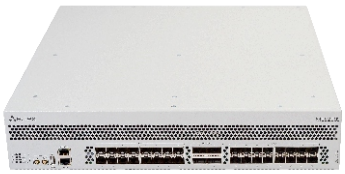
– **Reliable and high performance solution**
– **Wide support for MPLS switching mechanisms**
– **Redundant power supply**

ME5000

ME5100S



ME5200S

ME series routers are multifunctional devices with a high port density intended for use in provider networks as aggregation routers and IP/MPLS network edge routers. This solution can be used to organize operator's points of presence when providing data services for large customers with high reliability requirements.

ME series routers have unified software and management interfaces. In addition to traffic routing and switching, the main device functions are a wide support for 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.

Fault tolerance of devices is ensured by redundant power supply "1+1" (modular ME5000 routers are equipped with 2 DC feeders -48V instead of redundant power modules) and by redundant fan modules. All redundant units are hot-swappable.

ME5000 is a high performance modular router with a hardware architecture that provides flexible scaling and the ability of hardware configuration for various requirements both in terms of bandwidth and types of network interfaces. ME5000 router modules are installed in the chassis — standard 19" eurorack 15U. The chassis has 2 slots for fabric and management cards (FMC) and 12 slots for line cards (LC).

ME5100S and **ME5200S routers** with hardware support for network synchronization and the SyncE protocol, equipped with dedicated SMB interfaces for I/O synchronization signals (10 MHz). The devices can be used on converged networks of mobile operators as a Mobile Backhaul transport.

ME5000 technical features

Performance	
FMC16 switching fabric performance	1.4 Tbps
Maximum switching fabric performance	Up to 2.8 Tbps with two FMC16 modules
RAM	16 GB on FMC16 module
Maximum bandwidth per slot	Up to 138 Gbps with one FMC16 module Up to 276 Gbps with two FMC16 modules Line modules provide data processing at wire speed with 256-byte packets 0 and 11 slots have 46 Gbps bandwidth with one FMC16 module or 92 Gbps with two FMC16 modules
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
Resources	
Queues	Up to 96K per line module
FIB size	Up to 1M IPv4/512K IPv6 routes when using LC18XGE 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 262144 per line module for LC18XGE Up to 750000 per line module for LC20XGE, LC8XLGE The resource is shared with MPLS switching tables and elements of single-hop BFD sessions
RIB size	Up to 5.9M IPv4 routes Up to 4M IPv6 routes Defined by free RAM capacity
L3 subinterfaces	Up to 16K per device Up to 4K per line module for LC18XGE Up to 8K per line module for LC20XGE and LC8XLGE
MPLS VPN connections (L2/L3 service tunnels)	Up to 12K per device (when LC18XGE is used in the system) Up to 16K per device (when using only LC20XGE and LC8XLGE) The resource is shared with L3VPN/ARP interfaces
MPLS LSPs (transport tunnels)	Up to 6K per line card when using LC18XGE Up to 16K per line card when using only LC8XGE/LC20XGE
ARP table	Up to 20K when using LC18XGE Up to 57K 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)

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

ME5100S, ME5200S technical features

	ME5100S	ME5200S
Interfaces		
Built-in interfaces	– 20 × 10GE SFP+ network interfaces, support for 1GE mode (1000BASE-X), possible use of 1000BASE-T SFP transceivers – Out Of Band (OOB) 1GE port (10/100/1000BASE-T) – 10 MHz In/Out SMB (SubMiniature-B) 50 Ohm clock interfaces – RS-232 console port (RJ-45) – 1 × USB 2.0	– 32 × 10GE SFP+ network interfaces, support for 1GE mode (1000BASE-X), possible use of 1000BASE-T SFP transceiver – 4 × 40/100GE QSFP28 network interfaces, support for 40GE and 100GE modes – Out Of Band (OOB) 1GE port (10/100/1000BASE-T) – 10 MHz In/Out SMB (SubMiniature-B) 50 Ohm clock interfaces – RS-232 console port (RJ-45) – 1 × USB 2.0
Performance		
Bandwidth	200 Gbps, 300 Mpps	720 Gbps, 720 Mpps
Buffer memory	6 GB	8 GB
RAM	8 GB	16 GB
MAC address table	262144	750 000 (the resource is shared with MPLS switching tables and elements of single-hop BFD sessions)
Number of bridge domains	Up to 4K	Up to 8K
Routing table size	FIB: up to 1M IPv4 or up to 512K IPv6 The resource is shared with ARP tables and IPv6 ND cache RIB: up to 3M IPv4 or up to 2M IPv6 (limited by free RAM)	FIB: up to 4M IPv4 or up to 2.7M IPv6 FIB capacity depends on the prefix length The resource is shared with ARP tables and IPv6 ND cache RIB: up to 5.9M IPv4 or up to 4M IPv6 (limited by free RAM)
L3 interfaces	Up to 4K	Up to 8K
MPLS VPN connections (L2/L3 service tunnels)	Up to 12K	Up to 16K
MPLS LSPs (transport tunnels)	Up to 6K	Up to 16K
ARP table	Up to 20K	Up to 57K
VRFs (MPLS L3VPN)	Up to 1000 (or up to 128 while running instances of BGP processes in each of the VRFs)	
Number of QoS queues	96K	

