



The following documentation is an electronically-submitted vendor response to an advertised solicitation from the *West Virginia Purchasing Bulletin* within the Vendor Self-Service portal at ***wvOASIS.gov***. As part of the State of West Virginia's procurement process, and to maintain the transparency of the bid-opening process, this documentation submitted online is publicly posted by the West Virginia Purchasing Division at ***WVPurchasing.gov*** with any other vendor responses to this solicitation submitted to the Purchasing Division in hard copy format.

Header 3

List View

General Information

Contact

Default Values

Discount

Document Information

Procurement Folder: 327916

SO Doc Code: CRFQ

Procurement Type: Central Purchase Order

SO Dept: 0702

Vendor ID: 000000219154

SO Doc ID: TAX18000000004

Legal Name: SOFTWARE INFORMATION SYSTEMS LLC

Published Date: 9/13/17

Alias/DBA:

Close Date: 9/20/17

Total Bid: \$366,964.90

Close Time: 13:30

Response Date: 09/18/2017

Status: Closed

Response Time: 14:41

Solicitation Description: Addendum 3 - Storage Area Networks (SANs) and Fiber

Total of Header Attachments: 3

Total of All Attachments: 3



Purchasing Division
2019 Washington Street East
Post Office Box 50130
Charleston, WV 25305-0130

State of West Virginia
Solicitation Response

Proc Folder : 327916

Solicitation Description : Addendum 3 - Storage Area Networks (SANs) and Fiber Switches

Proc Type : Central Purchase Order

Date issued	Solicitation Closes	Solicitation Response	Version
	2017-09-20 13:30:00	SR 0702 ESR09181700000001076	1

VENDOR

000000219154

SOFTWARE INFORMATION SYSTEMS LLC

Solicitation Number: CRFQ 0702 TAX1800000004

Total Bid : \$366,964.90

Response Date: 2017-09-18

Response Time: 14:41:07

Comments:

FOR INFORMATION CONTACT THE BUYER

Michelle L Childers
(304) 558-2063
michelle.l.childers@wv.gov

Signature on File

FEIN #

DATE

All offers subject to all terms and conditions contained in this solicitation

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
1	SANs	2.00000	EA	\$124,427.390000	\$248,854.78

Comm Code	Manufacturer	Specification	Model #
43212200			

Extended Description : SEE 3.1.1 OF THE ATTACHED SPECIFICATIONS

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
2	FIBER SWITCHES	4.00000	EA	\$23,277.530000	\$93,110.12

Comm Code	Manufacturer	Specification	Model #
43222612			

Extended Description : SEE 3.1.2 OF THE ATTACHED SPECIFICATIONS

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
3	3 YEAR WARRANTY FOR SANs	2.00000	EA	\$0.000000	\$0.00

Comm Code	Manufacturer	Specification	Model #
81111818			

Extended Description : SEE 3.1.4 OF THE ATTACHED SPECIFICATIONS

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
4	3 YEAR WARRANTY FOR FIBER SWITCHES	4.00000	EA	\$0.000000	\$0.00

Comm Code	Manufacturer	Specification	Model #
81111818			

Extended Description : SEE 3.1.5 OF THE ATTACHED SPECIFICATIONS

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
5	INSTALLATION, IMPLENTATION, AND TRAINING	1.00000	EA	\$25,000.000000	\$25,000.00

Comm Code	Manufacturer	Specification	Model #
81111809			

Extended Description :	SEE 3.1.6 OF THE ATTACHED SPECIFICATIONS
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Purchasing Division
2019 Washington Street East
Post Office Box 50130
Charleston, WV 25305-0130

State of West Virginia
Request for Quotation
21 — Info Technology

Proc Folder: 327916

Doc Description: Addendum 3 - Storage Area Networks (SANs) and Fiber Switches

Proc Type: Central Purchase Order

Date Issued	Solicitation Closes	Solicitation No	Version
2017-09-13	2017-09-20 13:30:00	CRFQ 0702 TAX1800000004	4

BID RECEIVING LOCATION

BID CLERK

DEPARTMENT OF ADMINISTRATION

PURCHASING DIVISION

2019 WASHINGTON ST E

CHARLESTON

WV 25305

US

VENDOR

Vendor Name, Address and Telephone Number:

Software Information System, LLC
200 Association Drive, Suite 210
Charleston, WV 25311

307 768-1645

FOR INFORMATION CONTACT THE BUYER

Michelle L Childers

(304) 558-2063

michelle.l.childers@wv.gov

Signature X

FEIN #

01-1371685

DATE

9-20-2017

All offers subject to all terms and conditions contained in this solicitation

ADDITIONAL INFORMATION:

Addendum

Addendum 3 issued to address the following:

1. Answer vendor questions.
2. Modify the specifications.

End of Addendum 3

Request for Quotation

The West Virginia Purchasing Division is soliciting bids on behalf of the Tax Division to establish a contract for the one-time purchase of hardware, software, licensing, and support for a Storage Area Network (SAN) solution.

INVOICE TO		SHIP TO	
OPERATIONS DIVISION TAX DIVISION OF PO BOX 11748		INFORMATION TECHNOLOGY DIVISION TAX DIVISION OF 1001 LEE STREET STE M	
CHARLESTON	WV25339-1748	CHARLESTON	WV 25301
US		US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
1	SANs	2.00000	EA	124,427.39	248,854.78

Comm Code	Manufacturer	Specification	Model #
43212200			

Extended Description :

SEE 3.1.1 OF THE ATTACHED SPECIFICATIONS

INVOICE TO		SHIP TO	
OPERATIONS DIVISION TAX DIVISION OF PO BOX 11748		INFORMATION TECHNOLOGY DIVISION TAX DIVISION OF 1001 LEE STREET STE M	
CHARLESTON	WV25339-1748	CHARLESTON	WV 25301
US		US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
2	FIBER SWITCHES	4.00000	EA	23277.53	93110.12

Comm Code	Manufacturer	Specification	Model #
43222612			

Extended Description :

SEE 3.1.2 OF THE ATTACHED SPECIFICATIONS

INVOICE TO		SHIP TO	
OPERATIONS DIVISION TAX DIVISION OF PO BOX 11748		INFORMATION TECHNOLOGY DIVISION TAX DIVISION OF 1001 LEE STREET STE M	
CHARLESTON	WV25339-1748	CHARLESTON	WV 25301
US		US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
3	3 YEAR WARRANTY FOR SANs	2.00000	EA		<i>included</i>

Comm Code	Manufacturer	Specification	Model #
81111818			

Extended Description :
SEE 3.1.4 OF THE ATTACHED SPECIFICATIONS

INVOICE TO		SHIP TO	
OPERATIONS DIVISION TAX DIVISION OF PO BOX 11748		INFORMATION TECHNOLOGY DIVISION TAX DIVISION OF 1001 LEE STREET STE M	
CHARLESTON	WV25339-1748	CHARLESTON	WV 25301
US		US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
4	3 YEAR WARRANTY FOR FIBER SWITCHES	4.00000	EA		<i>included</i>

Comm Code	Manufacturer	Specification	Model #
81111818			

Extended Description :
SEE 3.1.5 OF THE ATTACHED SPECIFICATIONS

INVOICE TO		SHIP TO	
OPERATIONS DIVISION TAX DIVISION OF PO BOX 11748		INFORMATION TECHNOLOGY DIVISION TAX DIVISION OF 1001 LEE STREET STE M	
CHARLESTON	WV25339-1748	CHARLESTON	WV 25301
US		US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
5	INSTALLATION, IMPLENTATION, AND TRAINING	1.00000	EA		<i>\$25,000.00</i>

Exhibit A - Pricing Page
Storage Area Networks (SANs) and Fiber Switches

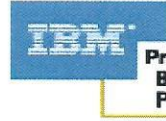
Item #	Part Number	Item Description	Brand of Equipment Bid	Unit of Measure	Quantity	Unit Cost	Extended Price
3.1.1		SANs	IBM V5000 SAN	Each	2	\$ 124,427.39	\$ 248,854.78
3.1.2		Fiber Switches	IBM SAN24B-5	Each	4	\$ 23,277.53	\$ 93,110.12
3.1.4		Warranty for SANs (3 years)	Included	Each	2	\$ -	\$ -
3.1.5		Warranty for Fiber Switches (3 Years)	Included	Each	4	\$ -	\$ -
3.1.6		Installation, Implentation, and Training		Each	1	\$ 25,000.00	\$ 25,000.00
						Total Bid Amount	\$ 366,964.90



