

# American Museum of Natural History

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Dr. Francis C. Lees, CIO of the American Museum of Natural History

Manhattan's American Museum of Natural History had the honor of being the first independent Museum to connect to Internet2's Abilene network, a connection now made via 1Gbps lambdas over two independent routes on NYSERNet's New York City Metro Fiber Service. As a research institution with over 200 scientists, it represents a base of intellectual activity that extends far beyond exhibits of poisonous frogs, historic panoramas of animals in their natural habitats, or the most advanced planetarium. Some of the 32 million objects in the permanent collection are not just viewed by several million people a year, but studied intensely by researchers around the globe.

Just a few years ago, a single astrophysicist could occupy all of the Museum's bandwidth for five or six hours a day. He was uploading scans of the stars as slivers of the sky seen from Earth. The purpose was to compare a set of photographic plates taken in the late 1950's and 60's with a new set taken by the Hubble space telescope in the previous year or two. When the Hubble images were aligned the patterns pretty much matched, reflecting the constancy of the night sky. But discrepancies were what were sought, and the computer program written to compare the two scans did not disappoint. In a single year, more "near Earth moving objects" were identified than in the previous three centuries. Anything headed our way? Not much, but you can't know until you can compare where each object was previously to where it is now.

This project would have taken years to complete at the rate uploads were coming in, to say nothing of the fact that practically everything else coming and going over the Museum's network connection was impeded. After the Museum acquired its Internet2 connection scans of each slice of sky were acquired in minutes instead of hours.

The Museum is one of the few places that shoots original short nature videos on various subjects and distributes them for use by other museums and educational institutions. A relatively unique aspect of this endeavor is the fact that the video is shot in High Definition (HD) for displays and exhibits. The clips are exported over Internet2 to the National Center for Supercomputing Applications in Chicago, and subsequently distributed to subscribers from there.

Two future projects are expected to make heavy use of the Museum's network connection. One is the upload of data collected by a NASA spacecraft trailing a comet, one class of "near Earth moving object." Researchers anticipate seeing terabytes of data every month. Another project requires the remote control of a telescope in Chile by scientists at the Museum. Enough information about the telescope's view needs to be transmitted and analyzed quickly so that the telescope's position can be adjusted during the brief time the instrument is available.

[www.nysernet.org](http://www.nysernet.org)

Finally, the Museum is preparing for the future and the ever-increasing demand that will be made of its web sites. There are enough photographic images of objects in the collection to fill thousands of CD's - a quantity of CD's so vast that handling them is too cumbersome. Then there are the laser scans, X-rays, videos, and audio files. These can be accessed by the public over the internet, but the ones required by researchers, people who usually have Internet2 access, are much larger. They contain details required for research but not for browsing. The flood of information traveling out of or into the Museum over its internet connections can only be handled by NYSERNet and Internet2.

As a member of the New York Metro Fiber Consortium, the Museum enjoys very high speed dual-path fiber connectivity to NYSERNet's peering facility in downtown Manhattan where it connects to NYSERNet and Internet2. The Museum employs coarse wave-division multiplexing to expand its fiber capability to eight 1 Gb/second waves, providing virtually unlimited capacity to share educational and research oriented information so NYSERNet and Internet2 are essential elements in the Museum's ability to fulfill its mission today. Moreover, the volume of traffic for both the Museum's research and education functions is growing at exponential rates. With an optical ring to NYSERNet's statewide optical infrastructure and the national and international peering point in lower Manhattan, the Museum can keep pace with demand into the future, merely swapping out optical equipment when it needs to move to the next threshold of transport capability.