IBM FlashSystem Family FAQ

Learn how to select the right IBM FlashSystem® product

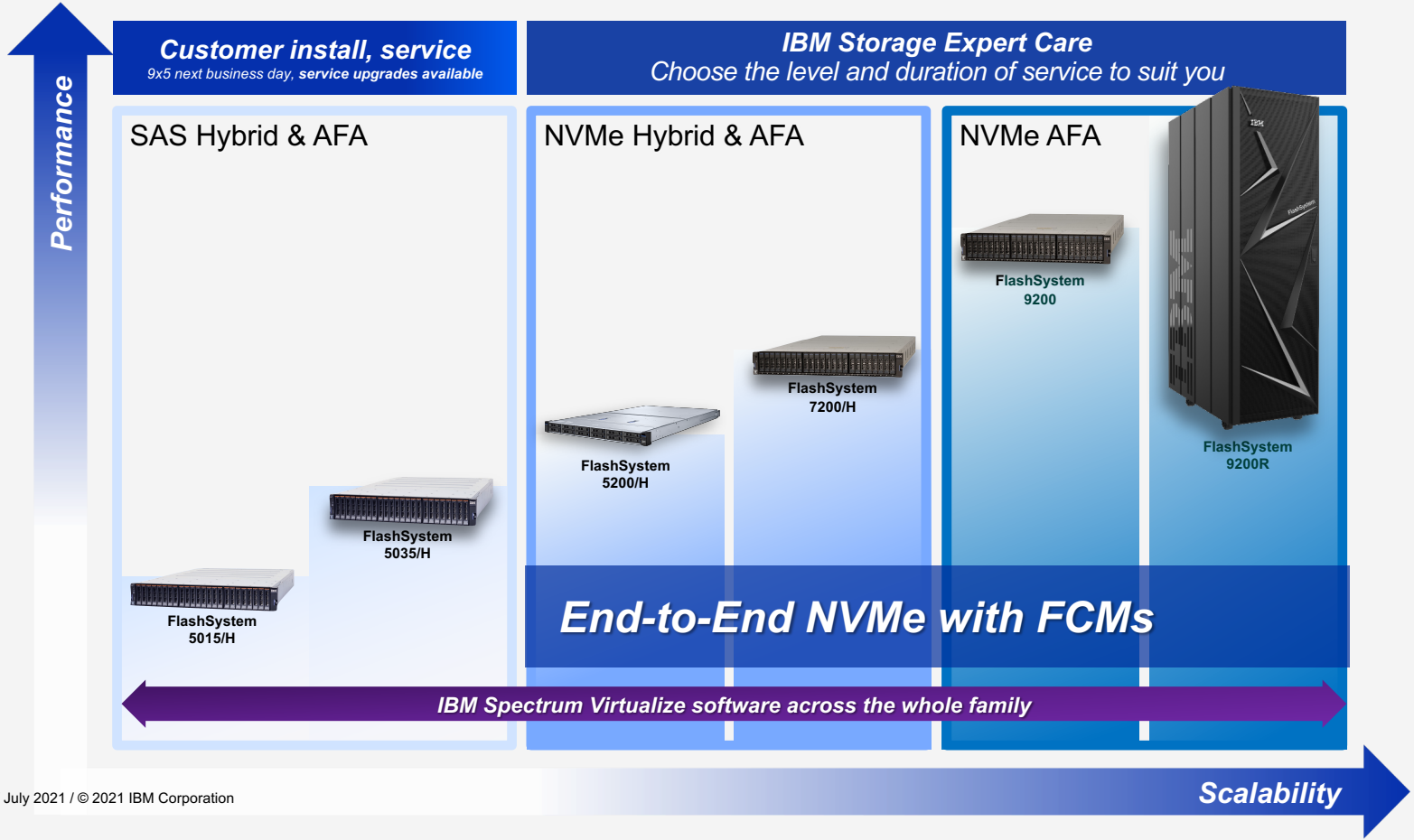
IBM Storage

IBM

Content

- Meet the IBM FlashSystem family
- FlashSystem family capabilities
- Choosing a FlashSystem product
- FlashSystem 5015 and 5035
- FlashSystem 5200 and 7200
- FlashSystem 9200
- Scale up and out
- Clustering across the family
- FlashSystem 9200R
- Have I selected the right system?
- Product selection FAQ
- Other resources