Strategy | Technology | Results

200 Association Drive
Charleston, WV 25311
(304) 768-1645
(304) 768-1671 (fax)

West Virginia Purchasing Division
CRFQ 0702 TAX1800000004
Bid Date 9-20-2017



20-Sep-17

Attachment A - Pricing

Part Number	Charleston Production Description	Qty	Unit Price	Extended Price
V5000 SAN Includes 3 year 7 x 24 Warranty				
2078-312	V5030 LFF CONTROL	1	\$4,725.00	\$4,725.00
2078-312-9730	POWER CORD PDU CONNECTION	1	\$9.14	\$9.14
2078-312-AC0B	16GB FC ADAPTER PAIR	1	\$1,512.00	\$1,512.00
2078-312-AC3B	8TB 7.2K 3.5 INCH NL HDD	7	\$1,759.69	\$12,312.83
2078-312-ACE4	ENCRYPTION ENABLEMENT	1	\$1,575.00	\$1,575.00
2078-312-ACEC	ENCRYPTION USB DRIVE PACK	1	\$131.36	\$131.36
2078-312-ACHD	V5030 CACHE UPGRADE	1	\$510.62	\$510.62
2078-312-ADN1	ORDER TYPE 1 CTO	1	\$0.00	\$0.00
2078-312-AGCD	SHIPPING AND HANDLING 312	1	\$78.44	\$78.44
2078-312-AHPA	AC POWER SUPPLY HE	1	\$0.00	\$0.00
7014-T42	RS/6000 SYSTEM RACK	1	\$2,342.30	\$2,342.30
7014-T42-5889	INTELLIGENT PDU+, BASE OPTION	1	\$386.45	\$386.45
7014-T42-6069	FRONT DOOR FOR 2.0 METER RACK	1	\$324.50	\$324.50
7014-T42-6098	SIDE PANEL 1.8M/2M RACK BLACK	2	\$88.50	\$177.00
7014-T42-6654	P.CORD.4.3M.24A,NEMA L6-30PLG	2	\$141.60	\$283.20
7014-T42-7109	INTELLIGENT PDU+, 1 EIA UNIT	1	\$858.45	\$858.45
7014-T42-9002	FIELD INTEGRATION INDICATOR	1	\$0.00	\$0.00
7014-T42-9300	7014-T42-9300	1	\$0.00	\$0.00
7014-T42-ESC1	RACK S H A	1	\$236.00	\$236.00
5639-SV7	SPECTRUM VIRTUALIZE V5030	1	\$0.00	\$0.00
5639-SV7-0004	BAS 1YRSWMANT P S D QTY 1	2	\$650.48	\$1,300.96
5639-SV7-0005	BAS 1YRSWMANT P S D QTY 1	1	\$2,898.00	\$2,898.00
5639-SVU	SPECT VIRTUALIZE V5030 3YREG	1	\$0.00	\$0.00
5639-SVU-0004	FULL BUNDLE PER STORAGE DEVICE SW MAINT	2	\$260.19	\$520.38
5639-SVU-0006	V5030 MAINTBA 3YRREG PS D QTY	1	\$1,159.20	\$1,159.20
5639-SVU-9000	SWMA AUTO RENEW	1	\$0.00	\$0.00
2078-24F	V5000 SFF EXPANSION	1	\$1,260.00	\$1,260.00
2078-24F-9730	POWER CORD PDU CONNECTION	1	\$9.14	\$9.14
2078-24F-ACN2	7.68TB 2.5INCH FLASH DRIVE	8	\$11,237.50	\$89,900.00
2078-24F-ACUA	0.6M 12GB SAS CABLE MSAS HD	2	\$37.49	\$74.98
2078-24F-ADN1	ORDER TYPE 1 CTO	1	\$0.00	\$0.00
2078-24F-AGCG	SHIPPING AND HANDLING 24F	1	\$78.44	\$78.44
2078-24F-AHPA	AC POWER SUPPLY HE	1	\$0.00	\$0.00
5639-SSL	SPECTRUM VIRTUALIZE SOFTWARE FOR STORWIZ	1	\$0.00	\$0.00
5639-SSL-0001	BASE PER STORAGE DEVICE SW MAINT 3 YEAR	1	\$504.00	\$504.00
5639-SSL-9000	SWMA AUTO RENEW	1	\$0.00	\$0.00
5639-SV8	V50X0 EXPANSION	1	\$0.00	\$0.00
5639-SV8-0002	IBM V50X0 EXPANSION BASE SW WI	1	\$1,260.00	\$1,260.00
V5000 SAN Subtotal				\$124,427.39
Fiber Switches Includes 3 Year NBD Warranty				
2498-X24	IBM SYSTEM NETWORKING SAN24B-5	1	\$0.00	\$0.00
2498-X24-2602	SFP TRANSCEIVER 16 GBPS SW	4	\$324.55	\$1,298.20
2498-X24-2603	SFP TRANSCEIV 16GBPS SW 8PCK	1	\$2,595.10	\$2,595.10
2498-X24-2624	SAN24B5 16GBPS SW SFP BUNDLE	1	\$5,815.20	\$5,815.20
2498-X24-5998	SAN24B-5 POWER SUPPLY/FAN KIT	1	\$1,026.24	\$1,026.24
2498-X24-7216	SAN24B-5 ENTERPRISE BUNDLE2	1	\$8,124.40	\$8,124.40
2498-X24-7246	SAN24B5 12PORT 16GBPS SW UPG	1	\$4,362.80	\$4,362.80
2498-X24-AGF2	SHIPPING AND HANDLING F24	1	\$55.59	\$55.59
2498-X24	IBM SYSTEM NETWORKING SAN24B-5	1	\$0.00	\$0.00
2498-X24-2602	SFP TRANSCEIVER 16 GBPS SW	4	\$324.55	\$1,298.20
2498-X24-2603	SFP TRANSCEIV 16GBPS SW 8PCK	1	\$2,595.10	\$2,595.10
2498-X24-2624	SAN24B5 16GBPS SW SFP BUNDLE	1	\$5,815.20	\$5,815.20
2498-X24-5998	SAN24B-5 POWER SUPPLY/FAN KIT	1	\$1,026.24	\$1,026.24
2498-X24-7216	SAN24B-5 ENTERPRISE BUNDLE2	1	\$8,124.40	\$8,124.40
2498-X24-7246	SAN24B5 12PORT 16GBPS SW UPG	1	\$4,362.80	\$4,362.80
2498-X24-AGF2	SHIPPING AND HANDLING F24	1	\$55.59	\$55.59
Fiber Switches Subtotal				\$46,555.06

Part Number	Playwoods Solution Description	Qty	Unit Price	Extended Price
V5000 SAN Includes 3 year 7 x 24 Warranty				
2078-312	V5030 LFF CONTROL	1	\$4,725.00	\$4,725.00
2078-312-9730	POWER CORD PDU CONNECTION	1	\$9.14	\$9.14
2078-312-AC0B	16GB FC ADAPTER PAIR	1	\$1,512.00	\$1,512.00
2078-312-AC3B	8TB 7.2K 3.5 INCH NL HDD	7	\$1,759.69	\$12,312.83
2078-312-ACE4	ENCRYPTION ENABLEMENT	1	\$1,575.00	\$1,575.00
2078-312-ACEC	ENCRYPTION USB DRIVE PACK	1	\$131.36	\$131.36
2078-312-ACHD	V5030 CACHE UPGRADE	1	\$510.62	\$510.62
2078-312-ADN1	ORDER TYPE 1 CTO	1	\$0.00	\$0.00
2078-312-AGCD	SHIPPING AND HANDLING 312	1	\$78.44	\$78.44
2078-312-AHPA	AC POWER SUPPLY HE	1	\$0.00	\$0.00
7014-T42	RS/6000 SYSTEM RACK	1	\$2,342.30	\$2,342.30
7014-T42-5889	INTELLIGENT PDU+, BASE OPTION	1	\$386.45	\$386.45
7014-T42-6069	FRONT DOOR FOR 2.0 METER RACK	1	\$324.50	\$324.50
7014-T42-6098	SIDE PANEL 1.8M/2M RACK BLACK	2	\$88.50	\$177.00
7014-T42-6654	P.CORD 4.3M 24A NEMA L6-30PLG	2	\$141.60	\$283.20
7014-T42-7109	INTELLIGENT PDU+, 1 EIA UNIT	1	\$858.45	\$858.45
7014-T42-9002	FIELD INTEGRATION INDICATOR	1	\$0.00	\$0.00
7014-T42-9300	7014-T42-9300	1	\$0.00	\$0.00
7014-T42-ESC1	RACK S H A	1	\$236.00	\$236.00
5639-SV7	SPECTRUM VIRTUALIZE V5030	1	\$0.00	\$0.00
5639-SV7-0004	BAS 1YRSWMANT P S D QTY 1	2	\$650.48	\$1,300.96
5639-SV7-0005	BAS 1YRSWMANT P S D QTY 1	1	\$2,898.00	\$2,898.00
5639-SVU	SPECT VIRTUALIZE V5030 3YREG	1	\$0.00	\$0.00
5639-SVU-0004	FULL BUNDLE PER STORAGE DEVICE SW MAINT	2	\$260.19	\$520.38
5639-SVU-0006	V5030 MAINTBA 3YRREG PS D QTY	1	\$1,159.20	\$1,159.20
5639-SVU-9000	SWMA AUTO RENEW	1	\$0.00	\$0.00
2078-24F	V5000 SFF EXPANSION	1	\$1,260.00	\$1,260.00
2078-24F-9730	POWER CORD PDU CONNECTION	1	\$9.14	\$9.14
2078-24F-ACN2	7.68TB 2.5INCH FLASH DRIVE	8	\$11,237.50	\$89,900.00
2078-24F-ACUA	0.6M 12GB SAS CABLE MSAS HD	2	\$37.49	\$74.98
2078-24F-ADN1	ORDER TYPE 1 CTO	1	\$0.00	\$0.00
2078-24F-AGCG	SHIPPING AND HANDLING 24F	1	\$78.44	\$78.44
2078-24F-AHPA	AC POWER SUPPLY HE	1	\$0.00	\$0.00
5639-SSL	SPECTRUM VIRTUALIZE SOFTWARE FOR STORWIZ	1	\$0.00	\$0.00
5639-SSL-0001	BASE PER STORAGE DEVICE SW MAINT 3 YEAR	1	\$504.00	\$504.00
5639-SSL-9000	SWMA AUTO RENEW	1	\$0.00	\$0.00
5639-SV8	V50X0 EXPANSION	1	\$0.00	\$0.00
5639-SV8-0002	IBM V50X0 EXPANSION BASE SW WI	1	\$1,260.00	\$1,260.00
V5000 SAN Subtotal				\$124,427.39
Fiber Switches Includes 3 Year NBD Warranty				
2498-X24	IBM SYSTEM NETWORKING SAN24B-5	1	\$0.00	\$0.00
2498-X24-2602	SFP TRANSCEIVER 16 GBPS SW	4	\$324.55	\$1,298.20
2498-X24-2603	SFP TRANSCEIV 16GBPS SW 8PCK	1	\$2,595.10	\$2,595.10
2498-X24-2624	SAN24B5 16GBPS SW SFP BUNDLE	1	\$5,815.20	\$5,815.20
2498-X24-5998	SAN24B-5 POWER SUPPLY/FAN KIT	1	\$1,026.24	\$1,026.24
2498-X24-7216	SAN24B-5 ENTERPRISE BUNDLE2	1	\$8,124.40	\$8,124.40
2498-X24-7246	SAN24B5 12PORT 16GBPS SW UPG	1	\$4,362.80	\$4,362.80
2498-X24-AGF2	SHIPPING AND HANDLING F24	1	\$55.59	\$55.59
2498-X24	IBM SYSTEM NETWORKING SAN24B-5	1	\$0.00	\$0.00
2498-X24-2602	SFP TRANSCEIVER 16 GBPS SW	4	\$324.55	\$1,298.20
2498-X24-2603	SFP TRANSCEIV 16GBPS SW 8PCK	1	\$2,595.10	\$2,595.10
2498-X24-2624	SAN24B5 16GBPS SW SFP BUNDLE	1	\$5,815.20	\$5,815.20
2498-X24-5998	SAN24B-5 POWER SUPPLY/FAN KIT	1	\$1,026.24	\$1,026.24
2498-X24-7216	SAN24B-5 ENTERPRISE BUNDLE2	1	\$8,124.40	\$8,124.40
2498-X24-7246	SAN24B5 12PORT 16GBPS SW UPG	1	\$4,362.80	\$4,362.80
2498-X24-AGF2	SHIPPING AND HANDLING F24	1	\$55.59	\$55.59
Fiber Switches Subtotal				\$46,555.06
SANs Subtotal				\$248,854.78
Fiber Switch Subtotal				\$93,110.12
Installation, Implementation and Ttraining				\$25,000.00
Total				\$366,964.90

ADDENDUM ACKNOWLEDGEMENT FORM
SOLICITATION NO.:

Instructions: Please acknowledge receipt of all addenda issued with this solicitation by completing this addendum acknowledgment form. Check the box next to each addendum received and sign below. Failure to acknowledge addenda may result in bid disqualification.

