centralized and distributed VXLAN deployment:** Supports various VXLAN access modes, including QinQ access VXLAN and IPv6 over VXLAN. This allows for flexible customization of heterogeneous networks.

- **EVPN and VXLAN:** It can be used to set up Layer 2 interconnections between data centers, enabling active-active VXLAN deployment across data centers and conserving DCI link bandwidth.

- **Supports IP packet fragmentation and reassembling**: Enabling oversized IP packets to travel across a WAN network without limited by the MTU. The switch can also identify fragmented packets to seamlessly interconnect with routers.

- **Supports VXLAN:** It has mapping, implementing interconnection between multiple DCs at Layer 2, unified service provisioning and O&M, and inter-DC resource sharing.

- **Multicast-capable Distributed Gateways:** Implement On-demand Traffic Forwarding VXLAN supports Layer 3 multicast. A multicast-capable gateway that functions as the VTEP node greatly reduces traffic.

Data Center Features

- **Support leading edge Data Center features**: Priority Flow Control (PFC), ETC, VEPA, SPB, TRILL, FCoE, Explicit Congestion Notification (ECN) and Data Center TCP, etc.

- **Support MLAG (Multi-Chassis Link Aggregation):** It aggregate links across different devices. MLAG can build an Active-Active system to improve the reliability of the network links from single board grade to device grade. MLAG use a peer link between to devices to aggregate two devices and make them as one device logically. Ports of two different devices join the aggregate ports together and all port can transmit the data traffic. MLAG need to management the device respectively, but

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the configurations are easier than stacking, reboot is not required after MLAG is configured. Forwarding and configuring are processing on local device, in normal condition the traffic do not transmit trough the peer link, the bandwidth of peer link is not the bottleneck of the network, and the latency is low.

- **Support overlay technology:** It includes NVGRE/VXLAN/GENEVE etc. Overlay can make layer 2 packets across the layer 3 networks by using NVGRE/VXLAN/ GENEVE header to encapsulate the entire Ethernet packets. Overlay resolves the problem of MAC table size limitation in traditional layer2 networks, resolves the problem of VLAN id count limitation, and resolves the problem network dynamic adjustment which cannot achieve by VLAN/VPN. Use VXLAN for example, 24 bits VNI identifier can support at most 16777215 logic networks, layer 2 networks built by VXLAN can keep the same IP/MAC etc. when move the virtual machine.

- **Supports RPC-API for SDN (Software Defined Network)**: SDN is a new architecture of network which can substantially simplify the management and maintenance by separating the control plane and data plane of the network.

HCI (Hyper-Converged Infrastructure)

- Supports 1GE/1G/10GE/10G/25G/40G/100G ports are suitable for HCI (Hyper-Converged Infrastructure) networks. Using 1GE/1G/10G Ports for management network and using 10GE/10G/25G/40G/100G ports for data traffic network. With the comprehensive inter-device link aggregation with LACP, MLAG, etc.

Varied Port Types

- 24GE/48GE PoE and Non PoE models, 24/32 SFP+ models along with Fixed uplink ports with stacking capacity up to 768 ports.

- Support varied management interfaces, includes RJ45 based Console & Management port, USB Console, USB 2.0 Storage port, Bluetooth 5.0 Console port & IEEE 802.11a/b/n (2T2R) 300Mbps Management port.

- Support Fixed Uplinks having capacity 1GE/10GE, 1G/10G/25G/40G/ 100G ports to meet bandwidth hungry network requirement in data centers with copper 1GE/10GE & fiber connectivity of SFP/SFP+/SFP28/QSFP+28 up to 100G modules.

Customized Profile for Different Deployment Scenarios

- The Flexible Table Management (FTM) technology offers multiple table size configuration profiles as optimized choices for different network scenarios. Support up to MAC Address Table Size 114688 entries. Support up to 56K IP routing table entries.

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Overlays

- Customers can deploy overlay networks to provide Layer 2 adjacency for applications over Layer 3 fabrics.
- The overlay networks use VXLAN in the data plane and EVPN to program the overlays.
- The overlays can operate without a controller or can be orchestrated with a fabric management platform to provide L2/L3 overlay virtual networking and security for bare metal servers and virtual workloads.

High-performance IP routing

- Supports routing protocols which includes static route and dynamically learned route with protocols like Routing Information Protocol (RIP) version 1 and 2 and next generation (RIPng), Open Shortest Path First (OSPF) Version 2/3, Border Gateway Protocol Version 4 (BGPv4) with AS Number of 2 and 4 bytes, and Intermediate System-to-Intermediate System also supports load balancing and for constructing scalable LANs. Supports up to 20480 IPv4 direct routes and up to 57344 indirect routes along with 256 unicast ipv4 policy based routes & 1024 multicast ipv4 routes is supported by hardware with maximum performance.
- Protocol-Independent Multicast (PIM) for IP multicast routing is supported with direct route up to 2048, including PIM Sparse Mode (PIM SM), bidirectional PIM, and Source-Specific Multicast (SSM).
- IPv6 addressing and routing is supported along with monitoring and troubleshooting commands.

Multi protocol label switching (MPLS)

- **L2 and L3 VPN with MPLS:** It integrates multiple networks into a single MPLS domain.
- **VPLS:** VPLS (Virtual Private LAN Service) enables enterprises to link together their Ethernet-based LANs from multiple sites via the infrastructure provided by their service provider.
- **EoMPLS:** EoMPLS is a category of Any Transport over MPLS (AToM) to transport Layer 2 packets over an MPLS backbone.
- **MPLS over GRE:** L3VPN over GRE and VPLS over GRE, are supported to tunnel MPLS/VPLS packets over non-MPLS networks utilizing GRE tunneling.
- Support a broad set of MPLS features, including L3 VPN, IPv6 provider edge router (6PE, 6VPE), RSVP traffic engineering, and LDP to allow standards-based network segmentation and virtualization.

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Inter-device Link Aggregation, High Efficiency and Reliability

- Support multi-chassis link aggregation group (M-LAG), which enables links of multiple switches to aggregate into one to implement device-level link backup. Switches in an M-LAG all work in active state to share traffic and back up each other, enhancing system reliability.
- Switches in an M-LAG can be upgraded independently. During the upgrade, other switches in the system take over traffic forwarding to ensure uninterrupted services.
- M-LAG supports dual-homing to Ethernet, VXLAN, and IP networks, allowing for flexible networking.
- Virtualization M-LAG VS (1:16 virtualization), Cluster Switch System (CSS).

Perpetual POE/PoE+

With Perpetual PoE/PoE+, no power downtime to connected PD devices. PD devices remains power ON even when any software process is not running on the switch. Provides non-stop PoE/PoE+ power and continue to provide power during configuration and reboot, the PDs will not lose power while reloading. The Perpetual POE provides uninterrupted power to connected powered device (PD) even when the switch is booting to make it highly available network without any interruptions.

Intelligent Ethernet OAM with Complete Network Fault Management and Performance Guarantee

With the IEEE802.1ag and ITU-T Y.1731 end-to-end OAM, Ethernet service providers can monitor the services, survey the end-to end performance and ensure the service quality match the agreement. The fault management technique includes CCM, LTM and LBM. Performance targets include measure for latency and jitter. It support remote management, network monitoring, network fault indication, remote loopback and MIB parameter retrieval according to the standard 802.3ah EFM.

High Reliability and Fault tolerance

- Powered by inbuilt dual input power supply modules with AC as well as DC.
- Fans support 3 Temperature Control Fan, front-to-back airflow design suits data center equipment rooms, and fan speed control as per surrounding conditions requirement greatly reduce power consumption.
- Support Real-time environment monitoring technology to detect the chipset temperature, status of fan and power, etc.
- Support LACP / VRRP / VARP / STP/RSTP/MSTP / Smart Link / BFD / ERPS / G.8031 / G.8032 / Load-Balancing, etc. to protect the network traffic all-around effectively.

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L2 to L4 QoS Control

- Provides 13 hardware queues per-port (8 unicast queues, 4 multicast queues, and 1 monitor queue).
- Support multi-stage scheduling technology such as WDRR (Weighted Deficit Round Robin) / SP (Strict Priority) and TD (Tail Drop) / WRED (Weighted Random Early Detection) to prevent congestion.
- Traffic classification based on COS/DSCP (simple classification).
- Traffic classification based on ACL (complex classification), Traffic classification based on inner header of the tunnel packets.
- Queue scheduling with Remark the priority fields (COS/DSCP) of the packet based on ACL or Remark the priority fields (COS/DSCP) of the packet based on the Table.
- Flow redirection, Flow mirror with traffic policing based on direction (in/out) of Port, Traffic policing based on direction (in/out) of VLAN, Traffic policing based on direction (in/out) of flow, Traffic policing based on direction (in/out) of aggregated flow Queue based traffic shaping, and Port based traffic shaping.
- Supports scheduling like SP (Strict Priority) scheduling, WDRR (Weighted Deficit Round Robin) scheduling, SP+WDRR mixed scheduling, TD (Tail Drop) WRED (Weighted Random Early Detection).
- Packet counts and bytes statistics based on traffic classification, Packet counts, and bytes statistics based on the color after traffic, Forwarded and discarded packet counts and bytes statistics, ECN tags based on Tail Drop, ECN tags based on WRED
- Support flexible queue scheduling mechanism to do the shaping for queue or port traffic.
- Ingress and egress policer provide intelligent bandwidth monitoring, which support to adjust the granularity according to the port speed. Both srTCM (Single Rate Three Color Marker) and trTCM (Two Rate Three Color Marker) can be supported.
- Offers high bandwidth for Triple-Play services such as IPTV, video monitoring. The built-in QoS capabilities and flexible queuing technologies guarantee high quality of services.

Multicast

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- Rich multicast protocol set (IGMP Snooping, IGMP v1/v2, PIM-SM) support up to 2K multicast groups and 4K logical replications per group. With MarshalIOS software, IPTV service and multicast latency control are fully supported.

Security

- Supports subscriber-class /switch-class /network-class security control.
- IPv4 / IPv6 / MAC ACL can filter IPv4 / IPv6 / Non-IP packet respectively. Besides that, extended IPv4/IPv6 ACL which can match Layer2 / layer3 / layer4 information in one rule is available. The ACLs can apply to physical ports / VLAN / port group / VLAN group. The members of port group or VLAN group share a set of ACLs and save the TCAM resource.
- ARP Inspection and IP Source Guard features prevent network from malicious ARP attack.
- Support CPU Traffic Protection, Storm Control and CPU load optimization features.
- Support centralized 802.1x authentication feature to forbidden illegal user accessing network.
- MACsec encryption is supported using a built-in advanced Layer 2 encryption engine based on standard IEEE 802.1AE, 256-bit, and 128-bit Advanced Encryption Standard (AES) algorithms to secure all traffic communications.

Convenient Management features

- Supports RPC-API for SDN (Software Defined Network). SDN is a new architecture of network which can substantially simplify the management and maintenance by separating the control plane and data plane of the network.
- Support varied management interfaces, include console port / INBAND network ports / OUTBAND network port / Mini USB port.
- Support SNMP v1/v2/v3, Support CLI (Command Line Interface), web management, Telnet and FTP connection.
- Support OAM to make management more convenient and support SSH2.0, SSL, etc. to ensure security of management.

Perpetual POE/PoE+

With Perpetual PoE/PoE+, no power downtime to connected PD devices. PD devices remains power ON even when any software process is not running on the switch. Provides non-stop PoE/PoE+ power to all ports and continue to provide power during configuration and reboot, the PDs will not lose power while reloading. The Perpetual POE provides uninterrupted power to connected powered device (PD) even when

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the switch is booting to make it highly available network without any interruptions.

Support uninterrupted critical network infrastructure

It has dual power options with AC which protect from power failures. Dual power improves availability to 100% and also increases life of device. It also comes with Lighting surge thunder protection ±6KV. With this feature protect on cost and the impact to your business by losing these network devices and thus the users/servers connected to them.

System Design for Green and Energy Saving

Intelligent FAN adjustment and real-time power consumption monitoring technology are provided for the cost of maintenance redundancy and IEEE802.3az Energy Efficient Ethernet (EEE) specifies the signaling for minimal power consumption during times when data is not being transmitted. 802.3az supports reduced power usage that reduces switch power consumption during periods of low network traffic. It is also sometimes known as Green Ethernet which help to build a green and energy saving data center.

Carrier Grade High Performance long-life chip

Designed based on COMMANDO's sixth generation Ethernet switching technology. COMMANDO Marshall C3500 Managed L3+ Core and Data Center Series Routing Switches are Carrier Grade high-performance switch which meets the requirement of Metro/Enterprise/Data Center/HCI networks.

