DS8000 Copy Service and Safeguarded Copy Update

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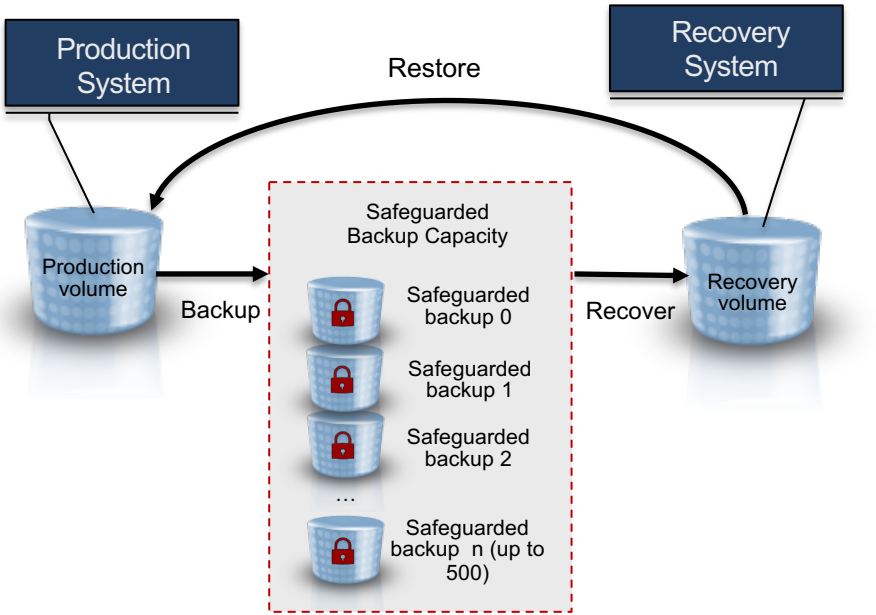
Safeguarded Copy

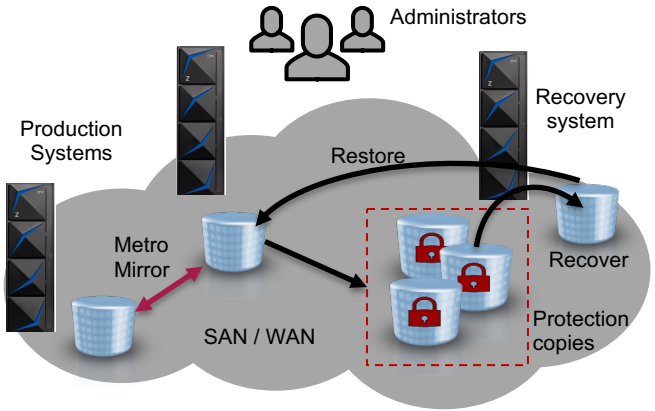
- Safeguarded Copy provides functionality to create up to 500 recovery points for a production volume
- These recovery points are called Safeguarded Backups
- The Safeguarded Backups are stored in a storage space that is called Safeguarded Backup Capacity (SGBC)
- The Safeguarded Backups are hidden and non-addressable by a host
- The data can only be used after a Safeguarded Backup is recovered to a separate recovery volume.
- Recovery volumes can be accessed using a recovery system and used to restore production data.

IBM DS8900 Safeguarded Copy prevents sensitive point in time copies of data from being modified or deleted due to user errors, malicious destruction or ransomware attacks



