- Look at the volume statistics (after the 1920 error is posted):
  - Source volume write throughput after the Global Mirror relationships were stopped.

    If write throughput increases greatly (by 30% or more) after the Global Mirror relationships are stopped, the application host was attempting to perform more I/O than the remote link can sustain.

    When the Global Mirror relationships are active, the overloaded remote link causes higher response times to the application host. This overload, in turn, decreases the throughput of application host I/O at the source volume. After the Global Mirror relationships stop, the application host I/O sees a lower response time, and the true write throughput returns.

    To resolve this issue, increase the remote link bandwidth, reduce the application host I/O, or reduce the number of Global Mirror relationships.

Storage controllers

Investigate the primary and remote storage controllers, starting at the remote site. If the back-end storage at the secondary system is overloaded, or another problem is affecting the cache there, the Global Mirror protocol fails to keep up. Similarly, the problem exhausts the (`gmlinktolerance`) elasticity and has a similar effect at the primary system.

In this situation, ask the following questions:

► Are the storage controllers at the remote system overloaded (performing slowly)?

Use IBM Spectrum Control to obtain the back-end write response time for each MDisk at the remote system. A response time for any individual MDisk that exhibits a sudden increase of 50 ms or more, or that is higher than 100 ms, generally indicates a problem with the back end. In case of 1920 error triggered by the "max replication delay exceeded" condition, check the peek back-end write response time to see if it has exceeded the `maxreplicationdelay` value around the 1920 occurrence.

Check whether an error condition is on the internal storage controller, for example, media errors, a failed physical disk, or a recovery activity, such as RAID array rebuilding that uses more bandwidth.

If an error occurs, fix the problem and then restart the Global Mirror relationships.

If no error occurs, consider whether the secondary controller can process the required level of application host I/O. You might improve the performance of the controller in the following ways:

- Adding more or faster physical disks to a RAID array.
- Changing the cache settings of the controller and checking that the cache batteries are healthy, if applicable.

► Are the storage controllers at the primary site overloaded?

Analyze the performance of the primary back-end storage by using the same steps that you use for the remote back-end storage. The main effect of bad performance is to limit the amount of I/O that can be performed by application hosts. Therefore, you must monitor back-end storage at the primary site regardless of Global Mirror. In case of 1920 error triggered by the "max replication delay exceeded" condition, check the peek back-end write response time to see if it has exceeded the `maxreplicationdelay` value around the 1920 occurrence.

However, if bad performance continues for a prolonged period, a false 1920 error might be flagged.