

SUBSTATION COMMUNICATION



MOST SUBSTATIONS HAVE SEVERAL GENERATIONS OF MONITORING AND CONTROL EQUIPMENT.

The earliest devices use simple contact closures to indicate status, such as “switch opened” or “switch closed.” Equipment that uses varying currents to report changing parameters such as voltage and temperature came next. Data interfaces such as RS232 or V.35 followed.

In an effort to aggregate these multiple signal types, Remote Terminal Units, or RTUs, were deployed. RTUs have the ability to communicate with different generations of equipment and data protocols, and many use a relatively modern “T1 interface” to provide a standard way of communicating status and control to central sites.

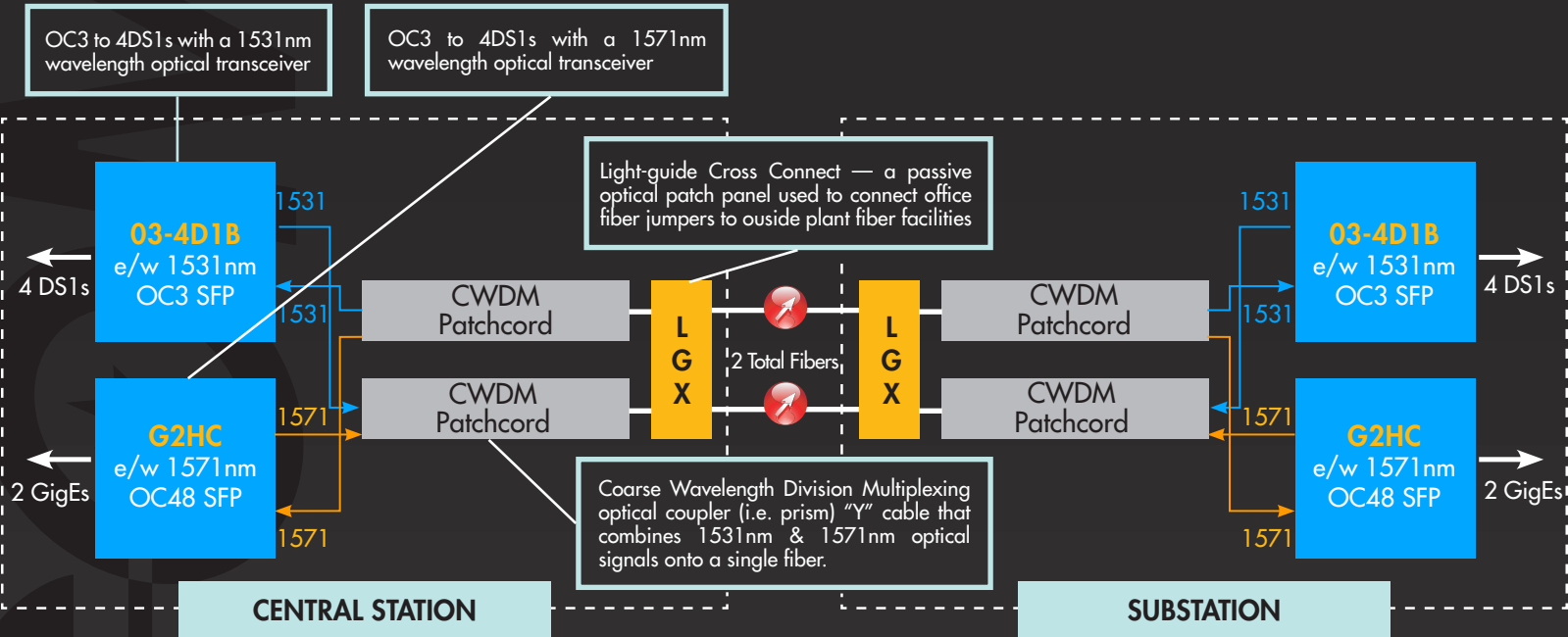
Each 1.544 Mbps T1 carries the equivalent of 24 separate phone conversations—more than enough capacity to support most existing substation communication needs.

However, two recent events have introduced yet another change to substation communications. First is the widespread adoption of Ethernet as a faster, less expensive and often simpler means to transfer data. Newer substation equipment - increasingly sophisticated load monitoring equipment, radios that support residential load shedding, video monitoring devices and even RTUs - commonly provide an Ethernet interface for substation-to-central-station communications.

The second is the growing focus on Smart Grid technologies to improve resilience and efficiency. Many Smart Grid capabilities like AMI (Advanced Metering Infrastructure) rely on Ethernet for its increased bandwidth and ability to carry the volume of data necessary to support real time operations.

Because of the substantial investment in existing T1 RTUs and the risk involved in a wholesale change to Ethernet, Ethernet links are often added to enable Smart Grid capabilities without replacing existing T1 infrastructure. As a result, the challenge becomes simultaneous support of T1 and Ethernet links - especially difficult because many utilities, like many phone companies, did not anticipate the new demands on fiber cable to carry higher communication speeds and traffic.

Pulsecom’s optical communication equipment has been designed to efficiently support exactly this scenario: cost-effective delivery of a few T1 and Ethernet substation circuits over strained fiber cable resources. The Pulsecom O3-4D1B carries 4 T1 circuits over an industry-standard OC3 SONET (150 Mbps) fiber circuit. Pulsecom’s G2HC carries a pair of Gigabit Ethernet (“GigE”) circuits over a standard OC48 SONET (2.4 Gbps) fiber circuit. Both products permit use of various optical wavelengths to extend multiple circuits over a single fiber pair to distant substations. SONET provides a nationwide fit with telcos as well as best-in-class communications over internal utility networks.



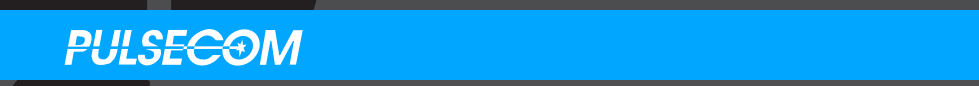
- Gigabit Ethernet (GigE) used to upgrade communication links between substations and central sites to support Smart Grid communication infrastructure
- T1s support existing RTUs
- Most substations have some fiber cables in place, but few fiber strands. Pulsecom multiplexing capability (many different circuits on the same fiber) cost-effectively resolves this "fiber starvation"
- Substations can be remote. Pulsecom long-range optical transceivers and cost-effective means of combining different optical wavelengths addresses this challenge
- Security and resilience: Pulsecom's equipment is designed for harsh, outdoor environments; nailed-up communications address security risks
- Low power: Industry-leading low power technology enables solar powering and extended battery operation

SUBSTATION EQUIPMENT

O3-4D1A
OC3 to 4 DS1 Multiplexer
Seismic Rated
-40°C to +75°C

G2HC
OC48 to 2 Full Rate GigE Multiplexer
Seismic Rated
-40°C to +75°C

203D3-19A
2-position Mounting Shelf
19"/23" 1.75" high 120Vac to -48Vdc
Seismic Rated
-40°C to +75°C



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