Meet the IBM FlashSystem family



FlashSystem family capabilities

It's all powered by **IBM Spectrum Virtualize** software

Storage Insights (AI predictive analytics and proactive monitoring)

FlashSystem 5015/H	FlashSystem 5035/H	FlashSystem 5200/H	FlashSystem 7200/H	FlashSystem 9200/R
VMware & container integration				
Multi-tenancy				
3-site data copies				
Metro/Global Mirror (remote copy)				
FlashCopy® (local and cloud copy snapshots)				
Easy Tier® (automated hot/cold extent movement)				
Data migration (from >500 supported arrays)				
Distributed RAID 1, 5 & 6				
DRP (Software Only)	Data reduction pools (hardware assist compression)			
Clustering (multiple I/O groups)				
HyperSwap® (active / active access)				
Encryption (local and server-based keys)				
Safeguarded Copy				
NVMe Flash and NVMeOF host connections				
FCMs (highest performance NVMe with compression & encryption)				
External storage virtualization (>500 supported arrays)				
Storage Class Memory (ultra low latency drives)				

Choosing a FlashSystem product

With the new simplified FlashSystem family, how do I select the right product?

How much storage **capacity** do you need?

- Does data reduction change that figure?
- FlashSystem 5000 and 7200 have “H” (for hybrid) models which means you can mix HDDs and SSD. 9200/R is AFA only

What **performance** are you expecting?

- Compare to your existing environment
- Consider future growth
- See example workloads in the IBM FlashSystem Product Tour

Are you going to use any **advanced function** (DRP, copy services, HyperSwap, etc)?

- Does this change the capacity or performance?

Use the **Storage Modelling Tool** (StorM) to validate your choices.

Select your product and **adjust the configuration.**

What’s a “typical configuration”?

Each system is designed around a set of components to meet a performance goal:

- The **CPU** is right sized for the expected workloads, but if you’re making use of advanced functions at the same time, you need more CPU
- The internal **bandwidth** is right-sized for each controller, but adding more ports and more storage will not increase that bandwidth
- Likewise, having too many drives and not enough ports to serve them is also bad
- Consider the size of **cache** relative to your working set and total capacity. Some functions, such as DRP, benefit from maximizing the cache too

A “typical configuration” is a best practice, balanced configuration that’s optimized across components.

Try and match your configuration to be close to a typical configuration.

*Illustrative performance comparison, will vary based on workloads and configurations

IBM FlashSystem 5015 and 5035

FlashSystem 5015/H

Entry Enterprise

4k read miss | **140k IOPS***

4k read hit | **400k IOPS***

Entry enterprise SAS controller

Great for blending HDD with SSDs to accelerate workloads with **EasyTier**
If you load a 5015 with SSDs, you'll NOT get maximum drive performance!

A modest CPU will limit the advanced function that can be used simultaneously

Optional SAS expansion for more capacity

FlashSystem 5035/H

Entry Enterprise

4k read miss | **400k IOPS***

4k read hit | **1.2k IOPS***

Also an entry enterprise SAS controller, but suited for a higher mix of SSDs for primary workloads and/or EasyTier

A low cost entry point for smaller **HyperSwap** configs

Some copy services. **Good for IP replication** with higher RPO requirements

Typical configurations

Upwards of 10TB raw
(less for workloads, more for bulk storage)

32GB of cache
per system

2 x 16Gb FC HBA
per system, or SAS, or 10 or 25Gb HBA

100TB raw capacity

Up to 64GB of cache

2 x 16Gb FC HBA
per system, or SAS or 10 or 25Gb HBA

*Illustrative performance comparison, will vary based on workloads and configurations

IBM FlashSystem 5200 and 7200

FlashSystem 5200/H

Entry Enterprise

4k read miss | **450k IOPS***

4k read hit | **1.5M IOPS***

An entry into **NVMe FCM drives** with performance neutral hardware **compression** and **encryption**

4 to 8 NVMe drives is the sweet spot for this hardware, which can be adequately serviced by a 16Gb FC HBA. ***Add more drives for capacity, not performance.***

Better CPU and **larger cache** make this a more capable box for advanced function

FlashSystem 7200/H

Midrange Enterprise

4k read miss | **700k IOPS***

4k read hit | **2.5M IOPS***

A midrange enterprise NVMe box with an 8 to 16 drive sweet spot

Can really start to leverage **multiple advanced functions**, including **DRP**

If using **Remote Copy** or doing **clustering**, allow for 2 extra FC cards to ensure box is not host port constrained

