SERVIX

Proposta

Tribunal de Justiça do Estado do Amazonas
Pregão Eletrônico/SRP Nº 032/2016

Razão Social: Servix Informática Ltda
Endereço: Rua Santos Dumond, 57 –sala: 202 – cep. 45.653-380
Fone/Fax: 11-3525-3400/11-3045-1911
Ilhéus / BA
E-mail: servix@servix.com

Banco: 341 – Itaú
Agência: 0383
Conta corrente: 14.835-0

Validade da Proposta: 60 (sessenta) dias.

Dados do Representante que irá assinar o Contrato

Nome: Vanderlei Arcanjo Carnielo Calejon	CPF. 736.875.028/72	RG. 5.412.384-7 SSP/SP
Cep:	05444-020	
Estado Civil:	Casado	
Residência:	Rua Iquitos, 75 - Pinheiros	
Cargo/Função:	Presidente	
Nacionalidade:	Brasileira	

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Cotação

Solução de rede switches, GBICS e software de gerenciamento, para atender ao Tribunal de Justiça do Estado do Amazonas, por um período de 12 (doze) meses, conforme especificações e condições definidas no Termo de Referência deste edital.

Item	Descrição	Unidade	Qtde	Preço Unitário	Preço Total
1	Switch de acesso 48 portas 10/100/1000 uplink 10GB Fabricante: Brocade Modelo: ICX7250-48-2X10G Solução de rede switches, Brocade (ICX7250-48-2X10G) composto por cabo de empilhamento de 3 metros (10G-SFPP-TWX-0301), porta de empilhamento e serviços de implantação e configuração incluindo em ambiente de produção, transferência de tecnologia, suporte e garantia de 36 meses e demais especificações técnicas de acordo com o edital e seus anexos.	Und	50	22.000,00	1.100.000,00
2	Switch de Distribuição 48 portas 10/100/1000 uplink 10GB Fabricante: Brocade Modelo: ICX7450-48 Solução de rede switches, Brocade (ICX7450-48) composto por fonte (RPS15-I), ventilador (ICX-FAN10-I), 03 (três) módulos de portas 1/10G (ICX7400-4X10GF) por switch e serviços de implantação e configuração incluindo em ambiente de produção, transferência de tecnologia, suporte e garantia de 36 meses e demais especificações técnicas de acordo com o edital e seus anexos.	Und	8	49.000,00	392.000,00

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3	Transceiver – Mini GBIC SFP Multimodo 1GbE LC Fabricante: Brocade Modelo: E1MG-SX-OM Solução de transceivers, Brocade (E1MG-SX-OM) composto por serviços de implantação e configuração incluindo em ambiente de produção, transferência de tecnologia, suporte e garantia de 36 meses e demais especificações técnicas de acordo com o edital e seus anexos.	Und	130	1.683,00	218.790,00
4	Software de Gerencia Centralizada para a solução de Conectividade Fabricante: Brocade Modelo: BNA Console de gerência e monitoração, software central de gerenciamento Brocade (BNA - Brocade Network Advisor) composto por software base com licenciamento para 50 dispositivos (BR-NTWADV-IP-BASE) e pacote de licenciamento adicional para 100 dispositivos (BR-NTWADV-IP-100) totalizando capacidade para até 150 dispositivos e serviços de implantação e configuração incluindo em ambiente de produção, transferência de tecnologia, suporte e garantia de 36 meses e demais especificações técnicas de acordo com o edital e seus anexos.	Und	1	66.756,00	66.756,00
	Valor Total Global R$				**1.777.546,00**

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1) Nos valores acima estão inclusos todos os custos diretos e indiretos, inclusive de embalagens, transportes ou fretes, e ainda os resultantes da incidência de quaisquer tributos, contribuições ou obrigações decorrentes da legislação trabalhista, fiscal e previdenciária a que estiver sujeito.

São Paulo, 11 de novembro de 2016

Atenciosamente,

Heitor Sakoda
Socio-Diretor

DATA SHEET

Brocade Ethernet Optics Family

HIGHLIGHTS

- Rigorously tested for performance and reliability by Brocade
- Hot-swappable flexibility in the field for greater ease and lower total cost of ownership
- Standards-based—802.3z, 802.3ah, 802.3u, 802.3ae, 802.3ak, and 802.3ba—and compliant as required
- Compliant with Restrictions on Hazardous Substances (RoHS), meeting either RoHS 5 or RoHS 6 EU standards

Highly Reliable, Brocade-Qualified Optics

Brocade offers a unique set of high-performance, reliable, and cost-effective optical transceivers to help enterprises and service providers meet the challenges of diverse network topologies. To ensure maximum quality, Brocade selects and tests the most reliable, highest-performing optical transceivers on the market, and then warrants their availability, capacity, and performance in Brocade® products.

Extensive performance and reliability testing reflects an ongoing commitment to quality. Brocade tests transceivers using the industry's most advanced tools and instruments to help ensure that they provide the right mix of functionality and performance when used in conjunction with Brocade products. The speed, capacity, reliability, and low cost of ownership that Brocade is known for is also provided in all optical components.

By using Brocade-qualified components, organizations can be assured that their warranty and service requirements will be met and that their Brocade products will continually provide the uptime, performance,
and reliability required by today's leading enterprise service providers.

Ethernet Optics Family Features

The Brocade Ethernet optics family includes several offerings designed to meet the performance and scalability requirements of service provider and enterprise environments. The new 100 Gigabit Ethernet (GbE) CFP optics deliver even greater performance capacity to support cloud services for these environments.

100 MbE Optics

- 100 Megabit Ethernet (MbE) transceivers support link lengths from 2 km to 40 km
- Both SMF and MMF fiber types
- RoHS 5 and 6 compliant
- Enterprise switching and routing

1 GbE Optics

- 1 GbE transceivers support link lengths from 300 m to 100 km
- Both SMF and MMF fiber types
- Coarse Wavelength Division Multiplexing (CWDM) support for distances of 80 km to 100 km
- RoHS 5 and 6 compliant
- For core routers and security applications

10 GbE Optics

- 10 GbE transceivers support link lengths of 26 m to 80 km
- Protocol-independent
- Less than one-third the power and size of MSA optic
- Hot-swappable
- Digital Optical Monitoring (DOM) support
- RoHS 5 and 6 compliant
- Application delivery and acceleration
- High-Performance Computing (HPC) interconnects
- Service provider traffic management

POS Pluggable OC12, OC48, and OC192 XFP Optics

- Pluggable XFP optic
- Ranges from 500 m to 80 km

40 GbE QSFP+ Optics

- 40 GbE transceivers support link lengths up to 100 m
- Hot-pluggable
- Industry-standard QSFP+
- Digital Optical Monitoring (DOM) support
- High-density 40 GbE connectivity options for data center, enterprise, and service provider applications

100 GbE CFP2 Optics

- 100 GbE transceivers support link lengths up to 40 km
- Hot-pluggable
- Low voltage
- Industry-standard CFP
- Diagnostic features per CFP MSA for laser bias, temperature, supply voltage
- Carrier, service provider, and cloud services
- Enterprise campus core routing
- RoHS 6 compliant

Brocade Global Services

Brocade Global Services has the expertise to help organizations build scalable, efficient cloud infrastructures. Leveraging 20 years of expertise in storage, networking, and virtualization, Brocade Global Services delivers world-class professional services, technical support, network monitoring services, and education, enabling organizations to maximize their Brocade investments, accelerate new technology deployments, and optimize the performance of networking infrastructures.

Affordable Acquisition Options

Brocade Capital Solutions helps organizations easily address their IT requirements by offering flexible network acquisition and support alternatives. Organizations can select from purchase, lease, Brocade Network Subscription, and Brocade Subscription Plus options to align network acquisition with their unique capital requirements and risk profiles. To learn more, visit www.brocade.com/capital.

Maximizing Investments

To help optimize technology investments, Brocade and its partners offer complete solutions that include professional services, technical support, and education. For more information, contact a Brocade sales partner or visit www.brocade.com.

Product Support for Fast Ethernet

	Brocade ICX Switches			FastIron Series		FastIron X Series	BigIron Series	NetIron Series		
Fast Ethernet Optics	ICX 6430/6450	ICX 7450	ICX 6610	FCX	FSX Gen3	SX	RX	XMR/MLX	CES/CER/ CER-RT	Brocade 6910
E1MG-100FX-OM	•	•	•[1]	•	•	•	•[2]	•	•	•
E1MG-100FX-IR-OM		•	•[1]	•	•	•	•[2]	•	•	•
E1MG-100FX-LR-OM		•	•[1]	•	•	•	•[2]	•	•	•

[1] Available only with Brocade ICX 6610-24F.

[2] Available only with SX-FI424HF and SX-FI-24HF.

Product Support for 1 Gigabit Ethernet

	Brocade ICX Switches							Brocade FastIron Series		Brocade NetIron Series			Brocade ServerIron Series	Brocade VDX Switches	Brocade SLX Series
1 GbE Fiber Optics	ICX 6430	ICX 6450	ICX 7250	ICX 7450	ICX 6610	ICX 6650	ICX 7750	FCX	FSX Gen3	XMR/ MLX	CES/ CER/ CER-RT	Brocade 6910	ADX	VDX 6710/6720/ 6730/6740/ 6940/8770	SLX 9850
E1MG-SX-OM	⊙[1]	•	•	•	•	•	•	•	•	•	•	•	•	•[5]	•
E1MG-SX-OM-T												•			
E1MG-LX-OM	•	•	•	•	•	•	•	•	•	•	•	•	•	•[5]	•
E1MG-LX-OM-T												•			
E1MG-LHA-OM	•	•			•			•	•	•	•	•			
E1MG-LHA-OM-T			•	•			•					•			
E1MG-LHB	•	•			•				•	•	•	•			
E1MG-BXD	•	•	•	•	•		•	•	•	•	•	•			•
E1MG-BXU	•	•	•	•	•		•	•	•	•	•	•			•
E1MG-CWDM80-XXXX					•				•	•	•	•			
E1MG-TX	⊙[1]	•	•	•	•	•	•	•[2]	•	•	•[4]		•		•
XBR-000190										•[3]				•[5]	
1G-SFP-C-0x01	⊙[1]	•	•												

⊙ Optics supported for both stacking and regular data links. For further details, visit www.brocade.com/fastironstacking.

[1] Stacking is not supported on the Brocade ICX 6430 12-port compact switch.

[2] Only qualified on FCX-624S-F.

[3] Qualified on Brocade MLX 24×1 GbE-X, Brocade MLX 10 GbE×4 SFP+, Brocade MLX 10 GbE×20 SFP+ modules.

[4] Qualified for 10/100/1000 Mbps speed.

[5] For more information, see the Brocade VDX Transceiver Support Matrix.

Product Support for 10 Gigabit Ethernet

	Brocade ICX Switches						FastIron Series		NetIron Series		ServerIron Series	Brocade VDX Switches	Brocade SLX Series
10 GbE Fiber Optics	ICX 6450	ICX 7250	ICX 7450	ICX 6610	ICX 6650	ICX 7750	FCX	FSX Gen3	XMR/ MLX	CER/ CES/ CER-RT	ADX	VDX 6710/6720/ 6730/6740/ 6940/8770	SLX 9850
10G-XFP-SR, LR							●	●	●[4]	●	●		
10G-XFP-ER							●	●	●[4]	●			
10G-XFP-ZR							●	●	●[4]	●			
10G-XFP-1310-LRM							●						
10G-SFPP-USR	⊙[1]	⊙	⊙	●	●	●	⊙	●[3]	●	●		●[7]	●
10G-SFPP-SR	⊙[1]	⊙	⊙	●	●	●	⊙	●[3]	●[4]	●	●[6]	●[7]	●
10G-SFPP-LR	●	⊙	⊙	●	●	●	●	●[3]	●[4]	●	●[6]	●[7]	●
10G-SFPP-ER	●	●	●	●	●	●	●	●[3]	●[4]	●		●[7]	●
10G-SFPP-ZR		●	●			●			●	●		●[7]	
10G-SFPP-ZRD-T									●[5]			●[7]	
10G-SFPP-LRM	⊙[1]		●	●			⊙[2]	●[3]		●	●[6]		
10G-SFPP-TWX-XXXX	●	⊙	⊙	⊙	●	●	⊙	●[3]	●	●		●[7]	
10GE-SFPP-AOC-XXXX		●	●		●	●			●	●		●[7]	

⊙ Optics supported for both stacking and regular data links. For further details, visit www.brocade.com/fastironstacking.

[1] Stacking is not supported on the Brocade ICX 6450 12-port compact switch.

[2] Available only with the FCX-2SFPP module.

[3] Available only with SX-FI-8XG, SX-FI-2XG, SX-FI-2XGMR-XL, and SX-FI-2XGMR-XL-PREM6 modules.

[4] The Brocade MLX and NetIron XMR modules (BR-MLX-10Gx8-X, BR-MLX-10Gx8-M, BR-MLX-10Gx4-X, BR-MLX-10Gx4-X-ML, NI-MLX-10Gx4, NI-MLX-10Gx2, NI-XMR-10Gx4, NI-XMR-10Gx2) support WAN mode.

[5] Available only with the Brocade MLXe 8×10 GbE and 24×10 GbE modules.

[6] Available only with Brocade ADX 1000F.

[7] For more information, see the Brocade VDX Transceiver Support Matrix.

Product Support for 40 Gigabit Ethernet

	Brocade ICX Switches[1]				Brocade VDX Switches	Brocade MLX Series	Brocade SLX Series
40 GbE Fiber Optics	ICX 7450	ICX 6610	ICX 7750	ICX 6650	VDX 6740/6940/8770	MLXe	SLX 9850
40G-QSFP-SR4	⊙		⊙	●	●[2]	●	
40G-QSFP-SR4-INT			●	●	●[2]	●	●
40G-QSFP-ESR4	●		●		●[2]	●	●
40G-QSFP-LR4	●		⊙	●	●[2]	●	●
40G-QSFP-LM4	●		●		●[2]	●	
40G-QSFP-ER4					●[2]	●	
40G-QSFP-SR-BIDI	●		⊙		●[2]	●	
40G-QSFP-4SFP-C-XXXX			●	●			
40G-QSFP-QSFP-C-XXXX	⊙		⊙	●		●	
40G-QSFP -C-XXXXX	⊙	⊙[1]	⊙				
40G-QSFP-QSFP-AOC-XXXX	⊙		⊙			●	

⊙ Optics supported for both stacking and regular data links. For further details, visit www.brocade.com/fastironstacking.

[1] 40 GbE ports on the Brocade ICX 6610 are supported for stacking only.

[2] For more information, see the Brocade VDX Transceiver Support Matrix.

Product Support for 100 Gigabit Ethernet

	Brocade MLX Series	Brocade VDX Switches		Brocade SLX Series
100 GbE Fiber Optics	MLXe	VDX 6940	VDX 8770	SLX 9850
100G-CFP2-LR4-10KM	●		●[1]	
100G-CFP2-SR10	●		●[1]	
100G-CFP2-ER4-40KM	●		●[1]	
100G-QSFP28-LR4-10KM	●	●[1]	●[1] (with adaptor)	●
100G-QSFP28-LR4L-2KM	●	●[1]	●[1] (with adaptor)	●
100G-QSFP28-LR4LP-10KM				●
100G-QSFP28-SR4	●	●[1]	●[1] (with adaptor)	●
100G-QSFP28-CWDM4 -2KM				●

[1] For more information, see the Brocade VDX Transceiver Support Matrix.

