Low Speed Optical Modules for Utility Communications

Improve Safety and Reliability of Intra-Substation Data Links

Avoiding Intra-Substation Link Dangers

In high-voltage environments at electric utility plants, teleprotection equipment is used on communication links to quickly isolate faults and protect the network from failure and damage.

Historically, copper interfaces between the teleprotection equipment and multiplexers transferred critical information to the command center. These high-speed, low-energy signal interfaces are vulnerable to intra-substation electromagnetic and radiofrequency interference (EMI and RFI), signal ground loops, and ground potential rise (GPR) – all of which considerably reduce communications reliability during electrical faults.

Optical fibers do not have ground paths and are immune to noise interference, so optical data links provide a superior interface for intra-substation communications between teleprotection equipment and multiplexers. Replacing copper interfaces with optical fiber ensures isolation from dangerous GPR, prevents induced electrical noise, and eliminates the signal ground loops and data errors common to electrical connections.

The IEEE C37.94 Optical Interface Standard

IAB-3000 Integrated Access Banks from Sycamore Networks with optional, IEEE C37.94-compliant Low Speed Optical Modules efficiently resolve intra-substation communications challenges.

The IEEE C37.94 standard defines the communication link between teleprotection equipment and digital multiplexers, via multimode optical fiber, as an interface that supports synchronous data at the rate of N x 64 kilobits per second, where N = 1, 2… 12, up to 2 km distance. Many power utility companies are deploying C37.94-compliant solutions to achieve safer and more reliable data communication links in high-voltage substation environments.

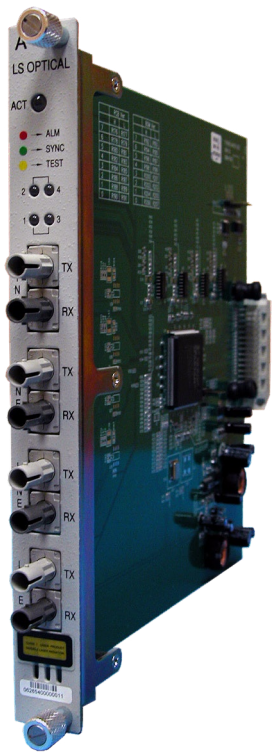
IAB-3000: Flexibility for Evolving Utility Networks

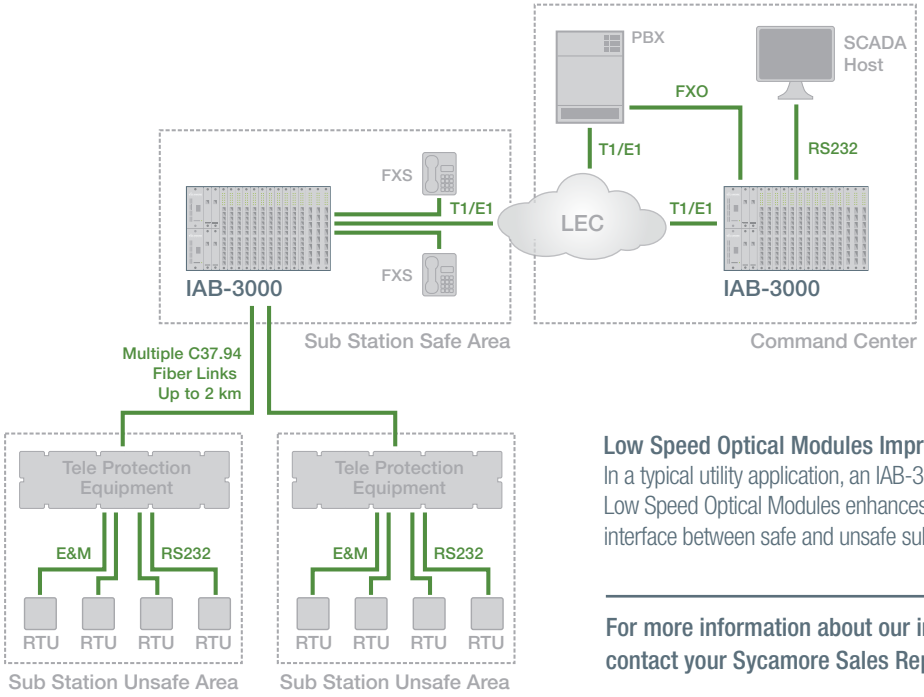
The IAB-3000 is a high-performance, multiservice channel bank platform for wide area interconnectivity in public and private access networks. The compact chassis offers a variety of voice and data interfaces, including T1/E1, Low Speed Optical (IEEE C37.94 compliant), OCU-DP, G.703, 10/100BaseT Router, RS-232, EIA530, V.35, V.36, X.21, E&M, FXO, FXS, and Magneto client interfaces.

