

IBM System Networking RackSwitch G8052

IBM Redbooks Product Guide

The IBM® System Networking RackSwitch™ G8052 (Figure 1) is a top-of-rack data center switch that delivers unmatched line-rate Layer 2/3 performance at a very attractive price. It has forty-eight 10/100/1000BASE-T RJ45 ports and four 10 Gigabit Ethernet SFP+ ports, and includes hot-swap redundant power supplies and fans as standard, minimizing your configuration requirements. Unlike most rack equipment that cools from side to side, the G8052 has rear-to-front or front-to-rear airflow that matches server airflow.

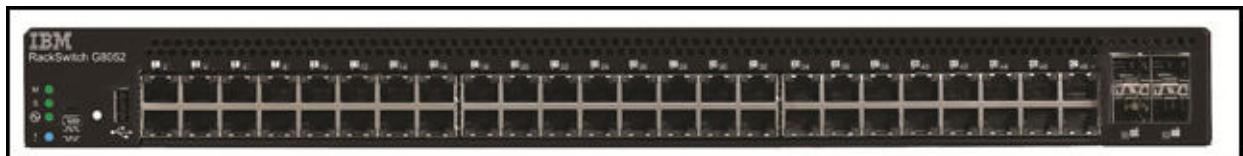


Figure 1. IBM System Networking RackSwitch G8052

Did you know

Did you know that:

- The RackSwitch G8052 is designed with line-rate throughput and low latency less than 2 microseconds.
- The RackSwitch G8052 includes redundant and hot-swappable power supplies and fans.
- The RackSwitch G8052 is designed specifically for the data center environment with server-matching airflow, high-availability hardware and software features, rich Layer 2/3 functionality, and ease of management.
- The RackSwitch G8052 is OpenFlow enabled. With OpenFlow, you can easily create user-controlled virtual networks, optimize performance dynamically, and minimize complexity when used with IBM Programmable Network Controller.
- IBM VMready® switch-resident software reduces the complexity of configuring and managing virtual machines throughout the network, making it VM-aware.
- IBM Networking Operating System software features deliver seamless, standards-based integration into existing upstream switches.

Ordering information

Table 1 shows IBM System x® part numbers and IBM Power Systems™ MTMs and Feature Codes for ordering switches and additional options.

Table 1. IBM part numbers and feature codes for ordering (part 1)

Description	System x	Power Systems MTM/FC
IBM System Networking RackSwitch G8052 (Rear-to-Front)	7309G52	1455-48E
IBM System Networking RackSwitch G8052 (Front-to-Rear)	730952F	
1 GbE options		
IBM SFP RJ45 Transceiver	81Y1618	EB29
IBM SFP SX Transceiver	81Y1622	EB2A
IBM SFP LX Transceiver	90Y9424	ECB8
0.6 m Blue Cat5e Cable	40K5679	ECB0
1.5 m Blue Cat5e Cable	40K8785	ECB2
3 m Blue Cat5e Cable	40K5581	1111
10 m Blue Cat5e Cable	40K8927	1112
25 m Blue Cat5e Cable	40K8930	1113
10 GbE options		
IBM SFP+ SR Transceiver	46C3447	EB28
IBM SFP+ LR Transceiver	90Y9412	ECB9
IBM SFP+ ER Transceiver	90Y9415	ECBA
0.5 m IBM Passive DAC SFP+ Cable	00D6288	ECBG
1 m IBM Passive DAC SFP+ Cable*	90Y9427	ECB4
1.5 m IBM Passive DAC SFP+ Cable	00AY764	
2 m IBM Passive DAC SFP+ Cable	00AY765	
3 m IBM Passive DAC SFP+ Cable*	90Y9430	ECB5
5 m IBM Passive DAC SFP+ Cable*	90Y9433	ECB6
7 m IBM Passive DAC SFP+ Cable*	00D6151	ECBH
1 m IBM Active DAC SFP+ Cable	95Y0323	EN01
3 m IBM Active DAC SFP+ Cable	95Y0326	EN02
5 m IBM Active DAC SFP+ Cable	95Y0329	EN03

*Passive cables not supported for Power Systems 10Gb NICs. Used for switch to switch connectivity only.

