

EMERGING TECHNOLOGY LAB INTERFACILITY TRANSMISSION RESEARCH



Advances in IP based low latency H.264 high definition video transmission is making high quality transmission possible over IP networks. Unlike satellite technology that is in wide use low latency IP H.264 operates with almost no visible lag. With the wide availability of Internet, WiFi, Cellular, G3 and G4 IP networks opportunities are opening up to study and advance how these communications channels can be used in live TV production between remote locations and Production Centre's.

Home to a 10 gigabit Ethernet infrastructure that connects to both the ORION and CINEGIRD fiber optic networks, Ryerson's Rogers Communications Centre has been supporting research and development in this emerging area focused to benefit both Ryerson and the Canadian Broadcast industry. The Centre has invested in Haivision's IP H.264 video system that delivers the lowest latency available—70 milliseconds— 720p/1080i high definition television through the University's computer networks. Currently in use for Ryerson University Television (RUTV) and the campus digital signage system, its architecture will allow RUTV, Convocation and live sports to be delivered to any signage screen on the Ryerson Campus.



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Circumventing Satellite and Traditional Fiber for Broadcast

Zero Latency Broadcast Live HD Interviews over Standard & Ultra High Speed IP

Richard Grunberg
Ryerson University, Toronto

<p>Introduction</p> <p>This research project focuses on opportunities enabled by the advent of cloud-based "Pushout" networks, and proposes their use as an entirely new form of video and audio transmission within broadcast and university environments.</p>	<p>Methods</p> <p>Methodologies for network analysis include both Qualitative as well as Quantitative testing procedures. Both will be used in measuring the perceived visual as well as technical parameters to answer response. Qualitative testing will be conducted using the "Real Life" model within Faculty at Ryerson's Advanced Visualization Lab. Quantitative testing will be conducted using technologies such as the "Reference PQAO" Picture Quality Analyzer.</p>	<p>Results</p> <p>Initial observations for this project would be the creation of a technological means to feed the Media Industry broadcast quality live and the Instructional HD content via the ORION High speed network.</p> <p>Secondarily, this content could be fed at a broadcast quality benchmark for standard 10Mbps IP networks.</p> <p>In a final time the processing system would supersede the satellite network channel on the aspect of traditional television production.</p>	<p>Technical Configuration</p>
<p>Objectives</p> <p>The purpose of this technology would be to facilitate a rapid direction for conventional multi-path High Definition news content acquisition systems that would take advantage of the ORION and other high speed IP networks such as internet 2. The system would support traditional satellite broadcast acquisition processes and multi-location interviews scenarios within a live or pre-record studio program with a far simpler, easier to access, and less costly technological alternative. This system would allow for other interviews with media programs and studios, access to HDQ (Interview) around the world with when to share, feed and direct feeds from, for pre-packaged and live news material, format - without programming material - includes daily news and other production content to be internal network, would have an opportunity to build a "CNN" of the University world. Focuses with the focus for media exchange would eventually go well beyond the University boundaries and into the broadcast environment.</p>	<p>Analysis</p> <p>Subjective analysis of the data collected for qualitative testing will be conducted by three graduate research students currently being trained in the use of our "Facility" facility and involves evaluating subjective audience response using Q-Sort methodology. Technical data analysis will be conducted by both our staff industry engineers and in comparison to standard broadcast used and visual specifications and reliability, both methodologies will compare of analysis in areas for product quality criteria such as resolution, tone, compression and motion artifacts, colorimetry and dynamic range.</p>	<p>With subjective test results to date, even at full HD (1080p), and displayed on a 50 inch LCD monitor, little visual degradation and artifacts were noticed. Delay with normally complex content is almost imperceptible (approx. 70ms) on standard 10Mbps networks - related by testing content feed and timing. The receiver delay based on the signal path (number and quality of switches) toward the ORION network system, there might be some reliability issues. When connected directly to high quality source and distribution network, there will be no delay in timing. There were no perceptible reliability issues seen on the standard 10Mbps networks.</p>	<p>Technological Components</p> <ol style="list-style-type: none"> 1. Haivision (H.264) Video Encoder/Decoder (Encoder/Decoder) 2. ORION (High Speed) Network 3. IP Network (Standard) Network 4. IP Network (Standard) Network 5. IP Network (Standard) Network 6. IP Network (Standard) Network 7. IP Network (Standard) Network 8. IP Network (Standard) Network 9. IP Network (Standard) Network 10. IP Network (Standard) Network

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The research to date has shown that the technology could supplant traditional satellite broadcast acquisition processes and multi-location interview scenarios by taking advantage of the ORION and other high speed IP networks that would be a less costly technological alternative. It would provide an opportunity for Ryerson University Television to build a "CNN" of the University world would go well beyond the University boundaries and into the broadcast environment.