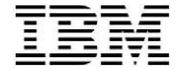


# IBM XIV SYSTEM GEN3 TURBO COMPRESSION (MODEL 314)

FAQ FOR CUSTOMERS

Document version: 3

Date: December 2015



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## Offering

### 1. What does IBM is announcing?

IBM is announcing the new **XIV Gen3 Turbo Compression model 314**. This new model provides the following enhancements:

- Enhanced hardware: With double RAM and CPU resources dedicated to Real-time-Compression (RtC), XIV model 314 is capable to deliver from 1 to 2PB of effective capacity at less than 1 USD per GB.
- Enhanced software: XIV software version 11.6.1 supports the 314 hardware enhancements, and the following improvements for any IBM XIV Storage System Gen3 hardware
  - ✓ 2 PB of user-configurable soft capacity
  - ✓ 51 GB of minimum compressible volume size

### 2. When is the availability date for XIV Gen314?

The general availability for XIV model 314 is December 4, 2015

## Offering Value Proposition

### 3. How does compression help on reducing the Total Cost of Ownership (TCO)

Compression dramatically reduces TCO by increasing the effective capacity while providing cost savings on physical space, power consumption and related administrative costs. The actual TCO reduction depends on the hard capacity and the compression ratio. A major part of the TCO is the purchase cost, typically compared per GB. For example, assuming a system can exhaust 2 PB of soft capacity, you can have ~75% lower purchase cost when having a 4x of compression ratio and 485 TB of hard capacity. As another example, you can have up to ~84% lower purchase cost with a 6x compression ratio and 324 TB of hard capacity.

Note: TCO is further reduced, since the per-GB cost of deployment, maintenance, labor and datacenter costs are also dramatically reduced.

#### 4. Can RtC be used for active data such as databases, email systems or other active data set applications?

Yes. With real time compression – vs. background processing - and temporal locality optimization, IBM RtC provides the only practical data reduction solution in the hybrid storage arrays market, by allowing compression to be applied in real time to all the I/O, including active primary data , at enterprise level performance.

#### 5. Are changes on the existing environment required in order to use compression ?

No, No changes to the existing environment are required. IBM Real-time Compression is part of the storage system. It was designed with transparency in mind so that, it can be implemented without changes to applications, hosts, networks, fabrics or other external storage systems. The solution is not visible to hosts, so users and applications continue to work as-is. Compression occurs within the XIV system itself.

#### 6. Are there performance benefits by using RtC?

Yes, XIV can provide the following performance benefits when using RtC:

- Better cache hit ratio: The XIV compression code uses an above cache architecture, where the data is compressed before it is stored in the cache. The cached data in RAM and SSD is stored compressed, which means that effectively more data is cached. When there is more data in cache, compressed volumes can have a better cache hit ratio.
- Efficient remote replication: Remote volume copies are always compressed if the source is compressed. This process not only reduces storage requirements, but also uses less bandwidth because the data is transferred compressed.
- Faster data movement: Hyper-Scale Mobility is faster and requires less bandwidth for the connections between XIV storage systems.

#### 7. How reliable is the RtC technology used in XIV?

Very reliable!, IBM Real-time Compression uses patented IBM Random Access Compression Engine (RACE) technology, achieving field-proven compression ratios and performance with compressible data. The RACE compression technology has been successfully used in XIV as well as in other IBM storage products.

## 8. What are the XIV 314 availability characteristics (i.e. five 9s or six 9s)?

XIV 314, like other former models, delivers better than five 9s of availability.

## Effective Capacity

### 9. What is effective capacity?

Effective capacity is the amount of storage that is allocated to applications. Using thin-provisioning, the effective capacity is virtually larger than the array usable capacity. When compression is applied, the space saving is predictable, thus eliminating the need to monitor against over-provisioning.

### 10. What is maximum effective capacity of XIV model 314 ?

2 PB is the maximum effective capacity of XIV model 314. This capacity is reached when all the soft capacity has been allocated to applications.

### 11. How much effective capacity can XIV model 314 deliver in practical terms ?

The primary factor that determines the practical capacity is the compression ratio. For example, at an average 2x compression ratio, a hard capacity of 485TB enables up to 970TB (2 x 485TB) of soft capacity. At an average 3x compression ratio, a hard capacity of 485TB enables up to 1455TB (3 x 485TB) of soft capacity.

To exhaust the system effective capacity (2PB), the average compression factor should not be lower than 2PB/system-hard-capacity. For example, in a 485TB system the average compression ratio should not be lower than 4.1X (2PB/485TB).

### 12. Are there typical compression ratios used for RtC?

IBM analysis of field data resulted in the following compression ratios by application/data type:

Data Type	Typical Compression Ratio	Savings
Databases	5:1	80 %
Virtual environments	4:1	75 %

<b>Engineering data</b>	5:1	80 %
<b>Messaging/email</b>	5:1	80 %
<b>Mixed/General Purpose</b>	2:1	50 %

Note: These compression ratios should be used as reference only, other tools should be used to get more accurate estimations based on real data types.