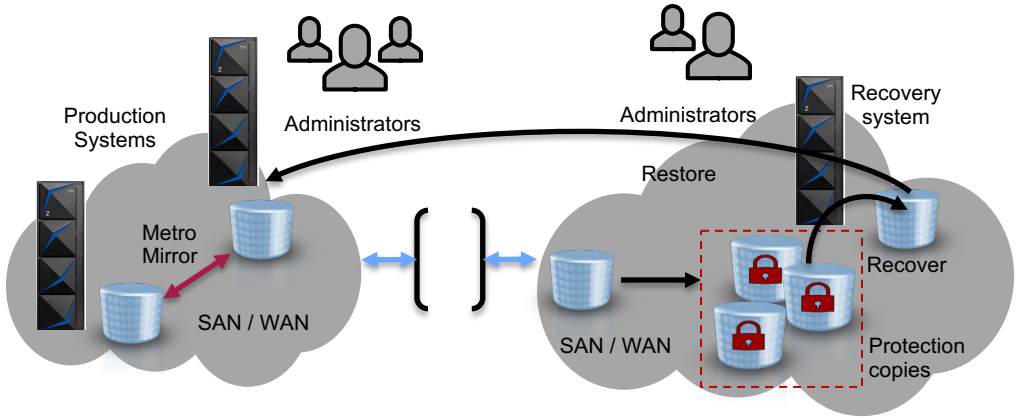
Virtual and Physical Isolation

Virtual isolation



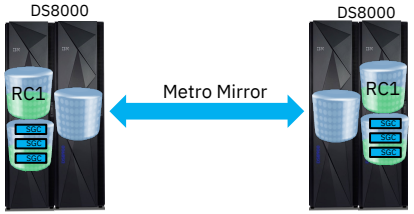
- The protection copies are created in one or more storage systems in the existing high availability and disaster recovery topology
- The storage systems are typically in the same SAN or IP network as the production environment

Physical isolation



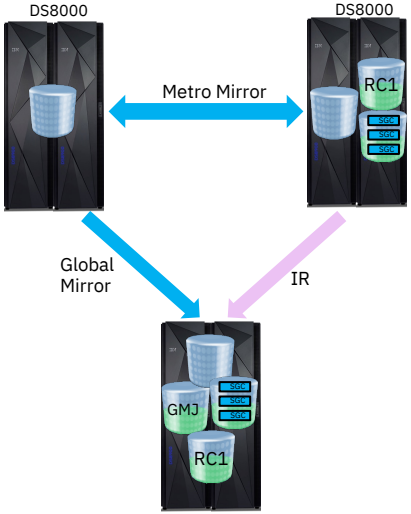
- Additional storage systems are used for the protection copies
- The storage systems are typically not on the same SAN or IP network as the production environment
- The storage systems have restricted access and even different administrators to provide separation of duties

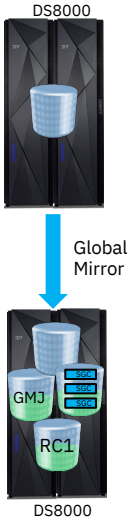
Virtual Isolation Topologies



Safeguarded Copy on Metro Mirror primary and/or secondary

Safeguarded Copy with Metro Global Mirror combining options for Metro Mirror and Global Mirror