Acknowledgment: I hereby acknowledge receipt of the following addenda and have made the necessary revisions to my proposal, plans and/or specification, etc.

Addendum Numbers Received:

(Check the box next to each addendum received)

- ☒ Addendum No. 1
- ☒ Addendum No. 2
- ☒ Addendum No. 3
- ☐ Addendum No. 4
- ☐ Addendum No. 5

- ☐ Addendum No. 6
- ☐ Addendum No. 7
- ☐ Addendum No. 8
- ☐ Addendum No. 9
- ☐ Addendum No. 10

I understand that failure to confirm the receipt of addenda may be cause for rejection of this bid. I further understand that any verbal representation made or assumed to be made during any oral discussion held between Vendor's representatives and any state personnel is not binding. Only the information issued in writing and added to the specifications by an official addendum is binding.

Software Information Systems LLC
Company

ED Alt
Authorized Signature

9-20-2017
Date

NOTE: This addendum acknowledgment should be submitted with the bid to expedite document processing.

DESIGNATED CONTACT: Vendor appoints the individual identified in this Section as the Contract Administrator and the initial point of contact for matters relating to this Contract.

Charles D. Arnett, Sr. Client Executive
(Name, Title)

(Printed Name and Title)

200 Association Drive Suite 210, Charleston, WV 25311
(Address)

304 768-1645 Fax 304 768-1671
(Phone Number) / (Fax Number)

carnett@thinksis.com
(email address)

CERTIFICATION AND SIGNATURE: By signing below, or submitting documentation through wvOASIS, I certify that I have reviewed this Solicitation in its entirety; that I understand the requirements, terms and conditions, and other information contained herein; that this bid, offer or proposal constitutes an offer to the State that cannot be unilaterally withdrawn; that the product or service proposed meets the mandatory requirements contained in the Solicitation for that product or service, unless otherwise stated herein; that the Vendor accepts the terms and conditions contained in the Solicitation, unless otherwise stated herein; that I am submitting this bid, offer or proposal for review and consideration; that I am authorized by the vendor to execute and submit this bid, offer, or proposal, or any documents related thereto on vendor's behalf; that I am authorized to bind the vendor in a contractual relationship; and that to the best of my knowledge, the vendor has properly registered with any State agency that may require registration.

Software Information Systems LLC
(Company)

Charles D. Arnett, Sr. Client Executive
(Authorized Signature) (Representative Name, Title)

Charles D. Arnett Sr. Client Executive
(Printed Name and Title of Authorized Representative)

9-20-2017
(Date)

304 768-1645 Fax 304 768-1671
(Phone Number) (Fax Number)

STATE OF WEST VIRGINIA
Purchasing Division

PURCHASING AFFIDAVIT

CONSTRUCTION CONTRACTS: Under W. Va. Code § 5-22-1(i), the contracting public entity shall not award a construction contract to any bidder that is known to be in default on any monetary obligation owed to the state or a political subdivision of the state, including, but not limited to, obligations related to payroll taxes, property taxes, sales and use taxes, fire service fees, or other fines or fees.

ALL OTHER CONTRACTS: Under W. Va. Code §5A-3-10a, no contract or renewal of any contract may be awarded by the state or any of its political subdivisions to any vendor or prospective vendor when the vendor or prospective vendor or a related party to the vendor or prospective vendor is a debtor and: (1) the debt owed is an amount greater than one thousand dollars in the aggregate; or (2) the debtor is in employer default.

EXCEPTION: The prohibition listed above does not apply where a vendor has contested any tax administered pursuant to chapter eleven of the W. Va. Code, workers' compensation premium, permit fee or environmental fee or assessment and the matter has not become final or where the vendor has entered into a payment plan or agreement and the vendor is not in default of any of the provisions of such plan or agreement.

DEFINITIONS:

"Debt" means any assessment, premium, penalty, fine, tax or other amount of money owed to the state or any of its political subdivisions because of a judgment, fine, permit violation, license assessment, defaulted workers' compensation premium, penalty or other assessment presently delinquent or due and required to be paid to the state or any of its political subdivisions, including any interest or additional penalties accrued thereon.

"Employer default" means having an outstanding balance or liability to the old fund or to the uninsured employers' fund or being in policy default, as defined in W. Va. Code § 23-2c-2, failure to maintain mandatory workers' compensation coverage, or failure to fully meet its obligations as a workers' compensation self-insured employer. An employer is not in employer default if it has entered into a repayment agreement with the Insurance Commissioner and remains in compliance with the obligations under the repayment agreement.

"Related party" means a party, whether an individual, corporation, partnership, association, limited liability company or any other form or business association or other entity whatsoever, related to any vendor by blood, marriage, ownership or contract through which the party has a relationship of ownership or other interest with the vendor so that the party will actually or by effect receive or control a portion of the benefit, profit or other consideration from performance of a vendor contract with the party receiving an amount that meets or exceeds five percent of the total contract amount.

AFFIRMATION: By signing this form, the vendor's authorized signer affirms and acknowledges under penalty of law for false swearing (W. Va. Code §61-5-3) that: (1) for construction contracts, the vendor is not in default on any monetary obligation owed to the state or a political subdivision of the state, and (2) for all other contracts, that neither vendor nor any related party owe a debt as defined above and that neither vendor nor any related party are in employer default as defined above, unless the debt or employer default is permitted under the exception above.

WITNESS THE FOLLOWING SIGNATURE:

Vendor's Name: Software Informatics Systems

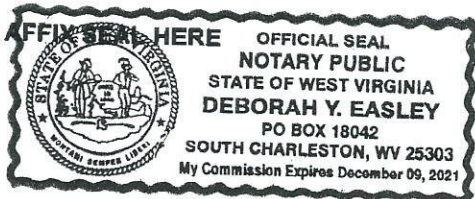
Authorized Signature: [Signature] Date: 9-5-2017

State of West Virginia

County of Kanawha, to-wit:

Taken, subscribed, and sworn to before me this 5 day of September, 2017

My Commission expires Dec. 9, 2021



NOTARY PUBLIC [Signature]

Purchasing Affidavit (Revised 07/07/2017)



Highlights

- Customize your storage system with flexible software and hardware options
 - Optimize performance with flash storage and automated tiering
 - Store up to five times more data on your existing storage with IBM compression technology¹
 - Consolidate and provide IBM® Storwize® V5000 capabilities to existing storage infrastructures
 - Enhance productivity with a fresh, new, intuitive and simplified graphical user interface (GUI)
-

IBM Storwize V5000

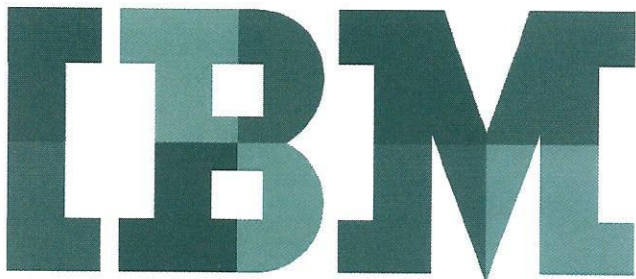
Designed to drive innovation and greater flexibility

The enterprise data storage marketplace is changing at a rapid pace. Organizations of all sizes are experiencing new business and IT operational challenges. Businesses now need greater data collaboration, agility and cost efficiency to stay ahead of the competition. Today, data is more important than ever for making highly informed decisions in real time. Security teams need data to recognize and prevent fraud before it happens. Call centers need data to help accelerate customer service. Most important, top executives need data to develop strategic insights for battling the competition.

With the rise of new applications that demand the integration of big-data analytics, mobility and social platforms, organizations require additional storage capacity, performance, advanced functionality and flexibility. IT must deliver more services faster and more efficiently, enable real-time insight and support more customer interaction. The right infrastructure allows clients to share information, secure transactions and drive real-time insights.

To enter the new era of business, organizations need robust storage solutions such as Storwize V5000 to provide comprehensive storage services, extraordinary scale and simplified management with all-flash or hybrid-flash options—all designed to support key business initiatives.

Three Storwize V5000 hybrid models—IBM Storwize V5030, IBM Storwize V5020 and IBM Storwize V5010—provide the flexibility to start small and keep growing while leveraging existing storage investments. And, to enable organizations with mid-sized workloads to achieve advanced performance, IBM Storwize V5030F provides an all-flash solution at an affordable price.



Utilizing IBM Spectrum Virtualize™ software at its core, Storwize V5000 is designed to optimize performance, providing virtualization capabilities and greater flexibility. It includes built-in functions such as IBM Real-time Compression™ and IBM Easy Tier® technology to deliver extraordinary levels of efficiency and high performance. Available in different models, Storwize V5000 delivers enterprise capabilities at entry-level pricing to help handle business-critical applications while controlling costs for growing organizations.

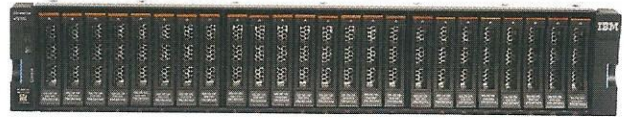
Multiply your possibilities. Storwize V5000 models provide the flexibility to start small and keep growing, while leveraging existing storage investments.

IBM Storwize also helps organizations achieve better data economics to support the traditional and new mobile, social and analytics workloads that are critical for success. The shift to cloud computing requires a fundamental shift in how organizations consume and support IT.

Storwize V5000 is intended to deliver more of what you need from storage with greater flexibility—while using fewer resources. Using innovative IBM technology, a single Storwize V5000 system can scale up to 760 drives per system (and up to 1,520 drives with two-way clustered systems).

Encompassing Storwize family functions

Storwize V5000 leverages proven Storwize family functions, management and interoperability features.



Enhance storage function

Built with IBM Spectrum Virtualize software, Storwize V5000 enables applications to run without disruption, even when changes are made to the storage infrastructure.

Available in the larger model, Storwize V5030 also extends capabilities to other storage systems. When virtualized, data in a storage system becomes part of the Storwize solution, and it can be managed in the same way as internal drives. Data in external systems inherits all the Storwize functional richness and ease-of-use features, including advanced replication, high-performance thin provisioning, encryption, Real-time Compression and Easy Tier.

Heterogeneous data services help improve administrator productivity and boost storage utilization while also enhancing and extending the value of existing storage investments.

