# IBM Ethernet Switch b-type c-series

*Advanced multi-service compact IBM Ethernet switches for today's network infrastructure*

## Highlights

- Compact 1 RU IP/MPLS/VRF-capable switch that is purpose-built for large data center and advanced Carrier Ethernet applications

- Wire-speed, non-blocking performance in all models

- Available 24-port and 48-port configurations in both 100/1000 MbE SFP (Hybrid Fiber) and 10/100/1000 MbE RJ-45 configurations to suit versatile access/aggregation deployment

- Full Layer 2 switching capabilities facilitate network resiliency

- Base Layer 3 capabilities enable routed topologies to the network edge

- Available Full Layer 3 or Metro Edge upgrade enables maximum scalability or deployment into metro networks

Network planners today must expand and extend the range of services offered further into the edge of the network. This requires extending the intelligence and high-touch processing capabilities to the network edge. To do so, capabilities must exist to flexibly define and easily manage customer services in an intuitive manner. As a result, Quality of Service (QoS), resiliency and security are critical to the success in the deployment of these advanced Ethernet services.

Whether deployed from a central or remote location, availability of space often determines the feasibility of deploying new equipment and services within any environment. To meet these challenges, IBM® b-type c-series Ethernet switches are purpose-built to offer flexible, resilient, secure and advanced services in a compact form factor.

IBM b-type c-series Ethernet switches are a family of compact 1 RU, multi-service edge/aggregation switches with a powerful set of capabilities that combine performance with rich functionality at the network edge. These switches offer network planners a broad set of high-performance Layer 2, IPv4 unicast and multicast capabilities in the same device, and come in six models:

- IBM Ethernet Switch B24C (Copper): 24x 10/100/1000 MbE RJ-45 ports including 4x 100/1000 MbE SFP combination ports with optional 2-port 10 GbE XFP upgrade slot (4002AC2)
- IBM Ethernet Switch B24C (Fiber): 24x 100/1000 MbE SFP ports including 4x 10/100/1000 MbE RJ-45 combination ports with optional 2-port 10 GbE XFP upgrade slot (4002BC2)
- IBM Ethernet Switch B48C (Copper): 48x 10/100/1000 MbE RJ-45 ports including 4x 100/1000 MbE SFP combination ports (4002-C4A/4002AC4)

- IBM Ethernet Switch B48C (Fiber): 48x 100/1000 MbE SFP ports (4002-C4B/4002BC4)
- IBM Ethernet Switch B50C (Copper): 48x 10/100/ 1000 MbE RJ-45 ports plus 2x 10 Gbps Ethernet XFP uplink ports (4002-C5A/4002AC5)
- IBM Ethernet Switch B50C (Fiber): 48x 100/1000 Mbps Ethernet SFP ports plus 2x 10 Gbps Ethernet XFP uplink ports (4002-C5B/4002BC5)

## High performance within the data center and enterprise

In the data center, cost reduction, virtualization, security, and consolidation continue to grow as top priorities. Growth in data traffic and rising application demands require higher levels of performance and the ability to scale with more storage and network bandwidth.

The IBM b-type c-series Ethernet switches are designed to meet the challenges of large data centers and campus environments by providing a broad set of features, including wire-speed performance, deep packet buffers (64 MB per 24-port 1 GbE or 2-port 10 GbE group), and low latency in a compact 1U form factor. To ensure a robust and scalable switching infrastructure, a wide variety of Spanning Tree Protocols are supported including SSTP, RSTP, MSTP, and PVST/PVST+ compatibility.

Virtual Switch Redundancy Protocol (VSRP) is also supported on these platforms, which enable sub-second fault detection and fail-over for mesh topologies in which redundant switches provide back-up operation for one another. Coupled with IEEE 802.3ad Link Aggregation (LACP), these features make the b-type c-series switches well suited for building a tolerant and resilient network infrastructure.



IBM b-type c-series copper and fiber 24, 48 and 50 port Ethernet switches

Comprehensive support for IPv4 routing protocols, when complemented with VRRP and VRRP-E, is well suited for these environments. In addition, the NetIron CES 2000 series is capable of advanced services such as MPLS (VLL, VPLS) and Layer 3 Virtualization (VRF)—making it an ideal top-of-rack switch in high-end data centers or an edge router in campus networks.

## Carrier Ethernet services

Key capabilities include an industry-standard interface, support for robust routing protocols, a broad range of OAM protocols, and advanced QoS and security. These switches also support Provider Bridge (PB) and Provider Backbone Bridging (PBB) functionalities. This rich set of functionality makes it easier to integrate these switches with existing OSS systems that are certified to interoperate with Multi-Service IronWare-based products.