Key Standards and Features

	IEEE Standards	Domestic Safety Standards	International Safety Standards	Wavelength (nm)	Fiber Type	Maximum Cable Distance	Digital Optical Monitoring
Fast Ethernet							
E1MG-100FX-OM	802.3u	FDA 21CFR 1040.10 Class 1, CSA 60950-1-03/ UL 60950-1	EN 60825-1, EN 60950-1	1,310	MMF	2 km	Yes
E1MG-100FX-IR-OM	802.3			1,310	SMF	15 km	Yes
E1MG-100FX-LR-OM	802.3			1,310	SMF	40 km	Yes
1 GbE Fiber							
E1MG-SX-OM/ E1MG-SX-OM-T	802.3z	FDA 21CFR 1040.10 Class 1, CSA 60950-1-03/ UL 60950-1	EN 60825-1, EN 60950-1	850	MMF	220 m to 550 m	Yes
E1MG-LX-OM/ E1MG-LX-OM-T	802.3z			1,310	MMF/SMF	550 m to 10 km	Yes
E1MG-LHA-OM/ E1MG-LHA-OM-T	802.3z			1,550	SMF	70 km	Yes
E1MG-LHB	802.3z			1,550		150 km w/0.18 dB/km cable, 91 km w/ standard 0.3 dB/ km cable	No
E1MG-BXD	802.3ah			TX: 1,490 RX: 1,310		10 km	No
E1MG-BXU	802.3ah			TX: 1,310 RX: 1,490		10 km	No
E1MG-CWDM80-XXXX	802.3z			1,470 to 1,610		80 km	No
1000BASE-T Copper							
E1MG-TX, XBR-000190	802.3z	CSA 60950-1-03/UL	EN 60950-1	N/A	Cat5	100 m	N/A
1G-SFP-TWX-0x01	802.3z	Direct-attached SFP copper cables				1 m, 5 m	No
10 GbE Fiber							
10G-XFP-SR	802.3ae	FDA 21CFR 1040.10 Class 1, CSA 60950-1-03/ UL 60950-1	EN 60825-1, EN 60950-1	850	MMF	26 m to 300 m	Yes
10G-XFP-LR	802.3ae			1,310	SMF	10 km	
10G-XFP-ER	802.3ae			1,550		40 km	
10G-XFP-ZR	802.3ae			1,550		80 km	
10G-XFP-1310-LRM	802.3aq			1,310		220 m	
10G-SFPP-USR	N/A			850	MMF	100 m	
10G-SFPP-SR	802.3ae			850	MMF	26 m to 300 m	
10G-SFPP-LR	802.3ae			1,310	SMF	10 km	
10G-SFPP-ER	802.3ae			1,550	SMF	40 km	
10G-SFPP-ZR	802.3ae			1,550	SMF	80 km	
10G-SFPP-ZRD-T	802.3-2005 Clause 52 standard			102 C-band tunable wavelengths from 1,528 to 1,568 (50 GHz apart)	SMF	80 km	
10G-SFPP-LRM	802.3ae			1,310	MMF	220 m	

Key Standards and Features (Continued)

	IEEE Standards	Domestic Safety Standards	International Safety Standards	Wavelength (nm)	Fiber Type	Maximum Cable Distance	Digital Optical Monitoring
10GBASE Cable							
10G-SFPP-TWX-XXXX	802.3ae	Direct-attached SFP+ Twinax copper cables				1 m, 3 m, 5 m	No
10G-SFPP-AOC-XXXX	N/A	Direct-attached SFP+ active optical cables				7 m, 10 m	No
40 GbE Fiber							
40G-QSFP-SR4	802.3ba	FDA 21CFR 1040.10 Class 1, CSA 60950-1-03/ UL 60950-1	EN 60825-1, EN 60950-1	850	OM3 MMF OM4 MMF	100 m 150 m	Yes
40G-QSFP-SR4-INT (compatible with 10GBASE-SR)	802.3ba				OM3 MMF OM4 MMF	100 m 150 m	Yes
40G-QSFP-LR4	802.3ba			1,264.5 to 1,337.5	SMF	10 km	
40 GbE Copper							
40G-QSFP-4SFP-C-XXXX	N/A	Direct-attached QSFP+ to 4 SFP+ copper cables				1 m, 3 m, 5 m	No
40G-QSFP-QSFP-C-XXXX	N/A	Direct-attached QSFP+ to QSFP+ copper cables				1 m, 3 m, 5 m	No
100 GbE CFP Fiber							
100G-CFP-SR10	802.3ba	FDA 21CFR 1040.10 Class 1, CSA 60950-1-03/ UL 60950-1	EN 60825-1, EN 60950-1	850	OM3 MMF OM4 MMF	100 m 150 m	Yes
100G-CFP-LR4-10KM	802.3ba			1,294.53 to 1,310.19	SMF	10 km	Yes
100G-CFP-10x10-2KM-OM	10×10 MSA			1,523 to 1,595	SMF	2 km	Yes
100G-CFP-10x10-10KM-OM	10×10 MSA			1,523 to 1,595	SMF	10 km	Yes
100G-CFP-ER4-40KM	802.3ba			1,294.53 to 1,310.19	SMF	40 km	Yes
100 GbE CFP2 Fiber							
100G-CFP2-LR4-10KM	IEEE 802.3ba	—	—	1,294.53 to 1,310.19	SMF	10 km	Yes
100G-CFP2-SR10	IEEE 802.3ba	UL/CSA 60950, CDRH Class 1	EN 60950, EN 60825 Class 1	840 to 860	OM3 MMF OM4 MMF	100 m 150 m	Yes
100 GbE QSFP28 Fiber							
100G-QSFP28-SR4	802.3bm	North America: UL/CSA 60950, CDRH Class 1 European Union: EN 60950, EN 60825 Class 1		850	MMF	100 m	
100G-QSFP28-LR4	802.3ba			1295, 1300, 1305, 1310	SMF	10 km	
100G-QSFP28-LR4-LP	802.3ba				SMF	10 km	
100G-QSFP28-LR4L	802.3ba			1295, 1300, 1305, 1310	SMF	2 km	
100G QSFP28-CWDM4	802.3bm			1310	SMF	2 km	

Brocade Ethernet Optics Ordering Information

Part Number	Description
100 MbE SFP Transceivers	
E1MG-100FX-OM	100BASE-FX SFP optic MMF, LC connector, optical monitoring capable.
E1MG-100FX-IR-OM	100BASEFX-IR SFP optic for SMF with LC connector, optical monitoring capable. For distances up to 15 km.
E1MG-100FX-LR-OM	100BASEFX-LR SFP optic for SMF with LC connector, optical monitoring capable. For distances up to 40 km.
1 GbE SFP	
E1MG-BXD	1000BASE-BXD SFP optic, SMF, 1,490 nm, LC connector. This optic can be connected only to an E1MG-BXU at the far end.
E1MG-BXU	1000BASE-BXU SFP optic, SMF, 1,310 nm, LC connector. This optic can be connected only to an E1MG-BXD at the far end.
E1MG-CWDM80-XXXX	CWDM SFP optic, 80 km, 1,470 to 1,610 (total of eight wavelengths supplied by eight optics, each 20 nm apart in wavelength), LC connector.
E1MG-LHA-OM	1000BASE-LHA SFP optic SMF, LC connector, optical monitoring capable. For distances up to 70 km.
E1MG-LHA-OM-T	1000BASE-LHA SFP optic, MMF, LC connector, optical monitoring capable (70 km), industrial temperature.
E1MG-LHB	1000BASE-LHB SFP optic, SMF, LC connector, 150 km maximum reach.
E1MG-LX-OM	1000BASE-LX SFP optic SMF, LC connector, optical monitoring capable. For distances up to 10 km.
E1MG-LX-OM-T	1000BASE-LX SFP optic, SMF, LC connector, optical monitoring capable, industrial temperature.
E1MG-SX-OM	1000BASE-SX SFP optic, MMF, LC connector, optical monitoring capable.
E1MG-SX-OM-T	1000BASE-SX SFP optic, MMF, LC connector, optical monitoring capable, industrial temperature.
E1MG-TX, XBR-000190	1000BASE-T SFP copper, RJ-45 connector.
1G-SFP-C-0x01	1 GbE direct-attached SFP copper cable, 1 m or 5 m (where x=1 for 1 m; x=5 for 5 m).
10 GbE XFP	
10G-XFP-SR	850 nm serial pluggable XFP optic (LC), target range 300 m over MMF.
10G-XFP-LR	1310 nm serial pluggable XFP optic (LC) for up to 10 km over SMF.
10G-XFP-ER	1550 nm serial pluggable XFP optic (LC) for up to 40 km over SMF.
10G-XFP-ZR	1,550 nm serial pluggable XFP optic (LC) for up to 80 km over SMF.
10G-XFP-1310-LRM	10GBASE-LRM, XFP optic, 1,310 nm serial pluggable optic (LC) for use on OM1/OM2/OM3 MMF up to 220 m.

Brocade Ethernet Optics Ordering Information (Continued)

Part Number	Description
10 GbE SFP+	
10G-SFPP-USR	10 GbE Ultra-Short Reach (USR), SFP+ optic (LC), target range 100 m over MMF.
10G-SFPP-SR	10GBASE-SR, SFP+ optic (LC), for up to 300 m over MMF.
10G-SFPP-LR	10GBASE-LR, SFP+ optic (LC), for up to 10 km over SMF.
10G-SFPP-ER	10GBASE-ER, SFP+ optic (LC), for up to 40 km over SMF.
10G-SFPP-ZR	10GBASE-ZR, SFP+ optic (LC), for up to 80 km over SMF.
10G-SFPP-ZRD-T	10 GbE tunable DWDM SFP+ optic (LC), for up to 80 km over SMF.
10G-SFPP-LRM	10GBASE-LRM, SFP+ optic (LC), 220 m over OM1/OM2/OM3 MMF.
10G-SFPP-TWX-XXXX	10 GbE SFP+ direct-attached copper cable, 1 m, 3 m, or 5 m.
10G-SFPP-AOC-XXXX	10 GbE SFP+ direct-attached active optical cable, 7 m or 10 m.
40 GbE QSFP+	
40G-QSFP-SR4	40GBASE-SR4 QSFP+ optic (MTP 1×8 or 1×12), 100 m over MMF (not compliant with 10GBASE-SR4 modules per IEEE 802.ae standard).
40G-QSFP-ESR4	40GBASE-ESR4 QSFP+ optic (MTP 1×8 or 1×12), 300 m over MMF, (10GBASE-SR compatible, breakout)
40G-QSFP-SR4-INT	40GBASE-SR4 QSFP+ optic (MTP 1×8 or 1×12), 100 m over MMF (10GBASE-SR compatible, breakout-capable).
40G-QSFP-LR4	40GBASE-LR4 QSFP+ optic (LC), for up to 10 km over SMF.
40G-QSFP-SR-BIDI	40GE SR QSFP+ optic (LC), bidirectional, 100 m over OM3 MMF.
40G-QSFP-4SFP-C-XXXX	4×10 GbE direct-attached QSFP+ to four SFP+ copper breakout cable, 1 m, 3 m, or 5 m.
40G-QSFP-QSFP-C-XXXX	4×10 GbE direct-attached QSFP+ to QSFP+ copper breakout cable, 1 m, 3 m, or 5 m.
100 GbE CFP	
100G-CFP-SR10	100 GbE CFP optic (MPO24), SR10, for distances up to 100 m over MMF.
100G-CFP-LR4-10KM	100 GbE CFP optic (SC), LR4, for distances up to 10 km over SMF.
100G-CFP-10x10-2KM-OM	100 GbE CFP optic (LC), 10×10, for distances up to 2 km over SMF.
100G-CFP-10x10-10KM-OM	100 GbE CFP optic (LC), 10×10, for distances up to 10 km over SMF.
100G-CFP-ER4-40KM	100 GbE CFP optic (LC), ER4, for distances up to 40 km over SMF.
100 GbE CFP2	
100G-CFP2-SR10	100 GbE CFP2 optic, SR10, for distances up to 100 m over MMF, 1-pack.
100G-CFP2-LR4-10KM	100 GbE CFP2 optic (LC), LR4, for distances up to 10 km over SMF.

Brocade Ethernet Optics Ordering Information (Continued)

Part Number	Description
100 GBE QSFP28	
100G-QSFP28-CWDM4-2KM	100GBASE CWDM4 QSFP transceiver LC 2 km over SM.
100G-QSFP28-SR4	100 GbE QSFP28 SR4 transceiver 100 m over MMF.
100G-QSFP28-LR4L-2KM	100 GbE QSFP28 LR4 lite transceiver 2 km over SMF.
100G-QSFP28-LR4-10KM	100 GbE QSFP28 LR4 transceiver 10 km over SMF.
100G-QSFP28-LR4-LP-10KM	100 GbE QSFP28 LR4 low power 10 km over SMF.

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BROCADE

DATA SHEET

Brocade ICX 7250 Switch

HIGHLIGHTS

- Offers enterprise-class stackable switching at an entry-level price, allowing organizations to buy what they need now and easily scale as demand grows and new technologies emerge
- Future-proofs campus networks via flexible stacking, software licensing of 1 GbE to 10 GbE ports, Brocade Campus Fabric technology*, and future upgrades to OpenFlow support in true hybrid port mode, enabling Software-Defined Networking (SDN) for programmatic network control
- Enables enterprise-class manageability with up to 8×10 GbE ports for stacking or uplinks
- Delivers market-leading stacking scalability with up to 12 switches per stack, 80 Gbps of stacking bandwidth, and long-distance stacking using open standards
- Offers full Power over Ethernet (PoE+) to power wireless access points, video surveillance and video conferencing equipment, VDI terminals, and HD displays directly from the switch
- Includes the Brocade Assurance Limited Lifetime Warranty and three years of technical support

Entry-Level, Enterprise-Class Stackable Switch with Future-Proof Expandability

The Brocade® ICX® 7250 Switch delivers the performance, flexibility, and scalability required for enterprise Gigabit Ethernet (GbE) access deployment. It raises the bar with up to 8×10 GbE ports for uplinks or stacking and market-leading stacking density with up to 12 switches (576×1 GbE) per stack. In addition, the Brocade ICX 7250 combines enterprise-class features, manageability, performance, and reliability with the flexibility, cost-effectiveness, and "pay as you grow" scalability of a stackable solution.

Premium Performance in an Entry-Level Switch

The Brocade ICX 7250 Switch provides enterprise-class stackable LAN switching solutions to meet the growing demands of campus networks. Designed for small to medium-size enterprises, branch offices, and distributed campuses, these intelligent, scalable edge switches deliver enterprise-class functionality at an affordable price—without compromising performance and reliability. The Brocade ICX 7250 delivers wire-speed, non-blocking performance across all ports to support latency-sensitive applications, such as real-time voice/video streaming and Virtual Desktop Infrastructure (VDI). The Brocade ICX 7250 is available in 24- and 48-port 10/100/1000 Mbps models with 1 GbE uplink or 10 GbE dual-purpose uplink/stacking ports (see Figure 1)—with or without PoE and PoE+—to support enterprise edge networking, wireless mobility, and IP communications without the need for additional power outlets or power injectors.

The new Brocade Campus Fabric technology* maximizes the value of Brocade ICX 7250 Switches. It enables the Brocade ICX 7250 to extend ports in combination with Brocade ICX 7450 and 7750 Switches, creating a complete campus network solution with consolidated management across aggregation and core layers, shared network services—adding advanced Layer 3 capabilities to all switches—and scale-out flexibility to expand port density as needed (see Figure 2). The Brocade ICX 7250 with Campus Fabric technology* provides an ideal network access solution for the campus network.

* Support on the Brocade ICX 7250 to be available in a future release.

Scaling Out Ports and Services as Demand Grows

The Brocade ICX 7250 is easy to deploy, manage, and integrate into both new and existing networks. Organizations can buy only what they need today, and easily scale out as demand grows and new technologies emerge.