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Features and Benefits

High-speed Performance with dual input power with HCI (Hyper-Converged Infrastructure)

Supports fixed uplinks with 1GE/10GE copper, 1G/10G/25G/40G/100G Fiber ports with backward compatibility along with stacking capacity up to 768ports and dual power card are suitable for HCI (Hyper-Converged Infrastructure) networks. Using 1GE ports for management network and using 10GE/10G/25G/40G/100G ports for data traffic network. With the comprehensive inter-device link aggregation with LACP, MLAG, etc with 114688 entries MAC address tables, 72 MB Packet Buffer memory, 9600 bytes Jumbo Frames, IPv4/IPv6 with 20480 static routing entries and up to 56000 entries in routing table.

Data Center Features

VXLAN, EVPN, Ethernet VPN (BGP-EVPN) with automatic VXLAN tunnel setup between virtual tunnel endpoints (VTEPs), removing the need for full mesh tunnel configuration with QinQ access VXLAN, IPv6 over VXLAN, VXLAN mapping, along with unified service provisioning and O&M, and inter-DC resource sharing.

L3 Features

Supports static route, default route, dynamically learned route and dynamic routing protocol with protocols set like RIPv1, RIPv2, RIPng, OSPFv1/2/3, BGPv4, IS-IS and load balancing with VRRP. It also has PIM including PIM SM, bidirectional PIM, and Source-Specific Multicast (SSM). It also has QoS, ACLs (Port based/ IP based/ MAC Based), DHCP Server and Client, DHCP Snooping, DHCP Snooping option82 and 252, DHCP Relay. It supports L2 and L3 VPN with MPLS, VPLS, EoMPLS, and MPLS over GRE: L3 VPN over GRE and VPLS over GRE.

Watchdog Function

This ensures high availability which is used to protect a system from specific software or hardware failures that may cause the system to stop responding and self-recover from hanged state.

L2+/L2 Features

This series is having advance L2+/L2 features like Port aggregation up to 8 ports, VLAN, Voice VLAN, Spanning Tree (STP, RSTP, MST), GVRP, 802.1X authentication, centralized MAC authentication, Guest VLAN, RADIUS authentication, SSH 2.0, Port isolation, Port security, MAC address learning limit, IP Source guard, Dynamic ARP inspection, Preventing man-in-the-middle attacks and ARP DoS attacks, IP/Port/MAC binding. Flexible Software features provides wide range of Layer 2 functions like VLAN, Multicasting, and Quality of Service (QoS), Security.

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Secure Networking

IEEE 802.1X port-based access control with surveillance VLAN, Port Security, Protected Port which also Prevent ARP Spoofing. L4/L3/L2 access control lists (ACLs) for granular network access control including 802.1x port authentication. ACL, L4 to L2 feature restricts access to sensitive network resources. DHCP Snooping ensures IP address allocation integrity by only allowing DHCP messages from trusted DHCP servers and dropping malformed DHCP messages with a port or MAC address mismatch. With DHCP Snooping binding and option82 and 252 enabled, it can combine dot1x and ARP. IP-MAC-Port-VID Binding, Port Security, Storm control which protect against broadcast storms. The switches support ARP attack and DoS attack prevention to safeguard the network.

Multicast

IGMP Snooping (v1, v2, v3), Multicast Listener Discovery (MLD) (v1/v2), Multicast VLAN Registration (MVR) designed for distribution of multicast traffic across segregated access networks which enables more efficient distribution of multicast streams in Layer 2 network.

QoS Features

Advanced QoS (Quality of Service) for traffic prioritization including port based, 802.1p and L4/L3/L2 DSCP based. L4/L3/L2 QoS optimize voice and video applications. Access Control List based, VLAN ID based IP precedence, COS and DSCP. Policy Based on Port & VLAN, Remark DSCP, COS/ 802.1p, Precedence, COS for SP, WRR for Scheduling and matching the IP fragmentation of message.

1G/1GE/10G/10GE/25G/40G/100G Backward Compatible Uplink

1G/1GE/10G/10GE/25G/40G/100G Backward Compatible Uplink supports high speed networking uplink requirement and reduces copper stacking cabling requirement and investment. Features like MLAG, LACP and LAGs and improves network backbone uplink stacking capability. It supports high-speed access to the network backbone or data center environment. This provides great resiliency, relieves congestion associated with bandwidth-intensive applications, and guarantees smooth hassle-free data transmission.

Stacking management

Stacking is a method of binding multiple switches so that they can act as a single switch. Stacking helps to configure multiple switches in such a way that they appear as a single switch with this group of switches showing the characteristics of a single switch but having the port capacity of the sum of the combined switches. A switch stack can be set of up to 16 switches connected through their uplink ports and only 50cm stack cables recommended. Stacking management with active and standby for stack control with auto numbering. Hot swap of units in stack to configure and manage switches in a stack as a single unit with a single IP address. The switch that controls the operation of the stack is the stack master. Switch Stack is a common technology used in network design, especially when large numbers of ports are required.

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Easy Management

With familiar and popular Command Line interface (CLI), there is no need for engineers to be hired or additional resources to be spent on training and/or learning the switch CLI. Management is made easy via Web GUI or industry-standard Command Line Interface (CLI), with administration traffic protected via SSL or SSH encryption. SNMP (v1/v2c/v3) and RMON support enables the switch to be polled for valuable status information and allows it to send traps when abnormal events occur. This series is having highly reliable, conformance to international open standards, durable, serviceable, aesthetics, perceived quality, enhanced performance with larger range with copper cables and usability leads to value to money. Easy Management via lots of options like Web-based Graphical User Interface (WEBUI), Industry standard Command Line interface (CLI) via console, USB console port, telnet, SSH, HTTP, HTTPS and Putty.

Lifetime Free Software Licensing and Upgrades

MarshallOS Software license and Upgrades are free for lifetime. Users do not have to worry about switch license expiring and software getting outdated and purchasing license (which is constant concern and worry of few other brands) . This series has improved HTTP base firmware upgrade as well as CLI based upgrades which are freely available to all users without any cost or license fee for lifetime. It is easy to install, configure, monitor, and troubleshoot. It significantly reduces cost of administration and Total Cost of Ownership (TCO).

Auto MDIX Capabilities

Auto sensing/Auto PoE/PoE+, 10M/100M/1GE/10GE ports with auto MDIX capabilities which also removes speed and duplex mismatches automatically as well as covers larger physical distance by auto adjustment of speed with copper pairs compared to other brands best switches.

Flexible Service Control

With various ACLs to flexibly control ports. It also supports Port-based VLAN assignment, MAC address-based VLAN assignment, Protocol-based VLAN assignment, and Network segment-based VLAN assignment. These secure and flexible VLAN assignment modes are used in networks where users move frequently. It also supports GARP VLAN Registration Protocol (GVRP), which dynamically distributes, registers, and propagates VLAN attributes to ensure correct VLAN configuration and reduce network administrator workloads. This series switches supports SSH v1/v2/v3, RMON, port-based traffic statistics, LLDP/LLDP-MED.

Compact Design with Flexibility of additional ports

The switches provide additional deployment flexibility, fiber connectivity with speed up to 100Gbps for each uplink as per model specifications for easy expansion of your networks. So, you can directly connect to a high-performance storage server or deploy a long-distance, Extremely high speed uplink in multiple of 100Gbps combining uplink by LAG or MLAG to another switch.

Perfect for Noise-Sensitive Environments

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This series comes with temperature controlled fans along with Small form-factor, for silent operation. Perfect for noise sensitive environments. Fan based Switches have Temperature-based fan-speed up to 10000 rpm control combines accurate monitoring with minimized system acoustic noise. The Temperature Controlled Fans based switches also feature built-in smart fans that monitor and detect temperature changes, adjusting the fan speed for maximum efficiency. At lower temperatures, the fans run at a lower speed, reducing both the power consumption and noise output of the switch.

Zero Maintenance

Cost efficient switches, Cost of ownership is less compared to other products of same features along with zero maintenance. Maximum power reduction for ongoing operation which ultimately save energy and running cost.

Easy Debugging and Troubleshooting

Ping, Traceroute, SNMP, RMON, Web based real time Switch ports monitoring with Web GUI and CLI can easily troubleshoot any problem in network with various show and debug commands.

Longer Distance Coverage

State of art quality switches that can serve real time high-speed performance which covers longer physical distance up to 250 meters with copper pairs as compared to other Major brands having limitation of 100m.

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Software

COMMANDO Marshall OS IP services work as core and data center routing switches which connect to other core switches using 100G/40G/25G/10G/10GE fixed uplink ports and use technologies such as VXLAN to build a non-blocking large Layer 2 network, which allows for large-scale VM migration and flexible service deployment. It comes with 24GE/48GE, 24/32 SFP+ models in a variety of form factors including perpetual PoE/PoE+ full provisioning. It delivers IPv4/IPv6 rich services for mid-enterprise edge and SMB core with mixed stacking between 100G, 40G, 25G, 10G, 10GE and 1G with advanced Layer 2, Layer 3 and Layer 4 data center feature set with no license required.

Advanced classifier-based, time-based hardware implementation for L2 (MAC), L3 (IP) and L4 (UDP/TCP transport ports) security and prioritization, Port-Channel / LAG (802.3ad - 802.1AX), MLAG, Voice VLAN with SIP, H.323 and SCCP protocols detection and LLDP-MED IP phones automatic QoS and VLAN configuration, DOT1X, Comprehensive IPv4/IPv6 static and dynamic routing including Proxy ARP, OSPF,BGPv4, MPLS, Policy-based routing and automatic 6-to-4 tunneling, High performance IPv4/IPv6 multicast routing with PIM, Advanced IPv4/IPv6 security implementation including malicious code detection, DHCP Snooping, IP Source Guard protection and DoS attacks mitigation.

Well known Industry standard SNMP, RMON, MIB, LLDP, AAA, sFlow, RSPAN, Service port for out-of-band Ethernet management (OOB), Standard RS232 straight-through serial RJ45 Console, USB Console, Bluetooth 5.0 Console port, IEEE 802.11a/b/n (2T2R) 300Mbps Management port, Standard USB port for local storage, logs, configuration or image files, Industry standard command line interface (CLI) with best known command by networking experts. Fully functional Web Console (Web GUI) for Network admins who prefer an easy to use, yet advance graphical interface.

Enhance Security using Traffic control MAC Filter and Port Security help restrict the traffic allowed into and out of specified ports or interfaces in the system to increase overall security and block MAC address flooding issues. DHCP Snooping monitors DHCP traffic between DHCP clients and DHCP servers to filter harmful DHCP message and builds a bindings database of (MAC address, IP address, VLAN ID & Port) that are considered authorized in order to prevent DHCP server spoofing attacks IP source guard and Dynamic ARP Inspection use the DHCP snooping bindings database per port and per VLAN to drop incoming packets that do not match any binding and to enforce source IP/MAC addresses for malicious users traffic elimination.

Time-based Access Control Lists (ACLs) can be bound to ports like Layer 2 interfaces, VLANs and LAGs. In-band and out of band switch management, management ACLs on CPU interface (Control Plane ACLs) are used to define the IP/MAC or protocol through which management access is allowed for increased HTTP/HTTPS or Telnet/SSH management security. Out-of-band management is available via dedicated service port (1G RJ45 OOB) when in-band management can be prohibited via management ACLs.

Bridge protocol data unit (BPDU) Guard, Dynamic 802.1x VLAN assignment mode, TACACS+ and RADIUS enhanced administrator management provides strict "Login" and "Enable" authentication enforcement for

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the switch configuration, Superior quality of service with advanced classifier-based hardware implementation for Layer 2 (MAC), Layer 3 (IP) and Layer 4 (UDP/TCP transport ports) prioritization. Advanced rate limiting down to 8 Kbps granularity and minimum guaranteed bandwidth can be associated with time-based ACLs for best granularity. DiffServ feature applied to class maps. Automatic Voice over IP prioritization with protocol-based (SIP, H323 and SCCP) or OUI-based Auto-VoIP for simultaneous voice calls. UDLD detects unidirectional links physical ports (UDLD must be enabled on both sides of the link in order to detect a unidirectional link).

It can be used for various applications and network sizes in data centers and high-end campus networks, featuring network scaling, automation, programmability, and real-time visibility. Following is a summary of software features supported.