Because these switches comply with MEF 9 and MEF 19 specifications, providers can offer E-LINE, E-LAN, and E-TREE services—the standardized service names for point-to-point, multipoint, and rooted multipoint services. These services can be offered using IEEE 802.1Q VLANs, PBs, PBBs, or MPLS Layer 2 VPNs.

## Advanced Quality of Service (QoS)

QoS features on these switches include support for up to eight queues per port, each with a distinct priority level. Advanced QoS capabilities such as the use of 2-rate, 3-color traffic policers, egress shaping, and priority remarking, can offer a deterministic "hard QoS" to help optimize traffic flows. Remarking can be done on port, VLAN, PCP, DSCP, or IPv4 flow level. To service the queues, Strict Priority (SP), Weighted Fair Queuing (WFQ), and mixed SP and WFQ scheduling is available.

## Multicast support

Multicast transport is a key enabler of next-generation video (IP Television), financial (i.e. sending stock quotes to multiple people), news, and other services that require one-to-many applications. To meet these challenges, these switches support multicast switching and routing through a variety of protocols, including PIM-SM, PIM-DM, PIM-SSM, IGMP v1/v2/v3, and other platform-independent capabilities.

## Security

Security capabilities of the switch includes support of inbound and outbound ACLs, ACL logging, advanced Layer 2 controls, limits for broadcast/unknown unicast/multicast, Multi-VRF capable, Layer 2 VPNs, and more.

Receive ACLs assist in placing controls on unwanted traffic targeted toward the control plane. Through tools such as ACL-based traffic policers, ACL-based sFlow, and ACL-based mirroring, malicious traffic can be easily identified and preventive measures taken in the network. In addition, Multi-VRF can help segment the network into different zones for security and isolation.

## Scalability

The b-type c-series Ethernet switches supports up to 128,000 MAC addresses and 4000 VLANs/S-VLANs/B-VLANs per system. Support for 100/1000 Mbps SFP ports or 10/100/1000 Mbps RJ45 ports (with wire-speed perform-ance even at full load) helps ensure available capacity. In addi-tion, the use of Link Aggregation Groups (LAGs) enables the aggregation of up to 12 links per trunk to provide even higher-bandwidth services.

Data center networks and edge/aggregation routing within ISP networks often require a compact Layer 3 switch with sufficient scalability in IPv4 routes. The b-type c-series Ethernet switches support up to 32,000 IPv4 unicast routes and up to 4,000 multicast groups in hardware.

To support highly scalable Carrier Ethernet services, an inno-vative framework called Ethernet Service Instance (ESI) is available. Using the ESI framework, providers can flexibly define and assign VLANs to service instances within the network—enabling them to rapidly instantiate and easily manage E-LINE, E-LAN, and E-TREE services.

## Upgrades

The IBM b-type c-series Ethernet switches are built on top of the same Brocade® Multi-Service IronWare® that powers the mission-critical IBM m-series Ethernet routers. All capa-bilities are built within a single software image. The base software features include Advanced Layer 2 services, QoS, and security features.

An optional Full Layer 3 Premium Activation expands the capabilities of the switch to include RIPv1/v2, OSPFv2, IS-IS, and BGP-4 with Graceful Restart helper mode for both OSPF and BGP. With the high growth of video, multi-cast has become a means to optimize content delivery to

wider audiences. To meet these needs, these switches can also support IPv4 multicast routing protocols including IGMP v1/v2v3, PIM-DM, PIM-SM, PIM-SSM, and MSDP. Additionally, the switch is capable of supporting Multi-VRF with this premium package. This advanced hardware-based routing technology ensures secure, robust, and scalable wire-speed routing performance

An optional Metro Edge Premium Activation (ME_PREM) gives users the flexibility to include support for Provider Bridges (IEEE 802.1ad), Provider Backbone Bridges (IEEE 802.1ah) functionalities in the same device. Also

included is support for Ethernet Service Instance (ESI) framework for managing customer instances, and Connectivity Fault Management (IEEE 802.1ag) for rapid troubleshooting of Carrier Ethernet services. Additionally, the switch is capable of supporting Multi-VRF, MPLS (VLL, VPLS), and IEEE 802.3ah Link OAM with this premium package. These capabilities address a diverse set of applications in metro edge networks, ISP networks, mobile backhaul networks, data centers, large enterprises, government networks, and education and research.

