



ROI Model: The Cost of Communication Bandwidth for Remote Replication

White Paper

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Introduction

Adequate communication bandwidth is required to enable disaster recovery using remote replication. In the worst case, remote replication is not feasible, if the bandwidth is too limited. In a less-critical case, too much data will be lost in the event of a disaster. On the other hand, bandwidth can be very expensive, and if too much bandwidth is allocated, then the cost of the replication solution becomes unnecessarily high.

In the following sections, we explain how to assess bandwidth requirements and how by using the Axxana Phoenix System® the cost of this bandwidth can be significantly reduced.

Bandwidth Requirements: Synchronous

For synchronous replication the bandwidth requirements are straightforward. The bandwidth has to support the maximum update rate of the system. Even though, for example, a system generates on average only 70MB/s of updates, the peak update rate determines the bandwidth requirement, not the average. Therefore, if once a day there is a period even of a few seconds where the update rate reaches 420MB/s, then the communication bandwidth requirement is 420 MB/s.

Bandwidth Requirements: Asynchronous

When using asynchronous replication, the calculation of bandwidth requirements is far more complicated. With asynchronous replication, there is no more requirement of RPO=0. During peak update time, there will often not be sufficient bandwidth to immediately transmit all updates to the remote site, however, the primary storage accumulates the updates and transmits them later, after the peak period ends. This accumulated data is often called the “Lag” and is typically measured in megabytes or gigabytes. This data will be lost when a disaster occurs, as it was never committed on the DR site. If the disaster occurs during, or soon after, a peak update period, then the amount of data lost would be far greater.

The adequate bandwidth obviously has to be higher than the average throughput, but it must also accommodate two additional requirements:

1. The bandwidth must be sufficient to contain the lag, keeping the lag below the maximum data loss the company is willing to risk. Basically this is the user’s RPO.
2. There should be enough communication bandwidth to allow disposal of the accumulated lag during normal operations.

Assume a customer has a workload in which the normal update rate is 70 MB/sec, but which peaks at 420 MB/sec for 2 minutes once per hour.

Figure 1 exhibits the system behavior when the communication bandwidth is 400 MB per seconds and with bandwidth at 400MB/sec the maximal lag is 2.4GB, and the lag clears in approximately 2 minutes.

