

## The Mobility Exchange™ The MX-400™

The Trapeze Networks™ Mobility Exchange™ (MX™) switch is the platform for executing the Mobility System Software™, and maintains the intelligence of the Trapeze Mobility System™. In addition to managing users' identities as they roam, MXs configure and control all aspects of Trapeze Mobility Points (MPs) and third-party access points (APs).

Multiple MXs function as a peer-to-peer system to support mobility and enforce security. For example, one MX can support a mobile user's connection to a subnet even though the actual attachment to that subnet is through a different MX. This MX-to-MX exchange requires no changes to existing IP backbones.



With Identity-based Networking, MXs provide user-based services such as Virtual Private Group™ (VPG™) membership, personal firewall filters, time-of-day/day-of-week access, encryption type, authentication, usage tracking, location tracking, and associated network statistics. Authorizations stay with users wherever they roam because MXs share the information, ensuring secure access and connectivity to the right services.

MXs control third-party APs and configure and manage Trapeze MPs whether they are directly attached or indirectly connected across the wired infrastructure. The MX is available in a variety of platforms—the MXR-2, MX-8, MX-200, MX-216 and MX-400—but all provide the same core features of Identity-Based Networking, systemwide roaming functions, multiple private groups, and AAA offload and integration.

The MX-400, designed for data center deployment, includes four Gigabit Ethernet ports. Each connection can use a GBIC for SX/LX fiber connectivity or a built-in 1000BASE-T port for unshielded twisted-pair connectivity. Any port on the MX-400 can be used for network connectivity, MP connectivity or both. The MX-400 supports up to 40, 80 or 120 managed MPs simultaneously, depending on the licensing option. It features redundant hot-swappable power supplies and 3.6 Gbps of throughput.

The Trapeze RingMaster planning and management tool suite allows the MX-400 to obtain its configuration locally or from a remote location. It can also be configured using WebView or the CLI. The MX-400 can also use an onboard DHCP client to quickly and automatically obtain its IP configuration.

In addition to performing Layer 2 forwarding, MXs come with extensive with Layer 3-4 and identity-tracking capabilities. They integrate seamlessly with wired infrastructures and offers redundant load-sharing links, 802.1Q trunking, spanning tree and per-VLAN spanning tree (PVST+). It also supports IGMP snooping, which is vital to supporting IP multicast streams. Quality of service (QoS) is done with Layer 3-4 application information on a per-user or per-group basis, while class of service (CoS) utilizes IP DiffServ code points.

### Key Features

The MX-400 delivers a range of unique features:

- MX-400 licensing options support 40, 80 or 120 managed MPs simultaneously
- Tracks and maintains user authentication, authorization and RF statistics information as users roam across multiple MXs
- Maintains a user's membership in the right virtual private group based on the user's authenticated identity
  - Dynamically enables Virtual Private Groups to support roaming across router boundaries

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- Provides scaled, resilient, integrated AAA back-end infrastructure
  - Terminates and processes the Extensible Authentication Protocol (EAP) for 802.1X users
  - Reduces AAA clients by 100:1
  - Supports complete local AAA authentication, including 802.1X, as primary or backup to a centralized AAA server
  - Supports multiple AAA server groups and can load share across multiple AAA servers or within a server group
  - Offloads Transport Layer Security (TLS) operations from AAA server, reducing the traffic load by 80%
  - Generates and manages X.509 digital certificates
- Assigns and enforces per-user authorization policies that are managed centrally from the AAA back-end
  - Authorizations include virtual private group membership, personal firewall filters, time-of-day/day-of-week access, encryption type, and location-specific policies
- Performs local cryptographic functions
  - WPA 2.0/AES, WPA/TKIP and dynamic WEP with rotating broadcast/multicast keys
  - Generates master and session keys
  - Provides key management for each encryption technique
- Provides detailed per-user session RF accounting statistics and management
  - Tracks the location, roaming history, virtual private group, network addresses, state, activity, errors, usage and other attributes by user name, session, VLAN, user group or other categories selected by IT
  - Provides per-user audit trail and charge-back capability through the accounting component of AAA
- Configures and controls MPs; controls third party APs
  - The boot, configuration and management model is compliant with the IETF Architecture for Control and Provisioning of Wireless Access Points (CAPWAP). The MX is categorized as an access controller (AC) that supports direct, switched, and routed connections.
  - Controls all data forwarding, configuration and images of MPs
  - Multiple MXs provide resilient control
- Enables resilient network operation
  - EtherChannel™ load-shared, redundant links
  - Spanning tree and per-VLAN spanning tree (PVST+)
  - Resilient network attachment via any MX port
  - N:1 redundant MX capabilities
- Provides management access
  - Web access using HTTPS
  - Telnet server, client
  - SSL, XML interface to RingMaster
  - SSH v2 (command line interface)
  - SNMP v1, v2c, v3