### IBM b-type c-series Ethernet switches at a glance

| Product characteristics | |
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| Product numbers | IBM Ethernet Switch B24C (Copper): 4002AC2<br>IBM Ethernet Switch B24C (Fiber): 4002BC2<br>IBM Ethernet Switch B48C (Copper): 4002-C4A/4002AC4<br>IBM Ethernet Switch B48C (Fiber): 4002-C4B/4002BC4<br>IBM Ethernet Switch B50C (Copper): 4002-C5A/4002AC5<br>IBM Ethernet Switch B50C (Fiber): 4002-C5B/4002BC5 |
| Interface modules | • 2-port 10 GbE module for B24C |
| Ports | • B24C (Copper) = 24x 10/100/1000 MbE RJ-45 ports including 4x 100/1000 MbE SFP combination ports with optional 2-port 10 GbE XFP upgrade slot<br>• B24C (Fiber) = 24x 100/1000 MbE SFP ports including 4x 10/100/1000 MbE RJ-45 combination ports with optional 2-port 10 GbE XFP upgrade slot<br>• B48C (Copper) = 48x 10/100/1000 MbE RJ-45 ports including 4x 100/1000 MbE SFP combination ports<br>• B48C (Fiber): 48x 100/1000 MbE SFP ports<br>• B50C (Copper): 48x 10/100/1000 MbE RJ-45 ports plus 2x 10 Gbps Ethernet XFP uplink ports<br>• B50C (Fiber): 48x 100/1000 Mbps Ethernet SFP ports plus 2x 10 Gbps Ethernet XFP uplink ports |
| Interface type | • 10/100/1000 Mbps Ethernet port with RJ-45 connector<br>• 100/1000 Mbps Ethernet port with SFP connector<br>• 10 Gbps Ethernet port with XFP connector |
| Management Interfaces | • One 10/100/1000 MbE RJ-45 out-of-band management port<br>• One DB9 serial console port (straight-through) |
| Management Methods | SSHv2, Telnet, SNMPv1/v3, Brocade IronView® Network Manager (INM), RADIUS |

## IBM b-type c-series Ethernet switches at a glance

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| Optical transceivers | Choice of SFP transceivers with Optical Monitoring (OM) capabilities:<br>• 1000BASE-T SFP Copper, 1 Gbps up to 100 m over CAT5 or higher cabling, RJ-45 connector<br>• 1000BASE-SX 850 nm SFP optic, 1 Gbps up to 550 m over multi-mode fiber, LC connector<br>• 1000BASE-LX 1310 nm SFP optic, 1 Gbps up to 10 km over single-mode fiber, LC connector<br>• 1000BASE-LHA 1550 nm SFP optic, 1 Gbps up to 70 km over single-mode fiber, LC connector<br>• 100BASE-FX 1310 nm SFP optic, 100 Mbps up to 2 km over multi-mode fiber, LC connector<br>  (no OM capability)<br>Choice of XFP transceivers with Optical Monitoring (OM) capabilities:<br>• 10GBASE-SR 850 nm XFP optic, 10 Gbps up to 300 m over multi-mode fiber, LC connector<br>• 10GBASE-LR 1310 nm XFP optic, 10 Gbps up to 10 km over single-mode fiber, LC connector<br>• 10GBASE-ER 1550 nm XFP optic, 10 Gbps up to 40 km over single-mode fiber, LC connector<br>• 10GBASE-CX4 XFP copper, 10 Gbps up to 15 m over CX4 grade copper, CX4 connector |
| Power supplies | 2x 500 W power supplies supported for 1+1 redundancy |
| Hot-swappable components | SFP/XFP transceivers, power supplies, fan tray |
| Non-rack support | Yes |
| Operating systems supported | Brocade Multi-Service IronWare R03.8.00 or greater in all b-type c-series systems |
| Fiber optic cable | Fiber optic cables are required and are available in various lengths in single-mode and multi-mode formats |
| Power cords | Power cords are not included and must be specified at time of order. |
| Warranty | One year; warranty service upgrades are available |
| Optional features | • Transceivers<br>• 2-port 10 GbE module for B24C<br>• 500 W ac Power Supply<br>• Full Layer 3 Premium Activation<br>• Metro Edge Premium Activation |
| **Performance** | |
| Packet Forwarding | • B24C (Copper) and B24C (Fiber) = 36 million packets per second, 65 million packets per second with<br>  2-port 10 GbE module installed<br>• B48C (Copper) and B48C (Fiber) = 71 million packets per second<br>• B50C (Copper) and B50C (Fiber) = 101 million packets per second |
| Data Forwarding | • B24C (Copper) and B24C (Fiber) = 48 Gbps, 88 Gbps with 2-port 10 GbE module installed<br>• B48C (Copper) and B48C (Fiber) = 96 Gbps<br>• B50C (Copper) and B50C (Fiber) = 136 Gbps |
| **Scalability** | |
| Jumbo Frames | 9,216 bytes |
| VLANs | 4090 |
| MAC Addresses | 128,000 |
| ACLs | 4000 |
| QoS queues per port | 8 |
| Link aggregation | 12 links per group, 50 link groups per switch |

