S.I. TECH FIBER OPTIC NETWORK COMMUNICATION SOLUTIONS FOR SCADA

Supervisory Control And Data Acquisition (SCADA) system are typically used by utilities such as power, Oil & Gas, water and waste management, etc. SCADA systems are also used by Process Industries including petrochemicals, fertilizers, cement, paper and pulp, steel industries and aluminum plants.

Many installations of these systems are in areas where it is exposed to harsh environments of EMI, RFI, multiple/dirty ground, and lightning where in the conventional communication cables have to be protected to run SCADA properly. Apart from this, distances to be covered may involve additional devices such as repeaters, boosters, or line drivers. This puts pressure on the proper installation methods used and supervision of extra testing to make sure that it will not surprise in future or require corrective action when problems develop. Fiber optic communication providers a clean and safer solution in this case. With a fiber optic system, SCADA system can be set up without repeaters and can cover a much larger geographical area.

Major advantages of fiber optic systems:

- Electrical isolation – No electrical, magnetic, or radio frequency interference.

- No grounding or cables can be installed next to power lines.

- Covers longer distances which otherwise not feasible or difficult on metallic cables.

- Clean and safe media.

- Future proof installation for high-speed communication.

Typical System Set up:
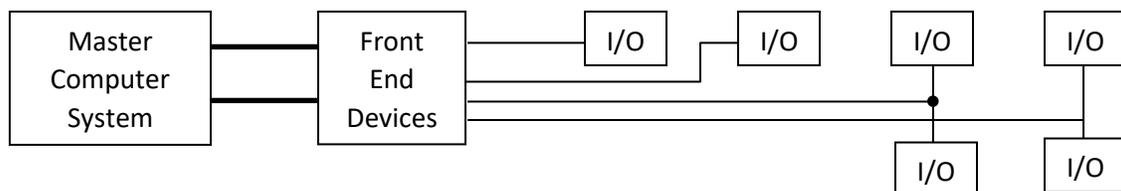

These could be RTUs, PLCs, Remote I/O devices, Energy meters, Controllers, Intelligent electronic devices (IEDs), Instruments, etc.

Above, a two-tier communication is envisioned. Between master and front end is generally at a higher speed where as the I/Os are at a lower speed. The I/Os are connected in various configurations such as individual, star connected (broad cast), or multidrop.

S.I. Tech products can be used as follows:
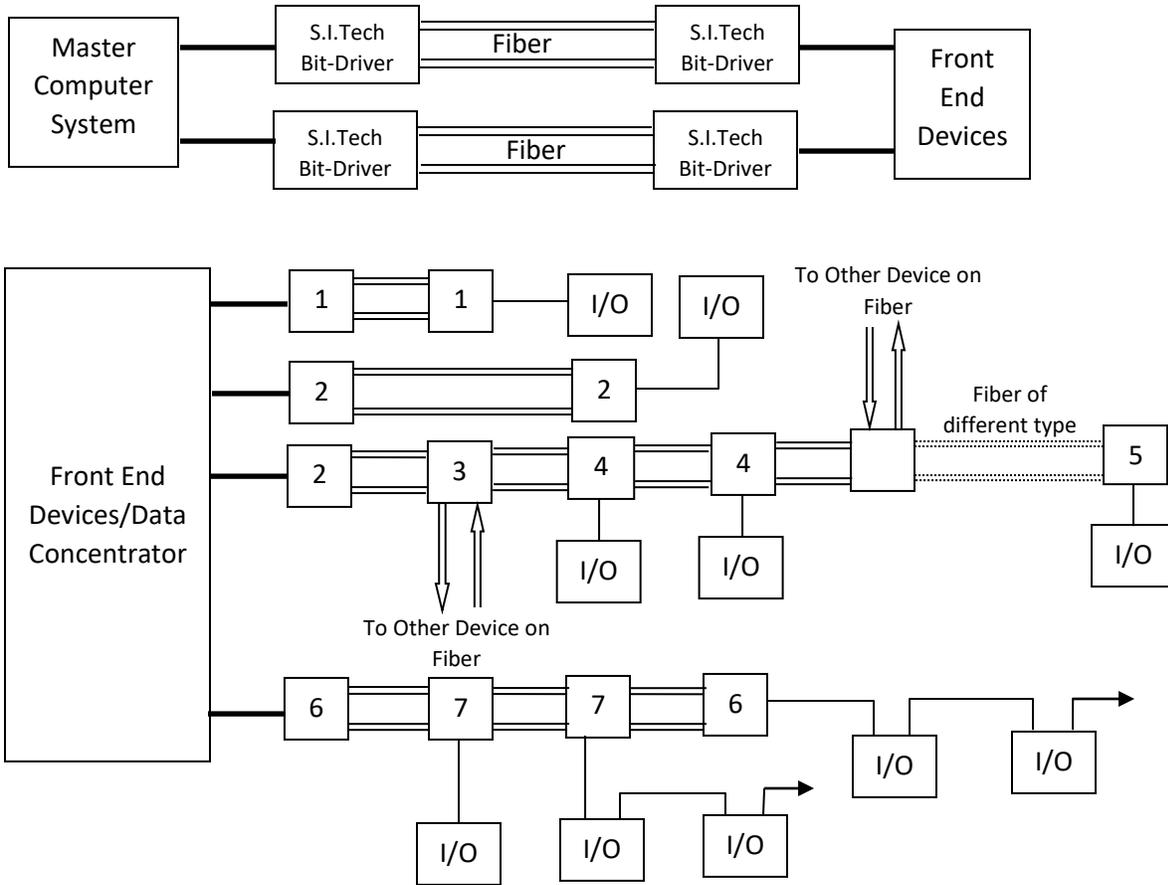
S.I. Tech Products for point-to-point communication could be:

