

VANCOUVER INTERNATIONAL AIRPORT (YVR)

Takes off with FutureFLEX Air-Blown Fiber



YVR Link Building

YVR deploys Sumitomo's FutureFLEX Air-Blown Fiber LAN Infrastructure...the most advanced system available today for the flexibility, immediate bandwidth, scalability, fiber-on-demand, and overall cost savings to meet instantaneously the onslaught of network growth & emerging technologies.

As Canada's second largest airport and a growing major gateway connecting the Asia-Pacific region, the Americas, and Europe, YVR is undertaking a significant expansion initiative to accommodate projected passenger traffic of 21 million by 2010, the newer, larger Airbus A380, and a significant increase in travelers visiting Vancouver for major events including the upcoming 2010 Olympics.

A central consideration in achieving its vision for

technological advancement was YVR's decision to introduce an advanced fiber optic infrastructure that would complement its Master Plan Fiber Optic Build-out and related airport expansion projects. YVR chose Sumitomo's FutureFLEX® Air-blown Fiber® system.

The YVR initiatives listed below are some of the many projects for which the airport will be expanding its fiber optic backbone infrastructure:

- **Link Project** — Construction of a five-storey structure that connects the International and Domestic terminals, providing increased international check-in capacity, passenger screening, additional baggage systems, office space, and access to the new Canada Line station. The Link project establishes a fiber optic

backbone connection between two key data centers using the FutureFLEX solution.

- **International Terminal Expansion** — YVR's extension of 9 new international departure and arrival gates and the introduction of 11 new communication equipment rooms in which reside horizontal cable runs and YVR equipment, including support for some of YVR's 300 total tenants choosing to expand their businesses into the new area.

- **Sea Island Fiber Optic Build-out** — Expansion of its outside plant fiber optic infrastructure on Sea Island originating from the two data centers located within the terminals. The build-out will establish a main West to East, and North to South, fiber optic infrastructure corridor. This corridor will enable connectivity for YVR's specific systems, and provide connectivity to current and future Sea Island tenants and other commercial projects.

The Limitations of Outdated, Conventional Fiber Optic Technology:

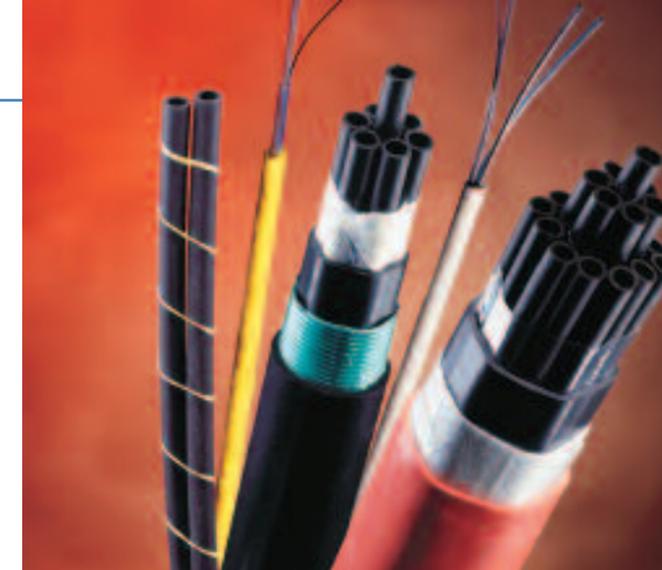
Had a conventional fiber optic infrastructure been adopted for these expansion projects, YVR would run the risk of running too few fibers with the expensive consequence of retrenching in the near future if fiber optic strand counts escalate...or the high cost of massive overbuild by laying too much dark fiber.

Due to the high cost of changing or installing new fiber via conventional methods within parallel fiber optic infrastructure pathways, a fixed conventional fiber optic cable count would restrict and challenge YVR's expansion flexibility in terms of both physical disruption to airport facilities and potential budget overruns.

YVR Discovers Immediate Benefits of Air-Blown Fiber

YVR's local IT infrastructure decisions depend upon the research, analysis, and recommendations of Milan Zivkovic, the Director of IT Airport Technology Solutions, and Vili Antic, RCDD, the airport's Telecommunication Infrastructure Analyst. Jerry Potucek, president of RADA Technology Consulting, Inc. (www.rada.bc.ca), who has been involved with various projects at YVR in a consulting role for the past fifteen years, initially introduced the Sumitomo FutureFLEX Air-blown Fiber infrastructure to YVR. Following further internal YVR analysis of current project plans comparing FutureFLEX with other solutions, YVR decided to move forward with FutureFLEX Air-blown Fiber for current projects, as well as include the FutureFLEX solution in the airport's plans for future fiber optic backbone expansions. The choice between a conventional fiber optic or a bundled air-blown fiber cabling infrastructure was critical in developing the most efficient and overall cost-effective fiber optic backbone possible.