IBM Spectrum Virtualize software in the three Storwize V5000 models provides advanced storage functions that enable VMware vSphere Virtual Volumes (VVOL) and support the latest capabilities in key operating environments including Microsoft Hyper-V, VMware vSphere, IBM PowerVM® and OpenStack.

Transform the economics of data with Real-time Compression

Real-time Compression in Storwize V5030 is designed to enable storing up to five times as much data in the same physical disk space by compressing data as much as 80 percent.²

Unlike other approaches to compression, Real-time Compression is designed to be used with active primary data such as production databases and email systems, which dramatically expands the range of candidate data that can benefit from compression. Real-time Compression operates immediately as data is written to the drive, meaning that no space is wasted storing uncompressed data awaiting post-processing.

When combined with external data virtualization, Real-time Compression can significantly enhance the usable capacity of existing storage systems, extending their useful life even further.

Improve storage access with Easy Tier

Easy Tier provides automatic migration of frequently accessed data to high-performing flash storage, enhancing usage efficiencies. Operating at a fine-grained granularity, the optional Easy Tier function automatically repositions different data types to the appropriate class of drives based on input/output (I/O) patterns and drive characteristics, requiring no administrative interaction.

Protect your most valuable asset—your data

To help protect sensitive data from unauthorized users, Storwize V5030 and Storwize V5020 give IT teams the full power of storage encryption. In addition to placing encryption inside hardware arrays—which protects only against a subset of data security risks—IBM Spectrum Virtualize software includes encryption capabilities in its management layer. This enables organizations to add encryption across their existing heterogeneous storage arrays, while leveraging a single point of control for encryption throughout the storage layer.

Storwize V5000 offers an optional IBM FlashCopy® function designed to create an almost-instant copy of active data, which can be used for backup purposes or for parallel-processing activities.

Should a catastrophic event occur at a data center, Storwize V5000 supports remote mirroring to create copies of data for use at a second location. Metro Mirror supports synchronous replication at distances up to 300 km (186 miles), whereas Global Mirror supports asynchronous replication at distances up to 8,000 km (4,970 miles). Replication can occur between any Storwize family offerings, and can include any supported virtualized storage. With IP networking, Storwize V5000 supports 1 GbE and 10 GbE connections, and uses innovative Bridgeworks WANrockIT technology to optimize the use of network bandwidth. As a result, the networking infrastructure may require lower speeds (and thus, lower costs), or users may be able to improve the accuracy of remote data through shorter replication cycles.

In addition, the IBM HyperSwap® function enables a single Storwize V5030 system to support servers in two data centers. In this configuration, the solution enables servers at both data centers to access data concurrently. When combined with server data mobility technologies such as VMware vMotion or PowerVM Live Partition Mobility, this configuration enables nondisruptive storage and virtual machine mobility between the two data centers.

Storwize V5000 also helps improve data availability with its support for Distributed RAID. The system allows data to be distributed across a large number of physical drives that are used simultaneously, achieving faster rebuild time. What's more, Distributed RAID can also deliver increased performance since data can be read from and written to more drives for a given I/O.

Avoid disruptions with dynamic migration

Moving data is one of the most common causes of planned downtime. Storwize V5000 includes a dynamic data-migration function that is designed to move data from existing storage into a new system or between arrays in a Storwize V5000

system, while maintaining user access to data. The data migration function might be used, for example, when replacing older storage with newer storage, as part of load-balancing work or when moving data in a tiered storage infrastructure.

Nondisruptive migration can speed time-to-value from weeks or months to days, minimize downtime for migration, help eliminate the cost of add-on migration tools, and may help avoid penalties and additional maintenance charges for lease extensions. The result can be real cost savings to your business.

Take advantage of additional features

In addition, Storwize V5000 includes:

- Innovative management capabilities, to ease storage management
- Dual clustering for Storwize V5030, to enable growth from smaller configurations

- High-density expansion enclosures, which can hold up to 92 drives and 1.4 PB in a 5U form factor.
- Support for OpenStack Cinder driver, which helps automate storage provisioning and volume management for organizations by combining the efficiency of Storwize V5000 with the OpenStack Compute cloud platform

Leveraging proven independent software vendor solutions

IBM is committed to continuous improvement and smooth application integration to optimize business results and minimize time-to-value. Our commitment is evident through our ongoing work and enduring partnerships with independent software vendors (ISVs) such as Microsoft, Oracle, SAP, Symantec and VMware.

IBM Storwize V5000 at a glance

Software	IBM Spectrum Virtualize software for Storwize V5030	IBM Spectrum Virtualize software for Storwize V5020	IBM Spectrum Virtualize software for Storwize V5010
User interface	Web-based GUI	Web-based GUI	Web-based GUI
Single or dual controller	Dual	Dual	Dual
Connectivity (standard)	10 Gb iSCSI 1 Gb iSCSI	12 Gb SAS 1 Gb iSCSI	1 Gb iSCSI
Connectivity (optional)	16 Gb Fibre Channel 12 Gb SAS 10 Gb iSCSI/Fibre Channel over Ethernet (FCoE) 1 Gb iSCSI	16 Gb Fibre Channel 12 Gb SAS 10 Gb iSCSI/FCoE 1 Gb iSCSI	16 Gb Fibre Channel 12 Gb SAS 10 Gb iSCSI/FCoE 1 Gb iSCSI

IBM Storwize V5000 at a glance

Cache (per system)	32 GB or 64 GB	16 GB or 32 GB	16 GB
Drives supported	<p>Small form-factor 2.5-inch disk drives:</p> <ul style="list-style-type: none"> • 300 GB, 600 GB @ 15k rpm • 900 GB, 1.2 TB, 1.8 TB @ 10k rpm • 2 TB @ 7.2k rpm SAS nearline <p>Large form-factor 3.5-inch disk drives:</p> <ul style="list-style-type: none"> • 300 GB, 600 GB, 900 GB @ 15k rpm, SAS (2.5-inch drive in a 3.5-inch drive carrier) • 900 GB, 1.2 TB, 1.8 TB @ 10k rpm, SAS (2.5-inch drive in a 3.5-inch drive carrier) • 2 TB*, 3 TB*, 4 TB, 6 TB, 8 TB, 10 TB @ 7.2k rpm <p>2.5-inch flash drives:</p> <ul style="list-style-type: none"> • 400 GB, 800 GB, 1.6 TB, 1.92 TB, 3.2 TB, 3.84 TB, 7.68 TB and 15.36 TB 	<p>Small form-factor 2.5-inch disk drives:</p> <ul style="list-style-type: none"> • 300 GB, 600 GB @ 15k rpm • 900 GB, 1.2 TB, 1.8 TB @ 10k rpm • 2 TB @ 7.2k rpm SAS nearline <p>Large form-factor 3.5-inch disk drives:</p> <ul style="list-style-type: none"> • 300 GB, 600 GB, 900 GB @ 15k rpm, SAS (2.5-inch drive in a 3.5-inch drive carrier) • 900 GB, 1.2 TB, 1.8 TB @ 10k rpm, SAS (2.5-inch drive in a 3.5-inch drive carrier) • 2 TB*, 3 TB*, 4 TB, 6 TB, 8 TB, 10 TB @ 7.2k rpm <p>2.5-inch flash drives:</p> <ul style="list-style-type: none"> • 400 GB, 800 GB, 1.6 TB, 1.92 TB, 3.2 TB, 3.84 TB, 7.68 TB and 15.36 TB 	<p>Small form-factor 2.5-inch disk drives:</p> <ul style="list-style-type: none"> • 300 GB, 600 GB @ 15k rpm • 900 GB, 1.2 TB, 1.8 TB @ 10k rpm • 2 TB @ 7.2k rpm SAS nearline <p>Large form-factor 3.5-inch disk drives:</p> <ul style="list-style-type: none"> • 300 GB, 600 GB, 900 GB @ 15k rpm, SAS (2.5-inch drive in a 3.5-inch drive carrier) • 900 GB, 1.2 TB, 1.8 TB @ 10k rpm, SAS (2.5-inch drive in a 3.5-inch drive carrier) • 2 TB*, 3 TB*, 4 TB, 6 TB, 8 TB, 10 TB @ 7.2k rpm <p>SSD 2.5-inch drives:</p> <ul style="list-style-type: none"> • 400 GB, 800 GB, 1.6 TB, 1.92 TB, 3.2 TB, 3.84 TB, 7.68 TB and 15.36 TB
Maximum drives supported	<p>Maximum of 760 drives per system and 1,520 drives in two-way clustered:</p> <ul style="list-style-type: none"> • Small form-factor enclosure: 24 x 2.5-inch drives • Large form-factor enclosure: 12 x 3.5-inch drives • High-density expansion enclosure: 92 x 3.5-inch drives 	<p>Maximum of 392 drives per system:</p> <ul style="list-style-type: none"> • Small form-factor enclosure: 24 x 2.5-inch drives • Large form-factor enclosure: 12 x 3.5-inch drives • High-density expansion enclosure: 92 x 3.5-inch drives 	<p>Maximum of 392 drives per system:</p> <ul style="list-style-type: none"> • Small form-factor enclosure: 24 x 2.5-inch drives • Large form-factor enclosure: 12 x 3.5-inch drives • High-density expansion enclosure: 92 x 3.5-inch drives or 2.5-inch drives
Maximum expansion enclosure capacity	<ul style="list-style-type: none"> • Standard expansion enclosures: up to 20 standard expansion enclosures per controller • High-density expansion enclosures: up to 8 high-density expansion enclosures per controller 	<ul style="list-style-type: none"> • Standard expansion enclosures: up to 10 standard expansion enclosures per controller • High-density expansion enclosures: up to 4 high-density expansion enclosures per controller 	<ul style="list-style-type: none"> • Standard expansion enclosures: up to 10 standard expansion enclosures per controller • High-density expansion enclosures: up to 4 high-density expansion enclosures per controller
RAID levels	RAID 0, 1, 5, 6, 10, Distributed	RAID 0, 1, 5, 6, 10, Distributed	RAID 0, 1, 5, 6, 10, Distributed