Data Center Features

- VSF (Virtual Switch Framework)
- Priority Flow Control (PFC), Explicit Congestion Notification (ECN) and Data Center TCP
- MLAG (Multi-Chassis Link Aggregation)
- Overlay technology NVGRE/VXLAN/GENEVE
- RPC-API for SDN (Software Defined Network)

L3 Features

- Static Route
- Dynamic Routing, RIPv1/v2/ng, OSPF v2/v3, BGP4
- RIPv3, OSPFv3, BGP4+
- OSPF multiple process
- Policy-based Routing (PBR) for IPv4 and IPv6
- VRRP
- URPF
- ECMP
- BFD
- IGMP v1/v2/v3, IGMP Proxy,
- Static Multicast Route
- Multicast Receive Control
- Illegal Multicast Source Detect
- ARP Guard, Local ARP proxy, Proxy ARP, ARP Binding, Gratuitous ARP, ARP Limit
- Anti ARP/NDP Cheat, Anti ARP/NDP Scan. Dynamic ARP Inspection (DAI)
- DNS Client, DNS Relay
- GRE Tunnel

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IPv6 Features

- 6to4 Tunnel, Configured Tunnel, ISATAP Tunnel, GRE Tunnel
- ICMPv6, ND, DNSv6
- IPv6 LPM Routing, IPv6 Policy-based Routing (PBR)
- IPv6 VRRPv3, IPv6 URPF, IPv6 RA
- RIPng, OSPFv3, BGP4+
- MLD Snooping, IPv6 Multicast VLAN
- MLDv1/v2, IPv6 ACL, IPv6 QoS

QoS

- 12 Queues
- SWRR, SP, WRR, DWRR, SDWRR
- Traffic Classification Based on 802.1p COS, ToS, DiffServ DSCP, ACL, port number
- Traffic Policing
- PRI Mark/Remark

ACL

- IP ACL, MAC ACL, IP-MAC ACL
- Standard and Expanded ACL Based on source/destination IP or MAC, IP Protocol,
- TCP/UDP port, DSCP, ToS, IP Precedence), VLAN, Tag/Untag, CoS
- REDIRECT and Accounting based ACL
- Rules can be configured to port, VLAN, VLAN routing interfaces
- Time Ranged ACL

Security

- 802.1x AAA
- Port, MAC based authentication
- Accounting based on time length and traffic
- Guest VLAN and auto VLAN
- RADIUS for IPv4 and IPv6
- TACACS+ for IPv4 and IPv6
- MAB

DHCPv4/v6 Traffic Monitor

- DHCP Server/Client for IPv4/IPv6
- DHCP Relay/Option 82, 252
- DHCP Snooping/Option 82

Link Aggregation

- 802.3ad – Link Aggregation Control Protocol (LACP)
- Multi-chassis Link Aggregation (M-LAG)

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MPLS

- LDP
- RSVP
- LDP tunneling (LDP over RSVP)
- Fast reroute (FRR)
- IPv6 tunneling (6PE)
- Ingress, transit, and egress label-switched paths (LSPs)
- IPv4 Layer 3 VPNs
- IPv6 Layer 3 VPNs (6VPE)
- Layer 2 circuits

Visibility

- Switched Port Analyzer (SPAN)
- RSPAN
- ERSPAN
- Port mirroring
- sFlow

Data Center Bridging

- Priority-based flow control (PFC)—IEEE 802.1Qbb
- Data Center Bridging Exchange Protocol (DCBX), DCBx FCoE, and iSCSI type, length, and value (TLVs)

Troubleshooting

- Configuration via CLI, Web GUI, telnet, or SSH.
- Diagnostics with Show, debug, and familiar and well-known commands
- Port mirroring
- IP tools like L2 ping and Extended ping and trace route.
- sFlow Traffic Analysis

L2 Features

- 802.1D – Spanning Tree Protocol (STP)
- 802.1w – Rapid Spanning Tree Protocol (RSTP)
- 802.1s – Multiple Spanning Tree Protocol (MSTP)
- VLAN Spanning Tree Protocol (VSTP)
- 802.1AB Link Layer Discovery Protocol (LLDP)
- VLAN Registration Protocol
- QinQ
- Root Guard
- BPDU Guard
- BPDU Tunnel
- IP Source Guard
- LLDP and LLDP-MED
- UDLD

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- MAC VLAN, Voice VLAN, Protocol VLAN, Multicast VLAN
- QinQ, Selective QinQ, Flexible QinQ

L1 Features

- IEEE 802.1AB: Link Layer Discovery Protocol (LLDP)
- IEEE 802.1ad: QinQ
- IEEE 802.1D-2004: Spanning Tree Protocol (STP)
- IEEE 802.1p: Class-of-service (CoS) prioritization
- IEEE 802.1Q: Virtual Bridged Local Area Networks
- IEEE 802.1s: Multiple Spanning Tree Protocol (MSTP)
- IEEE 802.1w: Rapid Spanning Tree Protocol (RSTP)
- IEEE 802.3: 10BASE-T
- IEEE 802.3u: 100BASE-T
- IEEE 802.3ab: 1000BASE-T
- IEEE 802.3z: 1000BASE-X
- IEEE802.3an, 10GBASE-T
- IEEE 802.3ae: 10-Gigabit Ethernet on fiber
- IEEE 802.3bm: 40-Gigabit/100-Gigabit Ethernet on fiber
- IEEE 802.3ad: Link Aggregation Control Protocol (LACP)
- IEEE 802.1Qbb: Priority-based Flow Control
- IEEE 802.1Qaz: Enhanced Transmission Selection
- IEEE802.3ak(10GBASE-CX4)
- Port loopback detection
- 802.3ad LACP, max 128 group trunks with max 8 ports for each trunk
- LACP load balance
- N:1 Port Mirroring
- RSPAN
- ERSPAN
- MRPP
- IEEE802.1Q, 4K VLAN
- GVRP
- N:1 VLAN Translation
- Broadcast / Multicast / Unicast Storm Control
- IGMP v1/v2/v3 Snooping and L2 Query
- ND Snooping
- MLDv1/v2 Snooping
- Port Security
- Flow Control: HOL, IEEE802.3x
- Bandwidth Control

Security Network Management

- CLI, WEB GUI, Telnet, SSH, SNMPv1/v2c/v3 through IPv4 and IPv6
- Syslog and external Syslog Server HTTP SSL
- SNMP MIB, SNMP TRAP
- FTP/TFTP/HTTP

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- SNTP/NTP
- RMOM 1,2,3,9
- Authentication by Radius/TACACS
- SSH v1/v2
- Dual firmware images/ Configuration files
- 802.3ah OAM, 802.1ag OAM

GREEN Features

- IEEE 802.3az (Energy Efficient Ethernet)
- Auto FAN Speed Control, with Temperature controlled Fan
- LED Shut-Off

Table 1. Software features

Function	Description
	IEEE 802.3af, Power Over Ethernet
	IEEE 802.3at, Power Over Ethernet Plus
	IEEE 802.3u,100BASE-TX
	IEEE 802.3ab,1000 BASE-T
	IEEE 802.3z,1000 BASE-X
	IEEE802.3ae, 10 Gbit/s Ethernet over fiber
	IEEE802.3an, 10GBASE-T
	IEEE 802.3bm: 40-Gigabit/100-Gigabit Ethernet on fiber
	IEEE 802.3ad, Static or Dynamic Link Aggregation
	IEEE 802.3x, Full-Duplex Flow Control
	IEEE 802.3az, EEE (Energy Efficient Ethernet)
	IEEE 802.1q, VLAN
	IEEE 802.1p, QoS/CoS
	IEEE 802.1d, STP (Spanning Tree Protocol)
	IEEE 802.1w, Rapid Spanning Tree Protocol
ETHERNET BASIC FEATURES	Ethernet interface operating modes: full duplex, half duplex, and auto-negotiation Ethernet interface operating rates Jumbo frames (9600 bytes) Flow-control Tx/Rx Port based storm-control Port-block (know-unicast/unknow-unicast/know-multicast/unknown multicast/broadcast)

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	Uni-direction isolate L2 Protocol Tunnel Support DOT1X/LLDP/SLOW-PROTO/STP/RSTP/MST) Store-and-forward Cut-through
MAC Address Table	Support auto-update, two-way learning Automatic learning and aging of MAC addresses Hardware Learning Static and dynamic MAC address entries Blackhole MAC MAC Flapping detect Port Bridge
VLAN	Port-based VLANs 4094 VLANs VLANs based on IEEE 802.1q Access/Trunk Default VLAN VLAN Classification (port based/mac based/IP based/protocol based) Basic QinQ Selective QinQ Selective QinQ VLAN Mapping 1:1 VLAN Translation VLAN Statistics Private VLAN Voice VLAN Guest VLAN

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Spanning Tree	Support Rapid Spanning Tree Protocol (Default Setting) Support Spanning Tree Protocol, Support Multiple spanning Tree Multi-instance Spanning-Tree Protocol BPDU Filter/Guard Root Guard Loop Guard Anti TC-BPDU attack
	Support 128 aggregation groups, and a maximum of 8 ports in each aggregation group Static aggregation and LACP
	Support bi-direction port mirroring RSPAN function for remote mirroring
Port Isolation	Isolation between downlink ports without influence the communication between downlink and uplink ports
	Back-pressure traffic control under Half-Duplex mode IEEE 802.3x traffic control under Full-Duplex mode
Port Rate Restriction	Port-based ingress or egress rate limiting
DHCP	DHCP Server, Client, Relay, Snooping, Option-82
Storm Suppression	Support the suppression of broadcast storm based on forwarding rate
Multicast Control	Support IGMPv1/2/3 and MLDv1/2 Snooping;
	Attack Prevention (Land attack/Blat attack/Ping attack/TCP control flag attack) MAC & Port based Security IP, MAC, Port based ACL, VLAN ACL ARP binding TCP/UDP port-based Security
	802.1p(Port Queuing Priority) WRR (Weighted Round Robin) Cos/Tos, QOS
PoE	PoE /PoE+(IEEE 802.3af/IEEE 802.3at)
	10/100Base-TX: UTP category 5/5e/6 cables (Maximum 250m) 1000Base-T: UTP Category 5/5e/6 cable (Maximum 100m) 10G Base-T: Category 6e cable (Maximum 80 m) 10G Base-T: Category 7 cable (100 m) 1000Base-SX: Fiber with 850nm wavelength, supports a max transmission distance of 550m 1000Base-LX/LH 1G SFP: Fiber with 1310nm/ 1550nm wavelength, supports a max transmission distance up to 20km

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	10G SFP+/ 25G SFP28/ 40G QSPF/ 100G QSFP28: Fiber with 850nm/ 1310nm / 1550nm wavelength, Supports a max transmission distance up to 80km
Network Cable Deployment	Support Auto-MDIX function, automatically identify straight forward cable and cross-over cable
Negotiation Pattern	Support port auto-negotiation function (automatically negotiate transmission rate and Duplex modes)
	Single ERPS ring Tangent ERPS rings Tangent ERPS rings Intersecting ERPS rings Compatible with RRPP
G.8031	G.8031-Ethernet Linear Network Protection
	G.8032 v1 & v2 Single Ring Sub Ring
Loopback Detect	Loopback-detection
	IGMPv1/v2/v3 Snooping Fast leave Static IGMP snooping group MVR- Multicast VLAN Registration
	Static and dynamic ARP entries Aging of ARP entries Gratuitous ARP Basic ARP-Proxy Local ARP-Proxy
	IPv4 Static Routes

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	Blackhole Routes Co-work with IP SLA VRF- Virtual Routing and Forwarding uRPF check RIPv1/v2/ng OSPFv2 IS-IS IBGP EBGP Route-map IPv4 prefix-list PBR -Policy-based Routing ICMP redirect ICMP unreachable ECMP(SLB) ECMP(DLB) ECMP(RR) ECMP Self-healing
	IGMPv1/v2/v3 IGMP-Proxy IGMP SSM Mapping PIM-SM PIM-SSM PIM-DM

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IPv6 Basic Protocol	ICMPv6 NDP PMTU
	IPv6 Static Route RIPng OSPFv3
	MLD v1/v2 MLD v1/v2 Snooping MVR6 PIM-SM v6
	IPv6 over IPv4 Tunnel 6to4 Tunnel ISATAP Tunnel
	DHCPv6 Relay DHCPv6 Snooping IPv6 Prefix-list
	Traffic classification based on COS/DSCP (simple classification) Traffic classification based on ACL (complex classification) Traffic classification based on inner header of the tunnel packets
	Queue scheduling Remark the priority fields (COS/DSCP) of the packet based on Table Map Flow redirection Flow mirror
	Traffic policing based on direction(in/out) of Port

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	Traffic policing based on direction(in/out) of VLAN Traffic policing based on direction(in/out) of flow Traffic policing based on direction(in/out) of aggregated flow
	Queue based traffic shaping Port based traffic shaping
	SP- Strict Priority scheduling WDRR - Weighted Deficit Round Robin scheduling SP + WDRR mixed scheduling
	TD-Tail Drop WRED - Weighted Random Early Detection
	Packet counts and bytes statistics based on traffic classification Packet counts and bytes statistics based on the color after traffic policing Forwarded and discarded packet counts and bytes statistics
	ECN tags based on Tail Drop ECN tags based on WRED
	BFD for Static route BFD for OSPFv2 BFD for VRRP/Track
	VRRP Track for VRRP
	Multi-instance Load balance Multi-Link Monitor-link

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MLAG	MLAG basic MLAG orphan Port
	VARP-Virtual-ARP VARP subnet
	Manual configure VxLAN tunnel VxLAN distributed gateway VxLAN active-active access Interconnect across Datacenters based on VxLAN L2 Protocol packet passthrough Edit DSCP in VxLAN outer header BGP EVPN GRE Tunnel NVGRE Tunnel GENEVE Tunnel
	LLDP support DCBX TLV PFC
	Authentication Authorization Accounting
	Port based dot1x MAC based dot1x Guest VLAN
	MAC/IP ACL Basic Mode ACL

