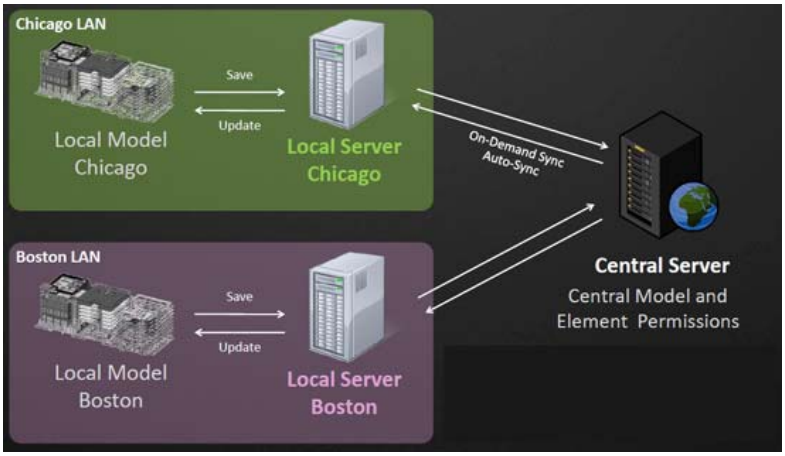
COLLABORATION SYSTEMS GROUP
A DIVISION OF CIVIL SYSTEMS GROUP, INC.

Business Case: Incorporating Revit Server Technology with Riverbed WAN Optimization for Collaborative Design

Autodesk has done an admirable job in their effort to address the limitations of sharing Revit models with remote offices utilizing the internet as the backbone for their Wide Area Network (WAN). Recognizing that LATENCY has been the main culprit to their speed issue, Autodesk has developed a scheme based on a local server technology - Revit Server. While Revit Server will alleviate some of the slowness of the "open" and "sync" process for those in remote locations, it should be noted that Revit Server does not address the issue of WAN LATENCY.



Revit Server technology requires that a local server be set up in each remote location, on which the Revit Server software will run. Yes, you will need a local server at each office, hosting its own local Revit Model, called the "local" central file. Users in each remote location will access their "local" central file and create a "local" working copy on their desktop, much like you do today working within your LAN environment. Syncing occurs to the "local" Central File and then that "local" Central File syncs with the "main" Central File over the secured internet connection (WAN).

The advantage to using Autodesk's Revit Server technology is that the "open" for the remote user is fast, since each user is accessing the model from the "local" central file residing on a local server (part of the remote LAN). Additionally, the "sync" to central file will also be fast, again because that is occurring from the remote "local" central file. Where this server based scheme begins to break down is with the syncing of the remote "local" central file model with the host "main" central file model. Autodesk states they are using new communication protocols that are much faster than the earlier non-optimized protocol, which is a positive move; however, the LATENCY on the WAN connection has not been addressed. Since LATENCY cannot be addressed without a WAN optimization device, such as those offered by Riverbed Technologies, Autodesk's approach is to replicate the "LAN" workflow in each remote office, and sync each remote server with the main central server in the background while the users are working. This scheme is much better than what was available with previous versions of Revit, and based on known "Revit-isms" regarding number of users working on a single model, and

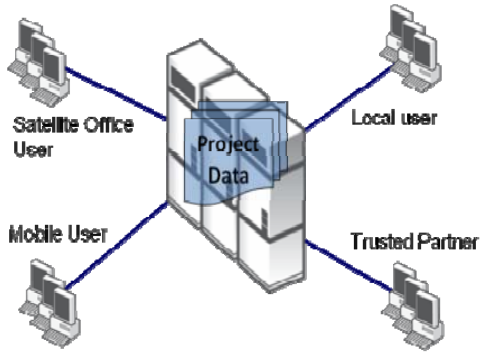
the size of a single model, should have a significant impact for those larger organizations working on a collaborative project within their own organization, or with external partners who elect to incorporate the Revit Server technology. However, it is important to remember that **Revit Server** technology does not address the WAN LATENCY issue that is inherent to the internet, and that it **only works on the Revit model.**

An additional consideration regarding Revit Server technology is that in order to accomplish the synchronization of the remote servers to the main servers in the background – all the servers need to maintain an IP connection to one another. Without that connection being maintained no work can be accomplished. If the synch is being done on an un-optimized connection this can take a considerable amount of time – as the RVT file with Revit Server has gained some weight (approximately 20%).

	Revit Server Technology Architecture 2011 2 Servers – Domain Independent 75.96MB RVT File
8 minutes 38 seconds	Open from Main Central File without Riverbed
2 minutes 34 seconds	First (Cold) Open from Data Center with Riverbed Enabled
50 seconds	Open (Warm) from Main Central File with Riverbed Enabled
1 minutes 39 seconds	Synchronize to Main Central File without Riverbed Enabled
43 seconds	Synchronize to Main Central File with Riverbed Enabled

The Equipment used: On the Central Server side, a Steelhead 1050H device supporting 10Mbps is installed. The Steelhead Mobile client software is being used on the Remote. The remote office has a business-class cable connection to the internet, with 17.38Mbps down/1.60Mbps up. A HP Elitebook 8530 workstation, with 3MB RAM and Windows XP 32-bit running Revit Architecture 2011 is on the client side.