Typical configurations

50-100TB raw capacity
(100-200TB with FCM compression)

Upwards of 256GB of cache
per system

2 x 16Gb FC HBA
per system with onboard 10Gb iSCSI

100-200TB raw capacity
(200-400TB with FCM compression)

Upwards of 256GB of cache
per system

4 x 16Gb/32Gb FC HBA
per system with onboard 10Gb iSCSI

*Illustrative performance comparison, will vary based on workloads and configurations

IBM FlashSystem 9200

FlashSystem 9200
High-end Enterprise

4k read miss | **1.2M IOPS***

4k read hit | **4.5M IOPS***

Target 12 to 24 drives and at least 2 FC cards, with 3 for HA and DR. Best performance with **32Gb FC cards**

With more **powerful CPUs**, the 9200 family can run **multiple advanced functions simultaneously**

Large cache options for more workloads and larger working set

FlashSystem 9200 with SCM
High-end Enterprise

4k read miss | **1.2M IOPS with lower latency ***

4k read hit | **4.5M IOPS***

Trade some FCM capacity for up to 12 **Storage Class Memory** drives to boost performance and/or lower latency further

Clustering pushes the performance and capacity envelopes beyond a single box

Enterprise Class Service *makes all 3 year warranty 9200 controllers best for enterprise customers*

Typical configurations

200-400TB raw capacity
400-800TB with FCM compression

At least 768GB of cache
per system

4 x 16Gb/32Gb FC HBAs
per system with onboard 10Gb iSCSI

Upwards of 300 TB raw
>600TB with FCM compression

Towards 1.5TB of cache
per system

6 x 32Gb FC HBA
per system, with onboard 10Gb iSCSI

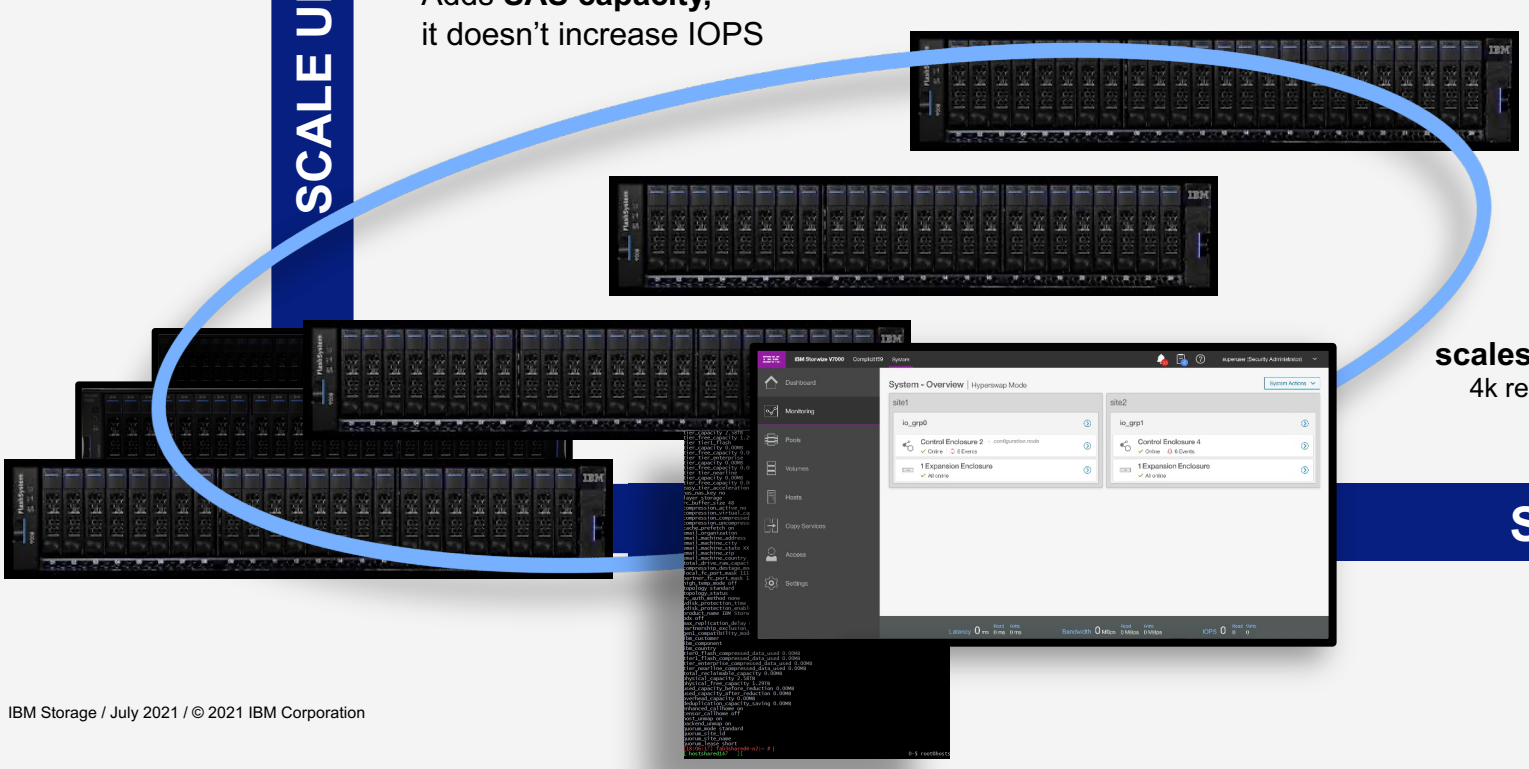
Scale up (expansions)
Scale out (clustering)

