

# Reducing Petrel Data Load Times Using EMC Celerra with Upstream Application Accelerator Technology

*Applied Technology*

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## **Abstract**

This white paper summarizes the findings from tests performed by Schlumberger that compared the performance and scalability of the Petrel<sup>®</sup> seismic interpretation and modeling application on traditional NAS to that of EMC<sup>®</sup> Celerra<sup>®</sup> with the Upstream Application Accelerator. I/O throughput improvements up to six times over traditional NAS were achieved using the EMC Upstream Application Accelerator.

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## Executive summary

EMC® Celerra® with the Upstream Application Accelerator provides significant advantages for seismic interpretation and analysis applications such as Schlumberger's Petrel™. Petrel provides seismic interpretation and analysis capability that enables rapid 2D and 3D seismic interpretation.

Celerra delivers advantages to Petrel in the following areas:

- **Performance** – Celerra and Upstream Application Accelerator enable significant reductions in time to perform data loads of Petrel 3D seismic projects. This translates into greater productivity and operational benefits when ingesting large multi-gigabyte seismic projects.
- **Scalability** - As more Petrel seismic workstations are added to the infrastructure, EMC Upstream Application Accelerator can deliver greater I/O throughput using multiple data paths to the Celerra array. This enables support of more 3D power users on a single array.
- **Cost reduction** - Moving seismic files from locally attached storage on the workstation to a consolidated Celerra unified storage solution allows greater operational and management cost savings.
- **Optimized environment** – Consolidation of storage drives reduces footprint, power, and cooling costs; improves transaction throughput; and reduces seismic prefetch runtimes.
- **Application transparency** - Upstream Application Accelerator works seamlessly with all seismic interpretation and analysis applications, so no application changes are required to get the benefits of increased performance and scalability, consolidated cost reductions, and manageability of NAS storage with Celerra and the Upstream Application Accelerator.

## Introduction

This white paper explains the benefits of combining Petrel software with EMC Celerra and the Upstream Application Accelerator. It describes the tested configuration environment and identifies the key results of testing.

## Audience

This white paper is intended for geoscientists using applications like Schlumberger Petrel to interpret seismic data and for the information technology staff who support the infrastructure on which Petrel runs.

## Celerra and the Upstream Application Accelerator with Petrel

With Petrel, users can sample seismic data directly into 3D reservoir models to predict pay and bias reservoir property distribution using a geostatistical approach. An extensive library of seismic attributes and volume rendering techniques can help identify hydrocarbon indicators and fracture patterns. Petrel enables companies to seamlessly transition from regional exploration to reservoir development.

Combining Petrel seismic interpretation and analysis software with EMC Celerra and the Upstream Application Accelerator provides the following benefits;

- **Faster prefetch performance:** Geoscientists must wait for seismic data to be prefetched into the Petrel workstation prior to beginning analysis. Upstream Application Accelerator provides significant performance benefits for reading and writing vast amounts of seismic data. With Upstream Application Accelerator, wait times can be less than a fifth of the time needed for traditional NAS solutions using CIFS.
- **Reduction in operational overhead:** Because the performance is dramatically improved, larger seismic datasets can be analyzed on a single Petrel workstation. This helps reduce the number of datasets by eliminating the need to break up datasets into smaller chunks. Reducing the number of

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datasets has a direct operational impact by reducing the administrative overhead to manage fragmented seismic data on local workstations.

- **Scalability:** Traditional CIFS environments are limited by the number of physical IP connections to the NAS head. CIFS connections optimized with the Upstream Application Accelerator use the NAS IP connections only for metadata operations while using iSCSI or Fibre Channel for read and write connections directly to the back-end storage array. This delivers a highly scalable architecture as additional seismic workstations are added into the Celerra Upstream Application Accelerator environment.