Table 1. IBM part numbers and feature codes for ordering (part 2)

Description	System x	Power Systems MTM/FC
Miscellaneous options		
IBM System Networking Adjustable 19" 4 Post Rail Kit	00D6185	EU27
IBM System Networking Recessed 19" 4 Post Rail Kit (NeXtScale)	00CG089	
Hot-swappable, Rear-to-Front Fan Assembly Spare	88Y6026	
Hot-swappable, Front-to-Rear Fan Assembly Spare	49Y7939	
Hot-swappable, Rear-to-Front Power Supply Spare	49Y7938	
Hot-swappable, Front-to-Rear Power Supply Spare	49Y7937	
Console Cable Kit Spare	90Y9462	EUC4
1 m LC-LC Fiber Cable (networking) - Optical	88Y6851	ECBC
5 m LC-LC Fiber Cable (networking)- Optical	88Y6854	ECBD
25 m LC-LC Fiber Cable (networking) - Optical	88Y6857	ECBE
ServicePacs (available in select countries)		
3-year on-site repair 24x7 two-hour response	67567MN	
3-year on-site repair 24x7 four-hour response	67567MM	
3-year on-site repair 9x5 four-hour response	67567MK	
4-year on-site repair 24x7 two-hour response	67567MS	
4-year on-site repair 24x7 four-hour response	67567MR	
4-year on-site repair 9x5 four-hour response	67567MQ	
4-year on-site repair next business day	67567MP	
5-year on-site repair 24x7 two-hour response	67567MW	
5-year on-site repair 24x7 four-hour response	67567MV	
5-year on-site repair 9x5 four-hour response	67567MU	
5-year on-site repair next business day	67567MT	

Figure 2 shows examples of transceivers and DAC cables.

Figure 2. Examples of transceivers and DAC cables



Figure 3 shows a 2-post Rack Mount Kit.

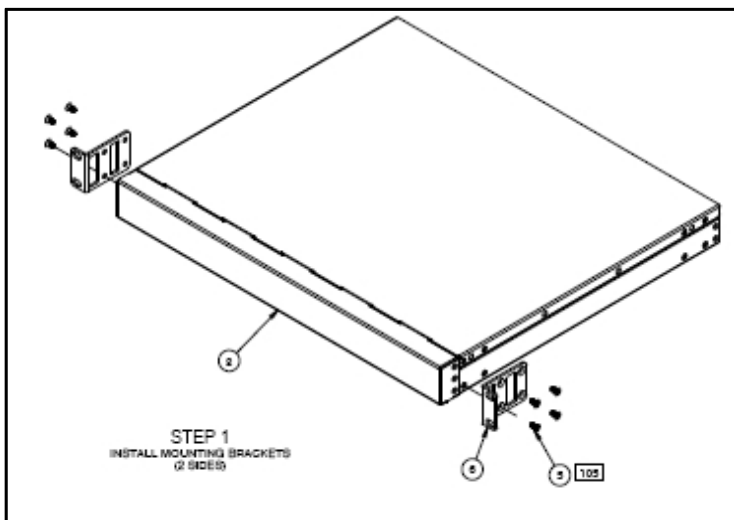


Figure 3. The 2-post Rack Mount Kit

The module part numbers include the following items:

- One IBM RackSwitch G8052 (Rear-to-Front or Front-to-Rear)
- Generic Rack Mount Kit (2-post)
- Mini-USB to DB9 serial cable (3 m)
- Comes with an IBM limited 3-year hardware warranty with Next Business Day (NBD), 9x5, Customer Replaceable Unit (CRU) warranty service and includes a 3-year software license, providing entitlement to upgrades over that period

Note: Make sure that you include power cords in your configuration localized to your country of purchase. Small form-factor pluggable plus (SFP+) transceivers are not included.

Table 2 lists part numbers and descriptions for IBM System x.

Table 2. IBM System x part numbers and descriptions

Part number	Description
39Y7917	Power Cord Europe AC plug 10A/250 V; OPT
39Y7918	Power Cord Europe (Denmark) 10A/250 V; OPT
39Y7919	Power Cord Europe (Switzerland) 10A/250 V; OPT
39Y7920	Power Cord Europe (Israel) 10A/250 V; OPT
39Y7922	Power Cord Europe (South America) 10A/250 V; OPT
39Y7923	Power Cord UK 13A/250 V; OPT
39Y7924	Power Cord Australia 10A/250 V; OPT
39Y7925	Power Cord Korea 10A/250 V; OPT
46M2593	2.8 m, 100 V, C13 to JIS C-8303 (Japan)
39Y7927	Power Cord India 10A/250 V; OPT
39Y7928	Power Cord China 16A/250 V; OPT
39Y7929	Power Cord Brazil 16A/250 V; OPT
39Y7930	Power Cord Uruguay/Argentina 16A/250 V; OPT
46M2592	2.8 m, 10A/250 V, C13 to NEMA 6-15P (US)

Table 3 shows power cords descriptions and their IBM Power Systems and IBM System Storage® Feature Codes.

