Bandwidth Requirements for Revit® Server

Recommendations for balancing performance and infrastructure cost when deploying Revit Server

Introduction

Balancing cost, user productivity, and resource consumption is a common goal when deploying Revit Server. If too little bandwidth is available, performance will suffer. If excess bandwidth is available, good performance may be realized at the expense of other services. This document, an update of a previous version, attempts to characterize the minimum bandwidth necessary for a satisfactory user experience with Revit Server. It reflects Autodesk's current understanding of its customers' use patterns. Atypical deployments may require more or less bandwidth than is recommended here.

Revit Server 2014 is the fourth release of the application. Compared to early adopters, current Revit Server users are generally operating over greater geographic distances and implementing projects of greater size and complexity. The test methodology for this analysis has thus been updated accordingly:

- Worksharing operations are conducted over a 65ms WAN, rather than a 35ms WAN.
- The test dataset is now a ~240MB model with a ~220MB link, rather than a ~92MB model with no links.
- The time required to open a local copy of the central model is now discussed, where previously it was not.

Note that our reported "WAN network bandwidth" reflects the actual throughput of the network, not the rating of the connection. External factors such as unrelated streaming traffic can reduce available real-world bandwidth, so we recommend validating the behavior of the network during periods of typical utilization. This can be accomplished easily by measuring the amount of time required to copy a few hundred megabytes of data from one point on the network to another. (Note that care must be exercised to ensure that network compression and packet shaping do not affect the performance of the operation.)

Discussion

Bandwidth and the performance of operations transferring little data

If the volume of data being moved across the network is small, bandwidth requirements are very modest. In this example, we check out a workset containing about 18,000 elements. (The number of elements actually has little bearing on the time required to complete the operation.) Note that the

WAN network bandwidth	Time to check out workset @65ms ping
1.544 Mbit/sec [T1]	1.34 sec
3 Mbit/sec	1.34 sec
6.312 Mbit/sec [T2]	1.30 sec
45 Mbit/sec [T3]	0.89 sec
100 Mbit/sec	0.88 sec

time required to complete the operation does not change substantially as available bandwidth increases: although data is being accessed across the WAN, the amount of data being transferred is very small. Other operations with a comparably light network footprint (such as borrowing or relinquishing an element) behave in a similar fashion.

Bandwidth and the performance of operations transferring moderate data

By comparison, operations such as synchronize with central (SWC) move more data across the network. These operations tend to be more strongly affected by available throughput. In this example, we perform a SWC resulting in the transfer of about 7MB of data across the WAN. The increased bandwidth demands are evident; the

WAN network bandwidth	Time for "typical" SWC @65ms ping
1.544 Mbit/sec [T1]	78 sec
3 Mbit/sec	34 sec
6.312 Mbit/sec [T2]	23 sec
45 Mbit/sec [T3]	16 sec
100 Mbit/sec	16 sec

time required to complete the operation increases dramatically under conditions of bandwidth starvation. (Note that the volume of data transferred during a SWC varies according to the complexity of the model and the complexity of the change being synchronized. A 7MB transfer characterizes a SWC that is near the upper bound for typical user activity.)

Bandwidth and the performance of operations transferring significant data

Aside from saving a central model for the first time, creating a new local copy is the most bandwidth intensive user action in Revit: during this operation Revit must build a cache for the permissions state of the model and its links, and in doing so it transfers a large volume of data across the WAN. In this

WAN network bandwidth	Time to create new local @65ms ping
1.544 Mbit/sec [T1]	612 sec
3 Mbit/sec	280 sec
6.312 Mbit/sec [T2]	200 sec
45 Mbit/sec [T3]	138 sec
100 Mbit/sec	142 sec

example, a total of 42MB of data is copied from the host server to the user's workstation: 27MB for the host model's permissions state and 15MB for the permissions state of its link. As with operations that transfer more moderate amounts of data, there is a direct relationship between available throughput and performance. Network administrators may wish to calibrate available bandwidth according to their users' tolerance for delays during these kinds of operations.

Conclusion

In most cases, reasonable performance can be consistently achieved if available network bandwidth exceeds 3Mbit/sec. There are three scenarios where more bandwidth may be required

- 1. Attempting to collaborate across wide geographic distances: More bandwidth may be required to achieve good usability because insufficient bandwidth and high latency have a negative compound effect on performance.
- 2. Implementation of large models and projects: Operations that generate heavy network traffic will move even more data when large models are in use. More bandwidth may be required to ensure that these operations complete within a reasonable timeframe.
- 3. Frequent simultaneous server access: When multiple users access Revit Server simultaneously bandwidth must be shared. If Revit Server is under heavy load, it can be helpful to increase available bandwidth, ensuring that each user has access to sufficient throughput.

Conversely, very lightly loaded servers, deployments spanning modest distances, and projects with limited complexity may achieve reasonable performance with significantly less throughput than 3Mbit/sec.

Finally, it should be noted that network traffic optimization and compression (such as that which is implemented in Riverbed's Steelhead devices) is fully compatible with Revit Server and can further improve performance, particularly under adverse network conditions.

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