IBM Storwize V5000 at a glance

Fans and power supplies	Fully redundant, hot-swappable	Fully redundant, hot-swappable	Fully redundant, hot-swappable
Rack support	Standard 19-inch	Standard 19-inch	Standard 19-inch
Advanced functions included with each system	<ul style="list-style-type: none"> • Embedded GUI • Virtualization of internal storage • Thin provisioning • One-way data migration • Dual-system clustering 	<ul style="list-style-type: none"> • Embedded GUI • Virtualization of internal storage • Thin provisioning • One-way data migration 	<ul style="list-style-type: none"> • Embedded GUI • Virtualization of internal storage • Thin provisioning • One-way data migration
Additional available advanced functions	<ul style="list-style-type: none"> • Easy Tier • FlashCopy • Remote mirroring • Encryption • Real-time Compression • External virtualization 	<ul style="list-style-type: none"> • Easy Tier • FlashCopy • Remote mirroring • Encryption 	<ul style="list-style-type: none"> • Easy Tier • FlashCopy • Remote mirroring
Size†	<p>8.7 cm (3.4 in.) H x 48.3 cm (19.0 in.) W x 55.6 cm (21.9 in.) D</p> <ul style="list-style-type: none"> • Approximate weight: <ul style="list-style-type: none"> – Large form-factor control enclosure: <ul style="list-style-type: none"> ○ Empty: 18.0 kg (39.6 lb) ○ Fully configured: 28.3 kg (62.2 lb) – Large form-factor expansion enclosure: <ul style="list-style-type: none"> ○ Empty: 16.4 kg (36.1 lb) ○ Fully configured: 26.7 kg (58.8 lb) – Small form-factor control enclosure: <ul style="list-style-type: none"> ○ Empty: 19.0 kg (41.8 lb) ○ Fully configured: 27.3 kg (60.0 lb) – Small form-factor expansion enclosure: <ul style="list-style-type: none"> ○ Empty: 16.7 kg (36.7 lb) ○ Fully configured: 25.0 kg (55.2 lb) 	<p>8.7 cm (3.4 in.) H x 48.3 cm (19.0 in.) W x 55.6 cm (21.9 in.) D</p> <ul style="list-style-type: none"> • Approximate weight: <ul style="list-style-type: none"> – Large form-factor control enclosure: <ul style="list-style-type: none"> ○ Empty: 18.0 kg (39.6 lb) ○ Fully configured: 28.3 kg (62.2 lb) – Large form-factor expansion enclosure: <ul style="list-style-type: none"> ○ Empty: 16.4 kg (36.1 lb) ○ Fully configured: 26.7 kg (58.8 lb) – Small form-factor control enclosure: <ul style="list-style-type: none"> ○ Empty: 19.0 kg (41.8 lb) ○ Fully configured: 27.3 kg (60.0 lb) – Small form-factor expansion enclosure: <ul style="list-style-type: none"> ○ Empty: 16.7 kg (36.7 lb) ○ Fully configured: 25.0 kg (55.2 lb) 	<p>8.7 cm (3.4 in.) H x 48.3 cm (19.0 in.) W x 55.6 cm (21.9 in.) D</p> <ul style="list-style-type: none"> • Approximate weight: <ul style="list-style-type: none"> – Large form-factor control enclosure: <ul style="list-style-type: none"> ○ Empty: 18.0 kg (39.6 lb) ○ Fully configured: 28.3 kg (62.2 lb) – Large form-factor expansion enclosure: <ul style="list-style-type: none"> ○ Empty: 16.4 kg (36.1 lb) ○ Fully configured: 26.7 kg (58.8 lb) – Small form-factor control enclosure: <ul style="list-style-type: none"> ○ Empty: 19.0 kg (41.8 lb) ○ Fully configured: 27.3 kg (60.0 lb) – Small form-factor expansion enclosure: <ul style="list-style-type: none"> ○ Empty: 16.7 kg (36.7 lb) ○ Fully configured: 25.0 kg (55.2 lb)

IBM Storwize V5000 at a glance

Operating environment	<ul style="list-style-type: none"> Air temperature: <ul style="list-style-type: none"> Operating: 10°C – 35°C (50°F – 95°F) at 30.5 m below to 3,000 m above sea level (100 ft below to 9,840 ft above) Non-operating: -10°C – 50°C (14°F – 125°F) Relative humidity: <ul style="list-style-type: none"> Operating: 20% – 80% Non-operating: 10% – 90% 	<ul style="list-style-type: none"> Air temperature: <ul style="list-style-type: none"> Operating: 10°C – 35°C (50°F – 95°F) at 30.5 m below to 3,000 m above sea level (100 ft below to 9,840 ft above) Non-operating: -10°C – 50°C (14°F – 125°F) Relative humidity: <ul style="list-style-type: none"> Operating: 20% – 80% Non-operating: 10% – 90% 	<ul style="list-style-type: none"> Air temperature: <ul style="list-style-type: none"> Operating: 10°C – 35°C (50°F – 95°F) at 30.5 m below to 3,000 m above sea level (100 ft below to 9,840 ft above) Non-operating: -10°C – 50°C (14°F – 125°F) Relative humidity: <ul style="list-style-type: none"> Operating: 20% – 80% Non-operating: 10% – 90%
Warranty	<p>Hardware:</p> <ul style="list-style-type: none"> Flexible warranty <ul style="list-style-type: none"> One- or three-year warranty with 9 to 5 next-business-day response (dependent upon machine type) Tier 1 customer-replaceable units and on-site repairs Warranty service upgrades available Post-warranty support available Customer setup (initial installation and field upgrades) <p>Software:</p> <ul style="list-style-type: none"> Initial license purchase Software maintenance agreement available 	<p>Hardware:</p> <ul style="list-style-type: none"> Flexible warranty <ul style="list-style-type: none"> One- or three-year warranty with 9 to 5 next-business-day response (dependent upon machine type) Tier 1 customer-replaceable units and on-site repairs Warranty service upgrades available Post-warranty support available Customer setup (initial installation and field upgrades) <p>Software:</p> <ul style="list-style-type: none"> Initial license purchase Software maintenance agreement available 	<p>Hardware:</p> <ul style="list-style-type: none"> Flexible warranty <ul style="list-style-type: none"> One- or three-year warranty with 9 to 5 next-business-day response (dependent upon machine type) Tier 1 customer-replaceable units and on-site repairs Warranty service upgrades available Post-warranty support available Customer setup (initial installation and field upgrades) <p>Software:</p> <ul style="list-style-type: none"> Initial license purchase Software maintenance agreement available
Supported systems	For a list of currently supported servers, operating systems, host bus adapters, clustering applications, and SAN switches and directors, refer to the IBM System Storage Interoperation Center at: ibm.com/systems/support/storage/config/ssic	For a list of currently supported servers, operating systems, host bus adapters, clustering applications, and SAN switches and directors, refer to the IBM System Storage Interoperation Center at: ibm.com/systems/support/storage/config/ssic	For a list of currently supported servers, operating systems, host bus adapters, clustering applications, and SAN switches and directors, refer to the IBM System Storage Interoperation Center at: ibm.com/systems/support/storage/config/ssic
ISV solutions	For a list of high-quality solutions with IBM partner ISVs, including access to solution briefs and white papers, refer to the ISV Solutions Resource Library	For a list of high-quality solutions with IBM partner ISVs, including access to solution briefs and white papers, refer to the ISV Solutions Resource Library	For a list of high-quality solutions with IBM partner ISVs, including access to solution briefs and white papers, refer to the ISV Solutions Resource Library

Why IBM?

The Storwize family of products from IBM, a recognized leader in the storage industry, is known for providing efficiency and high-performance storage for almost any type of workload. IBM storage offerings customized for small, mid-sized and large organizations are designed to deliver performance in streamlined packages that are easy to buy, deploy and manage.

Offered in a wide range of storage systems, the Storwize family delivers sophisticated capabilities that help control costs for growing businesses.

For more information

To learn more about IBM Storwize V5000, please contact your IBM representative or IBM Business Partner, or visit: ibm.com/us-en/marketplace/storage-consolidation

To learn more about IBM Storwize V5030F all-flash, please contact your IBM representative or IBM Business Partner, or visit: ibm.com/systems/storage/storwize/all-flash

IBM Global Financing can help enable credit-qualified clients to transform their business with affordable options to acquire the latest IT solutions, visit: ibm.com/financing



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Produced in the United States of America
August 2017

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Actual available storage capacity may be reported for both uncompressed and compressed data and will vary and may be less than stated.

* Available only in Storwize V5000 generation 1.

[†] To assure installation and serviceability in non-IBM industry-standard racks, review the installation planning information for any product-specific installation requirements.

¹ IBM lab measurements – April 2012.

² IBM lab measurements – August 2010.



Please Recycle





Highlights

- Gain flexibility, simplicity and enterprise-class functionality in a 24-port, 1U form factor entry-level switch
 - Scale from 12 to 24 ports using Ports on Demand (PoD) capabilities
 - Leverage Fabric Vision technology¹ and IBM® Network Advisor² dashboards to simplify administration, increase uptime and reduce costs
 - Maximize resiliency with nondisruptive software upgrades and redundant power supply option
 - Simplify deployment with the EZSwitchSetup wizard and support high-performance fabrics by using ClearLink Diagnostic Ports (D_Ports)
-

IBM System Networking SAN24B-5 switch

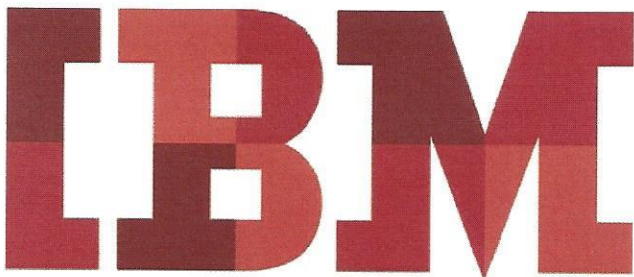
Flexible, easy-to-use, entry-level SAN switch for private cloud storage

The IBM System Networking SAN24B-5 switch features both Gen 5 Fibre Channel and Fabric Vision technologies—providing outstanding price to performance value in an entry-level switch. SAN24B-5 gives organizations the flexibility, simplicity and enterprise-class functionality they need to unleash the full potential of high-density server virtualization, cloud architectures and next-generation storage. The switch is configurable in 12 or 24 ports and supports 2, 4, 8 or 16 Gbps speeds in an efficiently designed 1U form factor. It comes with a single power supply and integrated fans. A second optional power supply provides additional redundancy for increased resiliency.

SAN24B-5 provides a critical building block for today's highly virtualized, private cloud storage environments. It can simplify server virtualization and virtual desktop infrastructure management while meeting the high-throughput demands of solid-state disks. SAN24B-5 supports multi-tenancy in cloud environments through quality-of-service (QoS) and fabric-based zoning features. It can also help minimize downtime in mission-critical environments by delivering high reliability, availability and serviceability.

Enterprise-class features in an entry-level switch

SAN24B-5 features advanced monitoring, diagnostics, reliability, availability, serviceability and redundancy capabilities in an entry-level switch to maximize availability, optimize performance and simplify



administration. Its enterprise-class features include critical diagnostic and monitoring capabilities, non-intrusive and non-disruptive monitoring on every port, forward error correction, additional buffers, real-time bandwidth consumption by hosts and applications on inter-switch links (ISLs), and a second optional power supply.