## IBM b-type c-series Ethernet switches at a glance

### Physical characteristics

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| Height | 4.3 cm (1.7 in.) (1 RU) |
| Width | 44.3 cm (17.4 in.) |
| Depth | 44.8 cm (17.6 in.) |
| Weight (fully loaded) | • B24C = 7.1 kg (15.5 lbs)<br>• B24C with 2-port 10 GbE module = 8.0 kg (17.5 lbs)<br>• B48C = 7.5 kg (16.5 lbs)<br>• B50C = 8.0 kg (17.5 lbs) |

### Power

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| Power (ac) | **Maximum power consumption:**<br>B24C (Copper) = 120 W, B24C (Fiber) = 145 W<br>B24C (Copper) with 2-port 10 GbE module = 170 W<br>B24C (Fiber) with 2-port 10 GbE module = 195 W<br>B48C (Copper) = 205 W, B50C (C) = 255 W<br>B48C (Fiber) = 245 W, B50C (F) = 295 W |
| Input | Input voltage: 100 to 240 V ac |
| Heat | B24C (Copper) = 410 BTU/Hr, B24C (Fiber) = 495 BTU/Hr<br>B24C (Copper) with 2-port 10 GbE module = 580 BTU/Hr<br>B24C (Fiber) with 2-port 10 GbE module = 666 BTU/Hr<br>B48C (Copper) = 700 BTU/Hr, B48C (Fiber) = 836 BTU/Hr<br>B50C (Copper) = 870 BTU/Hr, B50C (Fiber) = 1,007 BTU/Hr |

### Environmental

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| Temperature | Operating: 0°C to 40°C (32°F to 104°F)<br>Non-operating: -25°C to 70°C (-23°F to 158°F) |
| Humidity | Operating: 5% to 90% non-condensing<br>Non-operating: 95% maximum relative humidity, non-condensing |
| Altitude | Operating: Up to 10,000 feet (3048 meters)<br>Storage: Up to 15,000 feet (4500 meters) |
| Airflow | Port to non-port side airflow |

### Technical specifications

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| Standards compliance | IEEE 802.3 10Base-T; IEEE 802.3u 100Base-TX, 100Base-FX, 100Base-LX; IEEE 802.3z 1000Base-SX/LX; IEEE 802.3ab 1000Base-T; 802.3 CSMA/CD Access Method and Physical Layer Specifications; 802.3ae 10 Gbps Ethernet; 802.3x Flow Control; 802.3ad Link Aggregation; 802.1Q Virtual Bridged LANs; 802.1D MAC Bridges; 802.1w Rapid STP; 802.1s Multiple Spanning Trees; 802.1x Port-based Network Access Control; 802.1ad Provider Bridges; 802.1ah Provider Backbone Bridges; 802.1ag Connectivity Fault Management (CFM) |
| MEF specifications | MEF 2 Requirements and Framework for Ethernet Service Protection; MEF 4 Metro Ethernet Network Architecture Framework Part 1: Generic Framework; MEF 6.1 Metro Ethernet Services Definitions Phase 2; MEF 9 Abstract Test Suite for Ethernet Services at the UNI; MEF 10.1 Ethernet Services Attributes Phase 2; MEF 11 User Network Interface (UNI) Requirements and Framework; MEF 12 Metro Ethernet Network Architecture Framework Part 2: Ethernet Services Layer; MEF 13 User Network Interface (UNI) Type 1 Implementation Agreement; MEF 14 Abstract Test Suite for Traffic Management Phase 1; MEF 15 Requirements for Management of Metro Ethernet Phase 1 Network Elements; MEF 17 Service OAM Framework and Requirements (partial); |

