

- Reliable and high performance solution
- Wide support for MPLS switching mechanisms
- Redundant hot-swappable modules



ME5000M routers are multifunctional devices with a high port density intended for use in provider networks as aggregation routers and IP/MPLS network edge routers. ME5000M is a cost-effective, reliable and high-performance solution which can be used to organize operator's points of presence when providing data services for large customers with high reliability requirements.

ME5000M is a part of ME5000-series routers with a unified software and management interfaces. ME5000M supports all functionality of ME5000-series routers such as MPLS switching mechanisms, including MPLS Layer3 VPN, VPLS (Kompella/Martini), VPWS with pseudowire backup capabilities, Multicast-traffic routing with support for PIM-SM/PIM-SSM/MSDP/Anycast PIM protocols, as well as extensive QoS capabilities. This set of functions allows to use devices as network edge routers for termination of client services.

ME5000M modular architecture provides flexible scaling and the ability of hardware configuration for various requirements both in terms of bandwidth and types of network interfaces. The router modules are installed into standard 19" eurorack 15U. The chassis has 2 slots for fabric and management cards (FMC) and 12 slots for line cards (LC).

Fault tolerance of devices is ensured by redundant power supply "1+1" (the chassis is equipped with 2 DC feeders -48V) and by redundant fan modules. All redundant units including fabric and management cards, line cards are hot-swappable.

Technical features

Performance	
FMC32 switching fabric performance	3.06 Tbps
Maximum switching fabric performance	Up to 6.1 Tbps with two FMC32 modules
RAM	Up to 64 GB on FMC32 module
Maximum bandwidth per slot	Up to 255 Gbps with one FMC32 module Up to 510 Gbps with two FMC32 modules Line modules provide data processing at wire speed with 256-byte packet
Number of fabric and management modules	Up to 2 FMC modules per chassis
Number of line modules	Up to 12 LC modules per chassis
Module orientation	Vertical
Redundancy and reliability	FMC modules redundancy Software redundancy Distributed power supply scheme, two feeders Fan modules redundancy

Technical features (continued)

Resources	
Queues	96K per line module
FIB	Up to 2M IPv4/1.3M IPv6 ¹ routes when using LC20XGE and LC8XLGE (FIB capacity depends on the prefix length) The resource is shared with ARP tables and IPv6 ND cache
MAC address table	Up to 750 000 per line module for LC20XGE, LC8XLGE The resource is shared with MPLS switching tables and elements of single-hop BFD sessions
RIB capacity	Up to 72M IPv4 routes Up to 32M IPv6 routes Defined by free RAM capacity
L3 subinterfaces	Up to 96K per device Up to 8K per line module for LC20XGE and LC8XLGE
MPLS VPN connections (L2/L3 service tunnels)	Up to 16K per device (when using only LC20XGE and LC8XLGE)
MPLS LSPs (transport tunnels)	Up to 16K per line card when using LC8XGE/LC20XGE
ARP table	Up to 57K per line card when using LC8XGE/LC20XGE
VRFs (MPLS L3VPN)	Up to 1000 (or up to 128 while running instances of BGP processes in each of the VRFs)

Configuration of modules interfaces

Name	Ports	Performance
Fabric and management modules		
FMC32	1GbE RJ-45 management port 1GbE SFP management port RS-232 (RJ-45) console port	3.06 Tbps
Line modules		
LC20XGE	20 × 10 Gbps (SFP+)	200 Gbps 720 Mpps
LC8XLGE	4 × 40GE (QSFP) + 4 × 100GE/40GE (QSFP28)	560 Gbps 720 Mpps

Modules power consumption

Name	Power consumption
FMC32	Up to 190 W
LC20XGE	Up to 250 W
LC8XLGE	Up to 250 W
ME5000-FB	Up to 400 W

¹ In future firmware versions the capacity will be increased to 4M/2.7M.

Features and capabilities

Interfaces functions

- Link aggregation groups: static LAG and LACP
- Tunnel interfaces with IP-GRE and IP-IP support
- IP unnumbered interfaces, Proxy ARP functionality
- Layer 3 interfaces (Bridge-domain Virtual Interfaces, BVI)
- Equal load balancing in group
- Multi-chassis LAG
- BFDoverLAG support, single connection failure detection (RFC 7130)
- Traffic mirroring — SPAN, RSPAN

L2 functions

- Providing Ethernet switching through bridge domains and cross-connects
- IEEE bridging (IEEE 802.1d)
- VLAN (IEEE 802.1q)
- Q-in-Q (IEEE 802.1ad) with push/pop/swap/replace tag commands
- Spanning Tree protocols (STP, RSTP, MSTP)
- DHCP Snooping for bridge domains
- LLDP protocol