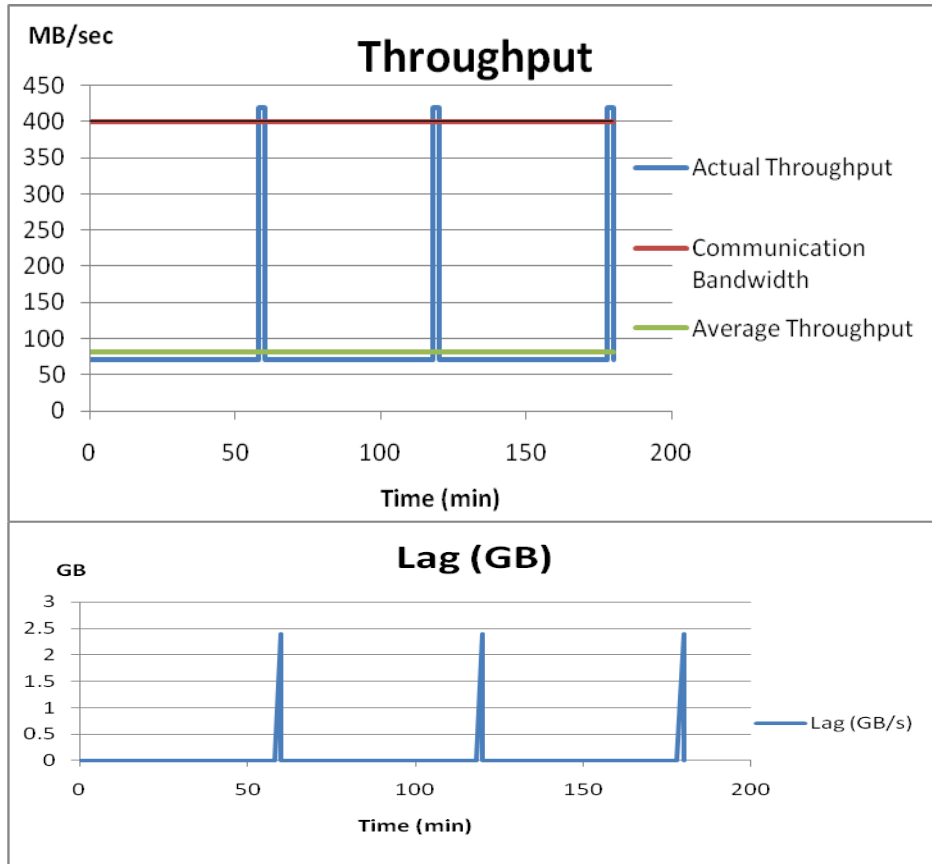
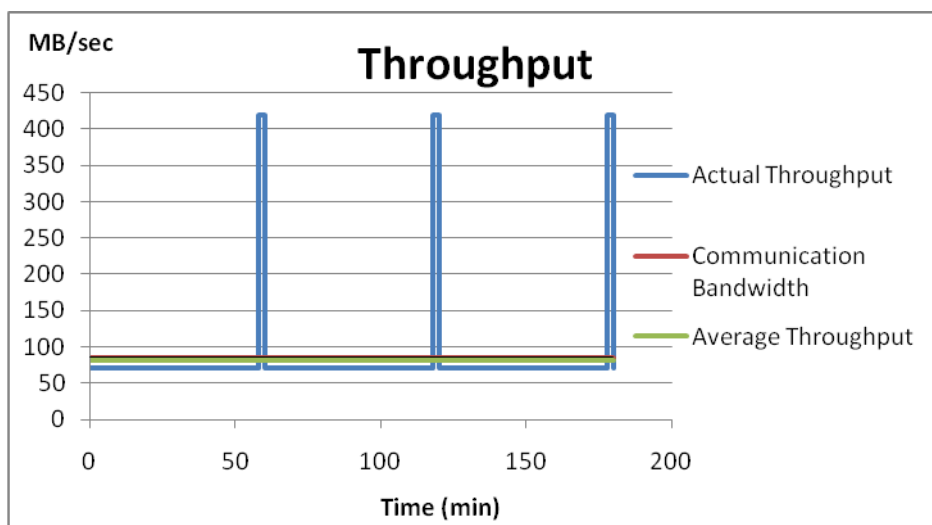


Figure 1

Figure 2 exhibits the behavior when the bandwidth is 85 MB/sec.





With bandwidth of 85 MB/sec the lag increases to around 40GB, and the lag takes 46 minutes to clear.

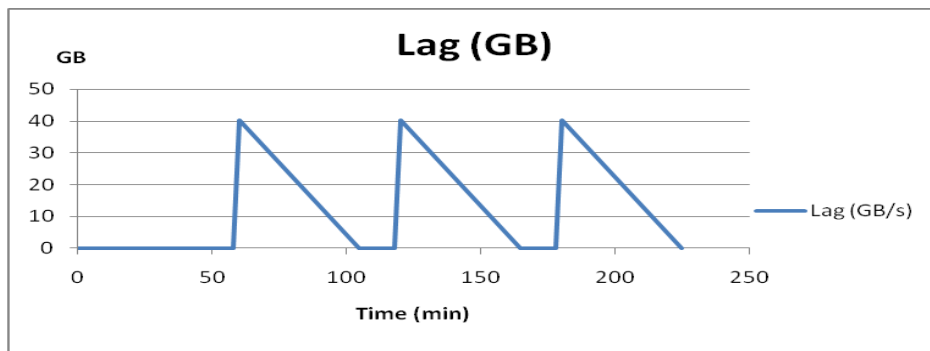


Figure 2

Communications Savings with Axxana Phoenix System®

When an organization is considering synchronous replication, the savings from leveraging Axxana are very straightforward. Using the example above, without Axxana the needed bandwidth is 420 MB/sec. **With Axxana, assuming that Axxana protects a lag of 40 GB, the necessary bandwidth is only 85 MB/sec, a savings of almost 80%.**

With asynchronous replication, the calculation is more involved. The bandwidth requirements result mainly from the maximum size of the lag and the maximum data loss the user is willing to incur in the event of a disaster. If the current bandwidth is sufficient to support the allowed lag and the annual throughput requirement is constantly increasing, then additional bandwidth will be needed once the throughput increases beyond where the current bandwidth can maintain the maximum allowable lag. The cost of the additional bandwidth becomes significant when observed over a three year period.

