Canarie AAP-03 "Shared Spaces" Project Milestone 3 Report
Appendix 1
Report on Transmission of Multiple HD Video Streams between McGill and UBC
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Stability Problems
Since our preliminary success in October 2005 of transmission of uncompressed HD-SDI data over the network, the major technical obstacle to stable performance has remained the scheduling of PCI bus operations as required to balance the timing demands of the HD-SDI interface and the network interface.

This issue was further complicated under the earlier (32-bit) RedHat Enterprise Linux system, running the 2.4 Linux kernel, which we were forced to use, as this release offered no support for the assignment of virtual interrupts. Without careful setting of BIOS parameters and a "trial-by-error" arrangement of interface cards in the PCI slots, all the interrupts generated by the various interface cards would be delegated to a single CPU of our dual-Opteron hardware, resulting in unacceptable performance.

With the eventual migration to a SUSE 64-bit Operating System, running the 2.6 Linux kernel, interrupt delegation became much more controllable. However, performance problems remained, despite PCI bus tuning as recommended by Neterion and AJA, in particular when running the systems bidirectionally, i.e. each machine acts as both a transmitter and receiver of HD-SDI data. The result is an apparent CPU load on one of the processors in excess of 100% when frames are processed in partial chunks. This manifests in timing bugs, as a chunk of video data from several frames in the past may be displayed erroneously. Recent coding improvements have reduced this problem, resulting in more stable performance under conditions of frame segmentation. Full-frame processing, instead, proves to be significantly more stable as a result of decreased interrupt rate, but results in increased latency.