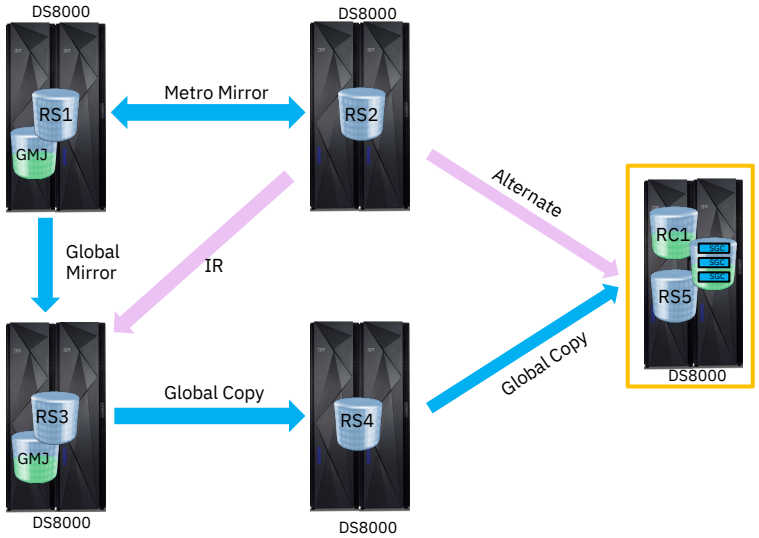




Safeguarded Copy on Global Mirror Secondary

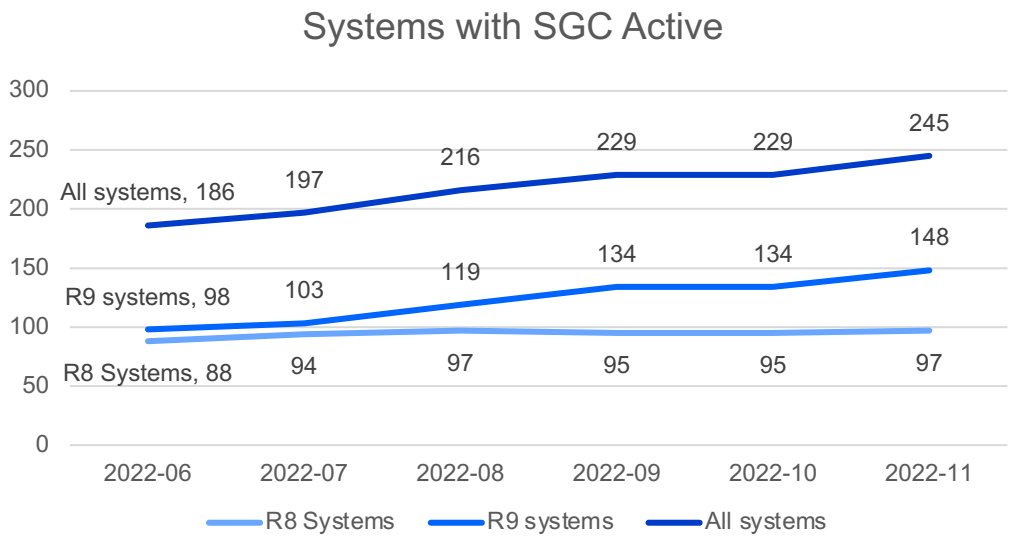
Physical Isolation Topologies

Safeguarded Copy to data vault using Global Mirror on Metro Mirror primary/secondary



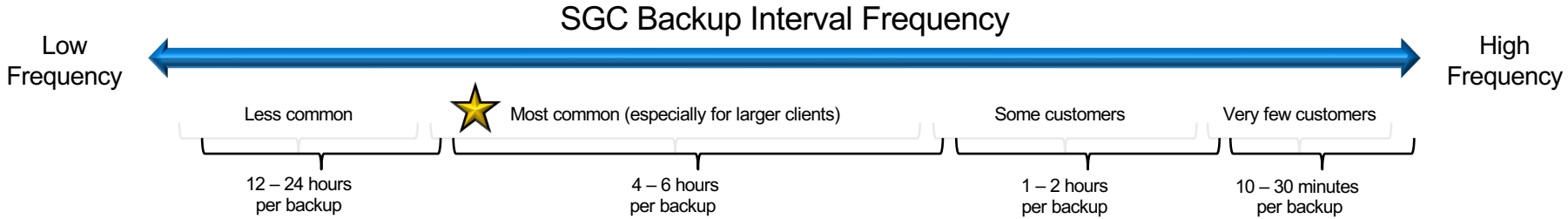
Safeguarded Copy to data vault using Global Copy from 4th copy in 4-site MGM environment

