

The Mackenzie Valley Fibre Link (MVFL) is designed to the highest international standards and specifications to handle your needs for small and large data transfer.

Network Architecture

The MVFL is designed to the highest international standards, conforming with both, ITU and IEEE technical specifications.

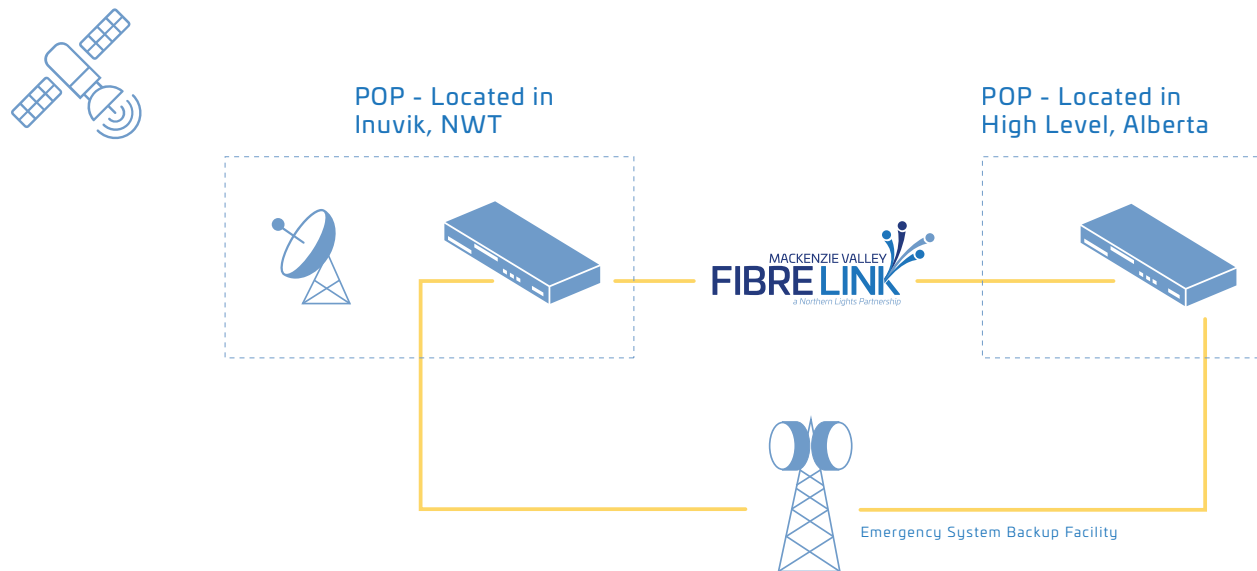


Figure A.

- Hot standby electronic equipment redundancy, in “folded ring” configuration, with independent fibre “GO” and “RETURN” channels, to provide enhance system availability and network redundancy in the event of equipment failure.
- All 48 fibres compliant with ITU Dense Wavelength Division Multiplexing (DWDM) standards (e.g. [RD18], [RD19]), and supporting a minimum of 88 DWDM channels per fibre.
- Each DWDM channel capable of supporting up to 100 Gbit/s.
- Emergency System Backup Facility, using existing microwave infrastructure to provide a fully diverse “ring” architecture.

Network Interfaces

The full range of electrical and optical technical interfaces are available at all MVFL Points of Presence (PoP) including town of Inuvik PoP, ISSF PoP, and High Level PoP:

- Carrier Ethernet Services as defined by Metro Ethernet Forum (MEF)
- 1G Ethernet
- 10G LAN PHY (10GBASE-R)
- 10G WAN PHY (10GBASE-W)
- 100G LAN PHY (100GBASE-R)
- Optical Transport Network (OTN) interfaces
- Synchronous Optical Networking (SONET) / Synchronous Digital Hierarchy (SDH) interfaces
- T-Carrier interfaces
- Dense Wavelength Division Multiplexing (DWDM) interfaces

Network Interconnection Options for High Level

The MVFL is a long-haul transport fibre-optic system. Data that is received at the ISSF PoP will be delivered in same formats at new MVFL PoP in High Level. Users of the MVFL can contract with any of the available long haul southern carriers at High Level for onward transmission of their data. For that purpose, the new MVFL PoP will be connected with the public PoPs of Northwestel, Axia Supernet and Telus in High Level (for Metro Ethernet see Figure B). “Virtual” PoP’s (e.g. CANARIE) can also be accessed at the physical PoP locations (for Metro Ethernet see Figure C).