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	Port-group ACL VLAN-group ACL IPv6 ACL ACL UDF Time Range
Port Security	Limitation on MAC address learning on interface
VLAN Security	Limitation on MAC address learning on VLAN
	Black List / White List Rate limit
CPU Traffic Limit	CPU Traffic Limit
Prevent DDOS attack	Prevent DDOS attack (ICMP Flood/Smurf/Fraggle/LAND/SYN Flood)
	Telnet/SSH ACL filtering Telnet/SSH IPv6 ACL filtering
MAC Security	MacSec (802.1AE)
Link-Flapping detection	Link-Flapping detection
	Configurations through CLI (Command Line Interface) Banner configuration Help information in English Vty Terminal service
	Inband management interface and configuration Outband management interface and configuration Privileged user priority and privileged commands Network management based on SNMPv1/v2c/v3 Public and private MIB

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	Public and private Trap Configuration and management based on WEB UI Configuration and management based on RPC-API Smart Config-Automatically configuration when system start Configuration and management based on OVSDB Change the system specifications by choose different STM Profiles Feature configuration based on License Restore factory default configuration
	File system (support directory and file management) Upload and download files through FTP or TFTP Upload and download files through Xmodem
	Per-module Debug features ICMP Debug Software process monitor: BHM- Beat Heart Monitor Hardware Watch Dog CPU usage display and alarm Memory usage display and alarm Device temperature and FAN status display and alarm User operation logs Management of logs, alarms, and debugging information VCT- Virtual Cable Test Detailed Diagnostic-information collection Manual reboot Schedule Reboot

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	Reboot Information logging Ping IPv6 Ping Traceroute Port mirror Flow mirror Remote mirror Multi-destination mirror m:n Use CPU as mirror source Use CPU as mirror destination and analyze packet ERSPAN To CPU/From CPU packets statistics Layer2 network connectivity detection - L2Ping (MAC Ping/Trace) UDLD- Unidirectional Link Detection Unidirectional forwarding of the fiber Port loopback Hardware loopback internal/external Time configuration Time zone
	Upgrade with the local image file Upgrade with the remote TFTP server Online upgrade Uboot
	Detect the connectivity of network cables Uploading or downloading of the configuration data Uploading of firmware upgrade patch Support system logs

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	WEB-based reset to factory defaults
	WEB-based management CLI Management (Command Line Interface) Telnet SNMP

Table 2. Software Highlights

C3500 MarshallOS Software Features	Highlights	Protocols	Description
			Ethernet interface operating modes(full duplex, half duplex, and auto- negotiation) Ethernet interface operating rates Jumbo Frame Port-xconnect
		Flow-control	Flow-control tx/rx
		storm-control	Port based storm-control
		Port-block	Port-block (know-unicast/unknow-unicast/know-multicast/unknow- multicast/broadcast)
			L2/L3/All Port-isolate Uni-direction isolate
		L2 Protocol Tunnel	L2 Protocol Tunnel (support CFM/DOT1X/LLDP/SLOW-PROTO/STP/VTP
			Store-and-forward Cut-through
			Access/Trunk Default VLAN

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		VLAN Classification	VLAN Classification (port based/mac based/IP based/protocal based)
			Basic QinQ Selective QinQ VLAN Mapping (1:1 VLAN Translation)
		VLAN Statistics	VLAN Statistics
		Private VLAN	Private VLAN
		Voice VLAN	Voice VLAN
		Guest VLAN	Guest VLAN
			Automatic learning and aging of MAC addresses Hardware Learning Static and dynamic MAC address entries Blackhole MAC
		MAC Flapping detect	MAC Flapping detect
		Port Bridge	Port Bridge
			Static-LAG, LACP, MLAG LAG load balance (SLB) LAG load balance (DLB) LAG load balance (RR) LAG Self-healing
		STP	Spanning-Tree Protocol
		RSTP	Rapid Spanning-Tree Protocol
		MSTP	Multi-instance Spanning-Tree Protocol
			BPDU Filter/Guard

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		Protocol Protection	Root Guard Loop Guard Anti TC-BPDU attack
			Single ERPS ring tangent ERPS rings intersecting ERPS rings compatible with RRPP
	G.8031	G.8031	G.8031(Ethernet Linear Network Protection)
			G.8032 V1 & V2 Single Ring Sub Ring
	Loopback Detect	Loopback Detect	Loopback-detection
			IGMPv1/v2/v3 Snooping Fast leave Static IGMP snooping group
		MVR	MVR (Multicast VLAN Registration)
			Static and dynamic ARP entries Aging of ARP entries Gratuitous ARP
			Basic ARP-Proxy Local ARP-Proxy
			IPv4 Static Routes Blackhole Routes

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			Co-work with IP SLA
			VRF (Virtual Routing and Forwarding) uRPF check
		RIP	RIPv1/v2
		OSPFv2	OSPFv2
		IS-IS	IS-IS
			IBGP EBGP
			Route-map IPv4 prefix-list
		PBR	PBR (Policy-based Routing)
			ICMP redirect ICMP unreachable
			ECMP(SLB) ECMP(DLB) ECMP(RR) ECMP Self-healing
			IGMPv1/v2/v3 IGMP-Proxy IGMP SSM Mapping
			PIM-SM PIM-SSM PIM-DM
		ICMPv6	ICMPv6

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	Protocol	NDP	NDP
		PMTU	PMTU
		IPv6 Static Routes	IPv6 Static Routes
		RIPng	RIPng
		OSPFv3	OSPFv3
		MLD v1/v2	MLD v1/v2
		MLD v1/v2 Snooping	MLD v1/v2 Snooping
		MVR6	MVR6
		PIM-SM v6	PIM-SM v6
		IPv6 over IPv4 Tunnel	IPv6 over IPv4 Tunnel
		6to4 Tunnel	6to4 Tunnel
		ISATAP Tunnel	ISATAP Tunnel
			DHCPv6 Relay DHCPv6 Snooping
		IPv6 Prefix List	IPv6 Prefix-list
			BFD for Static route BFD for OSPFv2 BFD for VRRP/Track BFD for PBR
			VRRP Track for VRRP
			multi-instance load balance

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			Multi-Link
			Monitor-link
			MLAG basic MLAG orphan Port
			Auto detection Network fault detection Network fault handle remote loopback
			Hardware CCM detect MAC Ping MAC Trace
	Y.1731	Y.1731	Latency and jitter measure
			Traffic classification based on COS/DSCP (simple classification) Traffic classification based on ACL (complex classification) Traffic classification based on inner header of the tunnel packets
			Queue scheduling Remark the priority fields (COS/DSCP) of the packet based on ACL Remark the priority fields (COS/DSCP) of the packet based on Table Flow redirection Flow mirror
			Traffic policing based on direction(in/out) of Port

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			Traffic policing based on direction(in/out) of VLAN
			Traffic policing based on direction(in/out) of flow Traffic policing based on direction(in/out) of aggregated flow
			Queue based traffic shaping Port based traffic shaping
			SP (Strict Priority) scheduling WDRR (Weighted Deficit Round Robin) scheduling SP + WDRR mixed scheduling
			TD (Tail Drop) WRE (Weighted Random Early Detection)
			Packet counts and bytes statistics based on traffic classification Packet counts and bytes statistics based on the color after traffic Forwarded and discarded packet counts and bytes statistics
			ECN tags based on Tail Drop ECN tags based on WRED
			VARP (Virtual-ARP) VARP subnet
			Manual configure VxLAN tunnel VxLAN distributed gateway VxLAN active-active access Interconnect across Datacenters based on VxLAN

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			L2 Protocol packet passthrough Edit DSCP in VxLAN outer header
			BGP EVPN Support to enable/disable overlay split horizon per-VNI
		GRE Tunnel	GRE Tunnel
		NVGRE Tunnel	NVGRE Tunnel
		GENEVE Tunnel	GENEVE Tunnel
		DCBX	LLDP support DCBX TLV
		PFC	PFC
		LDP	LDP
		MPLS Forwarding	MPLS Forwarding
		VPWS	VPWS
		VPLS	VPLS
		MPLS OAM	MPLS OAM
		MPLS Stats	MPLS Stats
		L3VPN	L3VPN
		ACL	MPLS ACL
		QoS	MPLS QoS
			SSHv1/v2 RSA Key generation
		RADIUS	RADIUS
		TACAS+	TACAS+
			Authentication Authorization

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			Accounting
			Port based dot1x
			MAC based dot1x Guest VLAN
			MAC/IP ACL Basic Mode ACL Port-group ACL VLAN-group ACL IPv6 ACL ACL UDF Time Range
		ARP Inspection	ARP Inspection
		IP Source Guard	IP Source Guard
		Port Security	Limitation on MAC address learning on interface
		VLAN Security	Limitation on MAC address learning on VLAN
			Black List / White List Rate limit
		CPU Traffic Limit	CPU Traffic Limit
		Prevent DDOS attack	Prevent DDOS attack (ICMP Flood/Smurf/Fraggle/LAND/SYN Flood)
			Telnet/SSH ACL filtering Telnet/SSH IPv6 ACL filtering
		MAC Security	MacSec (802.1AE)
		Link-Flapping detection	Link-Flapping detection

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	Network Management	DHCP	DHCP Server DHCP Relay
			DHCP Snooping DHCP Client DHCP Option82 DHCP Option252
		RMON	RMON
		sFlow	sFlow v4/v5
		IP SLA	IP SLA
		IPFIX	IPFIX
			Latency Monitor Buffer Monitor
		EFD	Elephant Flow Detection
		NTP	NTP（Network Time Protocol）
		Errdisable	Errdisable detection and recovery
		DNS	Static DNS Client
		LLDP	LLDP
		Command Line Interface	Configurations through CLI (Command Line Interface)
			Multiple Banner configuration Help information by ? at each mode
			Vty Terminal service Console Terminal service
			Inband management interface and configuration

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	Management	interface	Outband management interface and configuration
		User privilege management	Privileged user priority and privileged commands
			Network management based on SNMPv1/v2c/v3 Public and private MIB Public and private Trap
		WEB	Configuration and management based on WEB GUI
		RPC-API	Configuration and management based on RPC-API
		SmartConfig	SmartConfig (Automatically configuration when system start)
		OVSDB	Configuration and management based on OVSDB
		System profile configuration	Change the system specifications by choose different STM Profiles
		License control	Feature configuration based on License
		Restore factory default configuration	Restore factory default configuration
		File system	File system (support directory and file management)
			Upload and download files through FTP or TFTP Upload and download files through Xmodem
			Per-module Debug features ICMP Debug
			Software process monitor: BHM (Beat Heart Monitor) Hardware Watch Dog
			CPU usage display and alarm Memory usage display and alarm

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			Device temperature PSU FAN status display and alarm User operation logs
			Management of logs, alarms, and debugging information
		VCT	VCT (Virtual Cable Test)
		System diagnostics	Detailed Diagnostic-information collection
			Manual reboot Schedule Reboot Reboot Information logging
			Ping IPv6 Ping Traceroute
			Port mirror Flow mirror Remote mirror Multi-destination mirror (m:n) Use CPU as mirror source Use CPU as mirror destination and analyze packet ERSPAN
		CPU statistics	To CPU/From CPU packets statistics
		L2 Ping	layer2 network connectivity detection - L2Ping (MAC Ping/Trace)
		UDLD	UDLD (Unidirectional Link Detection)
		Uni directional	Unidirectional forwarding of the fiber
			Port loopback

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			Hardware loopback (internal/external)
			Time configuration
			Time zone
			Upgrade with the local image file Upgrade with the remote TFTP server
		Uboot upgrade	Online upgrade Uboot

IP multicast snooping and IGMP automatically prevent flooding of IP multicast traffic. IEEE 802.1AB Link Layer Discovery Protocol (LLDP) facilitates easy mapping using network management applications with LLDP automated device discovery protocol. LLDP-MED (Media Endpoint Discovery) defines a standard extension of LLDP that stores values for parameters such as QoS and VLAN to configure automatically network devices such as IP phones.

STP/RSTP/MSTP for loop free network, IEEE 802.1s Multiple Spanning Tree provides high link availability by allowing multiple spanning trees; provides legacy support for IEEE 802.1d and IEEE 802.1w.

IEEE 802.3ad Link Layer Discovery Protocol (LACP) and port trunking support up to 128 static, dynamic, or distributed trunks with each trunk having up to eight links (ports) per static trunk. Lag links provides easy-to-configure link redundancy of active and standby links.

Security

The AAA feature allows you to verify the identity of, grant access to, and track the actions of users. It supports Remote Access Dial-In User Service (RADIUS) or Terminal Access Controller Access-Control System Plus (TACACS+) protocols.