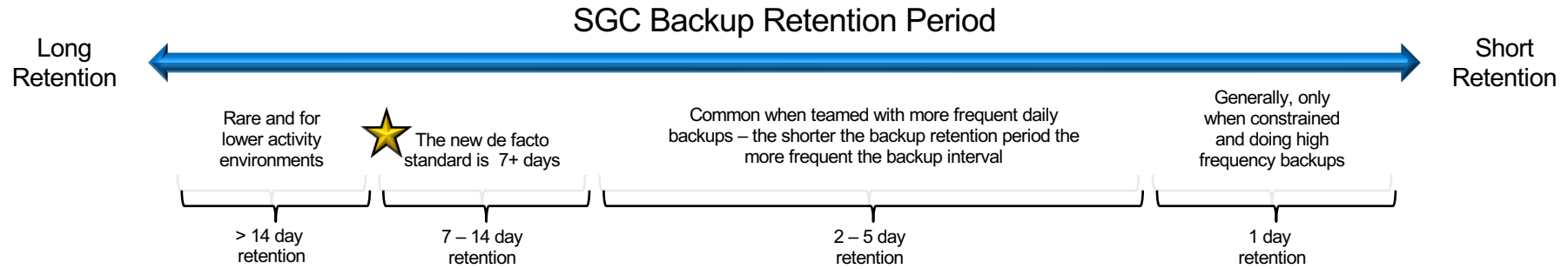
Safeguarded Copy Systems



Backup Interval Frequency & Retention Period

Safeguarded Copy Backup Interval Frequency & Retention Period should be determined by *business requirements* to ensure that the frequency and retention period are relevant for business recovery. Safeguarded Copy can be complemented with offline backup (e.g. tape/virtual tape) for longer term retention. For example, create an offline backup after data validation





Methods of Sizing Safeguarded Copy Capacity

Performance data method

a. Use performance data from **z/OS SMF**, **Spectrum Control** or **Storage Insights**
b. **Note:** This approach will lead to an **Over Estimation** of space required as it does not accurately consider re-writes of data within the same SGC backup / SGC Consistency Group

Copy Services method

Query FlashCopy nocopy relationships

Displays the number of tracks that have changed since the FlashCopy relationship was established

Query suspended PPRC relationships

Displays the number of tracks that have changed since the relationship was suspended

ESESizer tool method

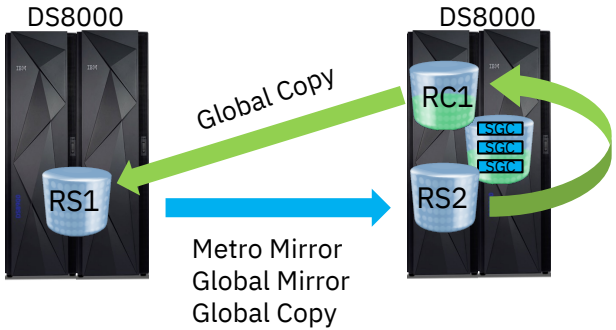
Query Write Monitoring bitmaps

Provides detailed information about the tracks written to a volume

Note: ESESizer is the **recommended** approach when the workload is already running on DS8880/DS8900F

Safeguarded Copy Restore to Production

Release 9.2



Hill: A line of business owner can meet regulatory SLAs for application recovery following a catastrophic cyberattack against production data by enabling an incremental copy of data back to production.

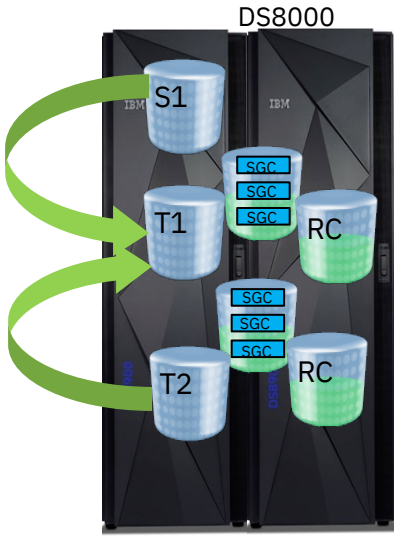
Details: Enable a user to restore a recovered Safeguarded Copy back to a Production copy of data using an incremental Global Copy rather than the full Global Copy required today.

The Global Copy is performed back to the PPRC pair of the Safeguarded Source device (RS1 in the picture) enabling this to be done both in physical isolation and virtual isolation scenarios.

The amount of data copied back and time to copy will depend on the time and changes since the particular backup that is being restored

FlashCopy onto Safeguarded Copy Source

Release 9.3



Hill: An application owner can exploit FlashCopy within an environment protected by Safeguarded Copy to provide fast backup/restore or batch acceleration.