ME5000 interfaces

Name	Ports	Performance
Fabric and management modules		
FMC16	2 × 1GbE (RJ-45) management ports RS-232 (RJ-45) console port	1.4 Tbps
Line modules		
LC18XGE	18 × 10Gbps (SFP+)	180 Gbps, 350 Mpps
LC20XGE	20 × 10Gbps (SFP+)	200 Gbps, 720 Mpps
LC8XLGE	4 × 40GE (QSFP) + 4 × 100GE/40GE (QSFP28)	560 Gbps, 720 Mpps

ME5000 modules power consumption

Name	Power consumption
FMC16	Up to 200 W
LC18XGE	Up to 200 W
LC20XGE	Up to 250 W
LC8XLGE	Up to 250 W
ME5000-FB	Up to 400 W

Physical specifications

	ME5000	ME5100S	ME5200S
Case ventilation	Front-to-back airflow 2 hot-swappable redundant fan modules	Front-to-back airflow 3 hot-swappable redundant fan modules	
Power supply sources	Two DC feeders 36–72 V	Two hot-swappable redundant power modules AC: 150–250 V, 50 Hz DC: 36–72 V	
Maximum power consumption	4200 W	250 W	350 W
Operating temperature range	From 0 to 45 °C		
Weight	Chassis assembly without LC/FMC — 46.7 kg FMC16 — 3.4 kg LC18XGE — 3.6 kg LC20XGE — 3.7 kg LC8XLGE — 3.9 kg	9.5 kg	9.8 kg
Dimensions (W × H × D)	487 × 661 × 495 mm	440 × 87 × 500 mm	

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
– SyncE and ESMC[1] protocol support

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, BDP Additional Path
– Route filtering (routemap, prefix-list)
– Policy-based routing, PBR
– IP unnumbered interfaces
– BFD 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 funtions
– 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)[2]
– 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

[1] For ME5100S, 5200S routers.
[2] ME5000-SM-STAT/ME5000-SM-STAT2 statistics module is required to be in a fixed device or on all line cards within a modular device.

ME5000 ordering information

Name	Description
Chassis	
ME5000 chassis	ME5000 universal edge router chassis
Line modules	
LC18XGE	Line module 18×10 Gbps 10GBASE-R/1000BASE-X (SFP+)
LC20XGE	Line module 20×10 Gbps 10GBASE-R/1000BASE-X (SFP+)
LC8XLGE	Line module 4×40 Gbps (QSFP) + 4×40/100 Gbps (QSFP28)
Fabric and management modules	
FMC16	Fabric and management module
Other modules	
ME5000-FB	Fan module (two modules are required to be installed in the chassis)
ME5000-FP	Slot blank
ME5000-SM-STAT	Statistics module[1] for LC18XGE
ME5000-SM-STAT2	Statistics module[1] for LC20XGE/LC8XLGE

ME5100S, ME5200S ordering information

Name	Description
ME5100S	ME5100S router, 20×10GE SFP+, 1×OOB 1GE (10/100/1000BASE-T), RS-232 (RJ-45), 1×USB 2.0
ME5200S	ME5200S router, 32×10GE SFP+, 4×40/100GE QSFP28, 1×OOB 1GE (10/100/1000BASE-T), RS-232 (RJ-45), 1×USB 2.0

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

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About ELTEX

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