Brocade stacking technology makes it easy to scale ports by stacking up to 12 Brocade ICX 7250 Switches into a single logical switch. This allows the Brocade ICX 7250 to provide a class-leading 80 Gbps of backplane bandwidth as well as simple and robust expandability for future growth at the network edge. In addition, this stacked switch has only a single IP address to simplify management and offers transparent forwarding across a pool of up to 576×1 GbE ports and 96×10 GbE ports. When new switches join the stack, they automatically inherit the stack's existing configuration file, enabling true plug-and-play network expansion. Flexible licensing of 1 GbE to 10 GbE ports, for uplink and stacking, allows organizations to optimize network performance based on specific requirements.

Furthermore, Brocade Campus Fabric technology* enables organizations to add advanced Layer 3 services across the stack by simply adding premium Brocade ICX 7750 Switches to existing Brocade ICX 7250 deployments. This eliminates the need for "rip and replace" upgrades, since low-cost Brocade ICX 7250 ports can live on to inherit new services.

Brocade Campus Fabric Technology: Extending Options and Scalability

Brocade Campus Fabric technology, offered for Brocade ICX 7250*, 7450, and 7750 Switches, extends network options and scalability. It integrates premium Brocade ICX 7750, midrange Brocade ICX 7450, and entry-level Brocade ICX 7250 Switches, collapsing network access, aggregation, and core layers into a single logical switch. This logical device shares network services while reducing management touch points and network hops through a single-layer design spanning the entire campus network.

These powerful deployments deliver equivalent or better functionality than large, rigid modular chassis systems, but with significantly lower costs and smaller carbon footprints.

Brocade ICX 7250 Switches

Except as noted, all Brocade ICX 7250 models offer eight uplink/stacking ports, a single integrated power supply and fan, one RJ-45 network management port, one mini USB serial management port, and one USB storage port on the front panel.

Brocade ICX 7250-24G
24×10/100/1000 Mbps RJ-45 ports
4×1 GbE uplink ports
Not upgradable; no EPS connector
Premium Layer 3 licenses not applicable

Brocade ICX 7250-24
24×10/100/1000 Mbps RJ-45 ports
8×1 GbE uplink/stacking ports
Upgradable to 10 GbE

Brocade ICX 7250-24P
24×10/100/1000 Mbps RJ-45 PoE+ ports
370 W PoE budget
8×1 GbE uplink/stacking ports
Upgradable to 10 GbE

Brocade ICX 7250-48
48×10/100/1000 Mbps RJ-45 ports
8×1 GbE uplink/stacking ports
Upgradable to 10 GbE

Brocade ICX 7250-48P
48×10/100/1000 Mbps RJ-45 PoE+ ports
740 W PoE budget
8×1 GbE uplink/stacking ports
Upgradable to 10 GbE

Figure 1: Up to 12 Brocade ICX 7250 Switches can be stacked together using up to four full-duplex SFP+ 10 Gbps ports for a fully redundant backplane with 80 Gbps of stacking bandwidth.

* Support on the Brocade ICX 7250 to be available in a future release.

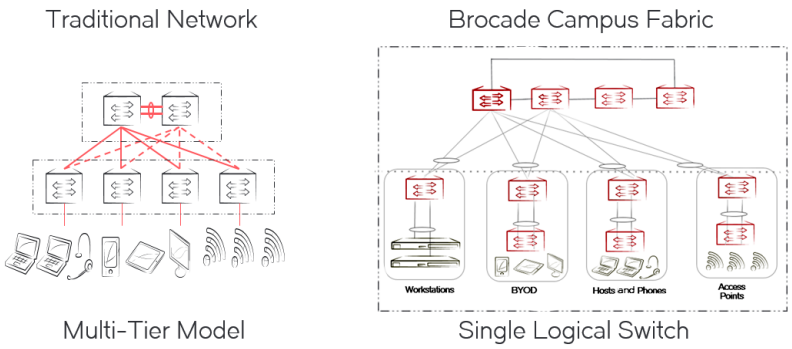

Figure 2: Brocade Campus Fabric technology.

Brocade ICX switches support a Distributed Chassis deployment model that uses standards-based optics and cabling interface connections to help ensure maximum distance between campus switches—up to 80 km—and minimum cabling costs—up to 50 percent less than incumbent solutions. This gives organizations the flexibility to deliver ports wherever they are needed on campus at a fraction of the cost. The Distributed Chassis design future-proofs campus networks by allowing networks to easily and cost-effectively expand in scale and capabilities.

Full Layer 3 Capabilities

Brocade ICX 7250 Switches offer an upgrade option to bring full Layer 3 capabilities to the network edge, reducing complexity and enhancing the reliability of enterprise networks.

Power to Spare

The Brocade ICX 7250 can deliver both power and data across network connections, supporting Power over Ethernet (PoE/PoE+) standards and providing a single-cable solution for edge devices, such as wireless access points, VoIP phones, video surveillance equipment, and VDI thin terminals. Carrying data and power through a single Ethernet wire reduces the number of power receptacles and power adapters while increasing reliability and wiring flexibility. The Brocade ICX 7250-24P provides 370 watts and can deliver PoE power to all 24 ports, while the Brocade ICX 7250-48P provides 740 watts and can deliver PoE+ power for up to 12 or 24 ports. Both switches can provide PoE and PoE+ (30 watts) power to all ports when an external power supply is deployed.

The optional Brocade ICX-EPS 4000 is an external power supply source that delivers additional power for up to 16 Brocade ICX 7250 Switches (see Figures 3 and 4). It can be used for system power redundancy and an increased PoE/PoE+ power budget to enable additional ports.

EEE Power Savings

The Brocade ICX 7250 Switch supports the IEEE 802.3az standard for Energy Efficient Ethernet (EEE), reducing power consumption during periods of low utilization. Ports are placed into a low power mode when no data is being transmitted.

Enterprise-Class Availability

When every second matters, Brocade ICX 7250 Switches help deliver continuous availability to optimize the user experience. Brocade stacking technology delivers high availability, performing real-time state synchronization across the stack and enabling instantaneous hitless failover to a standby controller in the unlikely event of a failure of the master stack controller. Organizations also can use hot-insertion/removal of stack members to avoid interrupting service when adding a switch to increase the capacity of a stack or replacing a switch that needs servicing.

BROCADE CAMPUS FABRIC TECHNOLOGY

Brocade Campus Fabric technology brings campus networks into the modern era to better support seamless wireless mobility, security, and ease of application deployment. This innovative technology collapses multiple network layers into a single logical switch, flattening the network and eliminating deployment complexity while simplifying network management and reducing operating costs.

Brocade Campus Fabric technology enables organizations to build networks that deliver:

- **Consolidated management:** Reduces unnecessary network layers to create large management domains that eliminate individual switch touch points, reducing maintenance time and costs.
- **Shared network services:** Allows premium and entry-level switches to mesh together into a single logical switch and share advanced Layer 2/3 services, delivering lower price-per-port functionality without compromising performance.
- **Scale-out networking:** Integrates high-performance, fixed form-factor switches to create a single distributed logical switch that is independent of physical location and allows organizations to add ports whenever and wherever needed across the campus without adding complexity.

Figure 3: Brocade ICX-EPS 4000 for the Brocade ICX 7250, shown with four AC power supplies.

Figure 4: Rear view of the Brocade ICX-EPS 4000 connectivity.

In addition to stack-level high availability, Brocade ICX 7250 Switches also offer an external power supply for failover resiliency, as well as increased PoE/PoE+ port availability.

Simplified, Open-Standards-based Management and Monitoring

The Brocade ICX 7250 provides simplified, standards-based management capabilities that help organizations reduce administrative time and effort while securing their networks.

sFlow-based "Always-On" Network Monitoring

sFlow is a modern, standards-based network export protocol (RFC 3176) that addresses many of the challenges that network managers face today. By embedding sFlow hardware support into the Brocade ICX 7250, Brocade delivers an "always-on" technology that operates with wire-speed performance. sFlow dramatically reduces implementation costs compared to traditional network monitoring solutions that rely on mirrored ports, probes, and line-tap technologies. Moreover, sFlow gives organizations full, enterprise-wide monitoring capability for every port in the network.

Simplified, Automated Deployment with Auto-Provisioning

The Brocade ICX 7250 supports auto-provisioning, simplifying deployment with a truly plug-and-play experience. Organizations can use this feature to automate IP address and feature configuration of the switches without requiring a highly trained network engineer onsite. When the switches power up, they can automatically receive their IP addresses and configuration files from DHCP and Trivial File Transport Protocol (TFTP) servers. They also can automatically receive a software update to be at the same code revision as currently installed switches.

Open-Standards Management

The Brocade ICX 7250 includes an industry-standard Command Line Interface (CLI) and supports Secure Shell (SSHv2), Secure Copy (SCP), and SNMPv3 to restrict and encrypt management communications to the system. In addition, support for Terminal Access Controller Access Control System (TACACS/TACACS+) and RADIUS authentication helps ensure secure operator access.

SDN-Enabled Programmatic Control of the Network

Software-Defined Networking (SDN) is a powerful new network paradigm designed for the world's most demanding networking environments and promises breakthrough levels of customization, scale, and efficiency. The Brocade ICX 7250 enables SDN by supporting the OpenFlow 1.3 protocol, which allows communication between an OpenFlow controller and an OpenFlow-enabled switch. Using this approach, organizations can control their networks programmatically, transforming the network into a platform for innovation through new network applications and services.

The Brocade ICX 7250 delivers OpenFlow in true hybrid port mode, which allows organizations to simultaneously deploy traditional Layer 2/3 forwarding with OpenFlow on the same port. This unique capability provides a pragmatic path to SDN by enabling network administrators to progressively integrate OpenFlow into existing networks, giving them the programmatic control offered by SDN for specific flows while the remaining traffic is forwarded as before. Brocade ICX 7250 hardware support for OpenFlow enables organizations to apply these capabilities at line rate.

Plug-and-Play Operations for Powered Devices

Brocade ICX switches support the IEEE 802.1AB Link Layer Discovery Protocol (LLDP) and ANSI TIA 1057 Link Layer Discovery Protocol-Media Endpoint Discovery (LLDP-MED) standards that enable organizations to deploy interoperable multivendor solutions for Unified Communications (UC). Configuring IP endpoints such as VoIP phones can be a complex task, requiring manual and time-consuming

configuration. LLDP and LLDP-MED provide a standard, open method for configuring, discovering, and managing network infrastructure.

Unified Wired/Wireless Network Management with Brocade Network Advisor

Managing enterprise campus networks continues to become more complex due to the growth in services that rely on wired and wireless networks. Services such as Internet, e-mail, video conferencing, real-time collaboration, and distance learning all have specific configuration and management requirements. At the same time, organizations face increasing demand to provide uninterrupted services for high-quality voice and UC, wireless mobility, and multimedia applications. To reduce complexity and the time spent managing these environments, the easy-to-use Brocade Network Advisor discovers, manages, and deploys configurations to groups of IP devices. By using Brocade Network Advisor, organizations can configure Virtual LANs (VLANs) within the network, manage wireless access points, and execute commands on specific IP devices or groups of IP devices. sFlow-based proactive monitoring is ideal for performing network-wide troubleshooting, generating traffic reports, and gaining visibility into network activity from the edge to the core. Brocade Network Advisor centralizes management of the entire family of Brocade wired products and Aruba wireless products.

Data Center ToR Server Connectivity

The Brocade ICX 7250 is designed to fit in server racks by consuming only one rack unit. In data center environments where most servers are 1 GbE-capable, the Brocade ICX 7250 provides a compact and cost-effective 1 GbE Top-of-Rack (ToR) switch by simply connecting 1 GbE Network Interface Cards (NICs) in the servers to Brocade ICX 7250 1 GbE ports. This configuration uses 10 GbE links to connect to Brocade ICX data center aggregation switches.

Warranty

Brocade ICX 7250 Switches are covered by the Brocade Assurance® Limited Lifetime Warranty. For details, visit www.brocade.com/warranty.

Best-in-Class Support

The Brocade ICX 7250 Switch is supported by next-business-day advance replacement where available, as well as software defect repairs and maintenance updates. In an effort to further improve service levels and operational efficiency, Brocade includes three years of technical support for Brocade ICX 7250 Switches, providing direct 24×7 access to the Brocade Technical Assistance Center.

Brocade Global Services

Brocade Global Services has the expertise to help organizations build scalable, efficient cloud infrastructures. Leveraging 20 years of expertise in storage, networking, and virtualization, Brocade Global Services delivers world-class professional services, technical support, network monitoring services, and education, enabling organizations to maximize their Brocade investments, accelerate new technology deployments, and optimize the performance of networking infrastructures.

Affordable Acquisition Options

Brocade Capital Solutions helps organizations easily address their IT requirements by offering flexible network acquisition and support alternatives. Organizations can select from purchase, lease, Brocade Network Subscription, and Brocade Subscription Plus options to align network acquisition with their unique capital requirements and risk profiles. To learn more, visit www.brocade.com/CapitalSolutions.

Maximizing Investments

To help optimize technology investments, Brocade and its partners offer complete solutions that include professional services, technical support, and education. For more information, contact a Brocade sales partner or visit www.brocade.com.

BROCADE ICX 7250 SWITCH AND CONTROLLER INTEROPERABILITY

The Brocade ICX 7250 Switch operates seamlessly under the Brocade SDN Controller. This controller is a quality-assured edition of the OpenDaylight controller code supported by an established networking provider and its leaders within the OpenDaylight community.

Brocade ICX 7250 Feature/Model Comparison

	24 RJ-45 Ports	24 or 48 Ports Non-PoE		24 or 48 PoE+ Ports	
	Brocade ICX 7250-24G	Brocade ICX 7250-24	Brocade ICX 7250-48	Brocade ICX 7250-24P	Brocade ICX 7250-48P
Switching capacity (data rate, full duplex)	128 Gbps	208 Gbps	256 Gbps	208 Gbps	256 Gbps
Forwarding capacity (data rate, full duplex)	96 Mpps	154 Mpps	190 Mpps	154 Mpps	190 Mpps
Fixed ports: 10/100/1000 Mbps RJ-45	24	24	48	24	48
Fixed ports: 100/1000 Mbps SFP	4				
Fixed ports: 1/10 Gbps SFP+ (10 GbE SPF+ optional upgrade license)		8	8	8	8
Maximum PoE Class 3 ports (internal AC power supply only)	N/A	N/A	N/A	24	48
Maximum PoE+ ports (internal AC power supply only)	N/A	N/A	N/A	12	24
Maximum PoE+ ports (with external power supply)	N/A	N/A	N/A	24	48
Advanced IPv4/v6 L3 routing (RIP, OSPF)	N/A	with license	with license	with license	with license
Aggregated stacking bandwidth	N/A	480 Gbps	480 Gbps	480 Gbps	480 Gbps
Stacking density (maximum switches in a stack)	N/A	12	12	12	12
Maximum stacking distance (distance between stacked switches)	N/A	10 km	10 km	10 km	10 km
Power					
Power inlet (AC)	C14				
Input voltage/frequency	AC: 100 to 240 VAC @ 50 to 60 Hz				
Power supply rated maximum (AC)	135 W	135 W	135 W	525 W	880 W
PoE power budget (AC) (internal AC power supply only)	N/A	N/A	N/A	370 W	740 W
Switch power consumption (25°C)					
Idle (no PoE load)	33.6 W	42.6 W	50.64 W	50 W	66 W
10% traffic† (full PoE load)	42.6 W	51.6 W	63.55 W	63 W	84 W
100% traffic† (full PoE load)	44.4 W	57.6 W	69.51 W	73 W	96 W
Airflow	front-to-back	side-to-back	side-to-back	side-to-back	side-to-back
Switch heat dissipation (25°C)‡					
Idle (no PoE load)	114.6 BTU/Hr	145.3 BTU/Hr	172.7 BTU/Hr	170.6 BTU/Hr	225.2 BTU/Hr
10% traffic† (full PoE load)	145.3 BTU/Hr	176.06 BTU/Hr	216.8 BTU/Hr	214.9 BTU/Hr	286.6 BTU/Hr
100% traffic† (full PoE load)	151.4 BTU/Hr	196.5 BTU/Hr	237.1 BTU/Hr	249.08 BTU/Hr	327.5 BTU/Hr

† Traffic load on all ports connected with maximum possible PoE/PoE+ loads (if equipped). PoE power delivered to powered devices not included.
‡ PoE power not included in switch heat dissipation figures since the heat is not dissipated at the switch.