### 13. What can I use to get better compression ratio estimates based on my actual data and workloads ?

The compression saving information is conveniently displayed through the XIV GUI at all times. The feature automatically analyzes actual capacity savings for compressed volumes and potential capacity savings for any non-compressed volumes. In addition, aggregate potential and actual capacity savings are displayed at the pool level.

You can also use the host-based IBM Comprestimator tool to accurately estimate the expected compression savings/benefits, when XIV Gen3 with version 11.6x is not available. The Comprestimator tool is available as a public download at:

<http://www-304.ibm.com/webapp/set2/sas/f/comprestimator/home.html>.

### 14. Are performance requirements important to determine the practical effective capacity?

In most cases, determining the practical capacity based on compression ratio is sufficient. However, when capacity planning requires higher precision, or when the system is expected to generate a high level of IOPS, for example above 80K IOPS, it would be good to further assess the actual effective capacity from a performance perspective using IBM technical sales team help.

### 15. Are there any storage operation practices that can help on maximizing the effective capacity?

Yes. Please refer to the XIV Planning Guide for detailed information about operation practices that can help on maximizing the effective capacity.

## Positioning and product comparison

### 16. What are the differences between model 314 and model 214

The following table shows the differences between model 214 and model 314:

Model	214	314
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<b>Number of modules (min/max)</b>	6 / 15	9 / 15
<b>Number of disks (min/max)</b>	72 / 180	108 / 180
<b>Supported disk capacities</b>	1, 2, 3, 4, 6	4, 6
<b>Number of CPUs (min/max)</b>	6 / 15	18 / 30
<b>Number of CPU cores (min/max)</b>	24 / 90	108 / 180
<b>Memory (min/max)</b>	144 GB / 720 GB	864 GB / 1440 GB
<b>Flash caching (min/max)</b>	2.4 TB / 12 TB (Optional)	7.2 TB / 12 TB
<b>Compression license</b>	Optional	Included
<b>Compression configuration</b>	Disabled by default	Enabled by default
<b>Full 2 PB of soft capacity utilization with compression enabled</b>	Best-case scenario	Doable with common workloads

### 17. Are there any differences or improvements in the RtC software?

- The newly announced software version 11.6.1 introduces the following improvements compared to software version 11.6.0:
  - ✓ Up to 2 PB of user-configurable soft capacity (was 3x the hard capacity in model 214)
  - ✓ 51 GB of minimum compressible volume size (was 103 GB in software version 11.6.0)
- Model 314 is shipped with software version 11.6.1 .
- Model 214 will be shipped with software version 11.6.1 starting December 4, 2015.

### 18. Can XIV models 114 and 214 with older software versions be upgraded to version 11.6.1 in order to use RtC?

Yes, if you have a model 114 or a model 214 XIV with older software versions, you can upgrade them to version 11.6.1 and use the same RtC engine. Software version 11.6.1 inherently adjusts the use of compute resources according to the available hardware.

Customers using XIV models 114 and 214 can apply the optional RtC license to reduce the total cost of ownership (TCO) of their current Gen3 machines, without hardware enhancements and without performance degradation.

### 19. Which product delivers more effective capacity?

In model 314, 48 GB of additional RAM per module, are dedicated to RtC. It is 12 times larger RtC RAM than model 214 (4GB), allowing a huge compressed-data cache and metadata store. As a result, model 314 supports roughly 5 times more compressed capacity at the same performance level or better.

## FAQs for Customers

In model 314, utilizing the full 2PB by applying compression is doable with common workloads and performance requirements. In model 214 reaching 2PB without performance degradation is a best-case scenario.

**20. What are the performance differences between 214 and 314?**

Yes, these are the key performance differentiators between models 214 and 314:

- 314 will maintain high performance with roughly 5x more compressed capacity than 214.
- 314 can deliver ~50% more IOPS on compressed workloads than 214.
- 314 latency is ~20% better than 214 for uncompressed workloads.

**21. Which product provides lower TCO ?**

Thanks to the enhanced hardware, model 314 dramatically improves TCO, by maximizing compression utilization. Data reduction can be applied to greater capacity than 214, without performance degradation, providing important TCO savings and a highly-competitive \$/GB ratio that is hard to beat .

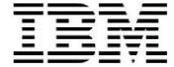
**22. I am interested in small capacity, what options do I have?**

314 is available with 4TB and 6TB drives, 9 or more modules, and 800GB SSDs. 314 COD option is helpful to start with a small capacity, utilize data reduction, and grow on demand.

If you need a small capacity and if you do not plan to use compression aggressively, model 214 is a viable option that would provide significant cost savings via data reduction.

**23. My XIV runs behind SAN Volume Controller (SVC) and I would like to use compression. How does compression should be used?**

It is important to mention that compression should be applied either on the backend, or the front end, but not on both. When compression is required, The IBM best practice is to utilize compression in the SVC hypervisor and use XIV without compression at the back-end. In such cases , if all the XIV capacity is used via SVC, model 214 without RtC license is a viable option. If a significant part of the capacity is used directly (not via SVC), model 314 is preferred, but it is recommended to disable compression on volumes that are provisioned via SVC.