Flexible, simple and easy-to-use industry-leading technology

SAN24B-5 delivers industry-leading Gen 5 Fibre Channel technology within a flexible, simple and easy-to-use solution. The base configuration includes 12 activated ports, with up to 24 ports on demand. In addition to providing best-in-class scalability, SAN24B-5 is easy to deploy with the EZSwitchSetup wizard and the ClearLink diagnostics (D_Ports) feature, which can help streamline setup.

SAN24B-5 can be deployed as a full-fabric switch or as an access gateway, which simplifies fabric topologies and heterogeneous fabric connectivity (the default mode setting is a switch). Organizations can easily enable Access Gateway Mode via the IBM Network Advisor² or a command-line interface.

Fabric operating system and management software

The Fabric Operating System (FOS), which is included with each SAN24B-5, contains all the functions necessary to operate a base system. The Gen 5 Fibre Channel base systems require FOS v7.0.1 or later, which allows organizations to take advantage of the advanced functions delivered through Fabric Vision technology.¹

The Advanced Web Tools, Advanced Zoning, Full Fabric and Enhanced Group Management features are part of the base FOS and do not require a separate license. When using FOS v7.2 or later, organizations can also access additional base functions such as Server Application Optimization and Adaptive Networking.



Entry-level SAN switch for private cloud storage

To enable advanced capabilities, several optional licenses are available, including: ISL Trunking, Extended Fabrics, 12-port SW Upgrade, Fabric Vision and the Enterprise Bundle.³

IBM Network Advisor software,² which is the base management software for SAN24B-5, simplifies Gen 5 Fibre Channel management and helps users proactively diagnose and resolve issues to maximize uptime, increase operational efficiency and reduce costs. IBM Network Advisor v12.0 or later is required for managing cloud environments.

Simplified management and robust network analytics

SAN24B-5 with Fabric Vision technology,¹ an extension of Gen 5 Fibre Channel, provides a breakthrough hardware and software solution that helps simplify monitoring, maximize network availability and dramatically reduce costs. Featuring innovative monitoring, management and diagnostic capabilities, Fabric Vision technology enables administrators to avoid problems before they impact operations, helping organizations meet service level agreements (SLAs). Some key advantages of SAN24B-5 with Fabric Vision⁴ include:

- Simplified monitoring:
 - Deploy 15 years of storage area network (SAN) best practices in one click to simplify performance monitoring with pre-defined, threshold-based rules, actions and policies
 - Instantly identify latency and congestion issues in the fabric through increased instrumentation and granularity
 - Gain comprehensive visibility into network health and performance using browser-accessible dashboards with drill-down capabilities

- Dramatically reduced costs:
 - Help eliminate the need for expensive third-party tools through built-in monitoring and diagnostics
 - Use automated testing and diagnostic tools to validate the health, reliability and performance of the network prior to deployment
 - Leverage specialized tools for pre-testing and validating IT infrastructure to accelerate deployment, simplify support and reduce operational costs
- Increased availability:
 - Avoid a high percentage of common network problems with proactive monitoring and advanced diagnostic tools that address problems before they impact operations
 - Identify hot spots and network problems before they impact application performance through intuitive reporting and trend analysis
 - Minimize downtime and accelerate troubleshooting with live monitoring, integrated diagnostics and point-in-time playback

Outstanding price and performance for growing SAN workloads

SAN24B-5 offers low-cost access to industry-leading Gen 5 Fibre Channel technology while providing “pay-as-you-grow” scalability to meet the needs of evolving storage environments. It also provides a low total cost of ownership (TCO) due to its 12-port base configuration, easy administration, 1U footprint and low energy consumption.

Why IBM?

To stay competitive in the global marketplace, employees need to have access to the right information at the right time, to help them be effective, creative and highly innovative. For today's

smarter planet, where organizations and networks are more instrumented, interconnected and intelligent than ever before, IBM provides flexible, scalable, and open standards-based business-class and global enterprise-class storage networking solutions.

The IBM System Networking SAN24B-5 SAN switch is designed to provide outstanding price and performance, combining flexibility, simplicity and enterprise-class functionality in a 24-port, 1U form factor entry-level switch.

IBM System Networking SAN24B-5 at a glance

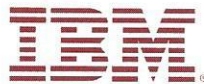
Product number	2498-X24
Hot-swap components	Power supplies, fan modules, small form-factor pluggables (SFPs)
Warranty	One-year; customer-replaceable unit (CRU) and on-site, 9x5 next-business-day response; warranty service upgrades are available
Optional features	Please refer to the SAN24B-5 Redbooks Product Guide to review most current optional features
Size	43.8 cm (17.24 in.) W x 4.3 cm (1.7 in.) D x 44.3 cm (17.44 in.) H
Weight	7.82 kg (17.25 lb) with one power supply, without transceivers

For more information

To learn more about the IBM System Networking SAN24B-5 switch, contact your IBM representative or IBM Business Partner, or visit: ibm.com/systems/storage/san/b-type/san24b-5

Additionally, IBM Global Financing can help you acquire the IT solutions that your business needs in the most cost-effective and strategic way possible. For credit-qualified clients we can customize an IT financing solution to suit your business requirements, enable effective cash management, and improve your total cost of ownership. IBM Global Financing is your smartest choice to fund critical IT investments and propel your business forward. For more information, visit:

ibm.com/financing



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Produced in the United States of America
July 2015

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¹ For most current information, please refer to the [Fabric Vision Technology solution brief](#).

² For more information, please refer to the [IBM Network Advisor datasheet](#).

³ The Enterprise Bundle includes one license for each of the following: ISL Trunking, Fabric Watch, Advanced Performance Monitor, Adaptive Networking, Server Application Optimization and Fabric Vision.

⁴ For more information, please refer to the [SAN24B-5 Redbooks Product Guide](#).



Please Recycle



Highlights

- Gain flexibility, simplicity and enterprise-class functionality in a 24-port, 1U form factor entry-level switch
 - Scale from 12 to 24 ports using Ports on Demand (PoD) capabilities
 - Leverage Fabric Vision technology¹ and IBM® Network Advisor² dashboards to simplify administration, increase uptime and reduce costs
 - Maximize resiliency with nondisruptive software upgrades and redundant power supply option
 - Simplify deployment with the EZSwitchSetup wizard and support high-performance fabrics by using ClearLink Diagnostic Ports (D_Ports)
-

IBM System Networking SAN24B-5 switch

Flexible, easy-to-use, entry-level SAN switch for private cloud storage

The IBM System Networking SAN24B-5 switch features both Gen 5 Fibre Channel and Fabric Vision technologies—providing outstanding price to performance value in an entry-level switch. SAN24B-5 gives organizations the flexibility, simplicity and enterprise-class functionality they need to unleash the full potential of high-density server virtualization, cloud architectures and next-generation storage. The switch is configurable in 12 or 24 ports and supports 2, 4, 8 or 16 Gbps speeds in an efficiently designed 1U form factor. It comes with a single power supply and integrated fans. A second optional power supply provides additional redundancy for increased resiliency.

SAN24B-5 provides a critical building block for today's highly virtualized, private cloud storage environments. It can simplify server virtualization and virtual desktop infrastructure management while meeting the high-throughput demands of solid-state disks. SAN24B-5 supports multi-tenancy in cloud environments through quality-of-service (QoS) and fabric-based zoning features. It can also help minimize downtime in mission-critical environments by delivering high reliability, availability and serviceability.

Enterprise-class features in an entry-level switch

SAN24B-5 features advanced monitoring, diagnostics, reliability, availability, serviceability and redundancy capabilities in an entry-level switch to maximize availability, optimize performance and simplify



administration. Its enterprise-class features include critical diagnostic and monitoring capabilities, non-intrusive and non-disruptive monitoring on every port, forward error correction, additional buffers, real-time bandwidth consumption by hosts and applications on inter-switch links (ISLs), and a second optional power supply.

Flexible, simple and easy-to-use industry-leading technology

SAN24B-5 delivers industry-leading Gen 5 Fibre Channel technology within a flexible, simple and easy-to-use solution. The base configuration includes 12 activated ports, with up to 24 ports on demand. In addition to providing best-in-class scalability, SAN24B-5 is easy to deploy with the EZSwitchSetup wizard and the ClearLink diagnostics (D_Ports) feature, which can help streamline setup.

SAN24B-5 can be deployed as a full-fabric switch or as an access gateway, which simplifies fabric topologies and heterogeneous fabric connectivity (the default mode setting is a switch). Organizations can easily enable Access Gateway Mode via the IBM Network Advisor² or a command-line interface.

Fabric operating system and management software

The Fabric Operating System (FOS), which is included with each SAN24B-5, contains all the functions necessary to operate a base system. The Gen 5 Fibre Channel base systems require FOS v7.0.1 or later, which allows organizations to take advantage of the advanced functions delivered through Fabric Vision technology.¹

The Advanced Web Tools, Advanced Zoning, Full Fabric and Enhanced Group Management features are part of the base FOS and do not require a separate license. When using FOS v7.2 or later, organizations can also access additional base functions such as Server Application Optimization and Adaptive Networking.



Entry-level SAN switch for private cloud storage

To enable advanced capabilities, several optional licenses are available, including: ISL Trunking, Extended Fabrics, 12-port SW Upgrade, Fabric Vision and the Enterprise Bundle.³

IBM Network Advisor software,² which is the base management software for SAN24B-5, simplifies Gen 5 Fibre Channel management and helps users proactively diagnose and resolve issues to maximize uptime, increase operational efficiency and reduce costs. IBM Network Advisor v12.0 or later is required for managing cloud environments.