In practical terms, the choice rested upon either "blowing" at speeds of up to 150 feet per minute the exact amount of fiber when and where needed through a highway of tube cables, or pulling and laying conventional dark fiber through traditional methods. With fiber-on-demand, FutureFLEX eliminates the risk of network obsolescence by dismissing the need for end-users



FutureFLEX provides immediate scalability through a point-to-point infrastructure of compact tube cable through which fiber bundles are blown at speeds of up to 150 feet per minute for easy, quick, and inexpensive network upgrades, adds, moves and changes. Tube cable holds up to 19 small individual tubes, some of which are left empty for future expansion, allowing you to blow in fiber quickly and easily on an as-needed basis—avoiding disruptions from cabling installation construction, eliminating dark fiber investment, and saving recurring labor costs.

to decide, or rather guess, today which fiber types would meet future network needs for the next five years and beyond. At the heart of the air-blown fiber backbone is a point-to-point infrastructure of compact tube cable (i.e. indoor-outdoor, plenum or riser-rated), containing up to 19 small individual tubes through which fiber bundles of various types, including laser optimized 10 gigabit, can be blown quickly and easily using either compressed air or nitrogen in a continuous fiber run through fiber distribution and termination boxes. Future network expansion is ensured by utilizing only a portion of the tube cells, filling those remaining with fiber bundles as needed.

"I recommended FutureFLEX to YVR because it delivers benefits that conventional cabling simply can not provide," explains Potucek. "In my opinion, FutureFLEX is the latest and greatest technology for YVR and all dynamic LANs because of immediate scalability, cost effectiveness, and a host of other benefits." The benefits Potucek mentions include:

- Easy and quick network backbone moves, adds, changes, and reconfigurations — including quick restoration and installing fiber to secure areas without requiring extensive labor or disruptive construction.
- Speed of adding fiber and quick replacement of fiber types. YVR can install multimode fiber today and in a week change its mind by easily and quickly blowing out the old and blowing in new single-mode or 10 gigabit fiber for immediate bandwidth control
- Ability to blow out fiber undamaged so that the airport can reuse it in another part of the network.
- Significant cost savings and continuous return on investment clients experience after the tube cables are in place.

Although FutureFLEX is installed in Canada's House of Commons, CRMP, Health Canada, Niagara Falls Bridge Commission projects, and others, a visit by YVR's IT team and



Potucek to McCarran International Airport-Las Vegas (a long-time user of FutureFLEX) really hit home." During the McCarran tour, we were able to witness first-hand the benefits that another airport derives from using FutureFLEX Air-blown Fiber," says Antic. The most valued attributes of FutureFLEX, according to Antic, are:

- Flexibility to expand and upgrade the fiber optic backbone, only when the need arises. The air-blown fiber infrastructure is immediately scalable, thereby eliminating the expense of laying dark fiber and the guesswork of forecasting fiber optic needs and budgets years in advance
- Quick project turnaround to install fiber, especially for short-notice airline and tenant requests
- Saving budget dollars in the long-run by eliminating the recurring labor costs associated with a conventional fiber backbone, including having to add additional conduit to expand network capacity
- Preservation of airport operations and facilities. Since FutureFLEX requires no construction work nor re-entrance into conduit systems when installing fiber or reconfiguring the fiber pathway as does conventional cabling, the public and tenants are safe and comfortable with the behind-the-scenes FutureFLEX installation.

YVR Projects Revisited...Realizing the Business Value of Air-Blown Fiber VS Conventional Cabling

Although still executing long-range plans, YVR is already realizing the benefits of having chosen the FutureFLEX Air-blown Fiber infrastructure as the following synopsis illustrates:

Link Project

Update:FutureFLEX 19-tube cable connects the main communication room in the International Terminal Building with the main communication room in the Domestic Terminal Building. At this time, the 19-tube cable is 1/2 full with both multimode and single-mode fiber. The remaining tubes are left empty for expansion at any time.

Major Benefit From YVR's Perspective: The initial benefit of utilizing the FutureFLEX Air-blown Fiber system is the quick

installation of fiber between the 2 main communication rooms. Since this fiber pathway is one that will be used frequently over the near and distant future, YVR will greatly benefit in overall cost savings by eliminating the need to repeatedly install conventional cable into the same pathway requiring disruption to the traveling public, daily airport operations, and the utilization of valuable pathway space.

Labor Time Saving Example

Fiber Link Between the Two Main Communication Rooms	# of Installers	Installation Time
Pulling Conventional Fiber Optic Cable	2	2 full days or 32 hours
Blowing FutureFLEX Air-blown Fiber Bundles	2	8 minutes

International Terminal Expansion

Update: Each of the eleven new Communication Equipment Rooms (CERs) will be linked through the air-blown fiber backbone to the Main Equipment Room (MER) using both multimode and single-mode fiber to support the extension of the new International Departure and Arrival gates. Phase 1 of the project introduces 7 new CERs, while Phase 2 introduces the remaining 4 CERs.

