

BSR 64000

**CMTS/EDGE ROUTER
RELEASE 5.2**



Provides high-density I-CMTS solution with complete high-availability and greater control of IPTV traffic

Features

- TX32 redundancy for full high availability of DOCSIS 3.0 and legacy traffic
- Increased downstream capacity
- Superior control of IPTV traffic with greater multicast traffic control
- Enhanced multi-path routing redundancy
- Subscriber billing with L2 MAC Classification

Motorola's BSR 64000 with release 5.2 is a fully redundant, carrier-class intelligent CMTS/edge router supporting (Euro)DOCSIS® 3.0 for next-generation Ultra-Broadband cable services. The BSR 64000 allows cable operators to cost-effectively and efficiently deploy Ultra-Broadband services in excess of 140 Mbps (DOCSIS) / 200 Mbps (EuroDOCSIS) with per-flow Quality of Service by implementing downstream channel bonding on existing BSR 64000 platforms.

The BSR 64000 provides cable operators with the highest level of investment protection by supporting a migration path to (Euro)DOCSIS 3.0 in support of new high-throughput residential and commercial services while leveraging installed BSR hardware. The BSR 64000 DOCSIS 2.0 hardware, including the SRM, HSIM, and 2.8 modules, is fully supported as customers migrate to software release 5.2.

The BSR 64000 is a fully redundant platform designed to offer cable operators 99.999% system availability for subscriber IP voice, video, and data services. The BSR 64000 release 5.2 supports the following modules:

- Supervisory Resource Module (SRM) providing system control and routing functionality. SRM4 and SRM3 are supported.
- TX32 Decoupled Downstream Module offering 32 downstream channels across 8 RF ports
- 2:8 CMTS Module providing integrated 2D and 8U RF channels

- Ether-Flex High-speed Interface Module (HSIM4) offering dual GbE and eight 10/100 Ethernet interfaces, as well as single port HSIM2 GbE modules
- Standby TX32, 2:8, and SRM modules providing full redundant operation
- Refer to the Release 5.2 SRN (Software Release Notice) for actual module revision levels supported

High Availability – TX32 Redundancy

CMTS redundancy is increasingly vital as competition among broadband service providers grows and service quality becomes a key differentiator. With release 5.2, the BSR 64000 introduces support for TX32 RF Redundancy to provide hitless switchover in the event of a hardware or software issue, while fully protecting subscriber IP voice, video, and data traffic. This includes the availability of the TX32 Standby and 3-slot rear I/O modules, which enable full chassis redundancy spanning CMTS, SRM, and HSIM modules. The TX32 3-slot rear I/O module provides the RF port interfaces for up to 2 primary TX32 modules, while integrating the RF switch capability for the TX32 Standby module. These modules, along with release 5.2, enable full TX32 redundancy without an external RF switch or additional cabling.

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Increased Downstream Capacity with Expanded Downstream Support

In order to support Ultra-Broadband applications, such as HD (High-definition) IPTV or remote medical imaging, greater and more cost-effective downstream capacity is required in the DOCSIS network. Release 5.2 expands downstream capacity per BSR 64000 with the support of dual TX32 modules per BSR 64000 chassis. Release 5.2 further increases the downstream channel capacity of the BSR 64000 by supporting up to eight downstream channels in a distributed MAC Domain per 2:8 CMTS module. The distributed MAC domain concept allows downstream channels from the TX32 to be part of the MAC Domain associated with the 2:8 downstreams and upstreams. The BSR 64000 now supports up to 64 downstream channels and 64 upstream channels with full redundancy across all modules.

In addition to increased downstream capacity, the BSR 64000 also supports both downstream channel bonding and dynamic load balancing:

Downstream Channel Bonding

Release 5.2 supports DOCSIS 3.0 downstream channel bonding with two, three, or four downstream channels in a bonding group to support ultra-high bandwidth speeds. DOCSIS 3.0 cable modems can coexist with legacy DOCSIS 2.0/1.x cable modems within the same downstream channels in a bonding group.