Table 3. Power cords descriptions and IBM Power Systems and IBM System Storage Feature Codes

Description	Feature Code
Power Cord 4.3m (14-ft), Drawer to Wall/IBM PDU (250V/10A)	6458
Power Cord 4.3m (14-ft), Drawer to Wall/OEM PDU (250V/15A) U. S.	6469
Power Cord 1.8m (6-ft), Drawer to Wall (125V/15A)	6470
Power Cord 2.7m (9-ft), Drawer to Wall/OEM PDU (125V/15A)	6471
Power Cord 2.7m (9-ft), Drawer to Wall/OEM PDU (250V/16A)	6472
Power Cord 2.7m (9-ft), Drawer to Wall/OEM PDU (250V/10A)	6473
Power Cord 2.7m (9-ft), Drawer to Wall/OEM PDU, (250V/13A)	6474
Power Cord 2.7m (9-ft), Drawer to Wall/OEM PDU, (250V/16A)	6475
Power Cord 2.7m (9-ft), Drawer to Wall/OEM PDU, (250V/10A)	6476
Power Cord 2.7m (9-ft), Drawer to Wall/OEM PDU, (250V/16A)	6477
Power Cord 2.7m (9-ft), Drawer to Wall/OEM PDU, (125V/15A or 250V/10A)	6488
Power Cord 2.7m (9-ft), Drawer to Wall/OEM PDU, (250V/10A)	6493
Power Cord 2.7m (9-ft), Drawer to Wall/OEM PDU, (250V/10A)	6494
Power Cord 4.3m (14-ft), Drawer to Wall/OEM PDU (125V/15A)	6660
Power Cord 2.8m (9.2-ft), Drawer to Wall/IBM PDU, (250V/ 10A)	6665
Power Cord 2.7m (9-ft), Drawer to Wall/OEM PDU, (250V/10A)	6680
Power Cord 2.7m (9-ft), Drawer to Wall/OEM PDU, (250V/10A)	6671
Power Cord 1.5m (5-ft), Drawer to Wall/OEM PDU, (250V/10A)	6672

Summary: IBM System Networking RackSwitch G 8052

The IBM System Networking RackSwitch G8052 provides:

- **High performance:** The RackSwitch G8052 provides up to 176 Gbps throughput and supports four SFP+ 10 G uplink ports for a very low oversubscription ratio, in addition to a low latency of 1.8 microseconds.
- **Lower power and better cooling:** The RackSwitch G8052 typically consumes just 130 W of power, a fraction of the power consumption of most competitive offerings. Unlike side-cooled switches, which can cause heat recirculation and reliability concerns, the G8052's rear-to-front or front-to-rear cooling design reduces data center air conditioning costs by matching airflow to the server's configuration in the rack. Variable speed fans assist in automatically reducing power consumption.
- **VM-Aware Network Virtualization:** IBM VMready software on the switch simplifies configuration and improves security in virtualized environments. VMready automatically detects VM movement between physical servers and instantly reconfigures each VM's network policies across VLANs to keep the network up and running without interrupting traffic or impacting performance. VMready works with all leading hypervisors, such as VMware, Citrix Xen, Red Hat KVM, Microsoft Hyper V, and IBM PowerVM® hypervisor
- **Layer 3 Functionality:** The RackSwitch G8052 includes Layer 3 functionality, which provides security and performance benefits plus the full range of Layer 3 static and dynamic routing protocols, including Open Shortest Path First (OSPF) and Border Gateway Protocol (BGP) for enterprise customers at no additional cost.
- **Fault tolerance:** These switches learn alternate routes automatically and perform faster convergence in the unlikely case of a link, switch, or power failure. The switch uses proven technologies such as L2 trunk failover, advanced VLAN-based failover, VRRP, HotLink, Uplink Failure Detection (UFD), IGMP V3 snooping, and OSPF.
- **OpenFlow enabled:** The RackSwitch G8052 offers benefits of OpenFlow. OpenFlow is the new open application programming interface (API) that enables the network administrator to easily configure and manage virtual networks that control traffic on a "per-flow" basis. It creates multiple independent virtual networks and related policies without dealing with the complexities of the underlying physical network and protocols. The G8052 can also be used with the IBM Programmable Network Controller, which is the IBM network controller that is compliant with OpenFlow.
- **Seamless interoperability:** IBM switches interoperate seamlessly with other vendors' upstream switches.

The IBM RackSwitch G8052 comes with an IBM limited three-year hardware warranty, including three years of software upgrades.

Figure 4 shows an example of a data center airflow to maintain hot and cold aisles.