Brocade ICX 7250 Feature/Model Comparison (Continued)

	24 RJ-45 Ports	24 or 48 Ports Non-PoE		24 or 48 PoE+ Ports	
Environment					
Weight (kg)	3.58	3.76	4.84	4.73	5.86
Dimensions	**48 port:** 440 mm (17.323 in.) W×370 mm (14.56 in.) D×43.7 mm (1.720 in.) H — 1U **24 port:** 440 mm (17.323 in.) W×280 mm (11.02 in.) D×43.7 mm (1.720 in.) H — 1U				
Acoustics (25°C)	40 dB	41.9 dB	44.5 dB	44.7 dB	45.9 dB
MTBF (hours) (25°C)	767,718	676,362	665,319	429,209	411,187

Brocade ICX 7250 Specifications

Specifications	
Connector options	• 10/100/1000 ports: RJ-45 • 1 Gbps SFP ports (Brocade ICX 7250-24G only) • 1/10 Gbps SFP+ ports (not available on Brocade ICX 7250-24G) • Out-of-band Ethernet management: 10/100/1000 Mbps RJ-45 • Console management: Mini-USB serial port (Mini-B plug) • File transfer: USB port (Standard-A plug) For the latest information about supported optics, please visit www.Brocade.com/Optics.
Maximum MAC addresses	16,000
Maximum VLANs	4,095
Maximum STP (spanning trees)	254
Maximum routes (in hardware)	12,000
Trunking	16
Maximum jumbo frame size	9,216 bytes
Average latency	1.5 µs
QoS Priority Queues	8
Layer 2 switching	• 802.1s Multiple Spanning Tree • 802.1x Authentication • Auto MDI/MDIX • BPDU Guard, Root Guard • Dual-Mode VLANs • MAC-based VLANs, Dynamic MAC-based VLAN activation • Dynamic VLAN Assignment • Dynamic Voice VLAN Assignment • Fast Port Span • GARP VLAN Registration Protocol • IGMP Snooping (v1/v2/v3) • IGMP Proxy for Static Groups • IGMP v2/v3 Fast Leave • IGMP Tracking • Inter-Packet Gap (IPG) adjustment • Link Fault Signaling (LFS) • MAC Address Locking; MAC Port Security • MAC-Layer Filtering • MAC Learning Disable • MLD Snooping (v1/v2) • Multi-device Authentication • Per-VLAN Spanning Tree (PVST/PVST+/PVRST) • Mirroring—Port-based, ACL-based, MAC Filter-based, and VLAN-based • PIM-SM v2 Snooping • Port Loop Detection • Private VLAN • Protocol VLAN (802.1v), Subnet VLAN • Remote Fault Notification (RFN) • Single-instance Spanning Tree • Single-link LACP • Trunk Groups • Uni-Directional Link Detection (UDLD)

Brocade ICX 7250 Specifications (Continued)

Base Layer 3 IP routing	• IPv4 and IPv6 static routes • ECMP • Port-based Access Control Lists • L3/L4 ACLs • Host routes	• Virtual interfaces • Routed interfaces • Route-only support • Routing between directly connected subnets
Premium Layer 3 IP routing	• IPv4 and IPv6 dynamic routes • RIP v1/v2 • OSPF v2 • Virtual Route Redundancy Protocol (VRRP) • VRRP-E • IPv6 over IPv4 tunnels	• PIM-SM, PIM-SSM, PIM-DM, PIM passive (IPv4/IPv6 multicast routing functionality) • OSPF v3 • VRRP v3 • RIPng
SDN features	• Support for OpenFlow v1.0 and v1.3 • OpenFlow support with true hybrid port mode	• Operates seamlessly under the Brocade SDN Controller
Metro features	• Metro-Ring Protocol MRP (v1, v2) • Virtual Switch Redundancy Protocol (VSRP) • VLAN Stacking (Q-in-Q)	• VRRP • Topology Groups
Quality of Service (QoS)	• ACL Mapping and Marking of ToS/DSCP • ACL Mapping and Marking of 802.1p • ACL Mapping to Priority Queue • ACL Mapping to ToS/DSCP • Classifying and Limiting Flows Based on TCP Flags • DHCP Relay	• DiffServ Support • Honoring DSCP and 802.1p • MAC Address Mapping to Priority Queue • Priority Queue Management using Weighted Round Robin (WRR), Strict Priority (SP), and a combination of WRR and SP
IEEE standards compliance	• 802.1AB LLDP/LLDP-MED • 802.1D-2004 MAC Bridging • 802.1p Mapping to Priority Queue • 802.1s Multiple Spanning Tree • 802.1w Rapid Spanning Tree (RSTP) • 802.1x Port-based Network Access Control • 802.3 10Base-T • 802.3ab 1000Base-T • 802.3ad Link Aggregation (Dynamic and Static)	• 802.3ae 10 Gigabit Ethernet • 802.3af Power over Ethernet • 802.3at Power over Ethernet Plus • 802.3u 100Base-TX • 802.3x Flow Control • 802.3z 1000Base-SX/LX • 802.3 MAU MIB (RFC 2239) • 802.3az-2010 - EEE • 802.1Q VLAN Tagging
RFC standards compliance	For a complete list of RFCs supported by the Brocade FastIron® software platform, please visit www.brocade.com/fastironrfc.	
Traffic management	• ACL-based inbound rate limiting and traffic policies • Broadcast, multicast, and unknown unicast rate limiting	• Inbound rate limiting per port • Outbound rate limiting per port and per queue
High availability	• L3 VRRP protocol redundancy • Real-time state synchronization across the stack	• Hitless failover from master to standby stack controller • Hot insertion and removal of stacked units
Network and Device Management		
Management	• Auto Configuration • Configuration Logging • Digital Optical Monitoring • Display Log Messages on Multiple Terminals • Embedded Web Management • Embedded DHCP Server	• Industry-standard Command Line Interface (CLI) • Key-based activation of optional software features • Integration with HP OpenView for Sun Solaris, HP-UX, IBM AIX, and Windows • Brocade Network Advisor • MIB Support for MRP, Port Security, MAC Authentication, and MAC-based VLANs

Brocade ICX 7250 Specifications (Continued)

Management (continued)	• Out-of-band Ethernet Management • ERSPAN support for remote traffic monitoring • RFC 783 TFTP • RFC 854 TELNET Client and Server • RFC 951 Bootp • RFC 1157 SNMPv1/v2c • RFC 1213 MIB-II • RFC 1493 Bridge MIB • RFC 1516 Repeater MIB • RFC 1573 SNMP MIB II • RFC 1643 Ethernet Interface MIB • RFC 1724 RIP v1/v2 MIB • RFC 1757 RMON MIB • RFC 2068 Embedded HTTP	• RFC 2131 DHCP Server and DHCP Relay • RFC 2570 SNMPv3 Intro to Framework • RFC 2571 Architecture for Describing SNMP Framework • RFC 2572 SNMP Message Processing and Dispatching • RFC 2573 SNMPv3 Applications • RFC 2574 SNMPv3 User-based Security Model • RFC 2575 SNMP View-based Access Control Model SNMP • RFC 2818 Embedded HTTPS • RFC 3176 sFlow • SNTP Simple Network Time Protocol • Multiple Syslog Servers
Security	• 802.1X Accounting • MAC Authentication • DHCP snooping • Dynamic ARP inspection • Bi-level Access Mode (Standard and EXEC Level) • EAP pass-through support • IEEE 802.1X username export in sFlow • Protection against Denial of Service (DoS) attacks • Authentication, Authorization, and Accounting (AAA)	• Advanced Encryption Standard (AES) with SSHv2 • RADIUS/TACACS/TACACS+ • Secure Copy (SCP) • Secure Shell (SSHv2) • Username/Password • Web authentication • Change of Authorization (CoA) RFC 5176 • Flexible authentication
Environment		
Temperature	• Operating temperature: -5°C to 50°C/23°F to 122°F • Storage temperature: -25°C to 70°C/-13°F to 158°F	
Humidity	• Operating relative humidity: 5% to 95% at 50°C, non-condensing • Non-operating relative humidity: 0% to 95% at 70°C, non-condensing	
Altitude	• Operating altitude: 10,000 ft (3,000 m) maximum • Storage altitude: 39,000 ft (12,000 m) maximum	
Compliance/Certification		
Electromagnetic emissions	FCC Class A (Part 15); EN 55022/CISPR-22 Class A; VCCI Class A; ICES-003 Electromagnetic Emission; AS/NZS 55022; EN 61000-3-2 Power Line Harmonics; EN 61000-3-3 Voltage Fluctuation and Flicker; EN 61000-6-3 Emission Standard (supersedes: EN 50081-1)	
Safety	CAN/CSA-C22.2 NO. 60950-1-07; UL 60950-1 Second Edition; IEC 60950-1 Second Edition; EN 60950-1:2006 Safety of Information Technology Equipment; EN 60825-1 Safety of Laser Products—Part 1: Equipment Classification, Requirements and User's Guide; EN 60825-2 Safety of Laser Products—Part 2: Safety of Optical Fibre Communication Systems	
Immunity	EN 61000-6-1 Generic Immunity and Susceptibility (supersedes EN 50082-1); EN 55024 Immunity Characteristics (supersedes EN 61000-4-2 ESD); EN 61000-4-3 Radiated, Radio Frequency, Electromagnetic Field; EN 61000-4-4 Electrical Fast Transient; EN 61000-4-5 Surge; EN 61000-4-6 Conducted Disturbances Induced by Radio-Frequency Fields; EN 61000-4-8 Power Frequency Magnetic Field; EN 61000-4-11 Voltage Dips and Sags	
Environmental regulatory compliance	RoHS-compliant (6 of 6); WEEE-compliant	
Vibration	IEC 68-2-36, IEC 68-2-6	
Shock and drop	IEC 68-2-27, IEC 68-2-32	

Brocade ICX 7250 Ordering Information

Part Number	Description
Brocade ICX 7250 Switches	
ICX7250-24G	Brocade ICX 7250 Switch 24-port, 4×1 GbE (basic, non-upgradable switch) with front-to-back airflow, no EPS connector
ICX7250-24	Brocade ICX 7250 Switch 24-port, 8×1/10 GbE, no 10 GbE PoD license preloaded, with side-to-back airflow
ICX7250-24P	Brocade ICX 7250 Switch 24-port PoE, 8×1/10 GbE, no 10 GbE PoD license preloaded, with side-to-back airflow
ICX7250-48	Brocade ICX 7250 Switch 48-port, 8×1/10 GbE, no 10 GbE PoD license preloaded, with side-to-back airflow
ICX7250-48P	Brocade ICX 7250 Switch 48-port PoE, 8×1/10 GbE, no 10 GbE PoD license preloaded, with side-to-back airflow
Switches	**With 2×10 GbE PoD Licenses**
ICX7250-24-2X10G	Brocade ICX 7250 Switch 24-port, 8×1/10 GbE, 2×10 GbE PoD license preloaded
ICX7250-24P-2X10G	Brocade ICX 7250 Switch 24-port PoE, 8×1/10 GbE, 2×10 GbE PoD license preloaded
ICX7250-48-2X10G	Brocade ICX 7250 Switch 48-port, 8×1/10 GbE, 2×10 GbE PoD license preloaded
ICX7250-48P-2X10G	Brocade ICX 7250 Switch 48-port PoE, 8×1/10 GbE, 2×10 GbE PoD license preloaded
Brocade ICX-EPS 4000 External Power Supply Options for the Brocade ICX 7250 Switch The Brocade ICX-EPS4000 supports up to four removable power supplies. Each power supply provides 920 W.	
ICX-EPS4000-SHELF	1U EPS
RPS17	EPS power supply, 920 W
ICX-EPS4000-CBL-01	Brocade ICX-EPS4000 power cable 1:1
ICX-EPS4000-CBL-02	Brocade ICX-EPS4000 power cable 1:2
Feature License and Accessories	
ICX7250-PREM-LIC	Brocade ICX 7250 Layer 3 Premium software license (non-node lock)
ICX7250-2X10G-LIC-POD	2×10 GbE PoD license (node lock)—upgrade uplink/stacking ports from 8×1 GbE to 2×1 GbE/10 GbE + 6×1 GbE
ICX7250-8X10G-LIC-POD	Upgrade uplink/stacking ports from 2×1 GbE/10 GbE + 6×1 GbE to 8×1 GbE/10 GbE (node lock)
ICX7000-RMK	FRU, rack mount kit, two-post, Brocade ICX 7750/7450
XBR-R000295	FRU, rack mount kit, four-post, 24 in. to 32 in. depth rack
BR-NTWADV-IP-BASE	Brocade Network Advisor IP management software license for up to 50 devices; required for initial purchase of IP-only management; minimum of one year of support required
Optics	**For Brocade ICX 7250-24G Only**
E1MG-BXD	1000BASE-BXD SFP optic SMF, transmits at 1,490 nm and receives at 1,310 nm, LC connector, single strand SMF fiber. This optic should only be connected to an E1MG-BXU at the far end.
E1MG-BXU	1000BASE-BXU SFP optic SMF, transmits at 1,310 nm and receives at 1,490 nm, LC connector, single strand SMF fiber. This optic should only be connected to an E1MG-BXD at the far end.
E1MG-LHA-OM-T	1000BASE-LHA SFP optic, SMF, LC connector, optical monitoring capable (70 km), industrial temperature
E1MG-LX-OM	1000BASE-LX SFP optic, SMF, LC connector, optical monitoring capable
E1MG-SX-OM	1000BASE-SX SFP optic, MMF, LC connector, optical monitoring capable
E1MG-TX	1000BASE-TX SFP copper, RJ-45 connector

Brocade ICX 7250 Ordering Information (Continued)

Optics	For Brocade ICX 7250-24/24P/48/48P
10G-SFPP-ER	10GBASE-ER SFP+ optic (LC), for up to 40 km over SMF
10G-SFPP-LR	10GBASE-LR, SFP+ optic (LC), for up to 10 km over SMF
10G-SFPP-SR	10GBASE-SR, SFP+ optic (LC), target range 300 m over MMF
10G-SFPP-USR	10GE USR SFP+ optic (LC), target range 100 m over MMF, 1-pack
10G-SFPP-ZR	10GBASE-ZR SFP+ optic (LC), for up to 80 km over SMF
E1MG-BXD	1000BASE-BXD SFP optic SMF, transmits at 1,490 nm and receives at 1,310 nm, LC connector, single strand SMF fiber. This optic should only be connected to an E1MG-BXU at the far end.
E1MG-BXU	1000BASE-BXU SFP optic SMF, transmits at 1,310 nm and receives at 1,490 nm, LC connector, single strand SMF fiber. This optic should only be connected to an E1MG-BXD at the far end.
E1MG-LHA-OM-T	1000BASE-LHA SFP optic, SMF, LC connector, optical monitoring capable (70 km), industrial temperature
E1MG-LX-OM	1000BASE-LX SFP optic, SMF, LC connector, optical monitoring capable
E1MG-SX-OM	1000BASE-SX SFP optic, MMF, LC connector, optical monitoring capable
E1MG-TX	1000BASE-TX SFP Copper, RJ-45 connector
Direct-Attached Cables	**For Brocade ICX 7250-24/24P/48/48P**
10G-SFPP-TWX-0101	Direct-attached SFP+ copper cable, 1 m, 1-pack, active
10G-SFPP-TWX-0301	Direct-attached SFP+ copper cable, 3 m, 1-pack, active
10G-SFPP-TWX-0501	Direct-attached SFP+ copper cable, 5 m, 1-pack, active
10GE-SFPP-AOC-0701	10 GbE SFP+ direct-attached active optical cable, 7m, 1-pack
10GE-SFPP-AOC-1001	10 GbE SFP+ direct-attached active optical cable, 10 m, 1-pack
1G-SFP-TWX-0101	Direct-attached 1 GbE SFP copper cable, 1 m
1G-SFP-TWX-0501	Direct-attached 1 GbE SFP copper cable, 5 m

For a list of cables and fiber optics approved for stacking, visit www.brocade.com/fastironstacking.