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| RFC compliance | **BGPv4** – RFC 4271 BGPv4; RFC 1745 OSPF Interactions; RFC 1997 Communities and Attributes; RFC 2439 Route Flap Dampening; RFC 2796 Route Reflectionl RFC 1965 BGP4 Confederations; RFC 2842 Capability Advertisement; RFC 2918 Route Refresh Capability; RFC 1269 Managed Objects for BGP; RFC 2385 BGP Session Protection via TCP MD5; RFC 3682 Generalized TTL Security Mechanism, for eBGP Session Protection; RFC 4273 BGP-4 MIB<br><br>**OSPF** – RFC 2328 OSPF v2; RFC 3101 OSPF NSSA; RFC 1745 OSPF Interactions; RFC 1765 OSPF Database Overflow; RFC 1850 OSPF v2 MIB; RFC 2370 OSPF Opaque LSA Option<br><br>**IS-IS** – RFC 1195 Routing in TCP/IP and Dual Environments; RFC 1142 OSI IS-IS Intra-domain Routing Protocol; RFC 2763 Dynamic Host Name Exchange; RFC 2966 Domain-wide Prefix Distribution<br><br>**RIP** – RFC 1058 RIP v1; RFC 1723 RIP v2; RFC 1812 RIP Requirements<br><br>**MPLS** – RFC 3031 MPLS Architecture; RFC 3032 MPLS Label Stack Encoding; RFC 3036 LDP Specification; RFC 2205 RSVP v1 Functional Specification; RFC 2209 RSVP v1 Message Processing Rules; RFC 3209 RSVP-TE; RFC 3270 MPLS Support of Differentiated Services; RFC 3812 MPLS MIB; draft-ietf-bfd-mpls BFD for MPLS LSPs (RSVP-TE)<br><br>**L2VPN and PWE3** – draft-ietf-l2vpn-framework Framework for Layer 2 Virtual Private Networks; draft-ietf-l2vpn-requirements Service Requirements for Layer 2 Provider Provisioned Virtual Private Networks; RFC 4762 VPLS using LDP Signaling; draft-ietf-pwe3-arch PWE3 Architecture; RFC 4447 Pseudowire Setup and Maintenance using LDP; RFC 4448 Encapsulation Methods for Transport of Ethernet over MPLS Networks; draft-ietf-pwe3-pw-tc-mib Definitions for Textual Conventions and OBJECT-IDENTITIES for Pseudo-Wires Management; draft-ietf-pwe3-pw-mib Pseudo Wire (PW) Management Information Base<br><br>**IPv4 multicast** – RFC 1122 Host Extensions; RFC 1112 IGMP; RFC 2236 IGMP v2; RFC 3376 IGMP v3; RFC 3973 PIM-DM; RFC 2362 PIM-SM |
| RFC compliance | **General protocols** – RFC 791 IP; RFC 792 ICMP; RFC 793 TCP; RFC 783 TFTP; RFC 826 ARP; RFC 768 UDP; RFC 894 IP over Ethernet; RFC 903 RARP; RFC 906 TFTP Bootstrap; RFC 1027 Proxy ARP; RFC 951 BootP; RFC 1122 Host Extensions for IP Multicasting; RFC 1256 IRDP; RFC 1519 CIDR; RFC 1542 BootP Extensions; RFC 1812 Requirements for IPv4 Routers; RFC 1541 and 1542 DHCP; RFC 2131 BootP/DHCP Helper; RFC 3768 VRRP; RFC 854 Telnet; RFC 1591 DNS (client)<br><br>**QoS** – RFC 2475 An Architecture for Differentiated Services; RFC 3246 An Expedited Forwarding PHB; RFC 2597 Assured Forwarding PHB Group; RFC 2698 A Two Rate Three Color Marker<br><br>**Other** – RFC 1354 IP Forwarding MIB; RFC 2665 Ethernet Interface MIB; RFC 1757 RMON Groups 1,2,3,9; RFC 2068 HTTP; RFC 2030 SNTP; RFC 2865 RADIUS; RFC 3176 sFlow; RFC 2863 Interfaces Group MIB; Draft-ietf-tcpm-tcpsecure TCP Security |
| System Management | IronView Network Manager (INM) Web-based Graphical User Interface (GUI); Embedded Web Management GUI; Industry Standard Command Line Interface (CLI); SNMP v1, v2c, v3; RMON; IBM Tivoli® Netcool®/OMNIbus |
| Element Security Options | AAA; RADIUS; Secure Shell (SSH v2); Secure Copy (SCP v2); HTTPs; TACACS/TACACS+; Username/Password (Challenge and Response); Bi-level Access Mode (Standard and EXEC Level); Protection against Denial of Service attacks, such as TCP SYN or Smurf Attacks |

## For more information

To learn more about IBM b-type c-series Ethernet switches, please contact your IBM marketing representative or IBM Business Partner, or visit:
**ibm.com**/systems/networking

Additionally, IBM Global Financing can tailor financing solutions to your specific IT needs. For more information on great rates, flexible payment plans and loans, and asset buyback and disposal, visit:
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