## Hardware

### Physical and Environmental

- Dimensions (W x D x H):
  - 17.4 in x 18.2 in x 3.5 in
  - 44.2 cm x 46.2 cm x 8.8 cm
- Weight:
  - 21.75 lbs (9.79 kg) with one power supply
  - 25.00 lbs (11.25 kg) with two power supplies
- Operating Temperature:
  - 10°C to +50°C
- Storage Temperature:
  - 20°C to +70°C
- Humidity % non-condensing:
  - 10% to 95%
- Power VAC range, Hz range:
  - 90-250 VAC, 47-63 Hz to 350 watts, hot-swappable power supply
- Amperage draw maximums:
  - At 120Vrms: 8Arms
  - At 230Vrms: 3.5Arms

### Interfaces

- 4 Gigabit Ethernet ports. each with GBIC or 1000Base-T, with no restrictions on port usage

### Regulatory Safety:

- UL 60950
- TUV/GS (EN #s) EN 60950
- CSA 22.2 NO. 60950

### EMI/EMC:

- FCC PART 15
- ICES PART 15
- VCCI
- EN 55022
- EN 55024
- CISPR 22
- EN 60101-1-2 (1993)

## Software

### Security and AAA:

- RFC 2246 - Transport Layer Security (TLS)
- RFC 2284 - EAP
- RFC 2315 - PKCS #7: Cryptographic Message Syntax Version 1.5
- RFC 2548 - Microsoft RADIUS VSAs
- RFC 2716 - PPP EAP-TLS Authentication Protocol
- RFC 2759 - Microsoft PPP CHAP Extensions, Version 2
- RFC 2865 - RADIUS Authentication
- RFC 2866 - RADIUS Accounting
- RFC 2869 - RADIUS Extensions
- RFC 2986 - PKCS #10: Certification Request Syntax Specification Version 1.7
- RFC 3580 - IEEE 802.1X RADIUS Guidelines



**IEEE:**

- IEEE Std 802.1X-2001 - Port-Based Network Access Control
- IEEE Std 802.3af
- IEEE Std 802.11i - Enhanced Security for 802.11 wireless networks
- IEEE Std 802.11h
- IEEE Std 802.11d

**Cryptography:**

- WEP and TKIP: RC4 40-bit and 104-bit
- SSL and TLS: RC4 128-bit and RSA 1024-bit and 2048-bit
- CCMP: AES 128-bit (FIPS-197)

**General:**

- RFC 1122 Host requirements
- RFC 1393 Traceroute
- RFC 1519 CIDR
- RFC 1591 DNS
- RFC 2030 SNTP
- RFC 768 UDP
- RFC 783 TFTP
- RFC 791 IP
- RFC 792 ICMP
- RFC 793 TCP
- RFC 826 ARP
- IEEE 802.1D Spanning Tree

- IEEE 802.1Q VLAN tagging
- IEEE 802.3ad (static config)

**Management and Control:**

- RFC 854 Telnet (server and client)
- SSHv2 - Secure Shell V2
- SNMP v1, v2c, v3
- RFC 1213 MIB-II
- RFC 1866 HTML
- RFC 2068 HTTP
- RFC 3164 Syslog
- Trapeze private MIB
- IETF CAPWAP

**IP Multicast:**

- RFC 1112 IGMP v1
- RFC 2236 IGMP v2

**Quality of Service:**

- Wi-Fi Multimedia (WMM)
- SpectraLink Voice Priority (SVP)
- RFC 2472 DiffServ precedence
- RFC 2597 DiffServ Assured Forwarding
- RFC 2598 DiffServ Expedited Forwarding



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