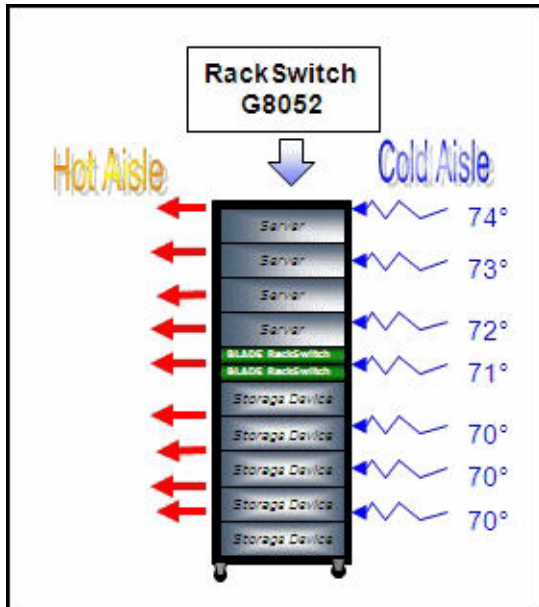


Figure 4. Data center airflow to maintain hot and cold aisles

Features and specifications

In this section, we list the features and specifications.

Performance

The performance features and specifications are:

- Single switch ASIC design
- Full line rate performance
- 176 Gbps (full duplex) switching architecture
- Low latency: 1.8 microseconds
- 132 million packets per second (mpps)

Hardware features

The front and rear views are shown in Figures 5 and 6.

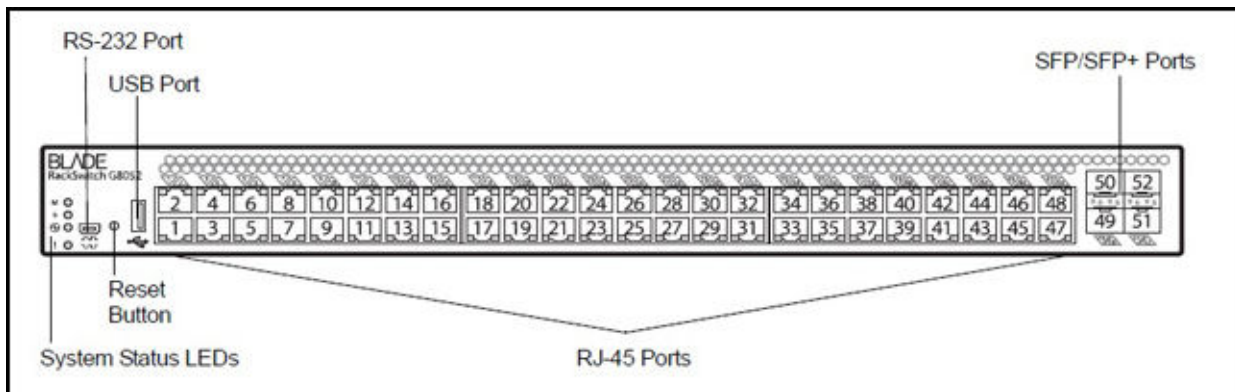


Figure 5. Front view of the IBM System Networking RackSwitch G8052

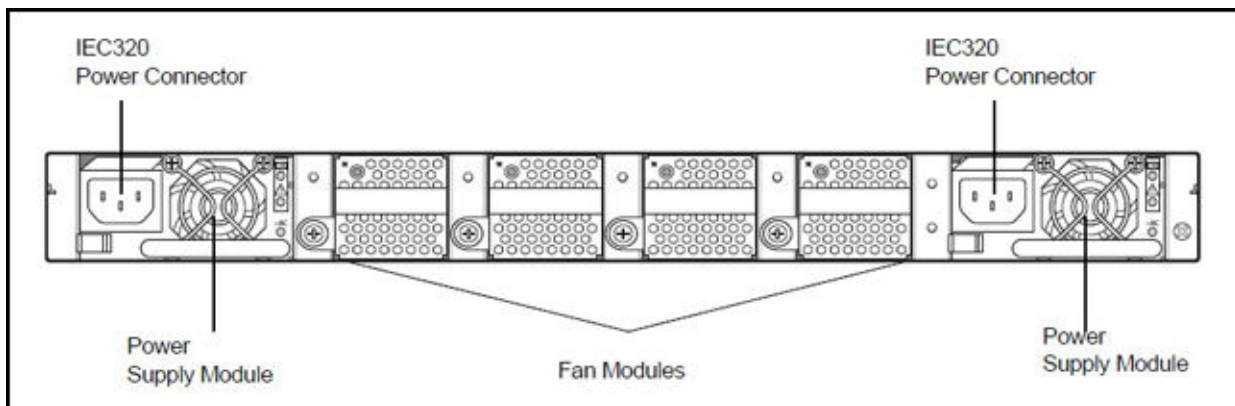


Figure 6. Rear view of the IBM System Networking RackSwitch G8052

The hardware features are as follows:

- Models
 - IBM RackSwitch G8052 (Front-to-Rear cooling)
Ports located in the front of the rack to match airflow of IBM iDataPlex® and NeXtScale systems
 - IBM RackSwitch G8052 (Rear-to-Front cooling)
Ports located in the rear of the rack to match System x®, Power Systems, IBM Flex System™, PureSystems™, and IBM BladeCenter® designs
- Interface options
 - Forty-eight 10/100/1000BASE-T ports (RJ-45)
 - Four 10GbE SFP+ ports
 - One USB port for external mass storage devices
 - RS-232 serial console port
- Dimensions: 17.3" wide, 17.5" deep, 1 RU high
- Weight: 5.45 kg (11.99 lb)
- Airflow
 - Front-to-rear or rear-to-front cooling
 - Redundant hot swappable field-replaceable fans with variable speed to reduce power draw

- Power:
 - Redundant load-sharing 450 W (rated) hot swappable power supply modules, operating at approximately 65 W, 50 - 60 Hz, 100 - 240 VAC auto switching per module when both are operating; or operating at approximately 120 W, 50 - 60 Hz, 100 - 240 VAC auto switching when only one power supply module is operating. Nominal power for the G8052 is approximately 130 W and will vary depending upon operation conditions.
- Rack Installation Kit
 - Generic Rail Mount Kit (2-post)
 - Optional, flexible 4-post mounting options for both the server rack and the datacom rack
 - Can be mounted vertically or horizontally
- LEDs
 - System LEDs to indicate status
 - Stacking LEDs to indicate master/member
- Environmental specifications
 - Temperature: Ambient operating: 0 - 40 °C
 - Relative humidity: Non-condensing, operating 10 - 90%
 - Altitude: Operating 3,050 m (10,000 feet)
 - Acoustic noise: Less than 65 dB

Cable management

Features of cable management are as follows:

- Intuitive LEDs for port identification and cable management.
- Server-like port orientations enable short and simple cabling.

Software features

For the most current updates, see the IBM Networking Operating System data sheet at:

<http://ibm.biz/Bdx4gn>

The software features are as follows:

- Security
 - LDAP
 - 802.1x with VLAN assignment
 - RADIUS
 - TACACS+
 - Wire Speed Filtering: Allow and Deny
 - Flexible ACL combinations - L2-L4 criteria: source and destination MAC, IP, TCP/UDP ports
 - SSH v1 and v2
 - HTTPS Secure BBI
 - SCP
 - Secure Interface Login and Password
- Management
 - MAC address move notification
 - Shift B Boot menu (Password Recovery/Factory Default)
 - Management ACLs
 - OpenFlow 1.1
 - Loopback interface (PIM, OSPF, BGP)
 - Netboot

- VLANs
 - Port-based VLAN
 - 4096 VLAN IDs supported
 - 1024 Active VLANs (802.1Q)
 - 802.1x with Dynamic VLAN assignment
 - Private VLAN Edge
- Trunking
 - LACP
 - Minimum links per LACP
 - Static trunks (EtherChannel)
 - Configurable trunk hash algorithm
 - Ingress-port-based hashing
 - Enhanced reporting of statistics
- Virtual Link Aggregation (vLAG)
 - L2 environment and IGMP supported
 - IGMP Snooping
 - L2 Environments
 - Active/Active VRRP for Layer 3 environments
- Spanning Tree
 - Multiple Spanning Tree (802.1 s)
 - Rapid Spanning Tree (802.1 w)
 - PVRST+
 - Auto assignment of VLANs to STG
 - BPDU Guard
 - Root Guard
 - Loop Guard
- Quality of service
 - QoS 802.1p
 - DSCP remarking
 - Weighted round robin
 - Metering
 - 4 MB shared packet buffer
 - Weighted random early detection with explicit congestion notification (WRED/ECN)
 - CPU priority policies (CoPP)
- Routing protocols
 - 128 static routes
 - Layer 2/3 static routes
 - RIP v1 and v2
 - OSPF v3
 - BGP
 - BGP enhancements for MD5 hash, ECMP, and Passive mode support
- High availability
 - HotLinks
 - Virtual Router Redundancy support (VRRP)
 - Layer 2 Failover
- Multicast
 - IGMP v1, v2, and v3 snooping with 2 K IGMP groups
 - Protocol Independent Multicast (PIM Sparse Mode/Dense Mode)
- Monitoring
 - Port mirroring
 - ACL-based mirroring
 - ACL logging
 - CPU logging
 - sFlow® Version 5
- Virtualization
 - VMready VI API support