Based on the user ID and password combination that you provide. The switch performs local authentication or authorization using the local database or remote authentication or authorization using one or more AAA servers. A pre-shared secret key provides security for communication between the Switch and AAA servers. You can configure a common secret key for all AAA servers or for only a specific AAA server.

It supports Multiple user authentication methods

- Uses an IEEE 802.1X supplicant on the client in conjunction with a RADIUS server to authenticate in accordance with industry standards.
- Supports web-based and MAC-based authentication.
- Multiple IEEE 802.1X users per port provides authentication of multiple devices on a single port; prevents a user from piggy backing on another user's IEEE 802.1X authentication.

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- Concurrent IEEE 802.1X, Web and MAC authentication schemes per port switch port will accept up to 8 sessions of IEEE 802.1X, Web and MAC authentications.
- Access control lists (ACLs) provide IP Layer 3 filtering based on source and destination IP address or subnet or source and destination TCP/UDP port number.
- Source-port filtering allows only specified ports to communicate with each other.
- RADIUS/TACACS+ eases switch management security administration by using a password authentication server.
- Secure shell encrypts all transmitted data for secure remote CLI access over IP networks.
- Secure Sockets Layer (SSL) encrypts all HTTP traffic, allowing secure access to the browser-based management GUI in the switch.
- Port security allows access only to specified MAC addresses, which can be learned or specified by the administrator.
- MAC address lockout prevents particular configured MAC addresses from connecting to the network.
- Secure FTP allows secure file transfer to and from the switch and protects against unwanted file downloads or unauthorized copying of a switch configuration file.
- Switch management logon security helps secure switch CLI logon by optionally requiring either RADIUS or TACACS+ authentication.
- Custom banner displays security policy when users log in to the switch.
- STP BPDU port protection blocks Bridge Protocol Data Units (BPDUs) on ports that do not require BPDUs, preventing forged BPDU attacks.
- DHCP protection blocks DHCP packets from unauthorized DHCP servers, preventing denial-of-service attacks.
- Dynamic ARP protection blocks ARP broadcasts from unauthorized hosts, preventing eavesdropping or theft of network data.
- Dynamic IP lockdown works with DHCP protection to block traffic from unauthorized hosts, preventing IP source address spoofing.
- STP root guard protects the root bridge from malicious attacks or configuration mistakes.
- Identity-driven ACL enables implementation of a highly granular and flexible access security policy and VLAN assignment specific to each authenticated network user.
- Per-port broadcast throttling configures broadcast control selectively on heavy traffic port uplinks.
- Monitor and diagnostics digital optical monitoring of SFP/SFP+/SFP28/QSFP/QSFP28 and 1GE/10GE transceivers ports allow detailed monitoring of the transceiver settings and parameters.

Effective Management

COMMANDO MarshalIOS offers Network Monitoring for users to observe traffic behavior with Port Mirroring, Loop Prevention and DHCP snooping features, can identify and even locate connection problems on your business network.

- Administrators can designate the priority of the traffic based on Port Priority, 802.1P and DSCP Priority, to ensure that voice and video are always clear, smooth and lag-free.

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- Voice VLAN, port-based VLAN and 802.1Q-based VLAN functions.
- RMON provide advanced monitoring and reporting capabilities for statistics, history, alarms, and events.
- Troubleshooting ingress and egress port monitoring enable more efficient problem solving.
- Unidirectional Link Detection (UDLD) monitors the link between two switches and blocks the ports on both ends of the link if the link goes down at any point between the two devices.

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Hardware

COMMANDO Marshall C3500 Managed L3+ Core and Data Center Series Routing Switch is the core and data center routing switch built for the cloud. It uses achieve easy to deploy, use, manage and designed exclusively for enterprise-class core and aggregation layer data center switches, specially built for Security, IoT, and Cloud networking needs of growing businesses, data centers and high-end campus networks maximum throughput. CPU Core running at 800MHz/1.2GHz depending on models, Support Jumbo Frame up to 9600 Bytes to provide Layer2, Layer3, MPLS, and VXLAN features with Low power consumption and low latency and Enhanced NetFlow. SmartPort technology to support multiple port speed mode. CoPP (Control Plane Policing) for CPU traffic protection. On-chip OAM engine supporting Ethernet OAM/ BFD/ MPLS-TP OAM. Embedded traffic manager providing 12 basic queues per port. It supports NVGRE and VXLAN and Data Center Features including PFC, ETC, VEPA, SPB, TRILL, FCoE, etc.

All ports capable of gigabit Ethernet speed and support either PoE or PoE+ power maximum 30W per port with up to 100G QSFP28 uplink stacking. This series has 24GE/48GE and 24/32 SFP+ models with auto-negotiation 10M/100M/1000Mbps PoE/PoE+. It has SFP, SFP+, SFP28, QSFP+ and QSFP28 Uplinks along with 16 switches stacking capability. PoE/PoE+ power supply transmission is more reliable due to design of robust network transformer which uses high current with power budget 600W-800W PoE+ Power for 24 & 48 ports PoE Switch models to provide PoE/PoE+ capability on all ports. PD detection will automatically detect and provide required power for your PoE/PoE+ devices and flexible enough for users to deploy wireless access points, surveillance cameras, IP phones and other PoE/PoE+ supported devices.

It supports Cut-Through as well as store and forward frame forwarding for lower and fixed latency. It has rich monitoring and diagnostic features for troubleshooting. L2 Bridging with SVL and IVL Hardware-based MAC learning and aging Station movement control, Fast MAC flush per port/VLAN/Port + VLAN, Per VLAN / destination port controlled unknown discard for unicast/multicast/broadcast, Unknown unicast/multicast/broadcast to CPU, Static MAC, Per port L2 protocol packet processing, Port random log, Access/trunk/hybrid port support, Flexible AFT (per port accept/deny packets according to any combination of C- TAG and S-TAG), SW MAC learning and aging, Black Hole MAC, White List, Dump MAC by port/ VLAN / port+ VLAN /MAC/MAC-fid, Dump MAC by dynamic /static/all, Dump MAC sort by trie tree, Logic port learning for L2VPN.

It supports 4094 VLAN where all VLANS can have Layer 3 IP address. It has C-VLAN and S-VLAN, Global C-VLAN TPID and S-VLAN TPID setting and per port S-VLAN TPID selection. It has ingress and egress VLAN filtering, Single or double tags VLAN translation on both ingress and egress. Any combination of adding/replacing/removing operation for CVID /C-TAG CoS / C-TAG CFI / SVID / S-TAG CoS / S-TAG CFI on both ingress and egress. VLAN classification based on MAC SA/MAC DA/IP SA/IP DA/any L2 fields combination/protocol/port. It supports single or double tag VLAN switching, Private VLAN, VLAN RX / TX statistics along with Spanning Tree STP，MSTP & RSTP.

It supports L2 Multicast with Per VLAN IGMP packet processing, L2 multicast to physical port or tunnel, PIM snooping, Discard or send to CPU for unknown multicast packets, IPDA, MACDA two level lookup, IP base I2 multicast. It has Storm Control Per port or VLAN storm control with both bits per second and packets per second rate limit. It Support unknown unicast /unknown multicast/ broadcast/ known unicast /known multicast /all unicast /all multicast rate limit, Per MAC address rate limit, Per port per packet type configurable threshold. It also has Port LAG with route selection for Static load balance for LAG, Regular and

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Random round-robin for LAG, Flow let-based dynamic load balance for LAG, Resilient hashing for LAG, Forwarding mode for local members with higher priority.

It has Fault Tolerance with Hardware-based LAG failover mechanism, Channel or CFlex LAG route Selection with Static load balance for LAG, Regular and Random round-robin for LAG, Flowlet-based dynamic load balance for LAG, Resilient hashing for LAG. Fault Tolerance with Hardware-based LAG failover mechanism.

It supports L3 Routing with 4K Layer 3 interface, including VLAN interface and routed port with Per L3 interface, L3 protocol packet processing, Per VLAN DHCP/ARP handling, IPv4 and IPv6 host route, Algorithm based IPv4 and IPv6 LPM (TCAM-based lookup is also supported), Public and Private route, ECMP, Loose and strict RPF check, VRRP, ICMP redirect check, Virtual Route Forwarding, up to 8K instances. It supports ECMP with route selection based on Static load balance for ECMP, Regular and Random round-robin for ECMP, Dynamic load balance for ECMP, Resilient hashing for ECMP, Fault Tolerance with hardware-based ECMP failover mechanism and Self-Healing for ECMP. It has HASH mechanism with Fields for HASH as L2: MAC SA / MAC DA / SVID / CVID / S-TAG CoS / C-TAG CoS/ EtherType, L3: IP DA/IP SA/IP header protocol/MPLS label, L4: TCP src/dest port, UDP src/dest port, Tunnel: Inner header's fields/outer header's fields/Inner+outer, Based on entropy information, for example: VXLAN, NVGRE, MPLS with entropy label and Symmetric hashing.

It supports IP Tunneling with Static V4 in V4, V6 in V4, V4 in V6, V6 in V6 tunnel, 6 to 4 tunnel, ISATAP tunnel, GRE tunnel with Ethernet/IPv4/IPv6/MPLS/Use defined type as payload, UDP tunnel, uRPF. It has IP Overlay with VXLAN/ NVGRE / VXLAN-GPE / GENEVE technology. It has IP Multicast Routing with (S, G), (x, G), (x, x) support, Multicast RPF check, physical replication (to port) and logical replication (to VLAN), Fallback bridge on IPMC lookup failure, discard or send to CPU for unknown multicast packets. It supports PIM Sparse and Dense mode with bidirectional PIM Can be replicated to any port, VLAN, tunnel, Programmable Tunnel with Encap/ Decap and flexible editing behavior on tunnel such as PPPoE and G.INT.

It supports Network Security with Port/MAC based 802.1X, per port isolation, unidirectional and bidirectional isolation on flooded packets only or all packets, binding with any combination of IP/ MAC/ Port/ VLAN. It has DDoS attack prevention for Illegal MAC SA, Illegal IP SA, Land Attack (MAC SA==MAC DA or IP SA==IP DA), Null scan (TCP sequence number=0, control bits=0), SYN/SYN-ACK flooding, Smurf attack, Port/VLAN/System based MAC Limit and Port Security & VXLAN encapsulation. It supports CPU Traffic Protection with protocol type rate limit, per group rate limit (multiple protocols can be grouped), 8 priority classes with SP/WFQ scheduling and also total CPU traffic rate limit CoPP policing based on flow rules, with bps or pps. Rate limit can be based on bps (bits per second) or pps (packet per second) unit.

It supports ACL both ingress and egress applied on port, VLAN, L3 Interface, and logic port with 8 parallel-lookup for ingress & 3 parallel lookup for egress ACL. Deep packet parsing up to 144 bytes to match all L2-L4 fields, UDF actions supported like Permit/deny, Redirect to port/L3 Nexthop/multicast group/tunnel, Redirect to CPU with timestamp attached, Mirror (port, L3 Nexthop, multicast group, tunnel, CPU), Priority and color remark, Flow policing, Statistics to Add/remove/replace any fields in STAG and/or CTAG, Deny bridge, Deny learning, Deny routing. Classification based on Port, VLAN, L3 Interface and Logic Port flexible to classify based on L2-L4 fields and FIB. It supports SGT encapsulation, Support SXP (identify and redirect to CPU), Class group-based ACL, Classify based on Port, VLAN, L3 Interface and Logic Port flexible to classify class group based on L2-L4 fields, Policy based routing, Forwarding Information as ACL key field, Flexible ACL TCAM Allocation.

It supports Policing and QoS with SrTCM (RFC 2697), TrTCM (RFC 2698) and modified TrTCM (RFC 4115). It also supports both color-aware and color-blind mode with fine granularity down to 8Kbps and up to 16M

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Bytes burst size and 256 metering/policing profile along with both ingress and egress policing. It has Port/ Flow/ VLAN based policing PPS based policing, Aggregated policing, WRED congestion avoidance on per-queue basis, Tunnel ECN, flow-based ECN, stacking-based ECN, CIR/PIR shaper with minimum guaranteed bandwidth and maximum regulated traffic for each queue. It has 384 flexible queue groups which can be bound to ports without limitation, 8 scheduling priorities in a base queue group, SP for different priorities, WFQ for queues with the same priority. 8 scheduling priorities in a extend queue group, SP for different priorities, WFQ for queues with the same priority. Configurable CIR/PIR weight, CIR is SP, PIR is SP/WFQ Priority propagation is from group to channel, 8 scheduling priorities in a group could be mapped to 4 scheduling priorities in a physical port. Configurable WFQ weight between different groups traffic rate regulation for all destinations by FPS (frame per second) unit. Support packet aging and queue flush (only extend queue support) Ingress/Egress Resource Manage with flexible PHB Mapping.