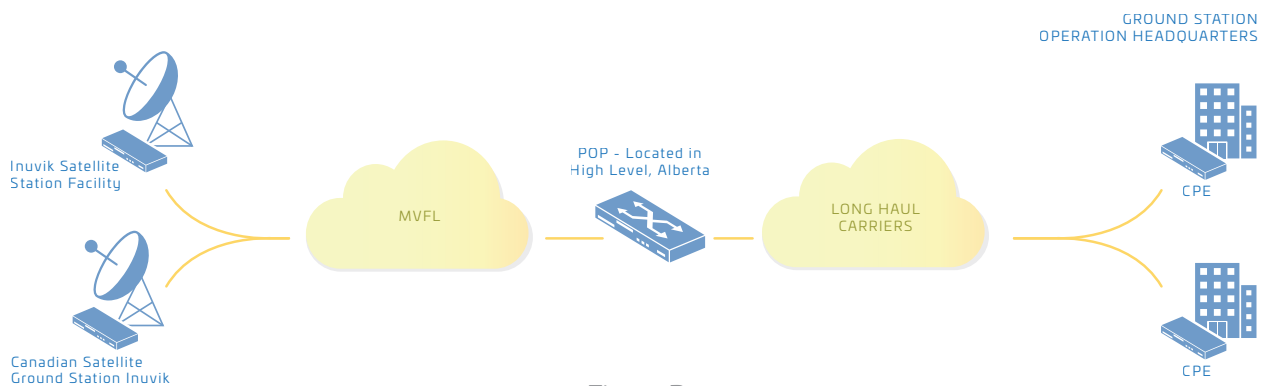


Figure B

Performance & Reliability

The MVFL is designed to meet international performance and reliability specifications for long haul, backbone fibre networks. The specified design life of the fibre-optic link is 30 years. The MVFL design is compliant with the latest ITU, IEEE, NEDS and ANSI performance specifications for the Metro Ethernet, OTN, SONET, T-Carrier, and DWDM, including, but not limited to:

- Bit Error Ratio Tests (BERT), including:
 - Jitter and jitter wander
 - Packet performance
 - Frame performance
 - One way delay (latency)
- The MVFL interfaces comply with ITU-T G.826 [RD23] including compliance with the requirements of long haul hypothetical reference path.
- The availability of the MVFL (w/o emergency microwave backup) has been specified for:
 - the equipment availability with 99.99%
 - the overall system availability with 98%
 - optional redundant microwave backup
 - system for mission-critical traffic (99.8% availability)
- Satellite Ground Station Operators receive Telemetry, Tracking and Control (TTC) traffic redundancy through Microwave backup as part of basic service (between Inuvik and High Level).
- Additional redundancy options are available as special builds for interested parties.

System Components

The MVFL southern terminus located at High Level, Alberta and the fibre-optic cable system between the existing fibre-optic infrastructure at the McGill Lake Microwave Site and the terminal facility at Inuvik includes several components. These components of the development are described in the following subsections:

System Components

FIBRE-OPTIC CABLE

- The installed fibre-optic cable has a 13 mm (1/2 inch) outside diameter with steel-armouring and a polyethylene outer covering. The cable contains 48 fibre strands, with a capacity of 88 Dense Wavelength Division Multiplexing channels per fibre pair, with an ultimate capacity of 100 Gbps per optical channel.
- The use of the steel-armoured cable was selected for direct buried operations north of Wrigley because of its superior physical characteristics and the proposed installation techniques, which involve cable placement in the active layer of permafrost zones. It has greater strength than conventional armoured cables while being about the same diameter. As a result, the cable is more resistant to stresses from freezing, ice movement, shifting ground and from being run over by a vehicle.
- North of Wrigley, the steel-armoured cable was directly buried in the ground without using conduit. This approach was suited to summer work when the ground was thawed and there were multiple stream crossings where boring was used to cross below the stream beds. A conventional outside-plant, single-armoured cable was then installed in the completed conduit using compressed air “jetting” techniques.
- North of Wrigley, the steel-armoured cable was directly buried in the ground without using conduit.

THE EQUIPMENT

- The 6500 Packet-Optical Platform is a Multi-port multi-protocol system designed by Ciena that supports TDM/WDM/GigE/10G/40G and 100G ports.
- The Ciena 6200 Packet-Optical Platform is a highly dense edge aggregation transport device that supports a mix of PDH, TDM, and Carrier Ethernet, all in one compact platform. It supports existing and emerging next-generation services with less equipment, resulting in simpler operations.

SOUTHERN TERMINAL FACILITY AT HIGH LEVEL

To realize the MVFL interconnection to the available long haul southern carriers at High Level, Alberta, a new shelter was built to house the southern terminus of the MVFL system in a public Point of Presence (PoP). This MVFL shelter is connected by local fibre links to the Northwestel Indefeasible Right of Use (IRU) interconnection point in High Level, to connect to the McGill Lake Microwave Site and to the three physical PoPs of the southern Canada long haul carriers in High Level (Northwestel, Axia Supernet and Telus).

NORTHERN TERMINAL FACILITY AT INUVIK

A terminal facility is located at Inuvik inside the existing Northwestel central office which is equipped with card-reader access and lockable cabinets for use by third-party telecom providers. The terminal facility is hosted in the Inuvik PoP. It serves as emergency backup hub in the event of a prolonged MVFL outage, connecting to Northwestel's existing microwave link to Yukon's fibre-optic network.

POINTS OF PRESENCE (POP)

- The MVFL Project includes PoPs in each community where local service providers, institutional and other users can connect to the MVFL. The PoPs can also connect to satellite systems to provide transmission diversity.
- Typically, PoP facilities are contained in a 20m² or similar sized insulated building, which will include: a heating, ventilation and air conditioning system; an "Add/Drop Multiplexer" unit to connect local loop distributors to the MVFL; a repeater to amplify the signal; cabling; rectifiers; batteries; fire protection and a 28 kW back-up diesel generator.
- PoPs are located in Fort Simpson, Wrigley, Tulita, Norman Wells, Fort Good Hope and Inuvik.
- In addition to the PoP in the terminal facility of Inuvik there will be a further PoP at the ISSF inside the CCMEO shelter/antenna control cabin.