Major Benefit From YVR's Perspective:

By installing two 19-tube FutureFLEX pathways within Phase 1 from the MER to the main CER (2A), which houses a distribution unit utilizing FutureFLEX 7-tube cable routes, YVR is prepared to blow fiber at any time to the remaining 4 CERs in Phase 2. Unlike conventional methods, FutureFLEX blows fiber to the 4 CERs without repeated disruption to facilities. Had a conventional infrastructure been in place, it would have required a minimum of 2-3 cable pulls with disruption to tenants, the Canada Customs Hall, and other active areas to extend the 1.5 kilometer fiber optic cable run to the 4 new CERs.

Labor Time Saving Example

Installing Fiber From the MER to a CER – Phase I	# of Installers	Installation Time
Pulling Conventional Fiber Optic Cable	2	3 working days or 48 hours
Blowing FutureFLEX Air-blown Fiber Bundles	2	30 minutes

Sea Island Fiber Optic Build-out

Update: YVR's main objective with this project is to expand its fiber optic backbone Infrastructure on Sea Island. Expansion introduces main fiber optic backbone corridors located within the central core of the island. The main corridors create the ability to logically expand to the outreaches of Sea Island when required to meet YVR's system and commercial development needs. The challenge, solved by FutureFLEX, is utilizing very little valuable underground duct space for current and future backbone fiber feeds.

Major Benefit From YVR's Perspective: Had a conventional backbone been adopted, YVR would have been limited by the strand count of the cable quite possibly requiring installers having to retrench to install additional cable for future expansion. Since FutureFLEX utilizes minimum duct space, YVR can easily blow the required fiber counts for current projects and for future commercial building expansions to points on the outskirts of Sea Island. One recent beneficiary of the Sea Island build-out is the FOD (Foreign Object Debris) Radar project. The FOD Radar detects debris on runways and sends the debris GPS coordinates to YVR Operations for near real-time removal. The system is precise enough to detect a Canadian Dollar Coin (26.5mm in diameter). YVR is the first airport in the world to apply this system. There are 4 FOD Radar locations; each is connected to the main equipment room through the FutureFLEX Air-Blown Fiber infrastructure.

Labor Time Saving Example (FOD Radar Installation)

Installing Fiber from RADAR to MER	# of Installers	Installation Time
Pulling Conventional Fiber Optic Cable	2	5 working days or 80 hours (per location)
Blowing FutureFLEX Air-blown Fiber Bundles	2	8 hours (per location)

The Outlook for YVR

By having adopted the FutureFLEX Air-blown Fiber system, YVR has established an efficient, logical, cost-effective, and scaleable fiber optic backbone infrastructure to meet the growing dynamics of airport operations. "I just wished I had known about the FutureFLEX solution earlier," says Antic. "It's a great product that provides the IT department flexibility in planning and project execution as well as establishes solid business practices and overall value to excel us in achieving our goal to be the world's Premier Global Gateway."

Vancouver International Airport (YVR) - YVR is Canada's second busiest airport and the second largest international passenger gateway on the West Coast of North America.

The airport takes a leading role in applying technology to facilitate passenger processing, deploying self service check-in kiosks at various locations around the airport and off-airport sites, on-board check-in, U.S. Direct for cruise ship passengers, and automated border crossing programs, such as Nexus Air and Canpass Air. YVR expects to serve approximately 17 million passengers in 2006 and is deploying plans for continued growth. For more information, please visit www.yvr.ca.

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Sumitomo Electric Lightwave Corp. - Located in Research Triangle Park, NC, Sumitomo Electric Lightwave is a company within the global network of Sumitomo Electric Industries, LTD (SEI). According to the CIA (Cable Industry Analyst) 2005 Wire and Cable Industry Survey, SEI is the world's largest cable manufacturer measured in total sales. SEI employs over 100,000 people worldwide and has revenues in excess of \$16 billion. Sumitomo Electric Lightwave develops and manufactures fiber optic cable, interconnect products, fusion splicing equipment, FTTH/FTTP solutions, and the FutureFLEX Air-blown Fiber System — the fiber-on-demand, bandwidth-on-demand solution for today's enterprise network. FutureFLEX is also the ideal solution for Green Building and sustainable design. For more information, visit www.sumitomoelectric.com. To learn more about FutureFLEX, visit www.futureflex.com or call 877-356-3539.

FutureFLEX customers include CNN, ESPN, Starbucks Coffee, Nissan, Intel, the Pentagon, Mayo Clinic, Johns Hopkins University, Canadian House of Commons, Health Canada, Corrections Canada, Niagara Falls Bridge Commission, and a host of other customers spanning various vertical industries.



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