Management features

Management features for clients are as follows:

- System Networking Switch Center (SNSC)
- ISCLI (Cisco-like)
- Scriptable CLI; Netconf (XML)
- Browser-based client or Telnet

Standard protocols

The standard protocols are as follows:

- SNMP v1, v2c, and v3
- IPv6
- IPv6 enhanced protocol support (MLDv2, OSPFv3 Encryption, IPSEC/IKEv2, NIST Compliance)
- RMON
- Secondary NTP Support
- DHCP Client
- DHCP Relay
- DHCP Snooping
- DHCP Option 82
- LLDP
- 128K MAC Table
- 9 K Jumbo Frames
- 802.3X Flow Control

Upgrades are as follows:

- Upgrade firmware through serial or TFTP
- Dual software images

Popular configurations

In this section, we discuss popular configurations.

Rack-optimized server aggregation of 1 GbE attached rack servers

Examples of possible high-concentration configurations for rack or blade server implementations are as follows:

- Power or System x 1U or 2U servers with a 1 GbE adapter installed
- Power or System x 4U servers with multiple 1 GbE adapters per server
- IBM BladeCenter using any of the following modules in the chassis
 - IBM BladeCenter Layer 2/3 Copper and Fiber Gigabit Ethernet Switch Modules
 - IBM BladeCenter Layer 2-7 Gigabit Ethernet Switch Module
 - IBM BladeCenter 1/10Gb Uplink Ethernet Switch Module
 - Intelligent Copper Pass-Thru Module for IBM BladeCenter
 - Server Connectivity Module for IBM BladeCenter
 - IBM Flex System using EN2092 Ethernet modules in the chassis

- Low-profile, high-performance, 48-port GbE switch needed to perform aggregation function per rack

Table 4 lists the features and benefits of the G8052 for server aggregation.

Table 4. Features and benefits of the G8052 for server aggregation

Features	Benefits
Line-rate, non-blocking, all 48-ports	Supports massive compute and virtualization workloads
1.8 microseconds latency	Faster application response times
Four 10 GbE uplink ports (40 Gb bandwidth to the core or upstream switch)	Minimal oversubscription 1:08 (~1 to 1)
Standards-based Layer 2/3 protocols, industry standard CLI	Interoperate with existing network, no learning curve

Figure 7 shows rack-optimized server aggregation 1 GbE attached rack servers.

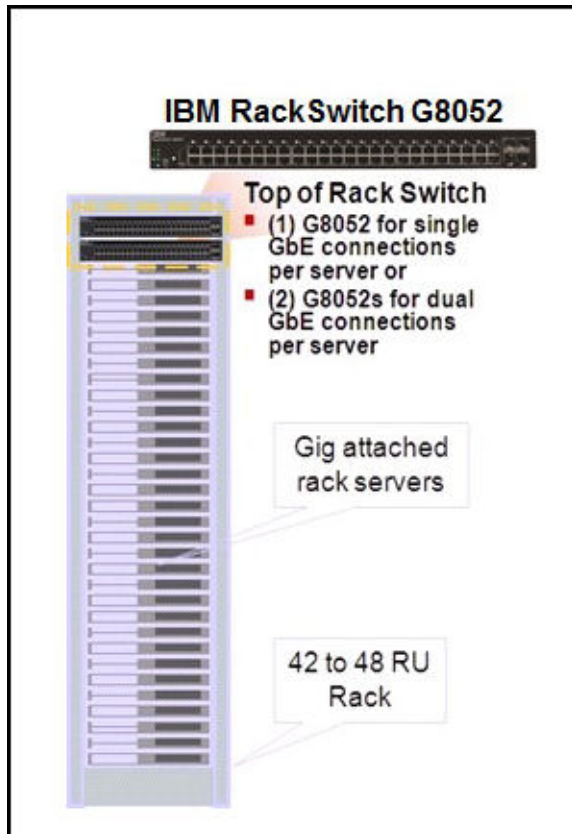


Figure 7. Rack-optimized server aggregation 1GbE attached rack servers

Rack-optimized server aggregation logical design

A design goal is to interoperate with the existing Layer 2/3 Switch and deploy IBM RackSwitch G8052s at the Data Center Edge:

- Logical configuration: Configure IBM RackSwitch G8052s for Layer 2. Apply VLAN domains (1 and 2) at core switches.
- Full Layer 2/3 Feature Set: STP, MSTP, RSTP, PVRST+; RIP v1/2, static routes, OSPF.
- Security: 802.1X; RADIUS/TACACS+; Wire Speed ACLs, SSH v1, v2; HTTPS Secure BBI.
- QoS: Up to eight queues/port, IEEE 802.1p and DiffServ prioritization.