With Axxana, the lag requirement can be significantly relaxed, since in a disaster, whatever lag exists is saved by the Axxana Phoenix System. The effect of relaxing the lag requirement is twofold:

- The communication bandwidth can be upgraded later than otherwise
- The additional bandwidth requirement will be less.



Looking again at the example in Figure 1, assume that the annual throughput growth is 15% and that the allowed lag should not exceed 3.5 GB. Figure 3 exhibits the system behavior after three years.

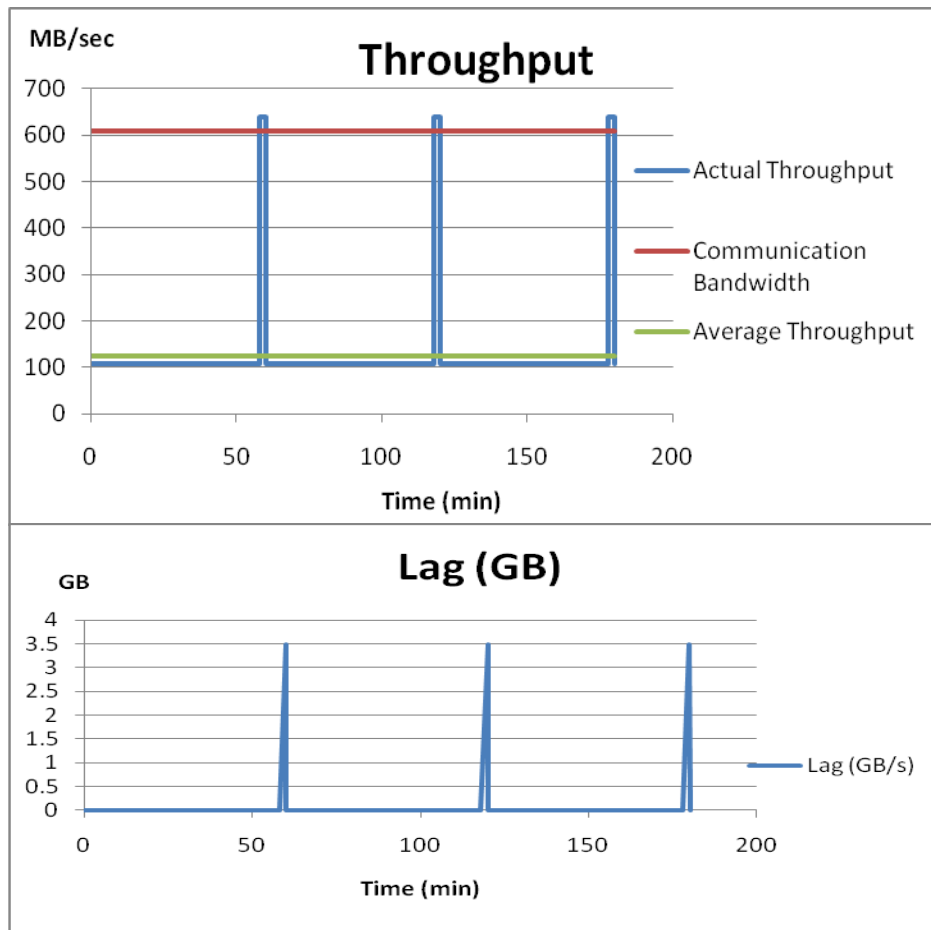


Figure 3

In this example, the system's normal throughput after three years is around 106 MB/s with peaks of around 638 MB/s. The required bandwidth to support a 3.5 GB lag is around 610 MB/s.

Assuming that Axxana can protect a lag of 20GB, then Figure 4 demonstrates the system's behavior after 3 years using the Axxana Phoenix System. Here the required bandwidth is only around 470 MB/sec. This is a savings of 23%. In addition, without Axxana, the bandwidth upgrade needs to occur after only one month. At that point the normal throughput will be around 72 MB/sec, peak throughput will be around 430 MB/sec, and as a result, the lag will increase from 2.5 to 3.5 GB. With Axxana on the other hand, bandwidth only needs to be upgraded after two years. At this point, the lag will have reached 20 GBc, the normal throughput will have reached around 95 MB/s and the peak throughput will have reached 566 MB/sec.