Moving beyond some of the technical issues regarding Revit Server there are several other considerations you should keep in mind – the hard and soft costs. While the new Revit Server technology is available for free, currently for subscription customers only, its implementation does require some additional hardware (64-bit servers) and software, such as Windows Server 2008 with IIS. Each remote office or user you plan to bring in to the collaborative design process would need to have their own dedicated server running the Revit Server application. Needless to say, there would be some initial server setup processes, mostly likely by your firm's IT systems department, and ongoing administration by BIM managers and/or project team leaders - using a dedicated set of Revit Server Administrator tools. If you have several projects running concurrently where you have engaged several different outside consultants for each project, you will need a corresponding number of Revit Servers. Multiple servers will require additional IT Support – not to mention disaster recovery and data backup. The costs begin to add up quickly.



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Think fast.

For those organizations working on projects that are not extremely large and/or for

those wanting to accelerate application performance beyond Revit - the Riverbed solution is the perfect answer. It does not require multiple Revit Central files; therefore it does not require any additional servers or management support. Your WAN-based users operate on the same Revit Central File as the LAN-based users, completing the true collaborative environment. The key to this solution is addressing LATENCY associated with Wide Area Networking.

	Revit Architecture 2011 75.96MB RVT File
2 minutes 56 seconds	Open from Main Central File without Riverbed
2 minutes 7 seconds	First (Cold) Open from Data Center with Riverbed Enabled
56 seconds	Open (Warm) from Main Central File with Riverbed Enabled
4 minutes 27 seconds	Synchronize to Main Central File without Riverbed Enabled
41 seconds	Synchronize to Main Central File with Riverbed Enabled

No matter what direction you take, Riverbed technology provides a significant impact on the sharing of Revit models across a WAN and/or VPN and it also accelerates and optimizes other CAD data and related project documents. Riverbed Steelhead products accelerate the broadest scope of key enterprise applications using a multi-tiered optimization approach that yields significant performance gains for customers. Riverbed's technology leverages a superior data reduction algorithm and transport layer optimization to provide a foundation for acceleration of all TCP-based traffic. Above this foundation, Riverbed further optimizes several application protocols via application-specific modules. The combination of this multi-tiered approach yields the best performance for key enterprise applications.

For many widely-used applications like Windows file sharing, Exchange email or Lotus notes, the application protocols are often the limiting factors to performance across the WAN. In order to have an even greater impact on these applications' performance over the WAN, optimizations must be made to the application protocol itself. Riverbed delivers this capability by including additional application streamlining modules in the architecture.

AutoCAD 2010 9.95MB DWG	
55.91 seconds	Open from Data Center without Riverbed
13.21 seconds	First (Cold) Open from Data Center with Riverbed Enabled
7.1 seconds	Open from Data Center with Riverbed Enabled
5.8 seconds	Open from Local Hard Drive

Application Streamlining enables Riverbed to address application-specific bottlenecks in addition to the underlying data streamlining and transport streamlining optimizations. Application streamlining allows Riverbed to deliver and improve those optimizations incrementally, without any architectural changes. Approaches such as TCP optimizers or data compression devices have tried to include such application-specific optimizations, but have shown limited performance gains because the system was not designed to support application-independent as well as application-specific optimizations.

Riverbed data streamlining works across all TCP-based applications including Microsoft Office, Lotus Notes, CAD, Oracle, ERP, databases, and data backup & replication systems; and across all TCP-based protocols including, but not limited to, CIFS, MAPI (2000, 2003, 2007 and 2008), TDS (MS-SQL), NFS, FTP, HTTP, HTTPS, and Oracle Forms. Data streamlining ensures the same data is never sent more than once over the WAN. Data streamlining reduces bandwidth consumption for many applications dramatically, typically by 60% to 95%. Data streamlining also supports rules-based policy administration of optimization classes, packet marking, and enforcement for Quality of Service (QoS) and route control.

	Acrobat Reader 9 26.2MB	Word 2003 35.14MB	Excel 2003 4.07MB
Open from Data Center without Riverbed	8.1 seconds	1 minute 20 seconds	31.04 seconds
Open from Data Center with Riverbed Enabled	1.4 seconds	8.7 seconds	4.1 seconds
Open from Local Hard Drive	1.2 seconds	4.5 seconds	1.2 seconds

Collaboration Systems Group (CSG) has been addressing the Revit model sharing issue utilizing Riverbed devices since 2007. Because of Riverbed's WAN optimization techniques, through compression and de-duplication, the Riverbed solution allows the remote project team members a connection to the same Central File that the LAN users are connected to. We are essentially taking the Autodesk-recommended, LAN-based workflow and incorporating the WAN-based users, as if they are all sitting in the same room. There is no duplication of Revit models, no copying of Revit models, any "background" sync of Revit models, no local caching servers. Your users, and project team members, work on the Central File as if they are sitting next to the server, regardless of their physical location.

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Our unique Try & Buy program will let you evaluate the positive impact Riverbed technologies can provide in your efforts to collaborative with remote offices, partner firms, and individual users. There is no need to buy Riverbed equipment to test it, and we typically deploy the solution over lunch. No need to purchase and configure new servers, no additional IT requirements, and we make no changes to your network. The Riverbed solution simply addresses LATENCY and removes that obstacle, enabling optimization to occur over your existing WAN and/or VPN connections

CSG's experience with IT and infrastructure solutions makes us an ideal partner for any firm looking for disaster recovery solutions, network infrastructure consolidation / virtualization, and overall cost savings initiatives. CSG hosts monthly webinars on these subjects, as well as, BIM(Revit)/CAD/Office Collaboration. Please visit us at an event near you. We look forward to becoming part of your team!! For more information, please call 866-376-8571, or visit us at www.cs-grp.net