Simplified management and robust network analytics

SAN24B-5 with Fabric Vision technology,¹ an extension of Gen 5 Fibre Channel, provides a breakthrough hardware and software solution that helps simplify monitoring, maximize network availability and dramatically reduce costs. Featuring innovative monitoring, management and diagnostic capabilities, Fabric Vision technology enables administrators to avoid problems before they impact operations, helping organizations meet service level agreements (SLAs). Some key advantages of SAN24B-5 with Fabric Vision⁴ include:

- Simplified monitoring:
 - Deploy 15 years of storage area network (SAN) best practices in one click to simplify performance monitoring with pre-defined, threshold-based rules, actions and policies
 - Instantly identify latency and congestion issues in the fabric through increased instrumentation and granularity
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IBM System Networking SAN24B-5 at a glance

Product number	2498-X24
Hot-swap components	Power supplies, fan modules, small form-factor pluggables (SFPs)
Warranty	One-year; customer-replaceable unit (CRU) and on-site, 9x5 next-business-day response; warranty service upgrades are available
Optional features	Please refer to the SAN24B-5 Redbooks Product Guide to review most current optional features
Size	43.8 cm (17.24 in.) W x 4.3 cm (1.7 in.) D x 44.3 cm (17.44 in.) H
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Additionally, IBM Global Financing can help you acquire the IT solutions that your business needs in the most cost-effective and strategic way possible. For credit-qualified clients we can customize an IT financing solution to suit your business requirements, enable effective cash management, and improve your total cost of ownership. IBM Global Financing is your smartest choice to fund critical IT investments and propel your business forward. For more information, visit: ibm.com/financing



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July 2015

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Please Recycle



Highlights

- Customize your storage system with flexible software and hardware options
 - Optimize performance with flash storage and automated tiering
 - Store up to five times more data on your existing storage with IBM compression technology¹
 - Consolidate and provide IBM® Storwize® V5000 capabilities to existing storage infrastructures
 - Enhance productivity with a fresh, new, intuitive and simplified graphical user interface (GUI)
-

IBM Storwize V5000

Designed to drive innovation and greater flexibility

The enterprise data storage marketplace is changing at a rapid pace. Organizations of all sizes are experiencing new business and IT operational challenges. Businesses now need greater data collaboration, agility and cost efficiency to stay ahead of the competition. Today, data is more important than ever for making highly informed decisions in real time. Security teams need data to recognize and prevent fraud before it happens. Call centers need data to help accelerate customer service. Most important, top executives need data to develop strategic insights for battling the competition.

With the rise of new applications that demand the integration of big-data analytics, mobility and social platforms, organizations require additional storage capacity, performance, advanced functionality and flexibility. IT must deliver more services faster and more efficiently, enable real-time insight and support more customer interaction. The right infrastructure allows clients to share information, secure transactions and drive real-time insights.

To enter the new era of business, organizations need robust storage solutions such as Storwize V5000 to provide comprehensive storage services, extraordinary scale and simplified management with all-flash or hybrid-flash options—all designed to support key business initiatives.

Three Storwize V5000 hybrid models—IBM Storwize V5030, IBM Storwize V5020 and IBM Storwize V5010—provide the flexibility to start small and keep growing while leveraging existing storage investments. And, to enable organizations with mid-sized workloads to achieve advanced performance, [IBM Storwize V5030F](#) provides an all-flash solution at an affordable price.



Utilizing IBM Spectrum Virtualize™ software at its core, Storwize V5000 is designed to optimize performance, providing virtualization capabilities and greater flexibility. It includes built-in functions such as IBM Real-time Compression™ and IBM Easy Tier® technology to deliver extraordinary levels of efficiency and high performance. Available in different models, Storwize V5000 delivers enterprise capabilities at entry-level pricing to help handle business-critical applications while controlling costs for growing organizations.

Multiply your possibilities. Storwize V5000 models provide the flexibility to start small and keep growing, while leveraging existing storage investments.

IBM Storwize also helps organizations achieve better data economics to support the traditional and new mobile, social and analytics workloads that are critical for success. The shift to cloud computing requires a fundamental shift in how organizations consume and support IT.

Storwize V5000 is intended to deliver more of what you need from storage with greater flexibility—while using fewer resources. Using innovative IBM technology, a single Storwize V5000 system can scale up to 760 drives per system (and up to 1,520 drives with two-way clustered systems).

Encompassing Storwize family functions

Storwize V5000 leverages proven Storwize family functions, management and interoperability features.



Enhance storage function

Built with IBM Spectrum Virtualize software, Storwize V5000 enables applications to run without disruption, even when changes are made to the storage infrastructure.

Available in the larger model, Storwize V5030 also extends capabilities to other storage systems. When virtualized, data in a storage system becomes part of the Storwize solution, and it can be managed in the same way as internal drives. Data in external systems inherits all the Storwize functional richness and ease-of-use features, including advanced replication, high-performance thin provisioning, encryption, Real-time Compression and Easy Tier.

Heterogeneous data services help improve administrator productivity and boost storage utilization while also enhancing and extending the value of existing storage investments.

IBM Spectrum Virtualize software in the three Storwize V5000 models provides advanced storage functions that enable VMware vSphere Virtual Volumes (VVOL) and support the latest capabilities in key operating environments including Microsoft Hyper-V, VMware vSphere, IBM PowerVM® and OpenStack.

Transform the economics of data with Real-time Compression

Real-time Compression in Storwize V5030 is designed to enable storing up to five times as much data in the same physical disk space by compressing data as much as 80 percent.² Unlike other approaches to compression, Real-time Compression is designed to be used with active primary data such as production databases and email systems, which dramatically expands the range of candidate data that can benefit from compression. Real-time Compression operates immediately as data is written to the drive, meaning that no space is wasted storing uncompressed data awaiting post-processing. When combined with external data virtualization, Real-time Compression can significantly enhance the usable capacity of existing storage systems, extending their useful life even further.

Improve storage access with Easy Tier

Easy Tier provides automatic migration of frequently accessed data to high-performing flash storage, enhancing usage efficiencies. Operating at a fine-grained granularity, the optional Easy Tier function automatically repositions different data types to the appropriate class of drives based on input/output (I/O) patterns and drive characteristics, requiring no administrative interaction.

Protect your most valuable asset—your data

To help protect sensitive data from unauthorized users, Storwize V5030 and Storwize V5020 give IT teams the full power of storage encryption. In addition to placing encryption inside hardware arrays—which protects only against a subset of data security risks—IBM Spectrum Virtualize software includes encryption capabilities in its management layer. This enables organizations to add encryption across their existing heterogeneous storage arrays, while leveraging a single point of control for encryption throughout the storage layer.

Storwize V5000 offers an optional IBM FlashCopy® function designed to create an almost-instant copy of active data, which can be used for backup purposes or for parallel-processing activities.

Should a catastrophic event occur at a data center, Storwize V5000 supports remote mirroring to create copies of data for use at a second location. Metro Mirror supports synchronous replication at distances up to 300 km (186 miles), whereas Global Mirror supports asynchronous replication at distances up to 8,000 km (4,970 miles). Replication can occur between any Storwize family offerings, and can include any supported virtualized storage. With IP networking, Storwize V5000 supports 1 GbE and 10 GbE connections, and uses innovative Bridgeworks WANrockIT technology to optimize the use of network bandwidth. As a result, the networking infrastructure may require lower speeds (and thus, lower costs), or users may be able to improve the accuracy of remote data through shorter replication cycles.

In addition, the IBM HyperSwap® function enables a single Storwize V5030 system to support servers in two data centers. In this configuration, the solution enables servers at both data centers to access data concurrently. When combined with server data mobility technologies such as VMware vMotion or PowerVM Live Partition Mobility, this configuration enables nondisruptive storage and virtual machine mobility between the two data centers.

Storwize V5000 also helps improve data availability with its support for Distributed RAID. The system allows data to be distributed across a large number of physical drives that are used simultaneously, achieving faster rebuild time. What's more, Distributed RAID can also deliver increased performance since data can be read from and written to more drives for a given I/O.

Avoid disruptions with dynamic migration

Moving data is one of the most common causes of planned downtime. Storwize V5000 includes a dynamic data-migration function that is designed to move data from existing storage into a new system or between arrays in a Storwize V5000

system, while maintaining user access to data. The data migration function might be used, for example, when replacing older storage with newer storage, as part of load-balancing work or when moving data in a tiered storage infrastructure.

Nondisruptive migration can speed time-to-value from weeks or months to days, minimize downtime for migration, help eliminate the cost of add-on migration tools, and may help avoid penalties and additional maintenance charges for lease extensions. The result can be real cost savings to your business.

Take advantage of additional features

In addition, Storwize V5000 includes:

- Innovative management capabilities, to ease storage management
- Dual clustering for Storwize V5030, to enable growth from smaller configurations

- High-density expansion enclosures, which can hold up to 92 drives and 1.4 PB in a 5U form factor.
- Support for OpenStack Cinder driver, which helps automate storage provisioning and volume management for organizations by combining the efficiency of Storwize V5000 with the OpenStack Compute cloud platform

Leveraging proven independent software vendor solutions

IBM is committed to continuous improvement and smooth application integration to optimize business results and minimize time-to-value. Our commitment is evident through our ongoing work and enduring partnerships with independent software vendors (ISVs) such as Microsoft, Oracle, SAP, Symantec and VMware.

IBM Storwize V5000 at a glance			
Software	IBM Spectrum Virtualize software for Storwize V5030	IBM Spectrum Virtualize software for Storwize V5020	IBM Spectrum Virtualize software for Storwize V5010
User interface	Web-based GUI	Web-based GUI	Web-based GUI
Single or dual controller	Dual	Dual	Dual
Connectivity (standard)	10 Gb iSCSI 1 Gb iSCSI	12 Gb SAS 1 Gb iSCSI	1 Gb iSCSI
Connectivity (optional)	16 Gb Fibre Channel 12 Gb SAS 10 Gb iSCSI/Fibre Channel over Ethernet (FCoE) 1 Gb iSCSI	16 Gb Fibre Channel 12 Gb SAS 10 Gb iSCSI/FCoE 1 Gb iSCSI	16 Gb Fibre Channel 12 Gb SAS 10 Gb iSCSI/FCoE 1 Gb iSCSI