Dynamic Load Balancing

Dynamic load balancing distributes DOCSIS 3.0 and legacy cable modems within the defined downstream and upstream load balancing groups to optimize channel utilization for subscriber services. Select cable modems are moved from a channel with the highest utilization to a channel with the lowest utilization based on real-time bandwidth utilization sampling and preconfigured thresholds.

Superior Control of IPTV Traffic with Greater Multicast Traffic Control

As Ultra-Broadband services rollout to subscribers, new applications supporting SD or HD IPTV content require greater management and control of multicast traffic flowing through a DOCSIS network. Release 5.2 provides support for Multicast Downstream Replication Control (MDRC), which allows cable operators to specify the downstream channel associated with an IPTV multicast flow, and dynamically moves a cable modem to the specific downstream channel based on the IGMP Join message coming from that cable modem. This enhancement eliminates the replication of multicast traffic to all downstreams in a MAC domain, and frees up additional bandwidth on other downstream channels to optimize the overall subscriber experience.

Enhanced Multi-path Routing Redundancy

Ultra-Broadband services require enhanced network availability and traffic management. Release 5.2 provides enhancements to equal-cost multi-path (ECMP) routing to load-balance the GbE traffic associated with the dual GbE ports on the Ether-Flex modules. Up to three paths are supported to allow multi-path routing to enable high availability with the Ether-Flex and Gig-E modules installed in the BSR platform.

Subscriber Billing with L2 MAC Classification

In order to provide fair access to bandwidth, some operators look to bill subscribers for bandwidth above and beyond committed levels of service. The Layer 2 MAC Classification enhancement allows operators to separate CM/ESAFE traffic from CPE traffic with the ability to assign different classes of service and collect separate statistics for the different flows to facilitate subscriber billing.

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Specifications

Scalable Platform for Growth

CARRIER-CLASS CHASSIS

Hot-swappable modules with redundancy
High availability architecture: 1:1 SRM redundancy, 1:N 2:8 Euro/DOCSIS Module redundancy, 1:2 TX32 Euro/DOCSIS, 1:1 High-Speed Interface Module redundancy, Redundant power and fan units, Integrated RF switch
Advanced real-time operating systems such as VxWorks and INTEGRITY provide high levels of reliability, availability, and security for the BSR 64000

STANDARDS-BASED INTEROPERABILITY

DOCSIS 2.0 and EuroDOCSIS 2.0 qualified
DOCSIS 3.0 and EuroDOCSIS 3.0 bronze qualified
PacketCable 1.1 and EuroPacket Cable 1.0 qualified
PacketCable Multimedia 1.0 and EuroPacket Cable 1.0 qualified

FLEXIBLE CAPACITY CONFIGURATIONS

Flexible downstream capacity expansion with the TX32 Decoupled Downstream I-CMTS Module
Ether-Flex Card offers two ports of Gigabit Ethernet with SFP optics or eight ports of 10/100 Fast Ethernet

Software Specifications

ROUTING

Internet Protocol version 4 and version 6 (IPv4 and IPv6)
Open Shortest Path First Version 2 (OSPFv2)
Border Gateway Protocol version 4 (BGPv4)
Multiprotocol Label Switching (MPLS)
Routing Information Protocol (RIP) version 1 and 2
Static Routes
Intermediate System-to-Intermediate System (IS-IS)
BGP/MPLS VPNs
Virtual Router Redundancy Protocol (VRRP)

MULTICAST

Internet Group Management Protocol (IGMP) version 1, 2, and 3
Protocol Independent Multicast-Sparse Mode (PIM-SM)
Protocol Independent Multicast-Source Specific Multicast (PIM-SSM)

IP ADDRESS MANAGEMENT

DHCP Relay

TRAFFIC MANAGEMENT

Marking, policing and shaping
Two-level class-based scheduling
SmartFlow™ per-flow queuing
Longest Queue Pushout (LQP) congestion management