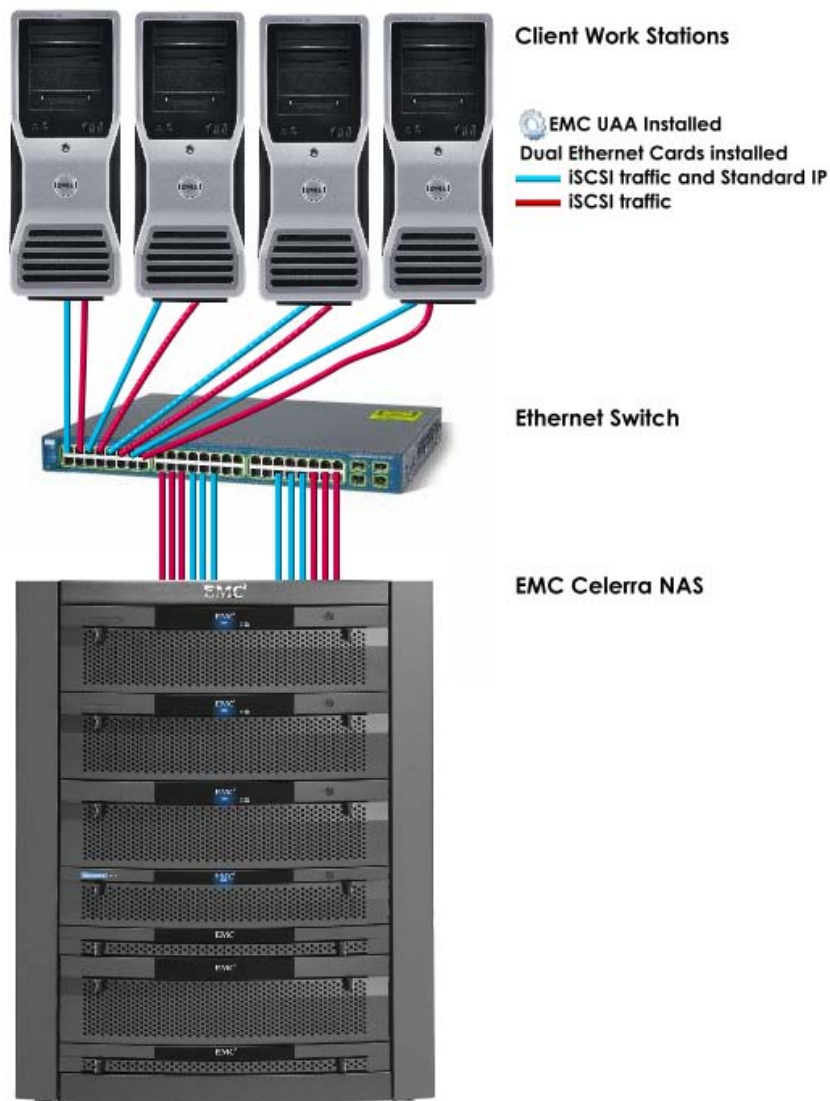
## Infrastructure test environment

The storage configuration tested consisted of an EMC Celerra NS-480 unified storage platform with iSCSI connectivity between the seismic application workstations and the Celerra NS-480. The network switch infrastructure was Cisco gigabit non-blocking.

The Upstream Application Accelerator file system was created and optimized across 20 disk spindles using 4 GB fibre drives with 300 GB capacity each.

The Petrel workstation environment consisted of two Dell Z800 machines, each consisting of dual, quad-core 3.0 GHz processors, dual gigabit Ethernet ports, and 48 GB of RAM. The local drive configuration used RAID 0 across two physical drives to give the best possible read/write performance for comparison.

Figure 1 shows a diagram of the test environment.



**Figure 1. Test environment**

## **Petrel seismic analysis and interpretation test variables and iterations**

Three sets of tests were performed using different connectivity methods between the seismic workstation and the Celerra NS-480 storage array. The same tests were repeated for both Windows XP 64-bit and Windows Vista 64-bit. The tests for both Windows XP and Windows Vista were as follows.

- Traditional CIFS over gigabit Ethernet
- Upstream Application Accelerator using a dual iSCSI link
- Local direct-attached disk

Each connectivity test was performed on the following:

- A Schlumberger Petrel workstation
- A 30 GB Petrel dataset

Test iterations were executed by first rebooting the seismic workstations to eliminate any effects of operating system or Upstream Application Accelerator caching on the client, and to ensure repeatability of the test results.