It supports MPLS Per system/per interface label space, Full label space with Penultimate Hop Pop, L-LSP and E-LSP support, Pipe/Short Pipe/Uniform Model LSP, Parse/push/pop/lookup label number: 8/10/3/3, Optimized Multi-Path MPLS, MPLS IP based ECMP, Entropy label and flow label, Martini Encapsulation, Raw mode and tagged mode PW, VPWS (port AC, VLAN AC), VPLS (port AC, VLAN AC)/H-VPLS. It supports L3VPN with Multicast MPLS, Upstream MPLS, MPLS over GRE Tunnel, I2/I3 Gateway, Using TCAM resolve hash conflict

It supports Ethernet OAM with 802.1ag Connectivity Fault Management with both UP MEP and Down MEP along with MIP, CCM (interval 3.3ms/10ms/100ms/1s/60s/600s), Link Trace (LTM/LTR), Loopback (LBM/LBR), CSF, RDI, APS/RAPS, IS, Link OAM, 802.3ah EFM, Y.1731 Performance Measurement, One-way/Two-way DM, Single-end/Dual-end LM, SD, QinQ OAM, VPLS/VPWS OAM. It supports BFD like IP BFD, LSP BFD, VCCV/PW BFD, VXLAN BFD, NVGRE BFD, S-BFD, Micro-BFD, TRILL BFD, MPLS-TP OAM, Y.1731 based and BFD based.

It supports network performance management with RFC2544 for L2/L3, Y.1564 for L2/L3, TWAMP/OWAMP, MEF SAT Testing (MEF46/MEF48/MEF49), SLM/SLR. It has automatic switch protection with protocol/topology independent mechanism, One-bit flap quick switch. No need to flush forwarding table, 2-level protection switch. Support both unicast and multicast and also Support both source and sink end Can be comprehensively applied to G.8031/G.8032/G.8131/G.8132/IETF. EAPS/Smart Link and all other possible protection switch protocols and Hardware based APS switch.

It has Temperature Control Fan control circuitry varies the fan speed to increases or decreases the airflow needed to keep the system operating in a desired temperature by adjusting fan speeds to optimize cooling. These Energy Efficient switches allows optimizes air circulation to provide more effective cooling throughout rack systems in data centers where the switches are used when compared to side-to-side airflow. The switches also feature built-in smart fans with internal heat sensors monitor and detect temperature changes and react accordingly by utilizing different fan speeds for different temperatures. At lower temperatures, the fans will run slower, reducing the switch's power consumption and noise. It has Hardware watchdog support which guard against certain types of system hangs. Watchdog timer is used to escape from if something goes wrong. Based on the situation, the Switches can automatically reset itself, or recover from the failure and generate an error message in the console logs. Rack mount design, Mounts in an EIA-standard 19-inch telco rack or equipment cabinet (Rack-mounting kit available), horizontal surface mounting, wall mounting and also having durable robust metal body with bilateral heat dissipation. LED Indication like Power, Activity, PoE available.

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Specifications

COMMANDO Marshall C3500 Managed L3+ Core and Data Center Series Routing Switches all ports capable of gigabit Ethernet speed and support either PoE or PoE+ power maximum 30W Per port with up to 100G uplinks and maximum 16 switch stacking. This series has 24GE/48GE and 24/32 SFP+ models with auto-negotiation 10/100/1000Mbps PoE (PoE+) with flexible SFP, SFP+, SFP28, QSFP+ and QSFP28 ports with speed up to 1G/10GE/10G/25G/40G/100G. Perpetual PoE/PoE+ power supply transmission is more reliable due to design of robust network transformer which uses high current with power budget 600W-800W PoE/PoE+ Power for 24 & 48 ports PoE+ Switch models. PD detection will automatically detect and provide required power for your PoE/PoE+ device and flexible enough for users to deploy wireless access points, surveillance cameras, IP phones and other PoE/PoE+ supported devices.

It supports Maximum Jumbo frame size is 9600 bytes, MAC Address Table Capacity 114688, ARP Capacity of 12288 with IPv4 FIB of 56K. It has three inbuilt temperature control fan control circuitry varies the fan speed up to 10000 rpm to increases or decreases the airflow needed to keep the system operating in a desired temperature by adjusting fan speeds to optimize cooling. These Energy Efficient switches allows optimizes air circulation to provide more effective cooling throughout rack systems in data centers where the switches are used when compared to side-to-side airflow. The switches also feature built-in smart fans has internal heat sensors monitor and detect temperature changes and react accordingly by utilizing different fan speeds for different temperatures. At lower temperatures, the fans will run slower, reducing the switch's power consumption and noise.

Table 4. Hardware product highlights

1. Basic Hardware product highlights		
Product Positioning		Data Center TOR access, Enterprise / Metro / HCI (Hyper-Converged Infrastructure) network access or aggregation
Switching Method		Store and Forwarding / Cut Through
Packet Buffer		72MB
CPU Model/ Frequency		800MHz/1.2GHz
Flash		8GB (eMMC)
Memory		16GB
	Main Board Specification	24/48 x 1GE ports 24/32 x SFP+ ports 4 x SFP+ Uplink Ports 8 x SFP28 Uplink Ports 2 x QSFP Uplink Ports

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		2 x QSFP28 Uplink Ports
	Console Type	RJ45, USB, Bluetooth 5.0
	Outband Eth Management Port	RJ45, IEEE 802.11a/b/n (2T2R) 300Mbps
	Inband Eth Management Port	Support RJ45 ETH Port
	Storage Ports	Support USB 2.0 port
2. Performance Specification		
	Switching Capability	880Gbps
	Throughput	654.72Mpps
	Latency	Min: 660ns Max: 960ns
3. Hardware Summary and reboot time		
Hardware Summary		Standard 1U 19'' Rack Mountable 24GE/48GE 24/32 SFP+
Software Upgrade Method		TFTP/FTP
Service interruption time when reboot system for software update		Less Than 120s
4. Power Supply and Power Requirements		
	AC	Support AC Power Supplies
	DC	Support DC Power Supplies
	AC	Operating Voltage: 100 ~ 240V; 50/60Hz Maximum Voltage: 90 ~ 264V; 47~63Hz
	DC	Operating Voltage: 12V as well as -48V ~ -60V
Double Power Input		(AC+DC)

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Power Supply Module	Inbuilt Dual with hotstandby
PoE Budget	600W-800W Depending on Model
Max Power Drawn by switch	100W
5. Over-current and Over-voltage protection	
Overcurrent/Overvoltage Protection	Yes
Surge Protection Level	±6 kV
6. Hardware content	
Hardware Size (H×W×D) in.	4.4 x 44.4 x 30.0 cm (1.7 x 17.5 x 11.8 inches)
Weight (kg)	Up to 6.7Kg
Cooling Mode	Fan Cooling (Front-to-Rear Airflow)
Quantity of Fans	Up to 3
Fan Module	Fixed fan
Fan Module Intelligent Speed Control	Supported up to 10000rpm.
Operating Temperature Range	0ºC - 40ºC

COMMANDO Marshall C3500 Managed L3+ Core and Data Center Series Routing Switches Technical Specifications are as follows.

Table 5. COMMANDO Marshall C3500 Managed Core Series Technical Specifications

Feature	Highlights	Technical Specifications	C3500 Supported Parameters
	Jumbo frame	Maximum Jumbo frame size	9600
		MAC Address Table Capacity	114688
		MAC Learning Rate (SW)	> 4000pps
		MAC Learning Rate (HW)	> 10Gbps

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		Blackhole MAC address capacity	128
	Multicast MAC	MAC address Capacity	2048
		VLAN IDs	4094
		VLAN Instances	4094
		VLANs to enable statistics	256
		Maximum mapping table	64
		Maximum rules Number	1024
	EVC	Maximum EVC Number	4094
		Maximum Member Number per group	8
		Maximum Group Number	128
		Load balance key mode	Static/Dlb/rr/Resilient /Self-healing
		Convergence time	< 50ms
		Maximum Rule Number	4096
		Maximum Group Number	1
		Base MAC Capacity	512
		Base IPv4 Capacity	448
		Base IPv6 Capacity	32
		Base Protocol Capacity	7
	STP	Convergence time	< 30s
	RSTP	Convergence time	< 1s
		Instance Number	64
		Convergence time	< 1s
		Domain Number	16

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		Ring Number	1 Primary ring/domain
		Protection instance Number per Ring	64
		Switchover time	< 50 ms
		Group numbers	256
		Switchover time	< 50 ms
		Rings	256
		Switchover time	< 50 ms
		Maximum Session Number	1K
		Maximum domain Number	8
		CCM Interval types	7
		CCM minimum Interval	3.3ms
		Maximum Down MEP Number	1024
		Maximum Up MEP Number	1024
		Maximum LMEP Number	1024
	ARP	ARP Capacity	12288
	IPv4	FIB	56K
	ECMP	ECMP Group	240
		Policy Route Map	64
		Policy Based Routing ACE	256
		Maximum Static Neighbors	256
		Maximum Summary address	2000
		Multicast Routing Table	2048
		Number of interfaces that support Multicast routing table	1024

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	IGMP Snooping	Maximum Groups Number	-
		Maximum Group Number	-
		Maximum Member Number	512
	Host Route	NDP Capacity	-
	IPv6	FIBv6	-
		Multicast Routing Table	-
		Number of interfaces that support Multicast routing table	-
		Maximum Entry Number	512
		Maximum Member Number	-
IP tunnel	IP Tunnel	Tunnel Peer Capacity	-
		Unicast Queue Multicast Queue Monitor Queue	
	Packet Buffer	System Packet Buffer Capacity	72MB
		Policer granularity Queue Shape granularity	
		Port Shape granularity	-
		Ingress Port qos IPv4 flow entries Ingress Port qos IPv6 flow entries	
		Ingress Port ACL for IPv4 Ingress VLAN ACL for IPv4	
		Egress Port ACL for IPv4 Engress VLAN ACL for IPv4	

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	IPv6 ACL	Ingress Port ACL for IPv6 Ingress VLAN ACL for IPv6	-
		Egress Port ACL for IPv6 Egress VLAN ACL for IPv6	
		Ingress Port ACL for MAC Ingress VLAN ACL for MAC	
		Egress Port ACL for MAC Egress VLAN ACL for MAC	
	CoPP	CoPP rules	250
	UDF	UDF rules	-
		IPv4 maximum rules Number IPv6 maximum rules Number	512 -
	802.1x base MAC	Maximum Entries	-
	DHCP-Snooping	Maximum bound entry	-
IPFIX	IPFIX	IPFIX Member	512
	BFD S-BFD	Maximum Session Number Maximum Session Number	
	VRRP	Maximum Group Number	-
		Maximum Group Number Maximum Instance Number Switchover time	- - -
		Maximum group Number Maximum up-link Number per group Maximum down-link Number per	- - -

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	MLAG	Maximum MLAG Group Number	-
	VARP	Virtual IP Number per Port	15
		VXLAN tunnel	6144
		VNI	2000
		VTEP Peer	1024
		VXLAN Gateway MAC for DVR	384

Table 6. Specifications

Hardware Parameter	Hardware Specification
CPU Frequency	800MHz/1.2GHz
CPU Memory DRAM (GB)	16GB
Flash	8 GB
Packet Buffer memory	72MB
	24/48 x 10/100/1000 Base-T all ports (POE/POE+) capable. 12/44 SFP+ 24/48 SFP SFP/SFP+/SFP28/QSFP/QSFP28 ports.
PoE standards supported	IEEE802.3af/IEEE802.3at power on all fixed ports.
Management port	Console port RJ45 -1, Console Port USB-1, Eth port (Out of band) -1, Console port Bluetooth 5.0 -1, IEEE 802.11a/b/n (2T2R) 300Mbps Management port- 1
Reset Button	1
DC input power from UPS	1
Fan Quantity	3
Enclosure Type (Rack-mountable)	Rack/Wall-mountable - 1U
Max PoE+ Output Power (single port)	30W
Total Power Consumption	100W~800W
PoE Pin-out	1/2(+), 3/6(-); Customized 4/5(+), 7/8(-)

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Switching Capacity	Up to 880Gbps
Forwarding Mode	Store and forward/Cut Through
Forwarding Rate	Up to 654.72Mpps
MAC Address Table Size	114688 entries
Jumbo frames (Bytes)	9600
VLAN IDs	4094
Management ACL	256
Link Aggregation	8
Maximum packet length	9216bytes
IPv4 routes	14,000 (10,000 direct routes and 4,000 indirect routes)
Routing table entries	56000
IPv6 routing entries	2000
Multicast routing scale	1000
Switched Virtual Interfaces (SVIs)	1000
QoS scale entries	1000
ACL scale entries	1600
Packet buffer per SKU	6 MB buffers for 24- or 48-port Gigabit Ethernet models
Flexible NetFlow (FNF) entries	16,000 flows on 24- and 48-port Gigabit Ethernet models
	Operating Temperature: 0°C~40°C (32°F~104°F) Storage Temperature: -40°C~70°C (-40°F~158°F) Operating Humidity: 10%~90% non-condensing Storage Humidity: 5%~95% non-condensing
Dimensions (W x D x H)	4.5 x 36.8 x 44.5 cm
Input Power Supply	100~240V AC, 50/60Hz
Lightning Protection	±6KV

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Weight	< 6.7Kg
LED Indicator	Power, System, Link/Act
Energy Saving	EEE Compliant with IEEE802.3az
Certification	CE, FCC

Table 7. Hardware Enclosure Type, Fan Specifications

PRODUCT CODE	Enclosure Type	Fan (Number)
C3500-24X	Rack/Wall mountable - 1U	3 Temperature Control Fan
C3500-24X+2Q	Rack/Wall mountable - 1U	3 Temperature Control Fan
C3500-24X+2C	Rack/Wall mountable - 1U	3 Temperature Control Fan

Table 8. Ports Specifications

PRODUCT CODE	Ports	Main Interface	Uplink Interfaces
C3500-24X	24 x 10G SFP+ ports	24SFP+	-
C3500-24X+2Q	24x 10G SFP+ ports 2 x 40G QSFP+ Uplink ports	24SFP+	2 x 40G QSFP+
C3500-24X+2C	24 x 10G SFP+ ports 2 x 100G QSFP28 Uplink ports	24SFP+	2 x 100G QSFP28

COMMANDO Marshall C3500 Managed L3+ Core and Data Center Series Routing Switches has additional DC input power to mitigate power supply failures. It automatically senses when the internal power supply of a connected device fails and provides power to that device, preventing loss of network traffic and support critical network infrastructure. These series Switches protect from power surges through their inline power supply automatically and have in build Surge protection of ±6KV. With this feature protect on cost and the impact to your business by losing these network devices and thus the users/servers connected to them.