SECURITY MANAGEMENT

IPSec Tunnels
MD5 Authentication
BPI+
Cable and Lawful Intercept

HIGH-PERFORMANCE IP ROUTING

Hardware-based forwarding and flow classification
Routing policy support
More than 3 million PPS for each High-Speed Interface Module
More than 42 million PPS for each chassis

ADVANCED QOS

Hardware-based wire-speed QoS
IP DiffServ, standards-based MPLS, BGP/MPLS VPNs (RFC 2547), per-SID queuing

PACKETIZED VOICE SERVICE SUPPORT

Dynamic QoS (DQoS)
Common Open Policy Service (COPS)
IPSec

LOGGING AND MONITORING

Syslog
Traceroute and Ping (IPv4 and IPv6)

SYSTEM MANAGEMENT AND PROVISIONING

Management and diagnostic capabilities
SSH, TACACS/TACACS+, and RADIUS
10/100BASE-T port for management
SNMP v1/v2/v3
Telnet with security extensions
DOCSIS, IETF and Motorola MIBs
Multiple levels of account/password authentication
Open interfaces for provisioning, accounting and billing applications

Hardware Specifications

PHYSICAL

Form	16-slot, 17 RU, NEBS-compliant chassis
Dimensions	29.75 in H x 19 in W x 19.75 in D (75.56 cm x 48.26 cm x 50.17 cm)
Fully configured weight	140 lbs (63.5 kgs)

POWER

Input power	-48 VDC
Optional Tyco NP1200 AC to DC Carrier-Class Power Converter	

ENVIRONMENTAL

Operating temperature	0° C (32° F) to +40° C (104° F)
Storage temperature	-20° C (-4° F) to +60° C (140° F)
Operating humidity	10% - 90% non condensing
Storage humidity	5% - 95% non condensing

REGULATORY COMPLIANCE

Safety	UL60950-1:2003 1st Ed.; CSA C22.2 No. 60950-1-03 1st Ed.; IEC 60950-1:2001, 1st Ed.; EN 60950-1:2002, 1st Ed.; 2006/95/EC
Electromagnetic Emissions	EN 300386 V 1.3.1: 2005, Telecom Centers; IEC CISPR 22: 2003 Class A; CFR 47 Part 15, Subpart B, Class A; VCCI V3: 2005, Class A; AS/NZS CISPR 22: 2002 Class A; RRL Notice 2006-67, Class A; 2004/108/EC
Electromagnetic Immunity	EN 300386 V 1.3.1: 2005, Telecom Center; RRL Notice 2005-130
Environmental	RoHS/WEEE; 2005/95/EC
Physical	Designed for NEBS GR-63-CORE level 3 requirements ETS 300 019 Part 1-1 Class 1.1, Part 1-2 Class 2.2, Part 1-3 Class 3.1

RF Specifications

STANDARDS-BASED INTEROPERABILITY

DOCSIS 3.0 Downstream channel bonding capable
DOCSIS 2.0 A-TDMA, S-CDMA and LOGICAL CHANNEL QUALIFIED
Integrated downstream RF upconverters
2:8 Advanced Spectrum Management

DOWNSTREAM RF

Downstream modulation	64 and 256 QAM
Downstream frequency range (fc)	
DOCSIS	91–870(999*)MHz
EuroDOCSIS	112–869 (998*)MHz
Frequency step	32.0 kHz
Downstream per-channel bit rates:	
DOCSIS	27–38Mbps
EuroDOCSIS	36–56Mbps
RF output level	44–60 dBmV
Bandwidth	
DOCSIS	6 MHz
EuroDOCSIS	Up to 8 MHz
Modulation Error Rate (MER)	47 Typical
Output load impedance	75 Ω

UPSTREAM RF

Upstream frequency range	
DOCSIS	5–42 MHz
J-DOCSIS	5–55 MHz
EuroDOCSIS	5–65 MHz
Upstream modulation	QPSK, 16, 32, 64, 128, and 256 QAM
Upstream per-channel bit rate	0.320 - 40.96 Mbps
Input load impedance:	75 Ω

Specifications are subject to change without notice.

*Applies to TX32 1 GHz Module

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