**24. I have a 314 machine and I plan to use RtC extensively. Can I use a 214 in the DR site to minimize cost?**

Yes. However, if both machines are new, the cost of a 214 model + optional RtC license is nearly the same as 314, so it makes more sense to buy 2 x 314 machines.

If the DR site already has a 214 system, the RtC license is all that you need to add at the DR site.

**25. Is 314 replacing 214? Will model 214 be available in the future?**

214 is here to stay. If you are interested on small capacities or if for any reason, you are not planning to use compression, then XIV model 214 is a viable option .

## Ordering and licensing

**26. How is ordering of model 314 different than ordering of model 214?**

The following tables show the ordering differences between models 214 and 314.

Ordering Options:

Model	214	314
Number of modules (min/max)	6 / 15	9 / 15
Disk capacities	1, 2, 3, 4, 6	4, 6
Flash caching (min/max)	2.4 TB / 12 TB (Optional)	7.2 TB / 12 TB
Compression	Optional	Included
Custom-rack	Optional (model 216)	Not available

Warranty Options:

Model	214		314	
Machine Type	2810	2812	2810	2812
Warranty	1 year	3 years	1 year	3 years

License Options:

Model	214	314
IBM XIV Storage System Gen3	5639-YYB	5639-YYE

software		
IBM XIV Storage System Gen3 Hardware Integration license for IBM Spectrum Accelerate	5639-YYF	5639-YYG
IBM XIV Cloud Storage for Service Providers	5639-YYC	Not available

### 27. Can I upgrade a model 214 to a model 314?

No. The XIV model 214 cannot be upgraded to model 314.

### 28. How is XIV RtC priced and sold with model 314?

RtC is included in the base license. The acquisition cost is equivalent to a similarly configured 214 system with the optional RtC license, but the effective \$/GB ratio is expected to be significantly lower due to greater effective capacity

### 29. Is the Spectrum Accelerate (SA) licensing applicable to model 314?

Yes. Like with model 214, SA requires a different software license.

- The regular software license for model 314 is 5639-YYE.
- The Spectrum Accelerate licensing for model 314 requires the usage of the hardware integrated software license 5639-YYG.

### 30. I bought Spectrum Accelerate licensing. Should I apply it to the new 314 model?

There are good reasons to consider SA licensing with model 314:

- The \$/GB cost of SA licensing can be dramatically improved with 314 effective capacity. The SA license is priced per usable capacity, but 314 effectively delivers much larger capacity.
- 314 hardware complies with the SA licensing pre-requisites of 800GB and 4TB/6TB drives. The additional SA license requirement is 15-module configuration.

Note: SA licensing is applicable to both 214 and 314, with the appropriate software licenses.

### 31. Does IBM provide a capacity and performance guarantee for RtC?

Yes, IBM provides the following guarantees when acquiring the eligible machine from IBM or an authorized IBM Business Partner:

- **Capacity Savings Guarantee:** IBM guarantees a system level Storage Efficiency Savings Rate of at least 50%.
- **Performance Guarantee:** IBM guarantees that the Eligible Machine will maintain the same level of average IOPs, up to 150K IOPs, under average four (4) milliseconds response time, as the client's existing 214 system.

For additional information on these guarantees, please contact your IBM seller or IBM Business Partner.

### 32. Are there any other ordering changes

Yes, you can now have any new Gen3 machine shipped with reduced height and partially reduced height, or fully reduced weight. These options are applicable to any Gen3 machine, 214 and 314. For technical information about these ordering options, please consult your IBM seller or reseller

## Using compression

### 33. Is compression turned on with model 314 out of the box?

Yes.

### 34. Are all XIV volumes compressed by default with model 314?

Yes, by default, a pool will be created as thin and compressed, which means that by default, a new volume will be compressed. Volumes that - for any reason - are not in compressed state, can be converted to compressed.

### 35. Can compressed volumes be decompressed?

Yes, compression can be reversed, non-disruptively.

### 36. Does XIV RtC use specialized hardware?

While RtC is done 100% in software, XIV model 314 dedicates additional CPU and 49GB per module to RtC, to let it handle dramatically more compressed data in real time.

The same compression engine runs on any XIV Gen3 hardware with versions 11.6.x and up, including XIV model 114 and 214.

## Related documents and references

- General online resources: [ibm.com/xiv](https://ibm.com/xiv)
- IBM Redbooks: [XIV Storage System: Architecture and Implementation](#)
- IBM Redbooks: [XIV Storage System: IBM Hyper-Scale Mobility Overview and Usage](#)
- IBM Redbooks: [IBM Real-time Compression on the IBM XIV Storage System](#)
- Infographic: [XIV Gen3, predictable performance for an unpredictable world](#)
- Video: [Customer Success with XIV and Real-time Compression](#)
- Video: [ITNow in Wikibon interview](#)

## Announcement letters

Title: IBM XIV Storage System Model 314 delivers Real-time Compression with larger effective capacity and better performance

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