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Table 9. Power specifications

PRODUCT CODE	Power Budget	Max no. of PoE+ (IEEE 802.3at) Ports	Max no. of PoE (IEEE 802.3af) Ports	Power Supply
C3500-24X	100W	-	-	Dual 1+1 (AC + DC) AC: 100~240V 50/60Hz, DC: 12V, 8.3A
C3500-24X+2Q	100W	-	-	Dual 1+1 (AC + DC) AC: 100~240V 50/60Hz, DC: 12V, 8.3A
C3500-24X+2C	100W	-	-	Dual 1+1 (AC + DC) AC: 100~240V 50/60Hz, DC: 12V, 8.3A

Bandwidth Specifications

It uses Cut-through which means it is fast forwarding without any CRC Checking as well as Store-and-forward switching which means that the LAN switch copies each complete frame into the switch memory buffers and computes a cyclic redundancy check (CRC) for errors. The switching capacity (backplane bandwidth) of a switch refers to the maximum amount of data that can be transmitted between a switch interface processor or interface card and a data bus. The stacking allows users to expand their network capacity without the hassle of managing multiple devices. Stackable switches can be added or removed. The Forwarding Rate is a measure of how many packets per second the switch can process for certain sized packets. Forwarding rate, refers to the number of network packets that can be processed by switch. The Forwarding rate is measured in Million packets per second (Mpps).

Table 10. Bandwidth Specifications

Model Number	Switching Capacity (Gbps)	Switching Capacity Forwarding rate(Mpps)	MTBF (hours)
C3500-24X	880 Gbps	654.72Mpps	305141
C3500-24X+2Q	640 Gbps	476.16Mpps	219194
C3500-24X+2C	880 Gbps	654.72Mpps	305516

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Environmental properties specifications

Environmental properties include those physical properties which relate to the environment. Moisture, heat conductivity, the physical effect of heat, Altitude, Humidity and electrical properties depend on the environmental conditions surrounding the device.

Table 11. Environmental properties

Property	Description
Operation Temperature	0°C to 40°C
Operating temperature and altitudes:	0°C to +40°C, up to 5000 feet (1500m) 0°C to +40°C, up to 10,000 feet (3000m) Minimum ambient temperature for cold start is 32°F (0°C) Short-termx exceptional conditions: 0°C to +55°C, up to 5000 feet (1500m) 0°C to +50°C, up to 10,000 feet (3000m) 0°C to +45°C, at sea level with single fan failure Not more than following in one-year period: 96 consecutive hours, or 360 hours total, or 15 days
Storage Temperature	-20° to 65°C
Operating Humidity (relative, noncondensing)	10% to 90% (non-condensing)
Storage Humidity	5% to 90% (non-condensing)

Weight and Dimension specifications

It offers best in class from package dimensions to weight, destination, value, and shipment type. They are suitable for Industry standard Rack/Wall mounting. Industry Standard Rack/Wall mounted describes a unit of electronic equipment that is housed in a metal framework called an equipment rack. Usually, an equipment rack contains multiple "bays," each designed to hold a unit of equipment of standard dimensions.

Table 12. Weight and Dimension

Product Code	Weight & Dimension		
	Kilograms(Kg)	Inches (H x D x W)	Centimeters (H x D x W)
C3500-24X	4.45	1.7 x 17.5 x 11.8	4.4 x 44.4 x 30.0
C3500-24X+2Q	4.50	1.7 x 17.5 x 11.8	4.4 x 44.4 x 30.0
C3500-24X+2C	4.50	1.7 x 17.5 x 11.8	4.4 x 44.4 x 30.0

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SFP/SFP+/SFP28/QSFP+/QSFP28 ports Slots specifications

It has 1GE/1G, 10GE/10G, 25G, 40G and 100G Gigabit Ethernet fiber based Quad Small Form-Factor Pluggable (SFP/SFP+/SFP28/QSFP+/QSFP28) switches with granular port densities that fit diverse campus needs. The SFP/SFP+/SFP28/QSFP+/QSFP28 transceiver is a compact, hot-swappable device that plugs into a physical port of a network device. SFP/SFP+/SFP28/QSFP+/QSFP28 optics are used in communication networks and have a transmitting side (Tx) and a receiving side (Rx). The different SFP/SFP+/SFP28/QSFP+/QSFP28 transceivers work with different wavelengths at an appointed distance. A 1G to 100G solution with QSFP28 preconfigured for up to 100G and can support 1G/10G/25G/40G/100G fiber uplinks.

Table 13. Supporting SFP

PRODUCT CODE	SUPPORTING SFP/SFP+
SFP-SM-1G	COMMANDO LightningFIBER 1000BASE-LX/LH, SFP, 1310nm, 20km, SMF, DDM, Multi-vendor Compatible
SFP-MM-1G	COMMANDO LightningFIBER 1000BASE-SX, SFP, 850nm, 550m, MMF, DDM, Multi-vendor Compatible
SFP-EX-1G	COMMANDO FiberX 1000BASE-EX, SFP, 1310nm, 40km, SMF, DDM, Multi-brand
SFP-ZX-1G	COMMANDO FiberX 1000BASE-ZX, SFP, 1550nm, 80km, SMF, DDM, Multi-brand
SFP-EZX-1G	COMMANDO FiberX 1000BASE-EZX, SFP, 1550nm, 120km, SMF, DDM, Multi-brand
SFP-UTP-1G	COMMANDO LightningCOPPER 1000BASE-T Copper RJ-45, SFP, 100m, CAT5/6, Multi-vendor Compatible
SFP-SR-10G	COMMANDO LightningFIBER 10GBASE-SR, SFP+, 850nm, 300m, MMF, DDM, Multi-vendor Compatible
SFP-LR-10G	COMMANDO LightningFIBER 10GBASE-LR, SFP+, 1310nm, 10km, SMF, DDM, Multi-vendor Compatible
SFP-ER-10G	COMMANDO LightningFIBER 10GBASE-ER, SFP+, 1550nm, 40km, SMF, DDM, Multi-vendor Compatible
SFP-ZR-10G	COMMANDO LightningFIBER 10GBASE-ZR/ZW, SFP+, 1550nm, 80km, SMF, DDM, Multi-vendor Compatible

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SFP-UTP-10G	COMMANDO CopperX 10GBASE-T RJ45, SFP+, 30m, CAT 6a/7, Multi-brand
SFP-LR-10G-20K	COMMANDO FiberX 10GBASE-LR, SFP+, 1310nm, 20km, SMF, DDM, Multi-brand
SFP-UTP-10G-80M	COMMANDO CopperX 10GBASE-T RJ45, SFP+, 80m, CAT 6a/7, Multi-brand
SFP-LR-25G	COMMANDO FiberX 10/25GBASE-LR, SFP28, 1310nm, 10km, SMF, DDM, Multi-brand
SFP-SR-25G	COMMANDO FiberX 25GBASE-SR, SFP28, 850nm, 70/100m, OM3/4 MMF, DDM, Multi-brand
QSFP-LR4-40G	COMMANDO FiberX 40GBASE-LR4, QSFP+, 1310nm, 10km, SMF, DDM, Multi-brand
QSFP-SR4-40G	COMMANDO FiberX 40GBASE-SR4, QSFP+, 850nm, 100m, MMF, DDM, Multi-brand
QSFP-SR4-100G	COMMANDO FiberX 100GBASE-SR4, QSFP28+, 850nm, 100m, MTP/MPO-12, MMF, DDM, Multi-brand
QSFP-LR4-100G	COMMANDO FiberX 100GBASE-LR4, QSFP28+, 1310nm, 10km, SMF, DDM, Multi-brand

Power Supply Specifications

Power supply is a king of all electronic devices without the power supply switch cannot work. Following rating power input required to make switch work.

Table 14. Power supply specifications

Description	Rating
Power supply rated maximum	240V AC
Input voltage and current	AC: 100~240V 50/60Hz DC: 12V, Amp Depending on model or DC: 52V, Amp Depending on model
Power cord rating	15A

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Included in the bundle/box

All Marshall C3500 Series Switches are made available for use globally along with accessories in the bundle to facilitate for enhance operations. The switch box comes included with the following accessories:

1x COMMANDO Marshall C3500 Series Switch
1x Power cable
1x Console cable
1x Grounding Cable
1x Stacking Cable (only 50CM stack cables recommended for C3500)
1x Rack/Wall mountable kit

Support and Warranty

- Same-day assistance.
- Comprehensive 24-hour support using common communication/chat platforms, Email and Telephone.
- Provide FAQs and troubleshooting help online (self-service) through cloud-based solutions.

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- Highly technical and trained representatives to resolve issues.
- One-year default warranty with option of warranty extension up to 5 years

Table 15. Support and Warranty

Warranty and Support	
Products covered	COMMANDO Marshall C3500 Series Routing Switches
Warranty duration	One Year RTB (Return To Base) replacement warranty – optionally extendable up to 5 years.
Hardware replacement	COMMANDO, its resellers or its service center will use commercially reasonable efforts to replace the product subject to stock availability. Otherwise, a replacement will be arranged within 15 working days after receipt of the Return Materials Authorization (RMA) request.
End-of-life policy	In case of discontinuation of the product, support is limited to 3 years from announcement date.
Effective date	Hardware warranty commences from the date of shipment to customer (and in case of resale by a COMMANDO reseller, not more than 90 days after original shipment by COMMANDO).
Support duration	Lifetime support.
COMMANDO Care	COMMANDO will provide 24x7 support for basic configuration, diagnosis, and troubleshooting of device-level problems for up to one year from the date of shipment of the originally purchased product. This support does not include solution or network-level support beyond the specific device under consideration.
Online Portal Access	Warranty allows guest access to commandonetworks.com for all available technical queries.

COMMANDO Soldier C3500 Series L3+ Managed Switches come with replacement warranty and provided support according to COMMANDO WarrantyX Program available on:

https://www.commandonetworks.com/warranty

Ordering Information

Table 16 lists ordering information for the COMMANDO Marshall C3500 Managed L3+ Core and Data Center Series Routing Switch.

To place an order, please contact your local reseller/distributor or COMMANDO Sales Representative at www.commandonetworks.com/catalog

Table 16. COMMANDO Marshall C3500 Managed L3+ Core and Data Center Series Routing Switch Ordering Information

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ORDERING Information: COMMANDO C3500 Series Routing Switches

Product Code	Description
C3500-24X	COMMANDO Marshall C3500 24x10G SFP+, AC+DC, L3+ Fiber Routing Switch
C3500-24X-2Q	COMMANDO Marshall C3500 24x10G SFP+, 2x40G QSFP+, AC+DC, L3+ Fiber Routing Switch
C3500-24X-2C	COMMANDO Marshall C3500 24x10G SFP+, 2x100G QSFP28, AC+DC, L3+ Fiber Routing Switch

Please note:
The model numbers of newer version products are further simplified such as + is updated to -. However, the product remains same and can be treated interchangeably.