Ordering Instructions

Customers have two options when ordering a Brocade ICX 7250 Switch. They can order one of the five Brocade ICX 7250 Switch models with 1 GbE uplink/stacking ports, or order a switch preloaded with a PoD license for two 10 GbE uplink/stacking ports.

The Brocade ICX 7250 (-24/-24P/-48/-48P) can be upgraded to 2×10 GbE uplink/stacking ports by purchasing a PoD license (ICX7250-2X10G-LIC-POD).

A Brocade ICX 7250 Switch with 2×10 GbE uplink/stacking ports can be upgraded to 8×10 GbE by purchasing an additional PoD license (ICX7250-8X10G-LIC-POD). Only switches that already have 2×10 GbE can be upgraded to 8×10 GbE.

Note that the Brocade ICX 7250-24G Switch is not upgradable and will support 4×1 GbE uplink ports only.

All Brocade ICX 7250 Switches include a power cord, two-post rack mounting brackets, and a USB serial console cable. Stacking cables must be ordered separately.

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BROCADE

DATA SHEET

Brocade ICX 7450 Switch

HIGHLIGHTS

- Offers ultimate flexibility and "pay as you grow" scalability in a modular design with three expansion slots for a choice of 1 GbE, 10 GbE, or 40 GbE uplinks, and a service module
- Supports next-generation 802.11ac Wave 2 wireless enterprise access points with 2.5 GbE ports
- Delivers market-leading stacking scalability of up to 12 switches per stack, 960 Gbps of aggregated stacking bandwidth, and long-distance stacking to enable single point management
- Provides OpenFlow support in true hybrid port mode, enabling a gradual transition to Software-Defined Networking (SDN) without disruption
- Offers Power over HDBaseT (PoH), to power video surveillance and video conferencing equipment, VDI terminals, and HD displays
- Meets compliance and data confidentiality requirements across corporate networks and cloud deployments by extending IPsec VPN to the wiring closet

Enterprise Stackable Switch Delivers Premium Capabilities and Ultimate Flexibility

The Brocade® ICX® 7450 Switch delivers the performance, flexibility, and scalability required for enterprise Gigabit Ethernet (GbE) access deployment. It offers market-leading stacking density with up to 12 switches (576 1 GbE and 48 1/10 GbE ports) per stack and combines chassis-level performance and reliability with the flexibility, cost-effectiveness, and "pay as you grow" scalability of a stackable solution. The mid-market stackable switch is one of the first in its class to offer 40 GbE uplinks, enabling enterprises to dramatically increase their network capacity while using their existing optical wire infrastructure. In addition, the Brocade ICX 7450 is the industry's first stackable switching solution to combine the performance and flexibility of network switching with the advantages of site-to-site IPsec VPN security to ensure end-to-end data integrity without the need for dedicated encryption appliances.

The unique design of the Brocade ICX 7450 provides three modular slots, offering up to 12 1/10 GbE SFP/SFP+ ports, 12 10GBASE-T ports, or up to three 40 GbE QSFP+ ports for uplink or stacking. As a result, the Brocade ICX 7450 can easily deliver sufficient bandwidth between the edge and aggregation layers to support expanding video traffic, VDI adoption, and high-speed wireless 802.11ac deployment. Additionally, the Brocade ICX 7450 delivers high performance across all ports for flawless support of latency-sensitive applications.

The Brocade ICX 7450 is an ideal network solution for campus network 1 GbE and 2.5 GbE access or small aggregation deployment with 10 GbE or 40 GbE uplinks to the core. The Brocade ICX 7450 also makes a very suitable data center Top-of-Rack (ToR) solution, delivering a mix of 1 GbE and 10 GbE server connectivity ports with 10 GbE or 40 GbE uplinks to the data center aggregation or core.

Scaling Out Ports as Demand Grows

The Brocade ICX 7450 is easy to deploy, manage, and integrate into both new and existing networks. Organizations can buy only what they need today, and easily

BROCADE CAMPUS FABRIC TECHNOLOGY

Brocade Campus Fabric technology brings campus networks into the modern era to better support seamless wireless mobility, security, and ease of application deployment. This innovative technology collapses multiple network layers into a single logical switch, flattening the network and eliminating deployment complexity while simplifying network management and reducing operating costs.

Brocade Campus Fabric technology enables organizations to build networks that deliver:

- **Consolidated management:** Reduces unnecessary network layers to create large management domains that eliminate individual switch touch points, reducing maintenance time and costs.
- **Shared network services:** Allows premium and entry-level switches to mesh together into a single logical switch and share advanced Layer 2/3 services, delivering lower price-per-port functionality without compromising performance.
- **Scale-out networking:** Integrates high-performance, fixed form-factor switches to create a single distributed logical switch that is independent of physical location and allows organizations to add ports whenever and wherever needed across the campus without adding complexity.

Figure 1: Up to 12 Brocade ICX 7450 switches can be stacked together using two full-duplex QSFP+ 40 Gbps ports that provide a fully redundant backplane with 960 Gbps of stacking bandwidth.

scale out as demand grows and new technologies emerge.

With three modular slots, the Brocade ICX 7450 enables organizations to grow their networks when necessary. Organizations can initially deploy 1 GbE or 10 GbE uplink ports and upgrade to 40 GbE ports on-demand with a new, high-speed module.

The Brocade ICX 7450 also offers a low-cost entry point. By providing the flexibility of a stackable switch, the Brocade ICX 7450 saves organizations from having to invest in a costly chassis upfront and tie up valuable capital. Instead, they can buy a single Brocade ICX 7450 Switch to get started and add new Brocade ICX 7450 Switches to the stack as their business grows.

Integrating High-Performance IPsec Service

As organizations move to a hybrid cloud architecture with geographically dispersed business partners, concerns about security breaches are increasing. Many organizations seek to better meet compliance and protect their data in transit—whether across the Internet or the enterprise network. Brocade offers an industry-first stackable switching solution that delivers encryption from the wiring closet, providing a cost-effective way to ensure data security and integrity across the premises without needing to purchase dedicated encryption appliances.

The Brocade ICX 7450 switch with the integrated IPsec VPN service module consolidates network switching and encryption to provide unprecedented VPN deployment flexibility and cost savings. By initiating an IPsec tunnel from the Brocade ICX 7450 for transporting selected traffic, organizations save the time and reduce the costs from having to install and manage encryption software on individual computers or deploy purpose-built encryption appliances.

The Brocade ICX 7450 Service Module provides hardware-based acceleration for IPsec VPNs using Advanced Encryption Standards (AES). It leverages programmable hardware technology to future-proof data protection, enabling more capabilities to be added as business needs evolve.

Brocade Campus Fabric Technology: Extending Options and Scalability

Brocade Campus Fabric technology, offered for Brocade ICX 7250*, 7450, and 7750 Switches, extends network options and scalability. It integrates premium Brocade ICX 7750, midrange Brocade ICX 7450, and entry-level Brocade ICX 7250 Switches, collapsing network access, aggregation, and core layers into a single logical switch. This logical device

* Support on the Brocade ICX 7250 to be available in a future release.

shares network services while reducing management touch points and network hops through a single-layer design spanning the entire campus network. These powerful deployments deliver equivalent or better functionality than large, rigid modular chassis systems, but with significantly lower costs and smaller carbon footprints.

Brocade ICX switches support a distributed chassis deployment model that uses standards-based optics and cabling interface connections to help ensure maximum distance between campus switches—up to 10 km—and minimum cabling costs. This gives organizations the flexibility to deliver
ports wherever they are needed on campus at a fraction of the cost.

Table 1: Brocade ICX 7450 models.

Brocade ICX 7450 Product Family	
All Brocade ICX 7450 models offer three modular slots for interchangeable uplink/stacking modules (one in the front, two in the back), dual power supply slots, dual fan trays, one RJ-45 network management port, one mini USB serial management port, and one USB storage port on the front panel.	
	**Brocade ICX 7450-24 Switch** 24×10/100/1000 Mbps RJ-45 ports
	**Brocade ICX 7450-24P Switch** 24×10/100/1000 Mbps RJ-45 PoE+ ports with eight pre-assigned ports supporting PoH (95 W)
	**Brocade ICX 7450-32ZP Switch** 24×10/100/1000 Mbps RJ-45 PoE+ ports with eight pre-assigned ports supporting PoH (95 W) and 8×100/1000 Mbps/ 2.5 GbE RJ-45 PoE+ ports
	**Brocade ICX 7450-48 Switch** 48×10/100/1000 Mbps RJ-45 ports
	**Brocade ICX 7450-48P Switch** 48×10/100/1000 Mbps RJ-45 PoE+ ports with eight pre-assigned ports supporting PoH (95 W)
	**Brocade ICX 7450-48F Switch** 48×100/1000 Mbps SFP ports

Figure 2: Brocade ICX 7450 rear view shown with two optional Brocade ICX7400-1X40GQ QSFP+ uplink/stacking modules, two AC power supplies, and two fan trays.

BROCADE ICX 7450 SWITCH AND CONTROLLER INTEROPERABILITY

The Brocade ICX 7450 Switch operates seamlessly with the Brocade SDN Controller and the applications running on the controller. This gives organizations the flexibility to move toward a dynamic infrastructure, benefiting from network application developments that help meet the operational or regulatory requirements of their industries.

The distributed chassis design future-proofs campus networks by allowing networks to easily and cost-effectively expand in scale and capabilities.

Flexible, Long-Distance Stacking for the Most Demanding Enterprise Environments

Brocade Ethernet switch stacking technology makes it possible to stack up to 12 Brocade ICX 7450 Switches together into a single logical switch using standard QSFP+ or SFP+ stacking ports. This allows the Brocade ICX 7450 to deliver a class-leading 960 Gbps of aggregated stacking bandwidth and offer simple and robust expandability for future growth at the network edge (see Figure 1).

A selection of standard QSFP+ or SFP+ copper cables or standard QSFP+ or SFP+ optics can be used to stack Brocade ICX 7450 Switches together, enabling stacking over distance and thereby eliminating the need for stacked switches to be colocated in the same wiring closet. This stacked logical switch also has only a single IP address to simplify management and offers transparent STP-free traffic forwarding and shared Link Aggregation Groups (LAG) across a pool of up to 576 1 GbE ports and 48 10 GbE ports. When new switches join the stack, they automatically inherit the stack's existing configuration file, enabling plug-and-play network expansion.

Brocade stacking technology also delivers high availability, enabling instantaneous hitless failover to a standby stack controller if the master stack controller fails. In addition, organizations can use hot-insertion and removal of stack members to avoid interrupting network services.

Simplified, Open-Standards-based Management and Monitoring

The Brocade ICX 7450 provides simplified, standards-based management capabilities that help organizations reduce administrative time and effort while securing their networks.

Table 2: Port and service module options for the Brocade ICX 7450.

Brocade ICX 7450 Port and Service Module Options	
Five different optional modules are offered for the Brocade ICX 7450. These modules are interchangeable and can be inserted in the three modular slots within the Brocade ICX 7450.[†]	
Brocade ICX7400-4X1GF Module	4-port 100 Mbps/1 GbE SFP
Brocade ICX7400-4X10GF Module	4-port 1/10 GbE SFP/SFP+ for uplink or stacking
Brocade ICX7400-4X10GC Module	4-port 1/10 GbE 10GBASE-T copper
Brocade ICX7400-1X40GQ Module	1-port 40 GbE QSFP+ for uplink or stacking
Brocade ICX7400-SERVICE-MOD Module	Service module for IPsec VPN encryption

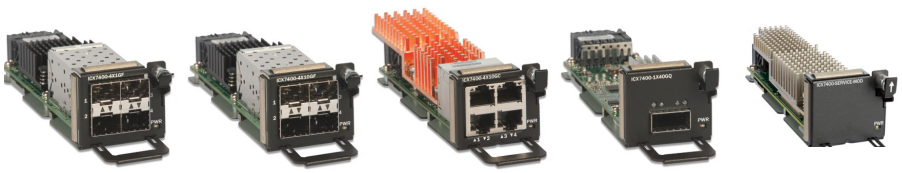

Figure 3: Five different optional port modules are offered for the Brocade ICX 7450 with a choice of 1 GbE SFP, 10 GbE SFP/SFP+, 10GBASE-T, and 40 GbE QSFP+ options and an IPsec VPN service module.

sFlow-based "Always-On" Network Monitoring

sFlow is a modern, standards-based network export protocol (RFC 3176) that addresses many of the challenges that network managers face today. By embedding sFlow hardware support into the Brocade ICX 7450, Brocade delivers an "always-on" technology that operates with wire-speed performance. sFlow dramatically reduces implementation costs compared to traditional network monitoring solutions that rely on mirrored ports, probes, and line-tap technologies. Moreover, sFlow gives organizations full, enterprise-wide monitoring capability for every port in the network.

Simplified, Automated Deployment with Auto-Provisioning

The Brocade ICX 7450 supports Zero Touch Provisioning, simplifying deployment with a truly plug-and-play experience. Organizations can use this feature to automate IP address and feature configuration of the switches without requiring a highly trained network engineer onsite. When the switches power up, they automatically receive an IP address and configuration from DHCP and Trivial File Transport Protocol (TFTP) servers. At this time, the switches can also automatically receive a software update to be at the same code revision as currently installed switches.

Open-Standards Management

The Brocade ICX 7450 includes an industry-standard Command Line Interface (CLI) and supports Secure Shell (SSHv2), Secure Copy (SCP), and SNMPv3 to restrict and encrypt management communications to the

[†] The Brocade ICX7400-1X40GQ module cannot be installed in the front-facing slot of the 48-port Brocade ICX 7450 models (Brocade ICX 7450-48, 7450-48P, 7450-48F, 7450-32ZP). The Brocade ICX7400-4X1GF module cannot be installed in the rear slots of any model of the Brocade ICX 7450 Switch and is not supported by the Brocade ICX 7450-32ZP model.

Table 3: Power supply options for the Brocade ICX 7450.

Brocade ICX 7450 Power Supply Options	
The Brocade ICX 7450 offers a selection of PoE/non-PoE and AC/DC power supply options with front-to-back or back-to-front airflow cooling options. The DC power supply can be installed in either PoE or no-PoE switches.	
RPS15-E power supply	Non-PoE 250 W AC with front-to-back airflow
RPS15-I power supply	Non-PoE 250 W AC with back-to-front airflow
RPS16-E power supply	PoE 1,000 W AC with front-to-back airflow
RPS16-I power supply	PoE 1,000 W AC with back-to-front airflow
RPS16DC-E power supply	PoE 510 W DC with front-to-back airflow
RPS16DC-I power supply	PoE 510 W DC with back-to-front airflow

Figure 4: The Brocade ICX 7450 offers a choice of 250 W AC, 1,000 W AC, or 510 W DC power supply options. All power supplies are available with front-to-back or back-to-front airflow.

system. In addition, support for Terminal Access Controller Access Control System (TACACS/TACACS+) and RADIUS authentication helps ensure secure operator access.