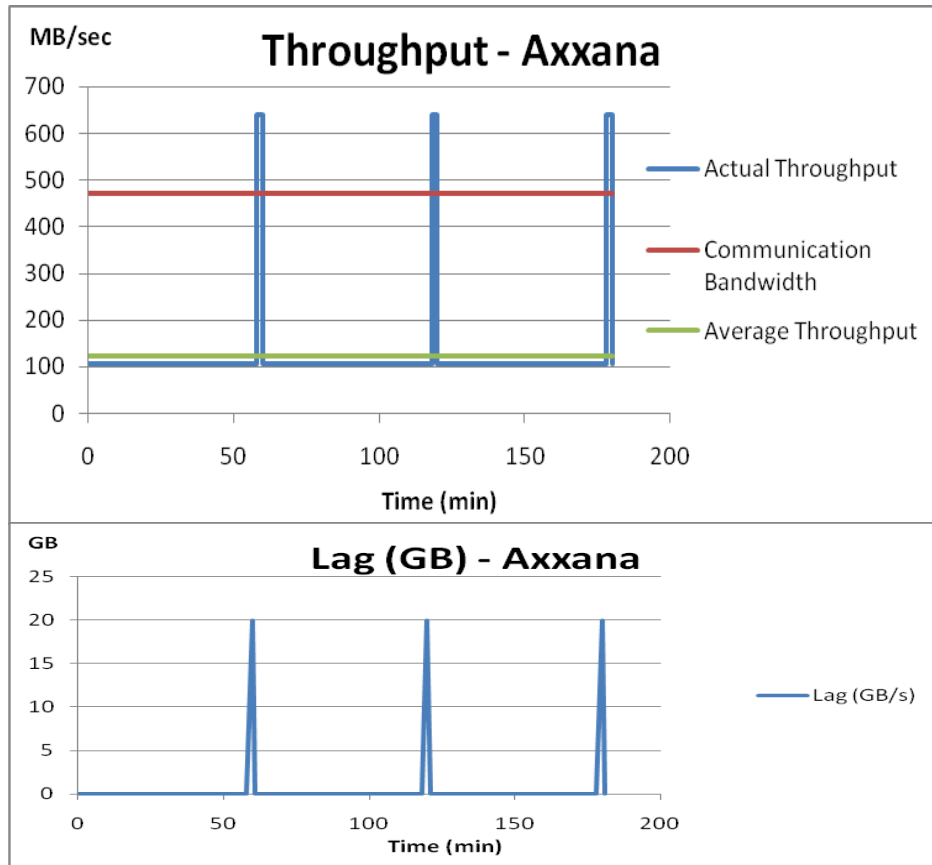


Figure 4

For the sake of the exercise assume that the monthly cost of 100 MB/sec of bandwidth is \$10,000 for long distance replication. The table below summarizes the communications cost savings using Axxana.

| # of months | Bandwidth without Axxana (MB/s) | Bandwidth with Axxana (MB/s) | Cost without Axxana (\$) | Cost with Axxana (\$) |
|--------------|---------------------------------|------------------------------|--------------------------|-----------------------|
| 1 | 400 | 400 | 40,000.00 | 40,000.00 |
| 23 | 610 | 400 | 1,403,000.00 | 920,000.00 |
| 12 | 610 | 470 | 732,000.00 | 564,000.00 |
| Total | | | 2,175,000.00 | 1,524,000.00 |

The overall savings over a three-year period is around **\$651,000**, which is about 30% of the overall communications cost.



Conclusion

From these examples, it is clear that The Axxana's Phoenix System can dramatically reduce communications costs, while enabling organizations to meet their applications' synchronous data replication requirements. Just as importantly, Axxana enables organizations to reduce current communications costs and defer future network bandwidth upgrades, while maintaining the lag and eliminating the risk of data loss that can occur when using asynchronous replication for disaster recovery.