- RS 232 – 2005/2505/2507/2560

- RS 422 – 2106/2012/2561

- RS 232 – 2139

- RS 232 – 2109

- RS 232 – 2505-660

- RS 485 – 2110/2126/2562

- RS 485 – 2128/2228

If based on the network topology the following applies:

Ethernet:

- 10 Mbps   -2550
- 10/100 Mbps -2150 – 10/100A
- Gigabyte   -2160

Industrial Ethernet:

- 10/100 Mbps -2151

The above diagram shows how individual connectivity of multidrop is possible either on fiber or in combination of copper and fiber. Also, a combination of different fiber types such as multimode, single mode, or plastic fiber is possible to cover different distances such as in a wide industrial complex, electrical distribution network, etc. where devices or locations are spread over long distances and needs connectivity end to end.

The diagram below indicates how devices can be multiplexed and brought to a common device with a single pair of fiber.
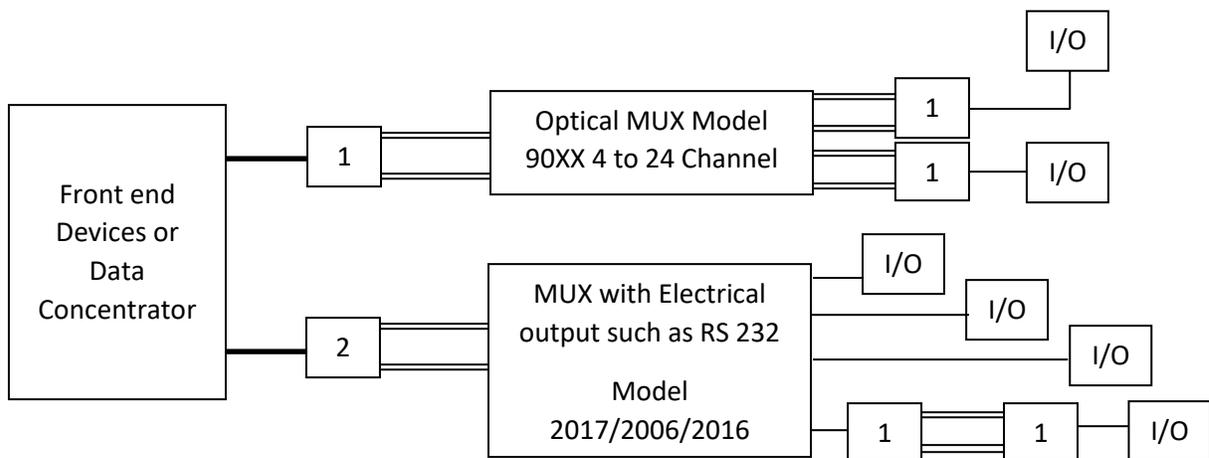
Fiber multidrop connectivity examples of wind turbine applications:

Example 1:

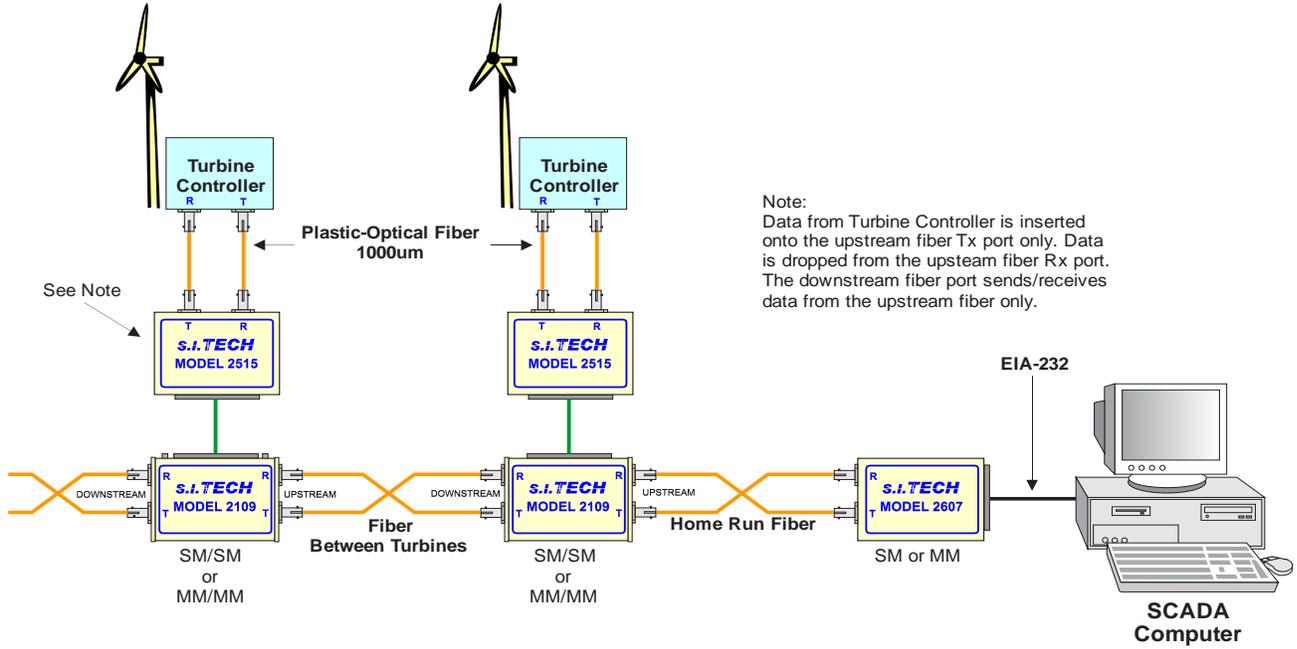**WIND TURBINE STRING**

Turbine Controller
R   T

Plastic-Optical Fiber 1000um

See Note

T   R
s.i.TECH
MODEL 2515

Turbine Controller
R   T

T   R
s.i.TECH
MODEL 2515

Note:
Data from Turbine Controller is inserted onto the upstream fiber Tx port only. Data is dropped from the upsteam fiber Rx port. The downstream fiber port sends/receives data from the upstream fiber only.

DOWNSTREAM
R   R
s.i.TECH
MODEL 2109
T
UPSTREAM

DOWNSTREAM
R   R
s.i.TECH
MODEL 2109
T
UPSTREAM

Fiber Between Turbines

R
s.i.TECH
MODEL 2607
T

EIA-232

Home Run Fiber

SM/SM or MM/MM

SM/SM or MM/MM

SM or MM

SCADA Computer

Example 2:

WIND TURBINE STRING

Turbine Controller
R   T

Plastic-Optical Fiber 1000um

See Note

Turbine Controller
R   T

Note:
Data from Turbine Controller is inserted onto the upstream fiber Tx port only. Data is dropped from the upsteam fiber Rx port. The downstream fiber port sends/receives data from the upstream fiber only.

EIA-232

DOWNSTREAM
R   T   R   R
s.i.TECH
MODEL 2139
T
UPSTREAM

DOWNSTREAM
R   T   R   R
s.i.TECH
MODEL 2139
T
UPSTREAM

R
s.i.TECH
MODEL 2607
T

Fiber Between Turbines

Home Run Fiber

SM/SM or MM/MM

SM/SM or MM/MM

SM or MM

SCADA Computer

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