The IAB-3000 ensures reliable support for voice, low-speed data, and other legacy services that perform essential functions in evolving critical infrastructure networks, and efficiently grooms this traffic onto modernized networks. C37.94-compliant Low Speed Optical Modules, and redundant T1/E1 links, controller, and power supply, make the IAB-3000 an excellent fit in utility environments.

Features and Benefits

- Comply with IEEE C37.94 Optical Interface Standard
- Interconnect Safe and Unsafe Substation Areas
- Eliminate EMI/RFI and GPR Vulnerabilities
- Overcome Limitations of Copper Interfaces
- Improve Reliability and Safety by Providing Isolation





Low Speed Optical Modules Improve Intra-Substation Data Link Integrity

In a typical utility application, an IAB-3000 Integrated Access Bank with IEEE C37.94-compliant Low Speed Optical Modules enhances both safety and reliability by serving as an isolating interface between safe and unsafe substations.

For more information about our intelligent networking products and solutions, please contact your Sycamore Sales Representative.

SPECIFICATIONS HIGHLIGHTS

Low Speed (IEEE C37.94) Optical Modules

- 1-port and 4-port modules, both IEEE C37.94-compliant
- Hot-swappable
- One tri-color LED indicates status of each C37.94 port
  - Green - SYNC
  - Red - UNSYNC/LOS
  - Yellow - Yellow Alarm
  - Flashing Yellow - Loopback

Optical Characteristics

- Optical Fiber
  - Multi-mode
  - 62.5 µm core diameter optical cable
  - 50 µm core diameter optical cable
- Optical Source: LED
- Optical Budget
  - 9.6 db at 50 µm of core size
  - 15 db at 62.5 µm of core size
- Connector: One pair of Tx/Rx ST-connectors per port
- Typical transmission distance: Maximum 2 km
- The center emission wavelength: 820 nm +/- 25 nm

Operating Modes

- Auto: System detects both Rx and Tx bandwidth by examining the content of the payload
- Manual: User-configurable Tx bandwidth

Communication Failure Scenarios

- LOS: Declared within 1 ms after receiving 2 or more errors in 8 consecutive framing patterns; cleared after receiving 8 consecutive correct framing patterns
- Yellow: Declared when 3 consecutive received frames have the "Yellow" bit set and there is no LOS; cleared after 3 consecutive received frames have the "Yellow" bit cleared or the LOS is present
- Framing and Payload Errors

Test Patterns

- 2exp20-1 (QRSS)

Loopback Capabilities

- Line, Local, Payload

Clocking Criteria

- Teleprotection equipment should use the signal from the multiplexer for clocking
- The multiplexer should not use the signal from the teleprotection equipment for clocking

Management

- Local access via RS232 serial interface
- Remote access via SNMP MIB and Node Viewer

Fault Management

- Support for TRAP PDUs
- Events and TRAPs generated for Port Alarm, Module Insertion/Removal, and Module Failure indications

Alarms

- Configurable levels (Critical, Major, Minor, Disable) for LOS, and YEL
- Alarms triggered based on error level thresholds set up for the ES, SES, and UAS

Performance Reports

- 1 hour, 24 hour, and 7-day intervals available

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Sycamore Networks, Inc. (NASDAQ: SCMR) is a leading provider of intelligent bandwidth management solutions for fixed line and mobile network operators worldwide. From multiservice access networks to the optical core, Sycamore products enable network operators to lower overall network costs, increase operational efficiencies, and rapidly deploy new revenue-generating services.