L3 protocols and functions

- IPv4, IPv6 Static Unicast Routing
- IS-IS protocol
- OSPFv2, OSPFv3
- Border Gateway Protocol (BGP)
- BGP Route Reflector, BGP Additional Path
- Route filtering (routemap, prefix-list)
- Policy-based routing, PBR
- IP unnumbered interfaces
- BFD support for routing protocols and static routes
- FastReroute/Loop Free Alternate for OSPF/IS-IS
- VRRP (version 2), DHCP relay agent
- IPv4 ACL (access control lists) for transit traffic
- ECMP load balancing
- VRF
- Inter-VRF routing

Multicast management

- PIM-SM, PIM-SSM, Anycast RP
- IGMP v2/v3, SSM mapping
- MSDP
- MulticastVPN over mLDP
- VRF-lite technology, including for all protocols (PIM/IGMP/MSDP)

MPLS functions

- Label Distribution Protocol (LDP)
- LDP FRR
- MLDP
- LDP authentication (MD5)
- RSVP-TE: automatic tunneling with a given bandwidth requirement, semi-automatic tunneling with indication of intermediate nodes
- RSVP-TE authentication
- RSVP-TE FRR (detour, facility)
- RSVP-TE end-to-end protection
- RSVP-TE auto-bandwidth
- Multiprotocol extensions for BGP-4

- BGP labeled unicast
- MPLS pseudowire with PW backup
- MPLS FAT PW (flow-aware transport)
- MPLS L2VPN
 - VPWS
 - VPLS LDP signalling (“Martini”)
 - VPLS BGP autodiscovery/signalling (“Kompella”)
 - L2VPN Inter-AS option C
- MPLS L3VPN
 - L3VPN for AFI/SAFI vpnv4 unicast and vpnv6 unicast
 - BGP 6VPE
 - L3VPN inter-AS option A, option C
 - Per-vrf label
- LSP ping and LSP traceroute

QoS

- Ingress policing, egress policing/shaping
- Strict priority (SP) and Deficit weighted round-robin (DWRR) queue scheduling algorithms
- Up to 8 queues per logical interface, one SP queue
- QoS queue counters
- Weighted random early detection (WRED)
- Queue limit and burst size setting
- Traffic classification based on the 802.1p, MPLS TC, IP DSCP fields with the ability to remark the corresponding fields
- QoS marking and handling based on access control lists (ACLs)
- Storm Control

Reliability functions

- Management module redundancy feature; module fault detection time is 300 ms max
- Synchronization of FIB/ARP tables between management modules
- Graceful Restart for routing protocols
- Non-stop forwarding
- In-service Software Upgrade
- Storage of two firmware versions on the internal drive
- Ability to restore the previous firmware version during update

Management and monitoring

- Command Line Interface (CLI), SSH, Telnet for remote control
- SNMPv1/v2c/v3 for device status monitoring
- NETCONF protocol
- Static data export (Netflow v9, v5, IPFIX)¹
- Configuration backup and restore (local, FTP, SFTP, TFTP)
- RADIUS, TACACS+ authentication and authorization; TACACS+ accounting
- Remote firmware change
- System parameters and resources monitoring
- Syslog
- Clock Synchronization, NTP, SNTP protocols
- Control-plane filtering
- Ability to limit the speed of traffic interception on the CPU
- ELTEX IP SLA

¹ME5000-SM-STAT/ME5000-SM-STAT2 statistics module is required to be on all line cards with enabled Netflow/IPFIX.

Physical parameters

Physical specifications and environmental parameters

Case ventilation	Front-to-back air flow Two hot-swappable redundant fan modules
Power supply sources	Two DC feeders 36–72 V
Maximum power consumption	4200 W
Operating temperature range	From 0 to 45 °C
Weight	Chassis assembly without LC/FMC — 46.7 kg FMC32 — 3.42 kg LC20XGE — 3.7 kg LC8XLGE — 3.9 kg
Dimensions (W × H × D)	487 × 661 × 495 mm

Ordering information

Name	Description
Chassis	
ME5000M chassis	ME5000M universal edge router chassis, for FMC32, up to 510 Gbps per slot
Fabric and management modules	
FMC32	Fabric and management module
Line modules	
LC20XGE	20 × 10 Gbps 10GBASE-R/1000BASE-X (SFP+) line module
LC8XLGE	4 × 40 Gbps (QSFP) + 4 × 40/100 Gbps (QSFP28) line module
Other modules	
ME5000-FB	Fan module (two modules are required to be installed in the chassis)
ME5000-FP	Slot blank
ME5000-SM-STAT2	Statistics module ¹ for LC20XGE/LC8XLGE

¹ Statistics module is required for NetFlow/IPFIX protocols operation and Access Control Lists counters statistics.

Contact us

About ELTEX



+7 (383) 274 10 01
+7 (383) 274 48 48



eltex@eltex-co.ru



www.eltex-co.com

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