Out-of-Band Management

The Brocade ICX 7450 includes a 10/100/1000 Mbps RJ-45 Ethernet port dedicated to out-of-band management, providing a remote path to manage the switches, regardless of the status or configuration of the data ports.

SDN-Enabled Programmatic Control of the Network

Software-Defined Networking (SDN) is a powerful new network paradigm designed for the world's most demanding networking environments and promises breakthrough levels of customization, security, and efficiency. The Brocade ICX 7450 enables SDN by supporting the OpenFlow 1.3 protocol , which facilitates communication between the Brocade SDN Controller and the underlying network infrastructure.

In today's increasingly mobile world, organizations are looking to OpenFlow and SDN to achieve programmability in the campus LAN. The business needs driving SDN deployment are improved Quality of Service (QoS), enhanced security, and management simplification. With new policies such as BYOD significantly impacting campus networks, SDN is a powerful solution that better prioritizes and forwards traffic based on the context of a flow and to easily enforce granular policies for regulatory compliance or security reasons.

With hybrid-port mode on the Brocade ICX 7450 and all other Brocade ICX 7000 series switches, organizations can run traditional protocols and OpenFlow-directed flows at the same time. The Brocade ICX family supports the Brocade SDN Controller and other OpenDaylight-based controllers, enabling organizations to benefit from programmatic control through gradual transition of their network into the controller domain without disruption. Brocade ICX 7450 hardware support for OpenFlow ensures these traffic flows at line-rate speeds.

Unified Wired/Wireless Network Management with Brocade Network Advisor

Managing enterprise campus networks continues to become more complex due to the growth in services that rely on wired and wireless networks. Services such as Internet, e-mail, video conferencing, real-time collaboration, and distance learning all have specific configuration and management requirements. At the same time, organizations face increasing demand to provide uninterrupted services for high-quality voice and Unified Communications (UC), wireless mobility, and multimedia applications.

To reduce complexity and the time spent managing these environments, the easy-to-use Brocade Network Advisor discovers, manages, and deploys configurations to groups of IP devices. By using Brocade Network Advisor, organizations can configure Virtual LANs (VLANs) within the network, manage wireless access points, and execute commands on specific IP

devices or groups of IP devices. sFlow-based proactive monitoring is ideal for performing network-wide troubleshooting, generating traffic reports, and gaining visibility into network activity from the edge to the core. Brocade Network Advisor also centralizes the management of the entire family of Brocade wired products and Open Mobility partners' wireless products.

Ready for Next-Generation Wireless Technology

Between the phenomenal expansion of wireless networks and the fast-paced evolution of enterprise wireless technology, wired networks are being pushed to their limits. At the same time, the current lifecycle for wireless network technologies is much shorter than it is for wired Ethernet networks, meaning that today's wireless networks will likely be upgraded two or three times over the life of the wired network. It is therefore critical that organizations choose a wired network solution capable of supporting next-generation wireless technology.

The Brocade ICX 7450 is designed to handle next-generation 802.11ac Wave 2 wireless access points. The Brocade ICX 7450-32ZP offers 8×2.5 GbE ports to connect multigigabit wireless access points. Moreover, the switch's non-blocking architecture offers up to 240 Gbps of uplink bandwidth with up to 3×40 GbE uplink ports, ensuring smooth end-to-end traffic flow from the wireless edge to the core.

EEE Power Savings

The Brocade ICX 7450 Switch supports the IEEE 802.3az standard for Energy Efficient Ethernet (EEE), reducing power consumption during periods of low utilization. Ports are placed into a low power mode when no data is being transmitted.

Enterprise-Class Availability

When every second matters, Brocade ICX 7450 switches help deliver continuous availability to optimize the user experience. Brocade stacking technology delivers high availability, performing real-time state synchronization across the stack and enabling instantaneous hitless failover to a standby controller in the unlikely event of a failure of the master stack controller. Organizations also can use hot-insertion/removal of stack members to avoid interrupting service when adding a switch to increase the capacity of a stack or replacing a switch that needs servicing.

In addition to stack-level high availability, Brocade ICX 7450 Switches include system-level high-availability features, such as dual hot-swappable, load-sharing, and redundant power supplies. The modular design also has dual hot-swappable fan trays. These features provide another level of availability for the campus wiring closet, all in a compact form factor.

Support for PoH to Power Next-Generation Edge Devices

The Brocade ICX 7450 can deliver both power and data across network connections, providing a single-cable solution for the latest edge devices. In addition to supporting the Power over Ethernet (PoE/PoE+) standards, the Brocade ICX 7450 also supports Power over HDBaseT (PoH). This new, high power standard delivers up to 95 watts per port through a standard Ethernet cable, simplifying the wiring of next-generation Ethernet-connected devices such as large HD displays, video surveillance equipment, and VDI thin terminals, enabling data and power to be carried by a single Ethernet wire. The PoE/PoE+ and PoH capabilities reduce the number of required power receptacles and power adapters while increasing reliability and wiring flexibility.

With a 1,500-watt power budget per switch (with two power supplies), the Brocade ICX 7450 24- and 48-port PoE models can supply up to Class 4 PoE+ power (30 watts) to every port and PoH power (95 watts) on eight dedicated ports.

Full Layer 3 Capabilities

Brocade ICX 7450 Switches offer powerful IPv4 and IPv6 Layer 3 switching capabilities. Organizations can use optional premium Layer 3 features (available as an option)—such as IPv4/IPv6 OSPF and RIP routing, Policy-Based Routing (PBR), VRRP, and Protocol-Independent Multicast (PIM)—to reduce complexity and enhance the reliability of large enterprise networks by bringing Layer 3 capabilities to the network edge and/or aggregation layer. Premium Layer 3 capabilities include BGP routing, enabling remote offices to connect Brocade ICX 7450 Switches to service provider networks. Premium routing capabilities can be added to any Brocade ICX 7450 Switch model through software licensing.

Data Center ToR Switch for 1 GbE and 10 GbE Server Connectivity

Thanks to its class-leading 10 GbE and 40 GbE port count, the Brocade ICX 7450 is a great solution as a Top-of-Rack (ToR) switch in a mixed 1 GbE/10 GbE server connectivity environment. It is designed to fit in server racks, consuming only one rack unit and offering dual integrated power supplies and fan assemblies with front-to-back or back-to-front airflow for flexible cooling options. In data center environments where most servers have 1 GbE and some 10 GbE network interfaces, the Brocade ICX 7450 provides a compact and cost-effective 1 GbE/10 GbE ToR switch. In this configuration some of the Brocade ICX 7450 10 GbE or 40 GbE ports can be used to connect to the data center aggregation switches.

Warranty

The Brocade ICX 7450 Switch is covered by the Brocade Assurance® Limited Lifetime Warranty. For details, visit www.brocade.com/warranty.

Maximum Operational Efficiency and Investment Protection

To further improve operational efficiency, Brocade ICX 7450 Switches come with 90 days of free technical support from the Brocade Technical Assistance Center and free software updates. With these capabilities, organizations gain peace of mind while freeing up IT budget and resources to grow their businesses.

Brocade Global Services

Brocade Global Services has the expertise to help organizations build scalable, efficient cloud infrastructures. Leveraging 20 years of expertise in storage, networking, and virtualization, Brocade Global Services delivers world-class professional services, technical support, network monitoring services, and education, enabling organizations to maximize their Brocade investments, accelerate new technology deployments, and optimize the performance of networking infrastructures.

Affordable Acquisition Options

Brocade Capital Solutions helps organizations easily address their IT requirements by offering flexible network acquisition and support alternatives. Organizations can select from purchase, lease, Brocade Network Subscription, and Brocade Subscription Plus options to align network acquisition with their unique capital requirements and risk profiles. To learn more, visit www.brocade.com/capitalsolutions.

Maximizing Investments

To help optimize technology investments, Brocade and its partners offer complete solutions that include professional services, technical support, and education. For more information, contact a Brocade sales partner or visit www.brocade.com.

Brocade ICX 7450 Feature/Model Comparison

	24 or 48 RJ-45 Ports		24, 32, or 48 PoE+ Ports			48 SFP Ports
	Brocade ICX 7450-24	Brocade ICX 7450-48	Brocade ICX 7450-24P	Brocade ICX 7450-32ZP	Brocade ICX 7450-48P	Brocade ICX 7450-48F
Switching capacity (data rate, full duplex)	288 Gbps	336 Gbps	288 Gbps	328 Gbps	336 Gbps	336 Gbps
Forwarding capacity (data rate, full duplex)	214 Mpps	250 Mpps	214 Mpps	244 Mpps	250 Mpps	250 Mpps
Fixed ports: 10/100/1000 Mbps RJ45	24	48	24	24	48	
Fixed ports: 100/1000 Mbps SFP						48
Fixed ports: 100 Mbps/1000 Mbps/ 2.5 Gbps RJ45				8		
Modular slots	3	3	3	3	3	3
Modular ports: 1 GbE SFP (max.)	4	4	4		4	4
Modular ports: 1/10 GbE SFP/SFP+ (max.)	12	12	12	12	12	12
Modular ports: 1/10GBASE-T RJ45 (max.)	12	12	12	12	12	12
Modular ports: 40 GbE QSFP+ (max.)	3	2	3	2	2	2
Modular service: IPsec VPN	Supported	Supported	Supported		Supported	Supported
Maximum PoE ports (15.4 W)			24 (1 AC PSU)	32 (1 AC PSU)	48 (1 AC PSU)	
Maximum PoE+ ports (30 W)			24 (1 AC PSU)	32 (2 AC PSU)	48 (2 AC PSU)	
Maximum PoH ports (95 W)			8 (1 AC PSU)	8 (1 AC PSU)	8 (1 AC PSU)	
Advanced IPv4/v6 L3 routing (RIP, OSPF, BGP)	With license	With license	With license	With license	With license	With license
Aggregated stacking bandwidth	960 Gbps	960 Gbps	960 Gbps	960 Gbps	960 Gbps	960 Gbps
Stacking density (maximum switches in a stack)	12	12	12	12	12	12
Maximum stacking distance (distance between stacked switches)	10 km	10 km	10 km	10 km	10 km	10 km
Power						
Power inlet (AC)	C14					
Input voltage / frequency	AC: 100 to 240 VAC @ 50 to 60 Hz | DC: 40 to 60 VDC					
Power supply rated maximum output (AC)	2×250 W	2×250 W	2×1,000 W	2×1,000 W	2×1,000 W	2×250 W
Power supply rated maximum output (DC)	2×510 W	2×510 W	2×510 W	2×510 W	2×510 W	2×510 W
PoE power budget (AC) (two AC power supplies)			1,500 W	1,500 W	1,500 W	
PoE power budget (DC) (two DC power supplies)			516 W	516 W	516 W	
Switch power draw‡ (25°C) **Idle** (no PoE load) **10% traffic**§ (full PoE load) **100% traffic**§ (full PoE load)	 63 W 64 W 69 W	 93 W 95 W 100 W	 75 W 911 W 916 W	 90 W 922 W 930 W	 106 W 930 W 935 W	 119 W 120 W 123 W
Switch heat dissipation‡, ** (25°C) **Idle** (no PoE load) **10% traffic**§ (full PoE load) **100% traffic**§ (full PoE load)	 215 BTU/hr 218 BTU/hr 235 BTU/hr	 317 BTU/hr 324 BTU/hr 341 BTU/hr	 256 BTU/hr 259 BTU/hr 276 BTU/hr	 307 BTU/hr 314 BTU/hr 330 BTU/hr	 362 BTU/hr 369 BTU/hr 386 BTU/hr	 406 BTU/hr 409 BTU/hr 420 BTU/hr
Environment						
Weight‡	6.4 kg (14.11 lb)	6.5 kg (14.33 lb)	6.9 kg (15.21 lb)	7.2 kg (15.87 lb)	7.2 kg (15.87 lb)	6.8 kg (14.99 lb)
Dimensions	440 mm (17.323 in.) W × 393.7 mm (15.5 in.) D × 43.7 mm (1.720 in.) H; 1U					
Acoustics‡ (25°C, ISO 7779)	46 dBA	47 dBA	49 dBA	49 dBA	49 dBA	46 dBA
MTBF‡ (25°C)	628,369 hours	571,520 hours	466,576 hours	448,376 hours	444,360 hours	576,586 hours

‡ Switch includes one AC power supply, one fan, one 4×10 GbE SFP+ uplink module, two QSFP+ stacking modules.
§ Traffic load on all ports connected with maximum possible PoE/PoE+ loads (if equipped).
** PoE power not included in switch heat dissipation figures since the heat is not dissipated at the switch.

Brocade ICX 7450 Specifications

Capabilities

Connector options	• 10/100/1000 Mbps, 2.5 Gbps, 10 Gbps 10GBASE-T ports: RJ-45 • 100 Mbps SFP ports • 1 Gbps SFP ports • 10 Gbps SFP+ ports • 40 Gbps QSFP+ ports • Out-of-band Ethernet management: 10/100/1000 Mbps RJ-45 • Console management: Mini-USB RS232 serial port (Mini-B plug) • Storage: USB port, standard-A plug For the latest information about supported optics, please visit www.brocade.com/optics.
Maximum MAC addresses	32,768
Maximum VLANs	4,096
Maximum STP (spanning trees)	254
Maximum routes (in hardware)	15,168 (IPv4) 5,120 (IPv6)
Trunking	Maximum ports per trunk: 16 Maximum trunk groups: 256
Maximum jumbo frame size	9,216 bytes
QoS priority queues	8 per port
IPsec performance	Maximum throughput: 10 Gbps, full-duplex Maximum tunnels: 20
Multicast Groups	8192
VRF	16

Features

Layer 2 switching	• 802.1s Multiple Spanning Tree • 802.1x Authentication • Auto MDI/MDIX • BPDU Guard, Root Guard • Dual-Mode VLANs • MAC-based VLANs, Dynamic MAC-based VLAN activation • Dynamic Voice VLAN Assignment • Fast Port Span • GVRP • IGMP Snooping (v1/v2/v3) • IGMP Proxy for Static Groups • IGMP v2/v3 Fast Leave • IGMP Tracking • Inter-Packet Gap (IPG) adjustment • Link Fault Signaling (LFS) • MAC Address Filtering	• MAC Learning Disable • MLD Snooping (v1/v2) • Multi-device Authentication • Per-VLAN Spanning Tree (PVST/PVST+/PVRST) • Mirroring - Port-based, ACL-based, MAC Filter-based, and VLAN-based • Port Loop Detection • Private VLAN • Remote Fault Notification (RFN) • Single-instance Spanning Tree • Single-link LACP • Trunk Groups (static, LACP) • Uni-Directional Link Detection (UDLD) • Metro-Ring Protocol (MRP) (v1, v2) • Virtual Switch Redundancy Protocol (VSRP) • VLAN Stacking (Q-in-Q) • Topology Groups

Brocade ICX 7450 Specifications (Continued)