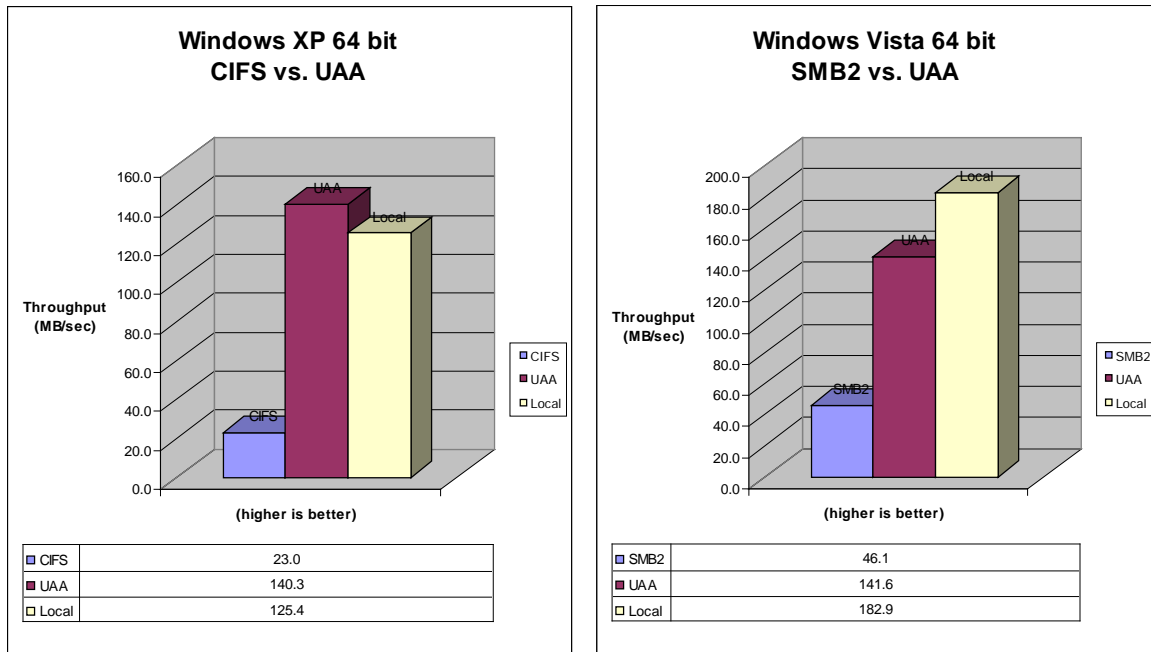
## Test results

For Windows XP 64-bit, Upstream Application Accelerator improved prefetch time by 511 percent as compared to a traditional CIFS protocol share connection - even beating local disk performance by almost 12 percent. The elapsed time to prefetch the 30 GB dataset dropped from 22.3 minutes to just 3.6 minutes.

For Windows Vista 64-bit, Upstream Application Accelerator improved prefetch time by 207 percent as compared to the newly enhanced CIFS-type share connection (also referred to as SMB 2.0). The elapsed time to prefetch the 30 GB dataset dropped from 11.1 minutes to just 3.6 minutes.

Of particular note is that the performance of Upstream Application Accelerator remained consistent throughout tests on both Windows XP and Windows Vista.

The charts below clearly illustrate the significant increase in I/O throughput that EMC Celerra with the Upstream Application Accelerator provides compared to traditional NAS.



**Figure 2. Performance improvements between three to six times can be expected depending on the Windows operating system used. EMC Upstream Application Accelerator software provides significant performance improvements even without upgrading your Windows operating system**

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## Conclusion

EMC Celerra with the Upstream Application Accelerator provides significant performance advantages for seismic interpretation and analysis applications over traditional CIFS and SMB 2.0 protocols and for seismic prefetch operations requiring high-bandwidth I/O between shared NAS storage and the seismic workstations.

The Celerra NS-480 configured with the Upstream Application Accelerator delivers a performance advantage by accelerating data transfer between the Celerra storage and the seismic application workstations by providing separate transports for file data and metadata. Upstream Application Accelerator achieves this by sending CIFS and NFS metadata traffic over IP to the Celerra X-Blade, while all file read and write data passes over iSCSI directly to the integrated storage array.

In other words, Celerra and the Upstream Application Accelerator deliver all the traditional operational benefits of NAS in terms of consolidated storage, manageability, and file sharing, while at the same time delivering the performance and scalability benefits of traditional block storage architectures by sending large read and write operations directly to the back-end storage array.

While the tests used iSCSI to a Celerra NS-480 unified storage platform, Upstream Application Accelerator can also use Fibre Channel connections directly to back-end Symmetrix<sup>®</sup> and CLARiON<sup>®</sup> arrays in Celerra gateway configurations for additional scalability and performance.

## About Schlumberger

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