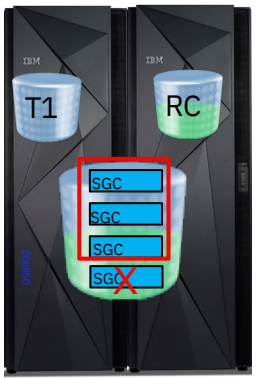
Details: Enable a user to perform a FlashCopy to a Safeguarded Source device. This could be used both for full volume FlashCopy and dataset FlashCopy.

The source device could also be protected by Safeguarded Copy, but this is not mandatory.

Note : Some full volume FlashCopy scenarios may not be practical if they result in a full copy of data to the Safeguarded Source and there is not enough space within the Safeguarded Backup Capacity

Safeguarded Copy – Perserve Backups on Out of Space

Release 9.3.2



Hill: A storage administrator can choose preserve some or all Safeguarded Backups if the storage pool runs out of space

Details: The user can request that IBM support change a setting to define the number of backups that will be preserved in an out of space condition

Writes to the Safeguarded Source will be prevented if required in order to prevent the backups being expired

This setting is generally more appropriate for a physically isolated topology with Safeguarded Copy

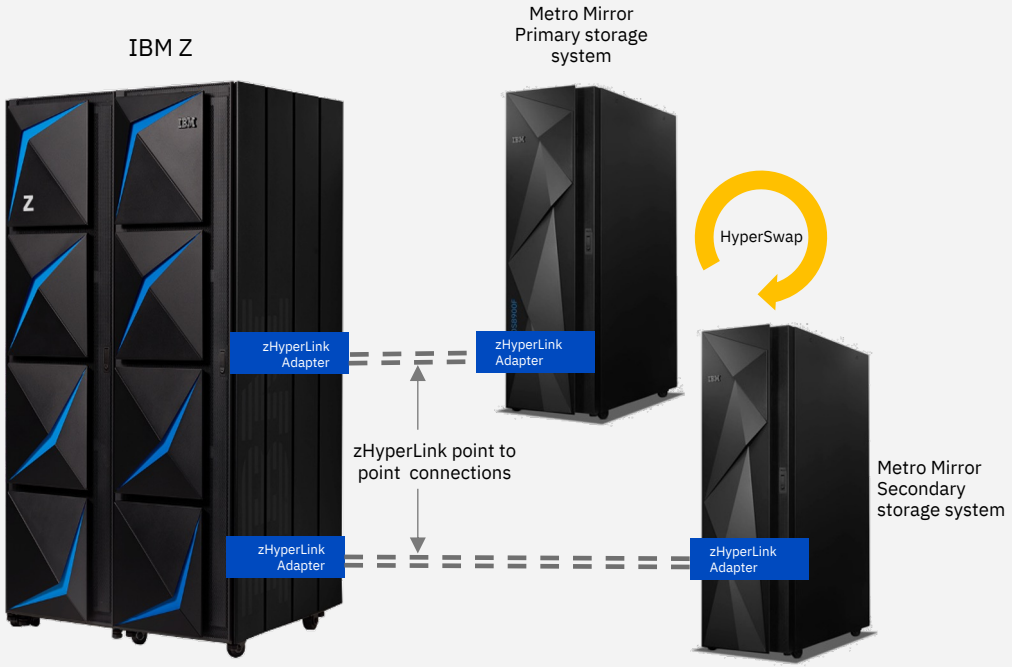
Safeguarded Copy Performance Improvements

- Faster Backups
  - More parallelism (release 9.2)
  - Improved scans (release 9.3)
- Recovery
  - Implement bitmap to optimize recovery search (release 9.2.1)
  - Optimize lookup on backup capacity (future)

zHyperLink Technology

IBM zHyperLink is the result of an IBM joint project created to provide ultra-low latency links between the mainframe and the storage.