Single point of control, with **single** GUI and CLI.
Manage all storage from a **single** pane of glass.

SCALE UP

Expansions

Adds **SAS capacity,**
it doesn't increase IOPS



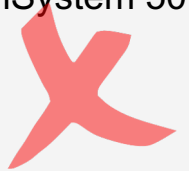
Clustering

Adds **NVMe capacity,**
scales performance linearly
4k read miss | **up to 4.8M IOPS**

SCALE OUT

Clustering across the family

FlashSystem 5015



FlashSystem 5035

2 WAY, Also with 5030, V5030E

FlashSystem 5200

4 WAY

FlashSystem 7200

4 WAY, also with V7000, 9100 & 9200

FlashSystem 9200

4 WAY, also with V7000, 7200, 9100

Clustering is supported across the FlashSystem family
as a way of linearly scaling performance, connectivity and capacity.

*Illustrative performance comparison, will vary based on workloads and configurations

IBM FlashSystem 9200R

The FlashSystem 9200R is a bundle of products that will be assembled, delivered and configured for the customer.

2, 3 or 4 9848-AG8 **FlashSystem 9200s**, clustered together with a single point of control and packaged in a 7965-S42 rack and sold as a 9202R, 9203R and 9204R respectively

- *2, 3 or 4 times the performance of a single FlashSystem 9200*

Optional expansions

- 2U 24 drive and 5U 92 drive options

Dedicated fibre channel backbone

- Isolated from host traffic
- Broadcom 8960-F24 switches

Can be expanded with additional controllers or expansion enclosures in the future

4k read miss | **4.8M IOPS** with 9204R, lower latency when combined with SCM drives*

4k read hit | **18M IOPS with 9204R***

Have I selected the right system?

Deviating from a “typical configuration” is expected!

Flexibility is good, we all have different needs …
… *use the StorM tooling to validate the workload requirements*

Compare your configuration with the “typical configurations.”

Consider **”Model Up”** or even **“Model Down”** if you’ve deviated significantly otherwise you have something that’s likely unbalanced!

Clustering might also be an option for you to increase connectivity or performance

Generally, avoid unbalanced configurations.

You’re either over spending or …
… you’re setting yourself up for disappointment
(or you’ve a specific use case)

Product selection FAQ

What's the difference between each of the products?
All platforms run the same IBM Spectrum Virtualize software, but each product's hardware is targeted at a different price-performance point.

Will anything bad happen if I create an unbalanced configuration?
No! The idea of this advice is to help you balance cost with capability and understand any trade-offs. There maybe use cases (such as "deep-and-cheap storage") where a lack of balance between the processing and connectivity capabilities and the overall storage capacity is not an issue.

Why do you offer unbalanced configurations?
Flexibility is good! We don't want to prevent you using the product to meet your unique needs. We want you to be informed about the decisions you make.