IBM Storwize V5000 at a glance

Cache (per system)	32 GB or 64 GB	16 GB or 32 GB	16 GB
Drives supported	<p>Small form-factor 2.5-inch disk drives:</p> <ul style="list-style-type: none"> • 300 GB, 600 GB @ 15k rpm • 900 GB, 1.2 TB, 1.8 TB @ 10k rpm • 2 TB @ 7.2k rpm SAS nearline <p>Large form-factor 3.5-inch disk drives:</p> <ul style="list-style-type: none"> • 300 GB, 600 GB, 900 GB @ 15k rpm, SAS (2.5-inch drive in a 3.5-inch drive carrier) • 900 GB, 1.2 TB, 1.8 TB @ 10k rpm, SAS (2.5-inch drive in a 3.5-inch drive carrier) • 2 TB*, 3 TB*, 4 TB, 6 TB, 8 TB, 10 TB @ 7.2k rpm <p>2.5-inch flash drives:</p> <ul style="list-style-type: none"> • 400 GB, 800 GB, 1.6 TB, 1.92 TB, 3.2 TB, 3.84 TB, 7.68 TB and 15.36 TB 	<p>Small form-factor 2.5-inch disk drives:</p> <ul style="list-style-type: none"> • 300 GB, 600 GB @ 15k rpm • 900 GB, 1.2 TB, 1.8 TB @ 10k rpm • 2 TB @ 7.2k rpm SAS nearline <p>Large form-factor 3.5-inch disk drives:</p> <ul style="list-style-type: none"> • 300 GB, 600 GB, 900 GB @ 15k rpm, SAS (2.5-inch drive in a 3.5-inch drive carrier) • 900 GB, 1.2 TB, 1.8 TB @ 10k rpm, SAS (2.5-inch drive in a 3.5-inch drive carrier) • 2 TB*, 3 TB*, 4 TB, 6 TB, 8 TB, 10 TB @ 7.2k rpm <p>2.5-inch flash drives:</p> <ul style="list-style-type: none"> • 400 GB, 800 GB, 1.6 TB, 1.92 TB, 3.2 TB, 3.84 TB, 7.68 TB and 15.36 TB 	<p>Small form-factor 2.5-inch disk drives:</p> <ul style="list-style-type: none"> • 300 GB, 600 GB @ 15k rpm • 900 GB, 1.2 TB, 1.8 TB @ 10k rpm • 2 TB @ 7.2k rpm SAS nearline <p>Large form-factor 3.5-inch disk drives:</p> <ul style="list-style-type: none"> • 300 GB, 600 GB, 900 GB @ 15k rpm, SAS (2.5-inch drive in a 3.5-inch drive carrier) • 900 GB, 1.2 TB, 1.8 TB @ 10k rpm, SAS (2.5-inch drive in a 3.5-inch drive carrier) • 2 TB*, 3 TB*, 4 TB, 6 TB, 8 TB, 10 TB @ 7.2k rpm <p>SSD 2.5-inch drives:</p> <ul style="list-style-type: none"> • 400 GB, 800 GB, 1.6 TB, 1.92 TB, 3.2 TB, 3.84 TB, 7.68 TB and 15.36 TB
Maximum drives supported	<p>Maximum of 760 drives per system and 1,520 drives in two-way clustered:</p> <ul style="list-style-type: none"> • Small form-factor enclosure: 24 x 2.5-inch drives • Large form-factor enclosure: 12 x 3.5-inch drives • High-density expansion enclosure: 92 x 3.5-inch drives 	<p>Maximum of 392 drives per system:</p> <ul style="list-style-type: none"> • Small form-factor enclosure: 24 x 2.5-inch drives • Large form-factor enclosure: 12 x 3.5-inch drives • High-density expansion enclosure: 92 x 3.5-inch drives 	<p>Maximum of 392 drives per system:</p> <ul style="list-style-type: none"> • Small form-factor enclosure: 24 x 2.5-inch drives • Large form-factor enclosure: 12 x 3.5-inch drives • High-density expansion enclosure: 92 x 3.5-inch drives or 2.5-inch drives
Maximum expansion enclosure capacity	<ul style="list-style-type: none"> • Standard expansion enclosures: up to 20 standard expansion enclosures per controller • High-density expansion enclosures: up to 8 high-density expansion enclosures per controller 	<ul style="list-style-type: none"> • Standard expansion enclosures: up to 10 standard expansion enclosures per controller • High-density expansion enclosures: up to 4 high-density expansion enclosures per controller 	<ul style="list-style-type: none"> • Standard expansion enclosures: up to 10 standard expansion enclosures per controller • High-density expansion enclosures: up to 4 high-density expansion enclosures per controller
RAID levels	RAID 0, 1, 5, 6, 10, Distributed	RAID 0, 1, 5, 6, 10, Distributed	RAID 0, 1, 5, 6, 10, Distributed

IBM Storwize V5000 at a glance

Fans and power supplies	Fully redundant, hot-swappable	Fully redundant, hot-swappable	Fully redundant, hot-swappable
Rack support	Standard 19-inch	Standard 19-inch	Standard 19-inch
Advanced functions included with each system	<ul style="list-style-type: none"> • Embedded GUI • Virtualization of internal storage • Thin provisioning • One-way data migration • Dual-system clustering 	<ul style="list-style-type: none"> • Embedded GUI • Virtualization of internal storage • Thin provisioning • One-way data migration 	<ul style="list-style-type: none"> • Embedded GUI • Virtualization of internal storage • Thin provisioning • One-way data migration
Additional available advanced functions	<ul style="list-style-type: none"> • Easy Tier • FlashCopy • Remote mirroring • Encryption • Real-time Compression • External virtualization 	<ul style="list-style-type: none"> • Easy Tier • FlashCopy • Remote mirroring • Encryption 	<ul style="list-style-type: none"> • Easy Tier • FlashCopy • Remote mirroring
Size[†]	<p>8.7 cm (3.4 in.) H x 48.3 cm (19.0 in.) W x 55.6 cm (21.9 in.) D</p> <ul style="list-style-type: none"> • Approximate weight: <ul style="list-style-type: none"> – Large form-factor control enclosure: <ul style="list-style-type: none"> ○ Empty: 18.0 kg (39.6 lb) ○ Fully configured: 28.3 kg (62.2 lb) – Large form-factor expansion enclosure: <ul style="list-style-type: none"> ○ Empty: 16.4 kg (36.1 lb) ○ Fully configured: 26.7 kg (58.8 lb) – Small form-factor control enclosure: <ul style="list-style-type: none"> ○ Empty: 19.0 kg (41.8 lb) ○ Fully configured: 27.3 kg (60.0 lb) – Small form-factor expansion enclosure: <ul style="list-style-type: none"> ○ Empty: 16.7 kg (36.7 lb) ○ Fully configured: 25.0 kg (55.2 lb) 	<p>8.7 cm (3.4 in.) H x 48.3 cm (19.0 in.) W x 55.6 cm (21.9 in.) D</p> <ul style="list-style-type: none"> • Approximate weight: <ul style="list-style-type: none"> – Large form-factor control enclosure: <ul style="list-style-type: none"> ○ Empty: 18.0 kg (39.6 lb) ○ Fully configured: 28.3 kg (62.2 lb) – Large form-factor expansion enclosure: <ul style="list-style-type: none"> ○ Empty: 16.4 kg (36.1 lb) ○ Fully configured: 26.7 kg (58.8 lb) – Small form-factor control enclosure: <ul style="list-style-type: none"> ○ Empty: 19.0 kg (41.8 lb) ○ Fully configured: 27.3 kg (60.0 lb) – Small form-factor expansion enclosure: <ul style="list-style-type: none"> ○ Empty: 16.7 kg (36.7 lb) ○ Fully configured: 25.0 kg (55.2 lb) 	<p>8.7 cm (3.4 in.) H x 48.3 cm (19.0 in.) W x 55.6 cm (21.9 in.) D</p> <ul style="list-style-type: none"> • Approximate weight: <ul style="list-style-type: none"> – Large form-factor control enclosure: <ul style="list-style-type: none"> ○ Empty: 18.0 kg (39.6 lb) ○ Fully configured: 28.3 kg (62.2 lb) – Large form-factor expansion enclosure: <ul style="list-style-type: none"> ○ Empty: 16.4 kg (36.1 lb) ○ Fully configured: 26.7 kg (58.8 lb) – Small form-factor control enclosure: <ul style="list-style-type: none"> ○ Empty: 19.0 kg (41.8 lb) ○ Fully configured: 27.3 kg (60.0 lb) – Small form-factor expansion enclosure: <ul style="list-style-type: none"> ○ Empty: 16.7 kg (36.7 lb) ○ Fully configured: 25.0 kg (55.2 lb)

IBM Storwize V5000 at a glance

Operating environment	<ul style="list-style-type: none"> Air temperature: <ul style="list-style-type: none"> Operating: 10°C – 35°C (50°F – 95°F) at 30.5 m below to 3,000 m above sea level (100 ft below to 9,840 ft above) Non-operating: -10°C – 50°C (14°F – 125°F) Relative humidity: <ul style="list-style-type: none"> Operating: 20% – 80% Non-operating: 10% – 90% 	<ul style="list-style-type: none"> Air temperature: <ul style="list-style-type: none"> Operating: 10°C – 35°C (50°F – 95°F) at 30.5 m below to 3,000 m above sea level (100 ft below to 9,840 ft above) Non-operating: -10°C – 50°C (14°F – 125°F) Relative humidity: <ul style="list-style-type: none"> Operating: 20% – 80% Non-operating: 10% – 90% 	<ul style="list-style-type: none"> Air temperature: <ul style="list-style-type: none"> Operating: 10°C – 35°C (50°F – 95°F) at 30.5 m below to 3,000 m above sea level (100 ft below to 9,840 ft above) Non-operating: -10°C – 50°C (14°F – 125°F) Relative humidity: <ul style="list-style-type: none"> Operating: 20% – 80% Non-operating: 10% – 90%
Warranty	<p>Hardware:</p> <ul style="list-style-type: none"> Flexible warranty <ul style="list-style-type: none"> One- or three-year warranty with 9 to 5 next-business-day response (dependent upon machine type) Tier 1 customer-replaceable units and on-site repairs Warranty service upgrades available Post-warranty support available Customer setup (initial installation and field upgrades) <p>Software:</p> <ul style="list-style-type: none"> Initial license purchase Software maintenance agreement available 	<p>Hardware:</p> <ul style="list-style-type: none"> Flexible warranty <ul style="list-style-type: none"> One- or three-year warranty with 9 to 5 next-business-day response (dependent upon machine type) Tier 1 customer-replaceable units and on-site repairs Warranty service upgrades available Post-warranty support available Customer setup (initial installation and field upgrades) <p>Software:</p> <ul style="list-style-type: none"> Initial license purchase Software maintenance agreement available 	<p>Hardware:</p> <ul style="list-style-type: none"> Flexible warranty <ul style="list-style-type: none"> One- or three-year warranty with 9 to 5 next-business-day response (dependent upon machine type) Tier 1 customer-replaceable units and on-site repairs Warranty service upgrades available Post-warranty support available Customer setup (initial installation and field upgrades) <p>Software:</p> <ul style="list-style-type: none"> Initial license purchase Software maintenance agreement available
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ISV solutions	For a list of high-quality solutions with IBM partner ISVs, including access to solution briefs and white papers, refer to the ISV Solutions Resource Library	For a list of high-quality solutions with IBM partner ISVs, including access to solution briefs and white papers, refer to the ISV Solutions Resource Library	For a list of high-quality solutions with IBM partner ISVs, including access to solution briefs and white papers, refer to the ISV Solutions Resource Library

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Produced in the United States of America
August 2017

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* Available only in Storwize V5000 generation 1.

† To assure installation and serviceability in non-IBM industry-standard racks, review the installation planning information for any product-specific installation requirements.

¹ IBM lab measurements – April 2012.

² IBM lab measurements – August 2010.



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