- Dramatically accelerates access to data with less than 18***µs*** response time; this represents a 4x improvement compared to High-performance FICON (zHPF)
- Has been seen to reduce elapsed time of transactions and batch jobs by up to 50% without requiring application changes



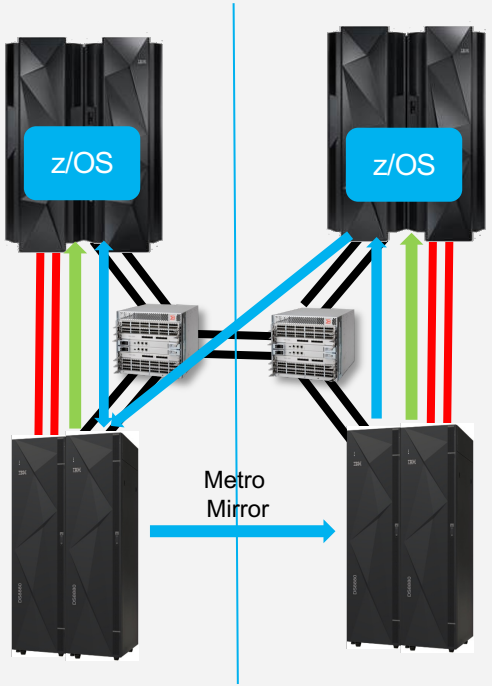
zHyperLink Requirements and Restrictions – Copy Services

CS Type	Volume	Write Eligibility	Read Eligibility
XRC	Primary	No	Yes
FlashCopy	Source	Yes	Yes
FlashCopy	Target	Yes	**No**
Safeguarded Copy	Source	Yes	Yes
Safeguarded Copy	Target	N/A	N/A

- FlashCopy target devices are not supported for zHyperlink reads as the bitmap check to redirect the read would exceed the zHyperlink budget

Read from Metro Mirror Secondary

R9.2

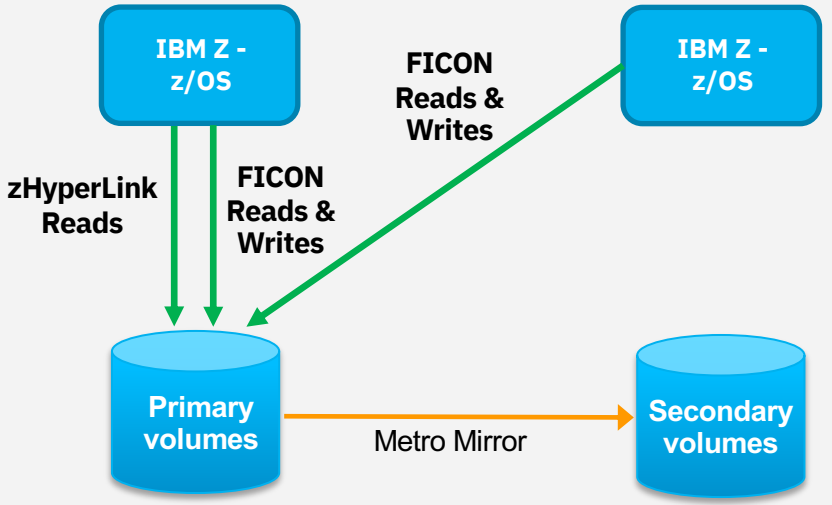


- Enable consistent read from Metro Mirror secondary for supported IO types
- Reduced latency for multi-site workloads with HyperSwap including local zHyperlink reads
- Enable local read IO after planned HyperSwap for single site workloads
- Exploit otherwise unused read cache on secondary storage system

Consistent Read from Metro Mirror Secondary – Multi-site Workload

Before Consistent Read

- Processor(s) and primary disk in site 1 and processor(s) and secondary disk in site 2
- Multi-site workload results in some systems performing cross-site IO and not benefiting from zHyperLink reads in normal operation