Examples:
C3500-24X+2Q is updated to C3500-24X-2Q
C3500-24X+2C is updated to C3500-24X-2C

Can't Find the Right Switch? Explore Our Full Range of Managed Switches

COMMANDO Soldier E1300 L2 Smart Managed Switches

COMMANDO Soldier E1300 L2 Smart Managed Switch Series is designed to meet the evolving needs of modern businesses. Built for seamless connectivity and reliable performance, these switches deliver a powerful combination of full PoE/PoE+ support, flexible uplink options, and enterprise-grade features at a cost-efficient price point. Equipped with smart management capabilities, the E1300 Series makes it easy to configure, monitor, and optimize your network without the complexity or high costs. The PoE/PoE+ models power devices such as IP cameras, wireless access points, and VoIP phones directly through the network cable, eliminating the need for separate power sources and reducing infrastructure costs. Flexible uplink options via Gigabit and SFP ports further enhance scalability, allowing smooth integration into larger or evolving networks.

Product Code	Description
E1300-8GP-2G	COMMANDO Soldier E1300 8x1GbE Full PoE/PoE+, 2x1GbE Uplinks, 130W, L2+ Smart Managed Switch

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E1300-4GP-2SFP	COMMANDO Soldier E1300 4x1GbE Full PoE/PoE+, 2x1G SFP Uplinks, 65W, L2+ Smart Managed Switch
E1300-8GP-2SFP	COMMANDO Soldier E1300 8x1GbE Full PoE/PoE+, 2x1G SFP Uplinks, 96W, L2+ Smart Managed Switch
E1300-16GP-2SFP	COMMANDO Soldier E1300 16x1GbE Full PoE/PoE+, 2x1G SFP Uplinks, 200W, L2+ Smart Managed Switch
E1300-24GP-2SFP	COMMANDO Soldier E1300 24x1GbE Full PoE/PoE+, 2x1G SFP Uplinks, 300W, L2+ Smart Managed Switch
E1300-4G-2SFP	COMMANDO Soldier E1300 4x1GbE, 2x1G SFP Uplinks, L2+ Smart Managed Switch
E1300-8G-2SFP	COMMANDO Soldier E1300 8x1GbE, 2x1G SFP Uplinks, L2+ Smart Managed Switch
E1300-16G-2SFP	COMMANDO Soldier E1300 16x1GbE, 2x1G SFP Uplinks, L2+ Smart Managed Switch
E1300-24G-2SFP	COMMANDO Soldier E1300 24x1GbE, 2x1G SFP Uplinks, L2+ Smart Managed Switch
E1300-4GP-2G	COMMANDO Soldier E1300 4x1GbE Full PoE/PoE+, 2x1GbE Uplinks, 65W, L2+ Smart Managed Switch

COMMANDO Soldier E2000 Series Managed Switches

COMMANDO Soldier E2000 Series Managed Switches are L2+ Access layer switches with Intelligent PoE/ PoE+ with Automated Scheduling and Perpetual POE/PoE+. It is a suitably best choice switch for Enterprise, Telecom, ISP, Industrial, Campus, Retail and Hospitality, Security and Surveillance, IoT, Cloud, Metro, SMBs Networks. Soldier E2000 is designed with performance and cost efficiency priority. Soldier E2000 Switches come with Dual-image SoldierOS offering higher availability, redundancy and operational flexibility. These switches are built for quality, offer high and heavy-duty performance in most demanding networking environment.

Product Code	Description
E2000-8G-4CF	COMMANDO Soldier E2000 8x1GbE, 2x1GbE+2x1G SFP Uplinks, L2+ Managed Switch
E2000-16G-4CF	COMMANDO Soldier E2000 16x1GbE, 2x1GbE+2x1G SFP Uplinks, L2+ Managed Switch
E2000-24G-8CF	COMMANDO Soldier E2000 24x1GbE, 4x1GbE/4x1G SFP Combo Uplinks, L2+ Managed Switch
E2000-48G-8CF	COMMANDO Soldier E2000 48x1GbE, 4x1GbE/4x1G SFP Combo

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	Uplinks, L2+ Managed Switch
E2000-8GP-4CF	COMMANDO Soldier E2000 8x1GbE Full PoE/PoE+, 2x1GbE+2x1G SFP Uplinks, 150W, L2+ Managed Switch
E2000-8GP-4SFP	COMMANDO Soldier E2000 8x1GbE Full PoE/PoE+, 4x1G SFP Uplinks, 150W, L2+ Managed Switch
E2000-16GP-4CF	COMMANDO Soldier E2000 16x1GbE Full PoE/PoE+, 2x1GbE+2x1G SFP Uplinks, 260W, L2+ Managed Switch
E2000-24GP-8CF	COMMANDO Soldier E2000 24x1GbE Full PoE/PoE+, 4x1GbE/4x1G SFP Combo Uplinks, 450W, L2+ Managed Switch
E2000-48GP-8CF	COMMANDO Soldier E2000 48x1GbE PoE/PoE+, 4x1GbE/4x1G SFP Combo Uplinks, 600W, L2+ Managed Switch

COMMANDO Soldier C2000 Series Managed Switches

COMMANDO Soldier C2000 Series Managed Switches are L2+ Access layer switches with It has Intelligent PoE/ PoE+ with Automated Scheduling and Perpetual POE/PoE+. It is a suitably best choice switch for Enterprise, Telecom, ISP, Industrial, Campus, Retail and Hospitality, Security and Surveillance, IoT, Cloud, Metro, SMBs Networks. Convenient Deployment as dual power design allows customers to use either AC or DC power sources according to need of deployment. Soldier C2000 Switches come with Dual-image SoldierOS offering higher availability, redundancy and operational flexibility. These switches are built for quality, offer high and heavy-duty performance in most demanding networking environment.

Product Code	Description
C2000-16GP-8CF	COMMANDO Soldier C2000 16x1GbE Full PoE/PoE+, 4x1GbE/4x1GSFP Combo Uplinks, 290W, L2+ Managed Switch
C2000-24GP-8CF	COMMANDO Soldier C2000 24xGbE Full PoE/PoE+, 4x1GbE/4x1G SFP Combo, 600W, AC+DC, L2+ Managed Switch
C2000-48GP-8CF	COMMANDO Soldier C2000 48x1GbE Full PoE/PoE+, 4x1GbE/4x1G SFP Combo, 800W, AC+DC, L2+ Managed Switch
C2000-8SFP-4CF	COMMANDO Soldier C2000 8x1G SFP, 2x1G SFP+2x1GbE Uplinks, AC+DC, L2+ Managed Switch

COMMANDO Soldier E3000 Series Routing Switches

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COMMANDO Soldier E3000 Managed Routing Switches are L3 Aggregation and Access layer switch with Intelligent PoE/PoE+ with Automated Scheduling, Perpetual POE/PoE+ with 10G uplinks. It is a suitably best choice switch for Enterprise, Telecom, ISP, Industrial, Campus, Retail and Hospitality, Security and Surveillance, IoT, Cloud, Metro, SMBs networks. Soldier E3000 is designed with performance and cost efficiency priority. COMMANDO Soldier E3000 Switches come with Dual-image OS offering higher availability, redundancy and operational flexibility. These switches are built for quality, offer high and heavy-duty performance in most demanding networking environment.

Product Code	Description
E3000-24GP-4X	COMMANDO Soldier E3000 24x1GbE Full PoE/PoE+, 4x10G SFP+ Uplinks, 450W, L3 Routing Switch
E3000-48GP-6X	COMMANDO Soldier E3000 48x1GbE PoE/PoE+, 6x10G SFP+ Uplinks, 600W, L3 Routing Switch
E3000-24G-4X	COMMANDO Soldier E3000 24x1GbE, 4x10G SFP+ Uplinks, L3 Routing Switch
E3000-48G-6X	COMMANDO Soldier E3000 48x1GbE, 6x10G SFP+ Uplinks, L3 Routing Switch
E3000-8X	COMMANDO Soldier E3000 8x10G SFP+, 10G Fiber L3 Routing Switch
E3000-8XG	COMMANDO Soldier E3000 8x10GbE, 10GbE L3 Routing Switch
E3000-8XGP	COMMANDO Soldier E3000 8x10GbE Full PoE/PoE+, 150W, 10GbE L3 Routing Switch
E3000-16X	COMMANDO Soldier E3000 16x10G SFP+, 10G Fiber L3 Routing Switch
E3000-16XG	COMMANDO Soldier E3000 16x10GbE, 10GbE L3 Routing Switch
E3000-16XGP	COMMANDO Soldier E3000 16x10GbE Full PoE/PoE+, 260W, 10GbE L3 Routing Switch
E3000-24X	COMMANDO Soldier E3000 24x10G SFP+, 10G Fiber L3 Routing Switch
E3000-24XG	COMMANDO Soldier E3000 24x10GbE, 10GbE L3 Routing Switch
E3000-24XGP	COMMANDO Soldier E3000 24x10GbE Full PoE/PoE+, 450W, 10GbE L3 Routing Switch

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COMMANDO Soldier C3000 Series Routing Switches

COMMANDO Soldier C3000 Series Managed Routing Switches are L3 Aggregation and Access layer switch with Intelligent PoE/PoE+ with Automated Scheduling, Perpetual POE/PoE+ with 10G uplinks. It is a suitably best choice switch for Enterprise, Telecom, ISP, Industrial, Campus, Retail and Hospitality, Security and Surveillance, IoT, Cloud, Metro, SMBs Networks. Convenient Deployment as dual power design allows customers to use either AC or DC power sources according to need of deployment. Soldier C3000 Switches come with Dual-image SoldierOS offering higher availability, redundancy and operational flexibility. These switches are built for quality, offer high and heavy-duty performance in most demanding networking environment.

Product Code	Description
C3000-24GP-4X	COMMANDO Soldier C3000 24x1GbE Full PoE/PoE+, 4x10G SFP+, 600W, AC+DC, L3 Routing Switch
C3000-48GP-6X	COMMANDO Soldier C3000 48x1GbE Full PoE/PoE+, 6x10G SFP+, 800W, AC+DC, L3 Routing Switch
C3000-8X	COMMANDO Soldier C3000 8x10G SFP+, AC+DC, 10G Fiber L3 Routing Switch
C3000-8XG	COMMANDO Soldier C3000 8x10GbE, AC+DC, 10GbE L3 Routing Switch
C3000-8XGP	COMMANDO Soldier C3000 8x10GbE Full PoE+, 150W, AC+DC, 10GbE L3 Routing Switch
C3000-24X	COMMANDO Soldier C3000 24x10G SFP+, AC+DC, 10G Fiber L3 Routing Switch
C3000-24X-2Q	COMMANDO Soldier C3000 24x10G SFP+, 2x40G QSFP+, AC+DC, L3 Fiber Routing Switch
C3000-24X-2C	COMMANDO Soldier C3000 24x10G SFP+, 2x100G QSFP28, AC+DC, L3 Fiber Routing Switch
C3000-24X-6Y2C	COMMANDO Soldier C3000 24x10G SFP+, 6x25G SFP28 + 2x100G QSFP28, AC+DC, L3 Fiber Routing Switch
C3000-24Y	COMMANDO Soldier C3000 24x25G SFP28, AC+DC, 25G Fiber L3 Routing Switch

COMMANDO Soldier IE3000 Industrial Routing Switch

COMMANDO Soldier IE3000 Industrial Managed Routing Switches are L3 Aggregation and Access layer switch which can withstand extreme temperatures ranging from -40° C to 80° along with surges, vibrations, and shocks found in industrial automation, outdoor applications. It has Intelligent

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PoE/ PoE+ with Automated Scheduling, Perpetual POE/PoE+ with 10G uplinks. Convenient Deployment as telecom grade DC power sources suitable and best choice for Enterprise, Telecom, ISP, Industrial, Campus, Retail and Hospitality, Security and Surveillance, IoT, Cloud, Metro, SMBs Networks. Soldier IE3000 Switches come with Dual-image SoldierOS offering higher availability, redundancy and operational flexibility. These switches are built for quality, offer high and heavy-duty performance in most demanding networking environment.

Product Code	Description
IE3000-4GP-2X	COMMANDO Soldier IE3000 4x1GbE Full PoE+, 2x10G SFP+ Uplinks, L3 Industrial Routing Switch
IE3000-8GP-4X	COMMANDO Soldier IE3000 8x1GbE Full PoE+, 4x10G SFP+ Uplinks, L3 Industrial Routing Switch
IE3000-24GP-4X	COMMANDO Soldier IE3000 24x1GbE Full PoE+, 4x10G SFP+ Uplinks, L3 Industrial Routing Switch
IE3000-8G-4X	COMMANDO Soldier IE3000 8x1GbE, 4x10G SFP+ Uplinks, L3 Industrial Routing Switch
IE3000-24G-4X	COMMANDO Soldier IE3000 24x1GbE, 4x10G SFP+ Uplinks, L3 Industrial Routing Switch

Document History

Release	What's new	Date
Release 1	First Release	January 4, 2021
Release 2	Software Upgrade	September 7, 2021
Release 3	Few model and supported Transceiver Module updates	September 18, 2023
Release 4	New model added	October 5, 2023
Release 5	Content Updated	April 20, 2026

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