Figure 8 shows an example of a rack-optimized server aggregation logical design.

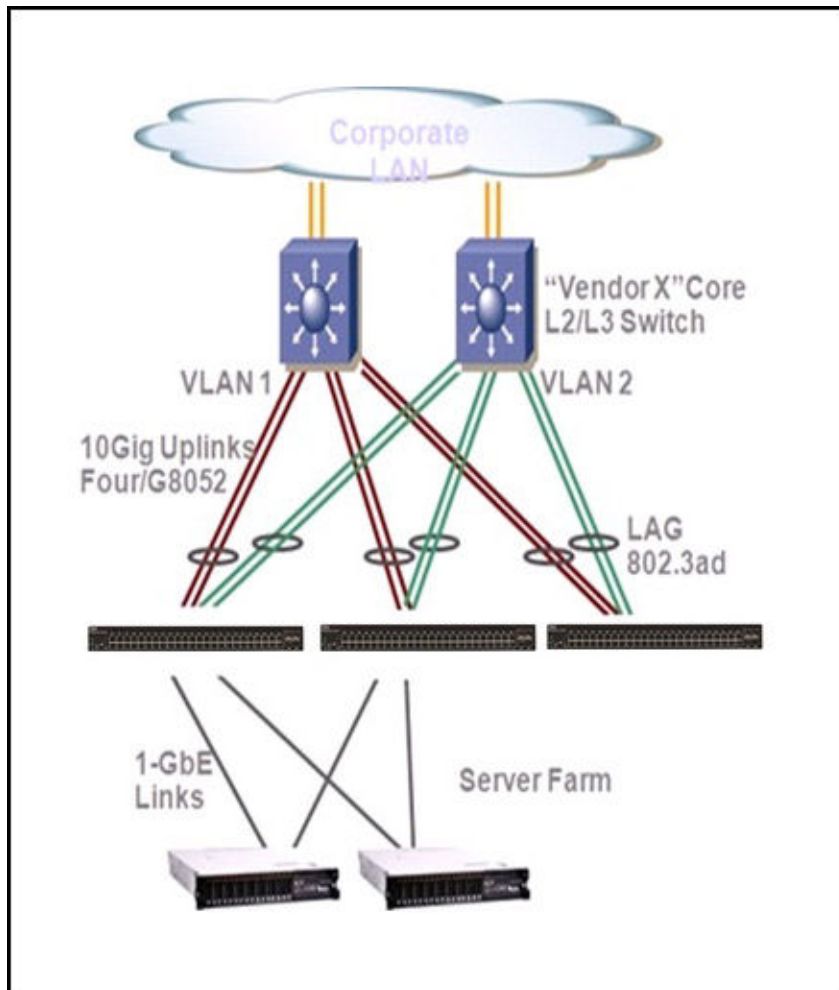


Figure 8. Rack-optimized server aggregation logical design

Server 10 GbE aggregation and connection to IBM System Storage is as follows:

- An excellent price/performance point for a data center environment
 - Low latency and investment protection for 10 GbE
- Good for connectivity to Network Attached Storage
 - IBM Real-time Compression Appliance™
 - IBM Scale Out Network Attached Storage (Figure 9)
 - IBM System Storage N Series Gateway for SAN Storage Environments
- Ideal for connectivity to iSCSI
 - IBM Storwize® V7000 Midrange Disk System
 - IBM System Storage SAN Volume Controller
 - IBM System Storage DS3500 or 5000 (Figure 10)