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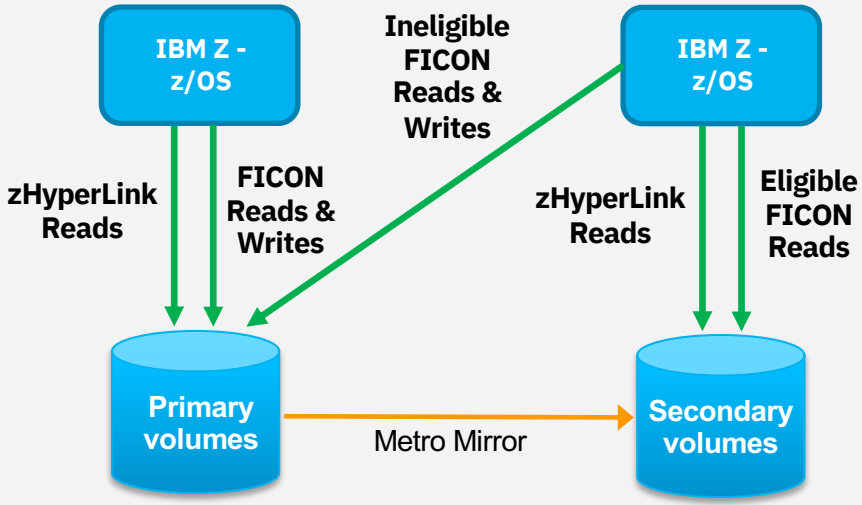
Consistent Read from Metro Mirror Secondary – Multi-Site Workload

After Consistent Read

- zHyperLink and eligible FICON reads can be performed to the local disk (primary or secondary) regardless of which DASD is the primary.
- Ineligible reads must still access the primary disk at distance
- Writes not eligible for zHyperWrite still require two long distance trips (CPC to primary to secondary)



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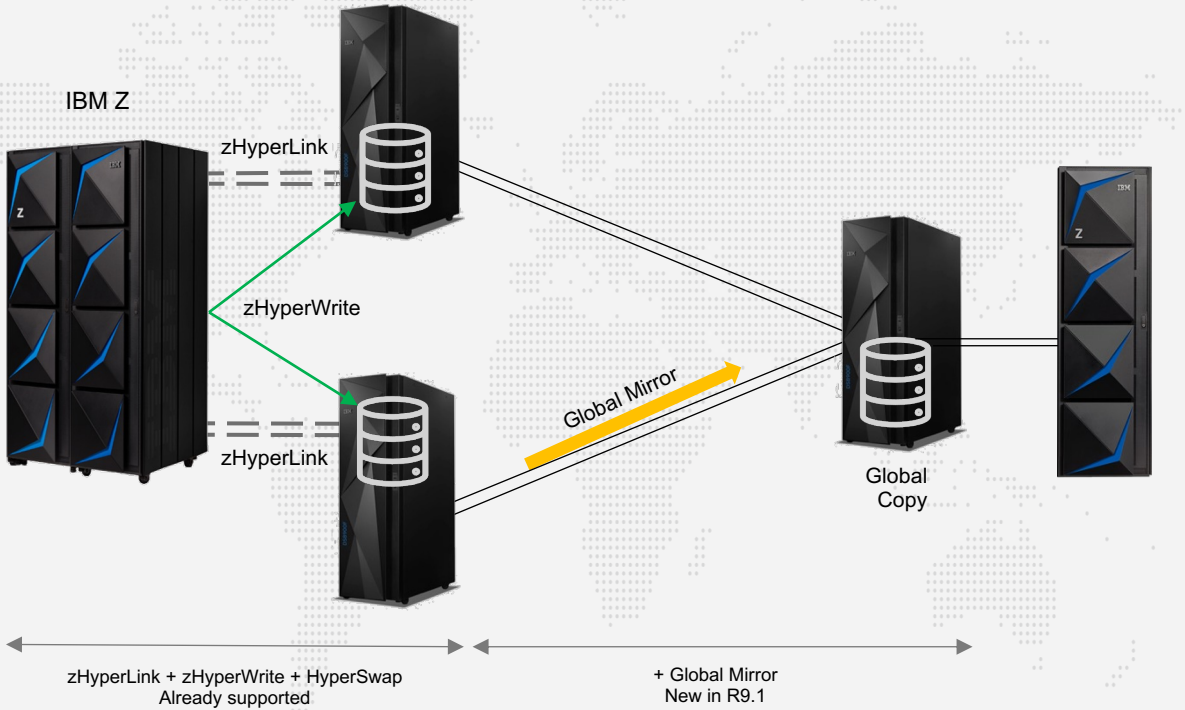
Extending zHyperLink writes to Global Mirror