Base Layer 3 IP routing	• IPv4 and IPv6 static routes • ECMP • Port-based Access Control Lists • L3/L4 ACLs • Host routes	• Virtual Interfaces • Routed Interfaces • Route-only Support • Routing Between Directly Connected Subnets • "MSDP" in Base Layer 3 IP routing
Premium Layer 3 IP routing (with software license)	• IPv4 and IPv6 dynamic routes • RIP v1/v2, RIPng (IPv6) • OSPF v2, OSPF v3 (IPv6) • PIM-SM, PIM-SSM, PIM-DM, PIM passive (IPv4/IPv6 multicast routing functionality) • PBR	• Virtual Route Redundancy Protocol VRRP v3 (IPv6) • VRRP-E, VRRP-E (IPv6) • BGP4, BGP4+ (IPv6) • GRE • IPv6 over IPv4 tunnels • VRF (IPv4 and IPv6)
Quality of Service (QoS)	• ACL Mapping and Marking of ToS/DSCP (CoS) • ACL Mapping and Marking of 802.1p • ACL Mapping to Priority Queue • Classifying and Limiting Flows Based on TCP Flags • DiffServ Support	• Honoring DSCP and 802.1p (CoS) • MAC Address Mapping to Priority Queue • Priority Queue Management using Weighted Round Robin (WRR), Strict Priority (SP), and a combination of WRR and SP • Priority Flow Control
Traffic management	• ACL-based inbound rate limiting and traffic policies • Broadcast, multicast, and unknown unicast rate limiting	• Inbound rate limiting per port • Outbound rate limiting per port and per queue • Multicast traffic reduction
Security	• IPsec 128/256 AES-GCM (with service module) • MACsec • 802.1X Authentication • MAC Authentication • Flexible authentication • Web authentication • DHCP snooping • Dynamic ARP inspection • Ndian inspection • Bi-level Access Mode (Standard and EXEC Level) • EAP pass-through support • IEEE 802.1X username export in sFlow • Protection against Denial of Service (DoS) attacks • Authentication, Authorization, and Accounting (AAA) • MAC Address Locking MAC Port Security • Advanced Encryption Standard (AES) with SSHv2 • RADIUS/TACACS/TACACS+ • Secure Copy (SCP) • Secure Shell (SSHv2) • Local Username/Password • Change of Authorization (CoA) RFC 5176 • Dynamic VLAN assignment	• RFC Conformance for Encryption: - RFC 5996 Internet Key Exchange Protocol Version 2 (IKEv2) - RFC 4303 IP Encapsulating Security Payload (ESP) - RFC 6379 Suite B Cryptographic Suites for IPsec (Suite-B-GCM-256 and Suite-B-GCM-128) - RFC 5903 Elliptic Curve Groups Modulo a Prime (ECP Groups) for IKEv2 - RFC 4868 Using HMAC-SHA-256, HMAC-SHA-384, and HMAC-SHA-512 with IPsec - RFC 4754 IKEv2 Authentication Using the Elliptic Curve Digital Signature Algorithm (ECDSA) - RFC 4106 The use of Galois/Counter Mode (GCM) in IPsec Encapsulating Security Payload (ESP) - SP800-56A Recommendation for Pair-Wise Key Establishment Schemes Using Discrete Logarithm Cryptography
SDN features	• OpenFlow v1.0 and v1.3 • OpenFlow with hybrid port mode	• Operates with the Brocade SDN Controller and the applications running on the controller

Brocade ICX 7450 Specifications (Continued)

High availability	• Redundant hot-swappable power supplies • Hot-swappable fan trays • L3 VRRP/VRRP-E protocol redundancy • Real-time state synchronization across the stack	• Hitless failover and switchover from master to standby stack controller • Hot insertion and removal of stacked units • L2 VSRP switch redundancy
Network and Device Management		
Management	• DHCP Auto Configuration • CLI Logging • Digital Optical Monitoring • Display Log Messages on Multiple Terminals • Embedded Web Management (HTTP/HTTPS) • Embedded DHCP Server • Industry-standard Command Line Interface (CLI) • Brocade Network Advisor (sold separately) • Integration with HP OpenView: • USB file management and storage • Macro for batch execution • Out-of-band Ethernet Management • ERSPAN support for remote troubleshooting and traffic monitoring • TFTP For management MIB, please visit www.brocade.com.	• TELNET Client and Server • Bootp • SNMPv1/v2c • DHCP Server and DHCP Relay • SNMPv3 Intro to Framework • Architecture for Describing SNMP Framework • SNMP Message Processing and Dispatching • SNMPv3 Applications • SNMPv3 User-based Security Model • SNMP View-based Access Control Model SNMP • Embedded HTTPS • sFlow • NTP Network Time Protocol • Multiple Syslog Servers • SCP
IEEE standards compliance	• 802.1AB LLDP • 802.1D MAC Bridging • 802.1p Mapping to Priority Queue • 802.1s Multiple Spanning Tree (MST) • 802.1w Rapid Reconfiguration of Spanning Tree • 802.1x Port-based Network Access Control (PNAC)†† • 802.3 Carrier Sense Multiple Access/Collision Detection (CSMA/CD) • 802.3ab 1000BASE-T • 802.1 AX-2008 Link Aggregation • 802.3ae 10 Gigabit Ethernet	• 802.3af Power over Ethernet (15.4 W) • 802.3at Power over Ethernet Plus • 802.3u 100Base-TX • 802.3x Full duplex and Flow Control • 802.3z 1000Base-SX/LX • 802.3 MAU MIB (RFC 2239) • 802.3ba 40 and 100 Gbps Ethernet • 802.1AE-MACsec (with license) • 802.3az Energy Efficient Ethernet • 802.1Q VLAN Tagging • 802.1BR Bridge Port Extension
IETF RFC standards compliance	For a complete list of RFCs supported by the Brocade FastIron® software platform, please visit www.brocade.com/fastIronrfc.	

†† Partial support

Brocade ICX 7450 Specifications (Continued)

Environment	
Temperature	Operating temperature: -5°C to 50°C/23°F to 122°F Storage temperature: -40°C to 70°C/-40°F to 158°F
Humidity	Operating relative humidity: 10% to 90% at 50°C, non-condensing Non-operating relative humidity: 5% to 95% at 70°C, non-condensing
Altitude	Operating altitude: 10,000 ft. (3,000 m) maximum Storage altitude: 39,000 ft. (12,000 m) maximum
Compliance/Certification	
Electromagnetic emissions	FCC Class A (Part 15); EN 55022/CISPR-22 Class A; VCCI Class A; ICES-003 Electromagnetic Emission; AS/NZS 55022; EN 61000-3-2 Power Line Harmonics; EN 61000-3-3 Voltage Fluctuation and Flicker; EN 61000-6-3 Emission Standard
Safety	CAN/CSA-C22.2 NO. 60950-1-07; UL 60950-1; IEC60950-1; EN 60950-1:2006 Safety of Information Technology Equipment; EN 60825-1 Safety of Laser Products
Immunity	EN 61000-6-1 Generic Immunity and Susceptibility; EN 55024 Immunity Characteristics; EN 61000-4-3 Radiated, Radio Frequency, Electromagnetic Field; EN 61000-4-4 Electrical Fast Transient; EN 61000-4-5 Surge; EN 61000-4-6 Conducted Disturbances Induced by Radio-Frequency Fields; EN 61000-4-8 Power Frequency Magnetic Field; EN 61000-4-11 Voltage Dips and Sags
Environmental regulatory compliance	RoHS-compliant (6 of 6); WEEE-compliant
Vibration	IEC 68-2-36, IEC 68-2-6
Shock and drop	IEC 68-2-27, IEC 68-2-32

Brocade ICX 7450 Ordering Information

Part Number	Description
Switch Bundles	
ICX7450-24-E	24-port 1 GbE switch bundle includes 4×10 GbE SFP+ uplinks/stacking, 2×40 GbE QSFP+ uplinks/stacking, 1×250 W AC power supply and one fan, front-to-back airflow
ICX7450-24-40G-E	24-port 1 GbE switch bundle includes 3×40 GbE QSFP+ uplinks/stacking, 1×250 W AC power supply and one fan, front-to-back airflow
ICX7450-24P-E	24-port 1 GbE switch PoE+ bundle includes 4×10 GbE SFP+ uplinks/stacking, 2×40 GbE QSFP+ uplinks/stacking, 1×1,000 W AC power supply and one fan, front-to-back airflow
ICX7450-24P-40G-E	24-port 1 GbE switch PoE+ bundle includes 3×40 GbE QSFP+ uplinks/stacking, 1×1,000 W AC power supply and one fan, front-to-back airflow
ICX7450-24P-E-RMT3	24-port 1 GbE switch PoE+ bundle includes 4×10 GbE SFP+ uplinks/stacking, 2×40 GbE QSFP+ uplinks/stacking, 1×1,000 W AC power supply and one fan, front-to-back airflow, three years 24×7 remote support
ICX7450-32ZP-E	24-port 1 GbE and 8-port 2.5 GbE switch PoE+ bundle includes 4×10 GbE SFP+ uplinks/stacking, 2×40 GbE QSFP+ uplinks/stacking, 1×1,000 W AC power supply, and one front-to-back airflow fan
ICX7450-48-E	48-port 1 GbE switch bundle includes 4×10 GbE SFP+ uplinks/stacking, 2×40 GbE QSFP+ uplinks/stacking, 1×250 W AC power supply and one fan, front-to-back airflow
ICX7450-48P-E	48-port 1 GbE switch PoE+ bundle includes 4×10 GbE SFP+ uplinks/stacking, 2×40 GbE QSFP+ uplinks/stacking, 1×1,000 W AC power supply and one fan, front-to-back airflow
ICX7450-48P-E-RMT3	48-port 1 GbE switch PoE+ bundle includes 4×10 GbE SFP+ uplinks/stacking, 2×40 GbE QSFP+ uplinks/stacking, 1×1,000 W AC power supply and one fan, front-to-back airflow, three years 24×7 remote support
ICX7450-48P-STK-E	48-port 1 GbE switch PoE+ bundle includes 2×40 GbE QSFP+ uplinks/stacking, 1×1,000 W AC power supply and one fan, front-to-back airflow (stack member with no uplink module)
ICX7450-48P-STK-E-RMT3	48-port 1 GbE switch PoE+ bundle includes 2×40 GbE QSFP+ uplinks/stacking, 1×1,000 W AC power supply and one fan, front-to-back airflow, three years 24×7 remote support (stack member with no uplink module)
ICX7450-48F-E	48-port 1 GbE SFP fiber switch bundle includes 4×10 GbE SFP+ uplinks/stacking, 2×40 GbE QSFP+ uplinks/stacking, 1×250 W AC power supply and one fan, front-to-back airflow
ICX7450-48F-E-RMT3	48-port 1 GbE SFP fiber switch bundle includes 4×10 GbE SFP+ uplinks/stacking, 2×40 GbE QSFP+ uplinks/stacking, 1×250 W AC power supply and one fan, front-to-back airflow, three years 24×7 remote support
Bare Switches	
ICX7450-24	24-port 1 GbE switch with three modular slots for optional uplink/stacking ports. Power supplies, fans, and modules need to be ordered separately.
ICX7450-24P	24-port 1 GbE switch PoE+ with three modular slots for optional uplink/stacking ports. Power supplies, fans, and modules need to be ordered separately.
ICX7450-32ZP	24-port 1 GbE and 8-port 2.5 GbE switch PoE+ with three modular slots for optional uplink/stacking ports. Power supplies, fans, and modules need to be ordered separately.
ICX7450-48	48-port 1 GbE switch with three modular slots for optional uplink/stacking ports. Power supplies, fans, and modules need to be ordered separately.
ICX7450-48P	48-port 1 GbE switch PoE+ with three modular slots for optional uplink/stacking ports. Power supplies, fans, and modules need to be ordered separately.
ICX7450-48F	48-port 1 GbE switch SFP with three modular slots for optional uplink/stacking ports. Power supplies, fans, and modules need to be ordered separately.

Brocade ICX 7450 Ordering Information (Continued)

Part Number	Description
Modules	
ICX7400-4X1GF	Brocade ICX 7450 4-port 100 Mbps/1 GbE SFP module
ICX7400-4X10GF	Brocade ICX 7450 4-port 1/10 GbE SFP/SFP+ module (for stacking or uplinks)
ICX7400-4X10GC	Brocade ICX 7450 4-port 1/10 GbE 10GBASE-T copper module
ICX7400-1X40GQ	Brocade ICX 7450 1-port 40 GbE QSFP+ module (for stacking or uplink)
ICX7400-SERVICE-MOD	Brocade ICX 7450 Service Module for IPsec VPN encryption
Power Supplies and Fans	
RPS15-E	Brocade ICX 7450/6610 non-PoE 250 W AC power supply with front-to-back airflow
RPS15-I	Brocade ICX 7450/6610 non-PoE 250 W AC power supply with back-to-front airflow
RPS16-E	Brocade ICX 7450/6610 PoE 1,000 W AC power supply with front-to-back airflow
RPS16-I	Brocade ICX 7450/6610 PoE 1,000 W AC power supply with back-to-front airflow
RPS16DC-E	Brocade ICX 7450/6610 PoE 510 W DC power supply with front-to-back airflow
RPS16DC-I	Brocade ICX 7450/6610 PoE 510 W DC power supply with back-to-front airflow
ICX-FAN10-E	Brocade ICX 7450 front-to-back airflow fan
ICX-FAN10-I	Brocade ICX 7450 back-to-front airflow fan
Feature License and Accessories	
ICX7450-PREM-LIC	Brocade ICX 7450 Layer 3 Premium Software License
ICX-MACSEC-LIC	License to enable MACsec encryption
ICX7000-RMK	FRU, rack mount kit, two post, Brocade ICX 7750/7450
XBR-R000295	FRU, rack mount kit, four post, 24 in. to 32 in. depth rack
BR-NTWADV-IP-BASE	Brocade Network Advisor IP management software license for up to 50 devices; required for initial purchase of IP only management; minimum of one year of support required.
Optics	
E1MG-100FX-OM	100BASE-FX SFP optic MMF, LC connector, optical monitoring capable
E1MG-100FX-IR-OM	100BASE-FX IR SFP optic for SMF with LC connector, optical monitoring capable. For distances up to 15 km.
E1MG-100FX-LR-OM	100BASE-FX LR SFP optic for SMF with LC connector, optical monitoring capable. For distances up to 40 km.
E1MG-TX	1000BASE-TX SFP copper, RJ-45 connector
E1MG-SX-OM	1000BASE-SX SFP optic, MMF, LC connector, optical monitoring capable
E1MG-LX-OM	1000BASE-LX SFP optic, SMF, LC connector, optical monitoring capable
E1MG-LHA-OM-T	1000BASE-LHA SFP optic, SMF, LC connector, optical monitoring capable
E1MG-BXU	1000BASE-BXU SFP optic SMF, transmits at 1,310 nm and receives at 1,490 nm, LC connector, single-strand SMF fiber

Brocade ICX 7450 Ordering Information (Continued)

Part Number	Description
E1MG-BXD	1000BASE-BXD SFP optic SMF, transmits at 1,490 nm and receives at 1,310 nm, LC connector, single-strand SMF fiber
10G-SFPP-USR	10GE USR SFP+ optic (LC), target range 100 m over MMF, 1-pack
10G-SFPP-SR	10GBASE-SR, SFP+ optic (LC), target range 300 m over MMF
10G-SFPP-LR	10GBASE-LR, SFP+ optic (LC), for up to 10 km over SMF
10G-SFPP-ER	10GBASE-ER SFP+ optic (LC), for up to 40 km over SMF
10G-SFPP-ZR	10GBASE-ZR SFP+ optic (LC), for up to 80 km over SMF
10G-SFPP-LRM	10GBASE-LRM, 1,310 nm SFP+ optic (LC), TAR
40G-QSFP-SR-BIDI	40GE SR QSFP+ optic (LC), Bidirectional, 100 m over OM3 MMF
40G-QSFP-SR4	40GBASE-SR4 QSFP+ optic (MTP 1×8 or 1×12), 100 m over MMF, 1-pack
40G-QSFP-ESR4	40GBASE-ESR4 QSFP+ optic 400 m over MMF, 1 pack
40G-QSFP-LM4	40GBASE-LM4 QSFP+ optic (LC), for up to 160 m over MMF and 2 km over SMF, 1-pack
40G-QSFP-LR4	40GBASE-LR4 QSFP+ optic (LC), for up to 10 km over SMF, 1-pack
Direct-Attached Cables	
10G-SFPP-TWX-0101	Direct-attached SFP+ active copper cable, 1 m, 1-pack
10G-SFPP-TWX-0301	Direct-attached SFP+ active copper cable, 3 m, 1-pack
10G-SFPP-TWX-0501	Direct-attached SFP+ active copper cable, 5 m, 1-pack
10GE-SFPP-AOC-0701	Direct-attached SFP+ active optic cable, 7 m, 1-pack
10GE-SFPP-AOC-1001	Direct-attached SFP+ active optic cable, 10 m, 1-pack
40G-QSFP-C-00501	40 GbE QSFP+ direct-attached passive copper cable, 0.5 m, 1-pack
40G-QSFP-C-00508	40 GbE QSFP+ direct-attached passive copper cable, 0.5 m, 8-pack
40G-QSFP-C-0101	40 GbE QSFP+ direct-attached passive copper cable, 1 m, 1-pack
40G-QSFP-QSFP-C-0101	40 GbE QSFP+ direct-attached QSFP+ to QSFP+ active copper cable, 1 m, 1-pack
40G-QSFP-QSFP-C-0301	40 GbE QSFP+ direct-attached QSFP+ to QSFP+ active copper cable, 3 m, 1-pack
40G-QSFP-QSFP-C-0501	40 GbE QSFP+ direct-attached QSFP+ to QSFP+ active copper cable, 5 m, 1-pack
40G-QSFP-QSFP-AOC-1001	40 GbE QSFP+ direct-attached QSFP+ to QSFP+ active optic cable, 10 m, 1-pack

For the latest information about supported optics and cables, please visit www.brocade.com/optics.