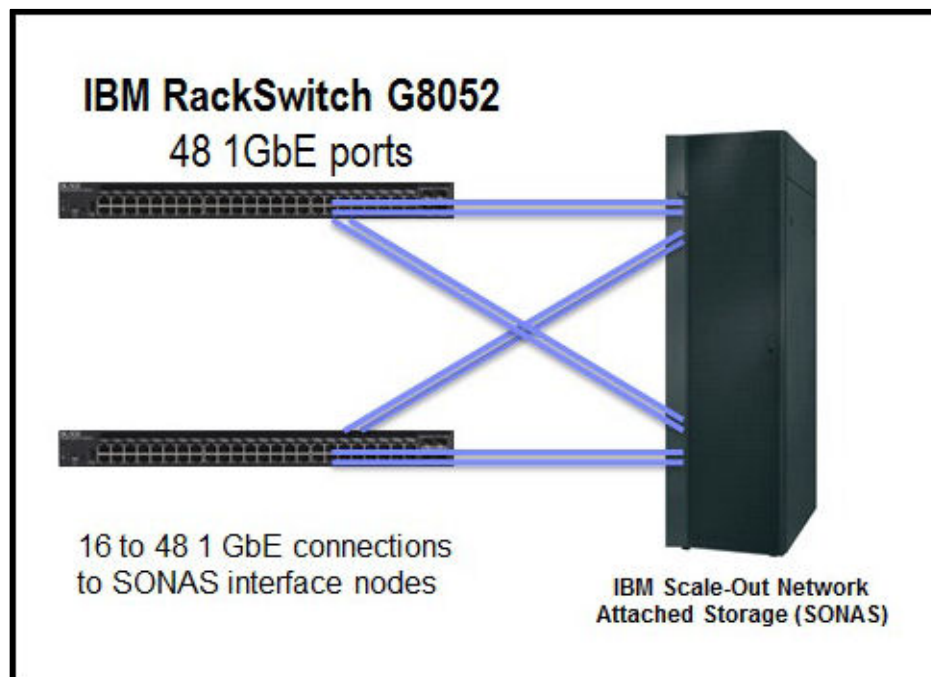


Figure 9. IBM RackSwitch G8052 with IBM Scale Out Network Attached Storage

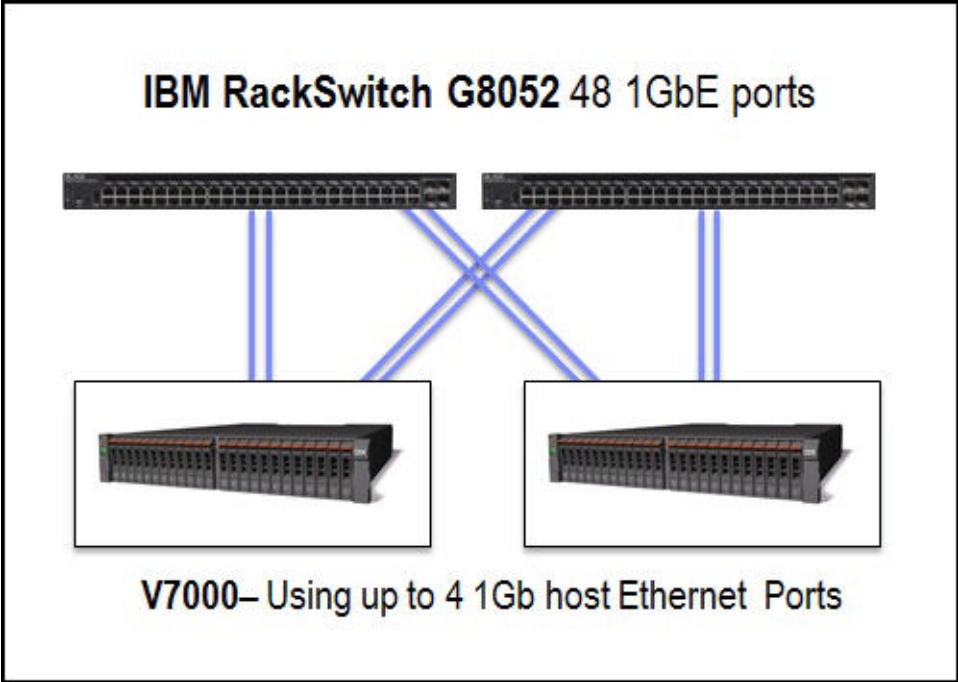


Figure 10. IBM RackSwitch G8052 with V7000

Related resources

For more information visit <http://www-947.ibm.com/support/entry/portal/Documentation> to see the following IBM RackSwitch G8052 product resources:

- *RackSwitch G8052 Installation Guide* (http://www.bladenetwork.net/userfiles/file/G8052_install.pdf)
- *IBM RackSwitch G8052 isCLI Command Reference*
- *IBM RackSwitch G8052 Application Guide*
- *IBM RackSwitch G8052 Browser-Based Interface Quick Guide*
- *IBM RackSwitch G8052 Menu-Based Command Reference*

For more information, refer to the following resources

- IBM US Announcement Letter, IBM RackSwitch G8052 and G8264 for System x and iDataPlex: <http://ibm.biz/BdxHAI>
- IBM Power Systems™ and Storage: <http://ibm.biz/Bdx4gG>

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