New in R9.1

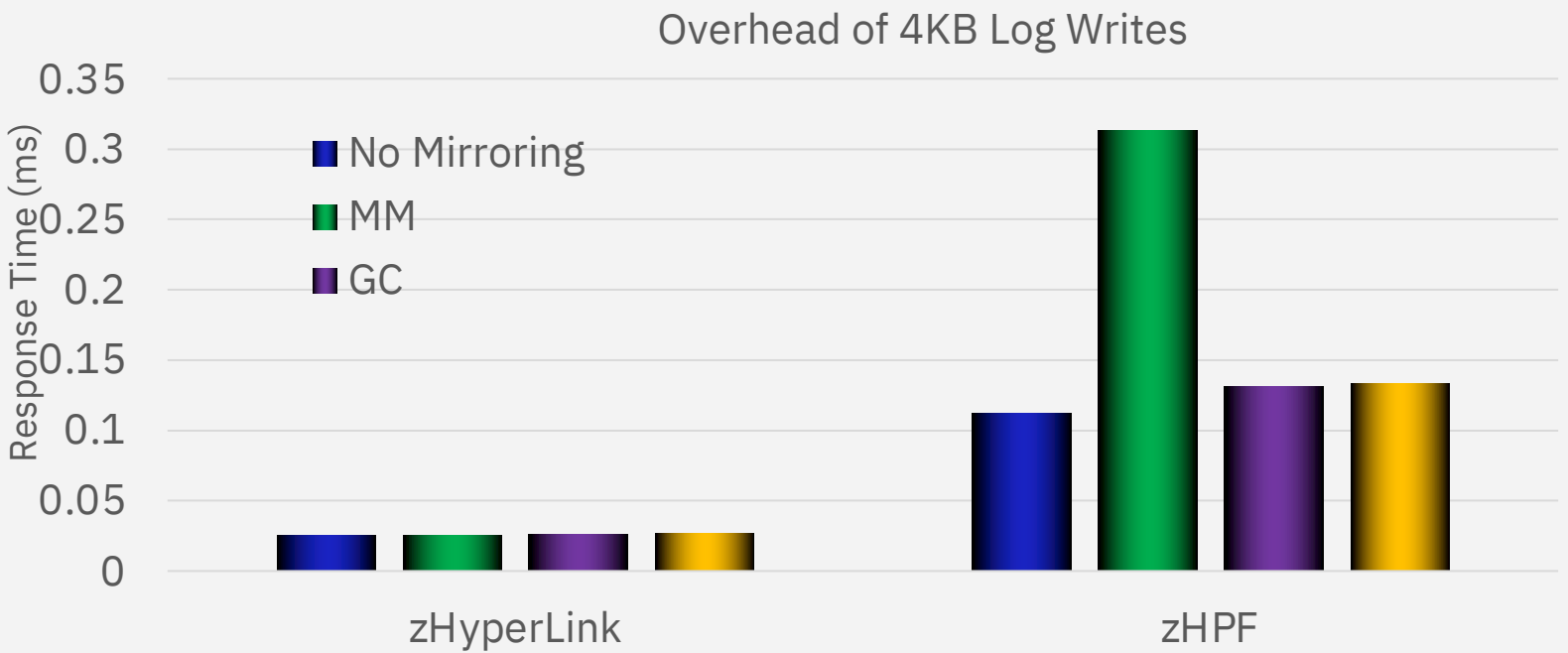
Take advantage of the performance benefits provided by zHyperLink while ensuring high availability and disaster recovery.

- zHyperLink, zHyperWrite, HyperSwap and Global Mirror provide the best combination of performance, high availability and disaster recovery in the industry.
- zHyperWrite improves transactional response time by running primary and secondary write operations in parallel to maintaining continuous availability.



zHyperLink with Global Mirror

New in R9.1



zHyperLink with Global Mirror

New in R9.1