Ordering Instructions

Customers have two options when ordering a Brocade ICX 7450 Switch. They can select one of the six pre-built units from the "Switch Bundles" section, or they can build their own custom unit by selecting a "Bare Switch" and adding their choice of power supplies, fans, port modules, and the IPsec VPN service module.

Pre-built units ordered from the "Switch Bundles" section include a power cord, two-post rack mounting brackets, and a USB serial console cable. Units ordered from the "Bare Switches" section include two-post rack mounting brackets and a USB serial console cable. AC power supplies ordered separately include a power cord. Stacking cables must be ordered separately.

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BROCADE

DATA SHEET

Brocade Network Advisor

HIGHLIGHTS

- Simplifies network operations with an intuitive interface and customizable dashboards
- Provides unprecedented visibility through integration with Brocade fabric technologies
- Reduces costs by automating tasks across the network operations lifecycle
- Unifies management of Fibre Channel and IP storage network devices
- Integrates seamlessly with industry-leading management solutions from Microsoft, VMware, EMC, HP, and IBM, maximizing the value of IT investments

Simplified Network Operations for Dynamic Networks

Under pressure to reduce costs, free up resources, and accelerate the introduction of cloud services, many organizations are standardizing their operational processes and policies. Operations teams are seeking ways to get ahead of performance issues and ensure maximum availability. Focus on the network is critical to avoid unexpected downtime, reduce ongoing operational costs, and enable IT and business agility.

Brocade® Network Advisor simplifies daily network operations with customizable dashboards that enable administrators to identify network problems quickly and maintain network availability. It unifies management of the Brocade IP and SAN portfolio, and integrates with third-party solutions, reducing the number of tools needed for end-to-end network visibility and control. In addition, Brocade Network Advisor unifies network monitoring to ensure critical systems are always up and running by providing discovery, troubleshooting, and reporting for Brocade IP, Ruckus Wireless, and SAN products. Brocade Network Advisor also automates repetitive tasks, enabling network teams to focus on proactively managing their network resources.

More Effective Network Operations

Brocade Network Advisor helps network teams efficiently manage the network operations lifecycle, including monitoring, diagnostics, change management, and troubleshooting. Brocade Network Advisor saves time and enables IT and business agility through:

- **Customizable, browser-accessible dashboards:** Proactively identify problem areas and prevent network downtime with at-a-glance summaries of all discovered Brocade devices and third-party IP devices.
- **Performance reporting:** Gain visibility into real-time and historical performance data for advanced troubleshooting and performance management.
- **Point-in-time analysis:** Filter dashboards to observe and report on trends, and use the playback feature to quickly identify errors that might have caused a network event.
- **Network scope:** Use simple, customizable filters to focus all dashboard widgets on a specific segment of the network, such as a department or device type.

- **Virtual infrastructure:** See Virtual Machine (VM) connectivity in topologies and sFlow reports, and use event insights to enhance network troubleshooting through VMware integrations.
- **Role-Based Access Control (RBAC):** Define granular administrator roles and privileges to support the needs of different SAN and IP network teams.
- **Event management:** Receive SNMP traps, syslog event messages, and customizable event alerts for reporting, analysis, and remediation.
- **Advanced Call Home:** Automatically collect diagnostic information and send notifications for faster fault detection, isolation, and remote support operations.

Data Center Storage Networks

Brocade Network Advisor simplifies management of data center fabrics with its performance dashboards, easy-to-use interface, and automation features. Storage and server administrators can proactively manage their storage network environments to support non-stop networking, address issues before they impact operations, and minimize manual tasks. Key capabilities and features include:

- **Consolidated storage views:** See both Gen 5 Fibre Channel and IP storage devices from a single, pre-defined storage dashboard—or view networks separately via individual storage dashboards.
- **Configuration and Operational Monitoring Policy Automation Services Suite:** Guard against drift from preferred configuration settings with configuration and policy violation monitoring, highlighted in dashboards.
- **Multiprotocol support:** Automate manual operations with configuration wizards for Fibre Channel SANs, FICON® and cascaded FICON environments, Fibre Channel over IP (FCIP) tunnels, and Fibre Channel over Ethernet (FCoE) networks.
- **Out of Range Violations widget:** Identify devices or ports with the most demanding traffic flows for proactive capacity planning.
- **VM-to-storage visibility:** Easily integrate insights from leading virtualization solutions for VM-to-LUN visibility and management.
- **Multivendor adapter management:** Monitor and report on Emulex and QLogic adapter properties for a more holistic view of the SAN.

Brocade Fabric Vision Technology

Brocade Network Advisor integrates with Brocade Fabric Vision™ technology to provide unprecedented visibility and insight across storage networks. Brocade Network Advisor supports the following Brocade Fabric Vision technology features:

- **Monitoring and Alerting Policy Suite (MAPS):** Apply pre-built, customizable rules and policies to multiple ports, switches, or fabrics in a single click and instantly visualize health and performance statistics of the SAN infrastructure in the dashboard, topology, and event views. Click through wizards to adjust configurations to ensure availability is maintained; minimal expertise is required.
- **Fabric Performance Impact (FPI) Monitoring:** Set pre-defined thresholds in a single click from MAPS and take action on latency alerts highlighted in the dashboard or via e-mail. Use customizable topology views to visually pinpoint which devices and hosts are impacted by a bottlenecked port. Use the wizard and right-click menus to diagnose and troubleshoot before performance begins to degrade.
- **Brocade ClearLink® Diagnostics:** Configure ports to diagnostic mode and view reports to validate optic and cable signal integrity before deployment.
- **Flow Vision:** Automatically configure application flows from the network topology view to accelerate and simplify troubleshooting and maximize performance.
- **Single-dialog bulk configuration:** Reduce time spent on repetitive tasks by deploying MAPS policies and rules across the fabric from a single dialog.

Enterprise Campus Networks

Brocade Network Advisor provides management for increasingly complex enterprise campus networks that support services such as video conferencing, real-time collaboration, and distance learning. Brocade Network Advisor helps network administrators deliver highly available wired and wireless networks by enabling:

- **Customizable health and performance dashboards:** Focus attention on the most critical health and performance indicators for the campus network.
- **Brocade campus fabrics:** Discover, configure, and manage firmware updates of campus fabrics as one product.
- **Discovery and monitoring:** Consolidate discovery and monitoring of wired and wireless solutions, including Ruckus Access Points (APs) and wireless controllers.
- **Policy monitoring:** Configure multiple check options, including end-to-end VLAN consistency.
- **Real-time alerts:** Receive instant notifications when users deviate from customizable configuration policies, ensuring compliance standards are maintained.
- **Report for audit and compliance:** Create and export reports for wired products and APs using pre-built templates that can be easily customized.

Metro and Carrier Ethernet Networks

Service providers must address the exponential growth in network traffic by helping to reduce operational costs, prevent bandwidth over-provisioning, and improve user service provisioning. Brocade Network Advisor helps service providers achieve these goals by providing:

- Discovery, monitoring, deployment, management, and configuration capabilities for metro and Carrier Ethernet networks
- Comprehensive MPLS service management with support for MPLS Virtual Private LAN Services (VPLS), Label Switched Path (LSP), Local VPLS, Virtual Leased Line (VLL), and Local VLL services
- The ability to detect, isolate, and report Ethernet faults with full support for the IEEE 802.1ag Connectivity Fault Management (CFM) set of standards

Advanced Management for VCS Fabrics

Brocade Network Advisor allows organizations to maximize their Brocade VCS® Fabric technology investments by enabling advanced management of Brocade VCS fabrics and Brocade VDX® switches. For more information on VCS Fabric technology, visit www.brocade.com/vcs.

Key VCS fabric technology features include:

- **Flexible management options:** Manage a VCS fabric as a single entity or logical chassis, or drill down to individual Brocade VDX switches.
- **VCS fabric visibility:** Gain end-to-end visibility from the data center edge to hosts and VMs, as well as across multiple VCS fabrics and at individual node levels.
- **VCS fabric diagnostics:** Visualize traffic paths, measure network latency, and perform fault isolation via hop-by-hop inspection to pinpoint bottlenecks.
- **sFlow-based monitoring:** Achieve VM-level monitoring and gain application performance insights through this integration.
- **Firmware management:** Receive non-disruptive firmware updates for the entire VCS fabric or for a subset of Brocade VDX switches within the fabric.
- **VCS Virtual Fabric management:** Create, edit, and delete virtual fabrics.
- **Automatic Migration of Port Profiles (AMPP) Management:** Create, read, inventory, delete, associate, and disassociate port profiles to VMs. Rapidly associate port profiles and VMware port groups managed by a single or multiple VMware vCenter servers. Perform integrity checks of the port profiles across Brocade VDX switch configurations, either in the same fabric or across different VCS fabrics.

Flexibility through Partner Integration

To ensure organizations maximize their existing investments, Brocade Network Advisor integrates with a wide range of network management solutions—including tools from VMware, Microsoft, HP, EMC, and IBM—to provide end-to-end network visibility. Organizations also have the flexibility to extract data directly from Brocade Network Advisor for integration with homegrown applications through Open Database Connectivity (ODBC), or SMI-S.

Integration options include:

- **Brocade Network Advisor REST APIs (SAN):** Enables third-party applications to leverage REST services to access Brocade Fabric Vision performance data, events, dashboard summaries, SAN zoning, and inventory. This enables further programmability and paves the way for cloud, virtual, and Software-Defined Networking (SDN).
- **Brocade integrations with VMware vRealize Operations Insight[1]:** Delivers health, risk, and efficiency insights from Brocade fabric technologies to dashboards in VMware vRealize Operations, enabling faster root-cause analysis and better VM and application performance. The vRealize Log Insight integration helps virtualization and cloud teams further troubleshoot from within vRealize, by presenting Brocade SAN and IP device log data.
- **Brocade Management Pack for Microsoft System Center Operations Manager (SCOM):** Provides visibility into the network connectivity of Microsoft SCOM servers and proactively responds to bottlenecks through policy-based actions.

Supported Technologies and Platforms

Brocade Network Advisor supports the entire Brocade portfolio, unifying network management under a single tool. For a complete list of supported products, refer to the Brocade Network Advisor Installation and Migration Guide.

Supported platforms and hardware include:

- Brocade DCX® Backbones
- Brocade FastIron® SX Series
- Brocade FastIron WS Series
- Brocade ICX® switches
- Brocade MLX® Series

[1] The Brocade Network Advisor license is required only for the VMware vRealize Operations Analytics Pack. All other adapters are available to download at no cost from the VMware Solutions Exchange.

- Brocade MLXe Core Routers
- Brocade CER 2000 Series
- Brocade SAN switches
- Brocade VDX switches
- Brocade vRouters
- QLogic and Emulex adapters
- Ruckus Wireless products

Brocade Global Services

Brocade Global Services has the expertise to help organizations build scalable, efficient cloud infrastructures. Leveraging 20 years of expertise in storage, networking, and virtualization, Brocade Global Services delivers world-class professional services, technical support, and education services, enabling organizations to maximize their Brocade investments, accelerate new technology deployments, and optimize the performance of networking infrastructures.

Training and Education

Brocade Global Education Services offers Web-based training and instructor-led courses to share product information, tips, and best practices—and to provide hands-on experience with Brocade Network Advisor.

Acquisition Options That Match Balance Sheet Objectives

Successful network deployments drive business forward, providing technical and financial agility. Brocade offers the broadest financing models, from traditional leasing to Brocade Network Subscription. Network-as-a-Service allows organizations to subscribe to network assets today then upgrade on demand, scale up or down, or return them with 60-day notification. Brocade Network Subscription plans can be structured to meet IASC guidelines for OpEx or CapEx treatment to align with financial goals. Learn more at www.nonetworkcapex.com.

Maximizing Investments

To help optimize technology investments, Brocade and its partners offer complete solutions that include professional services, technical support, and education. For more information, contact a Brocade sales partner or visit www.brocade.com.

System Requirements

Brocade Network Advisor software and documentation are available via download.
For details on the recommended system specifications, refer to the *Brocade Network Advisor Installation and Migration Guide*.

Supported Client and Server Operating Systems

- Windows Server 2008 R2 Standard, Data Center, and Enterprise Editions
- Windows Server 2012 and 2012 R2 Standard and Data Center Editions
- Windows 8 and 8.1 Enterprise
- Red Hat Enterprise Linux 6.4, 6.5, 6.6, and 6.7 Adv
- Oracle Enterprise Linux 6.4, 6.5, 7.0
- SUSE Linux Enterprise 11.3 and 12
- Guest VMs for the following operating systems: VMware ESXi (5.1/5.5), KVM RedHat Linux Enterprise 6.5, and Microsoft Hyper-V (Hyper-V Server 2008 R2, Windows Server 2012, and Windows Server 2012 R2 Data Center)

Server Requirements

For 64-bit Windows and Linux systems, Intel Core 2 Duo Dual-CPU, 2.4 GHz or equivalent, 8 to 16 GB RAM, 80 GB disk is required. 16 GB RAM is required for the SAN+IP bundle, and medium or large networks.

Browser Support

Windows versions of Firefox, Internet Explorer, and Chrome are supported.

Software Evaluation

A 120-day, full-featured evaluation version of Brocade Network Advisor is available for download from www.brocade.com/networkadvisor. Install the software in minutes and start managing your network more effectively today.

Ordering Information

Brocade Network Advisor comes in several packages, providing organizations with the flexibility to choose what best meets their network requirements. Package options include SAN-only, IP-only, SAN+IP, and SMI Agent-only. For additional details, refer to the *Brocade Network Advisor Software Licensing Guide*.

License	Description
SAN Professional (no license required)	Up to 300 SAN switch ports and 2 SAN fabrics
SAN Professional Plus	SAN management, supports up to 2,560 switch ports and 36 fabrics
SAN Enterprise	SAN management, supports up to 15,000 switch ports and 100 fabrics
IP Base[2]	IP management, supports multiple VCS fabrics, up to 50 IP devices
SAN Professional Plus with IP	SAN+IP management, supports up to 2,560 SAN switch ports, 36 SAN fabrics, and 150 IP devices
SAN Enterprise with IP	SAN+IP management, supports up to 15,000 SAN switch ports, 100 SAN fabrics, and 550 IP devices

[2] Additional licenses can be purchased for MPLS management and increased IP device support.

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