If I use clustering, what should I use as guidance for a typical configuration?
Clustering allows you to scale linearly. Use the guidance for the product that you're clustering for each of the controllers in the cluster.

When should I cluster rather than model up?
Clustering controllers together scales performance, capacity and connectivity linearly. If you're looking to just increase performance, then compare the performance of the next model up with the performance of a clustered system and consider cost and future expansion.

When should I not cluster?
Clustering reduces your management overhead and creates flexibility, but also creates larger failure domains. If you want to isolate different workloads (e.g. core customer function from internal business functions), then managing the controllers individually may be more appropriate.

What machine type model (MTM) is the FlashSystem 9200R?
It doesn't have it's own MTM, it's a bundle of products that's pulled together through econfig and then assembled, delivered and configured for the customer.

I want a FlashSystem 9200R, what should I use as guidance for a typical configuration?
The FlashSystem rack products are based on clustered FlashSystem 9200s. Use the FlashSystem 9200 as guidance, and scale linearly.

I want a different configuration to the FlashSystem 9200R configurations offered.
Right now only a limited set of configurations are offered. You can still expand the 9200R by ordering extra components, or by ordering everything separately and using Lab Services to assemble it for you. You must stay within the configuration limits of the FlashSystem 9200.

What's the difference between hybrid and AFA (all-flash array) products, e.g. FlashSystem 5200 and FlashSystem 5200H?
The hardware is the same for hybrid (i.e., models ending in "H") and AFA (i.e., "non-H" models). AFA models are limited to containing just flash drives, preventing HDDs from being ordered, installed or used.

Why do you offer both hybrid and AFA variants?
To ensure we can meet a range of different customer requirements.

I don't get the IOPS performance stated on the chart!
This is a maximum IOPS number using 4k random reads. Many workloads are not like this and your experience will be different. The numbers have been provided as a high level comparison across products. You should use the StorM tool to validate your use case and workloads.

Other resources

IBM Spectrum Virtualize FAQ

Details on the IBM Spectrum Virtualize products, covering IBM FlashSystem family and SAN Volume Controller

IBM FlashWatch FAQ

Guidance on the IBM FlashWatch programs

IBM Redbooks

Detailed information on both IBM FlashSystem products and IBM Spectrum Virtualize function

FlashSystem Product Tour

Interactive product tour showing GUI usage and performance

Thank you

Matt Smith
IBM FlashSystem Product Manager
—
msmith@uk.ibm.com
ibm.com

Legal Notices

IBM, the IBM logo, and ibm.com are trademarks of International Business Machines Corp., registered in many jurisdictions worldwide. Other product and service names might be trademarks of IBM or other companies. A current list of IBM trademarks is available on the web at “Copyright and trademark information” at ibm.com/legal/copytrade.shtml.

Product data has been reviewed for accuracy as of the date of initial publication. Product data is subject to change without notice. This document could include technical inaccuracies or typographical errors. IBM may make improvements and/or changes in the product(s) and/or program(s) described herein at any time without notice. Any statements regarding IBM's future direction and intent are subject to change or withdrawal without notice and represent goals and objectives only. References in this document to IBM products, programs, or services does not imply that IBM intends to make such products, programs or services available in all countries in which IBM operates or does business. Any reference to an IBM Program Product in this document is not intended to state or imply that only that program product may be used. Any functionally equivalent program, that does not infringe IBM's intellectually property rights, may be used instead.

THE INFORMATION PROVIDED IN THIS DOCUMENT IS DISTRIBUTED "AS IS" WITHOUT ANY WARRANTY, EITHER OR IMPLIED. IBM LY DISCLAIMS ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NONINFRINGEMENT. IBM shall have no responsibility to update this information. IBM products are warranted, if at all, according to the terms and conditions of the agreements (e.g., IBM Customer Agreement, Statement of Limited Warranty, International Program License Agreement, etc.) under which they are provided. Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements or other publicly available sources. IBM has not tested those products in connection with this publication and cannot confirm the accuracy of performance, compatibility or any other claims related to non-IBM products. IBM makes no representations or warranties, express or implied, regarding non-IBM products and services.

The provision of the information contained herein is not intended to, and does not, grant any right or license under any IBM patents or copyrights. Inquiries regarding patent or copyright licenses should be made, in writing, to:

IBM Director of Licensing
IBM Corporation
North Castle Drive
Armonk, NY 1 0504- 785
U.S.A.