Features

Simplex® Fire Alarm Network communications are available for wired or fiber optic connections:

- Wired communications are available on Network interface modules; available with either wired connections only, or as a modular design allowing selection of either wired or fiber optic media modules
- Fiber optic communications are available with fiber media modules on the Network interface modules or when using the higher performance multiple signal fiber optic modems
- LED status indicators assist with system setup and servicing

Multiple communication signal modems use laser optical transmitters to provide:

- Increased transmission distances compared to copper wiring (over 20 miles (32 km) may be possible with low-loss single-mode fiber)
- Designs are optimized for fiber type; models are selected for single mode fiber, or multi-mode fiber
- Multiple signal modems are two slot modules and are available with separate enclosures if required for smaller Network node control panels

Network modular interface modules provide:

- Class B or Class X communications using wired media or fiber optics; selectable separately to match media requirements

Wired media module details:

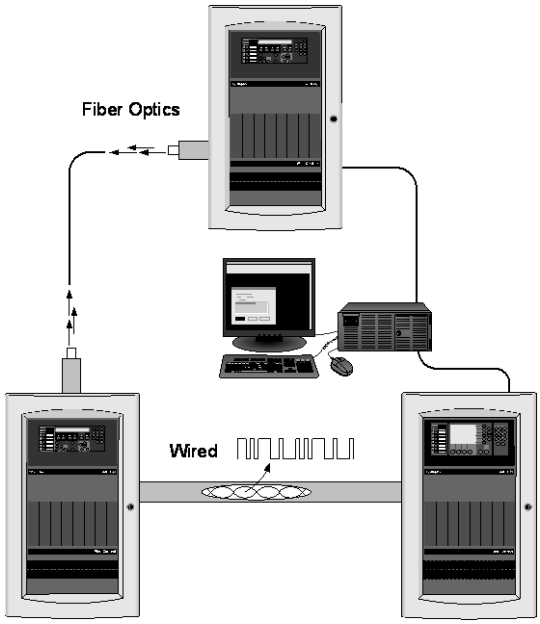
- Provides isolated earth detection
- Compatible with Simplex isolated loop and overvoltage protectors
- Electrical characteristics are similar to RS-485

Network signal fiber optic media module:

- Fiber optic links provide immunity to electrical transients, short circuits, and ground conditions
- LED based fiber optic media module uses two multi-mode fibers to communicate; has type ST connectors, compatible with 62.5/125 or 50/125 fiber
- Bi-Directional Couplers are available to allow use of single fiber cable (for Network communications)

Multiple communications fiber optic modules provide:

- Laser based half-duplex communications over single fiber connections
- Available for single mode, or multi-mode fiber
- Refer to information summary on pages 2 and 3 and to data sheet S4100-0049 for additional feature description



Fire Alarm Network Communications, Wired or Fiber Optic

Features *(Continued)*

Physical Bridge Modules connect multiple Network loops and provide Star topology connections:

- Physical Bridge Modules connect to Network communications using wired or fiber optic media and interconnect using modem media modules (refer to data sheet S4100-0057 for details)
- TCP/IP Physical Bridge Modules are similar but provide LAN (Local Area Network) compatible interconnections (refer to data sheet S4100-0029 for details

Network Panel List

Network nodes include the following Simplex fire alarm products:

- 4100ES, 4100U, 4010ES and 4010 Series Fire Alarm Control Panels and 4100ES or 4100U Network Display Units (NDU)
- 4190 Series TrueSite™ Workstations (TSW)
- 4190 Series Network System Integrators
- Legacy 4120 Series panels, NPU, and 2500 NDU; 4190 Series IMS and GCC systems; 4020, 4002 Series systems and retrofitted 4100/4100+ and 2120 systems

– **NOTE:** Refer to individual product data sheets for specific product listing details, see reference data sheet list on page 3.

Network Communications Module Selection Reference

4100ES/4100U and 4190 TrueSite Workstation Modular Network Interface Modules

Model	TrueSite Workstation Model	Description	Notes
4100-6014	4190-6032	Modular Network Interface for Master Controller	Requires two media modules (below)
4100-6061	4190-6033	Modular Network Interface for Redundant Master Controller	
4100-6056	4190-6036	- Wired Media Module	Also used for Network System Integrator Models 4190-9826 and 4190-9827
4100-6057	4190-6037	- Fiber Optic Media Module	

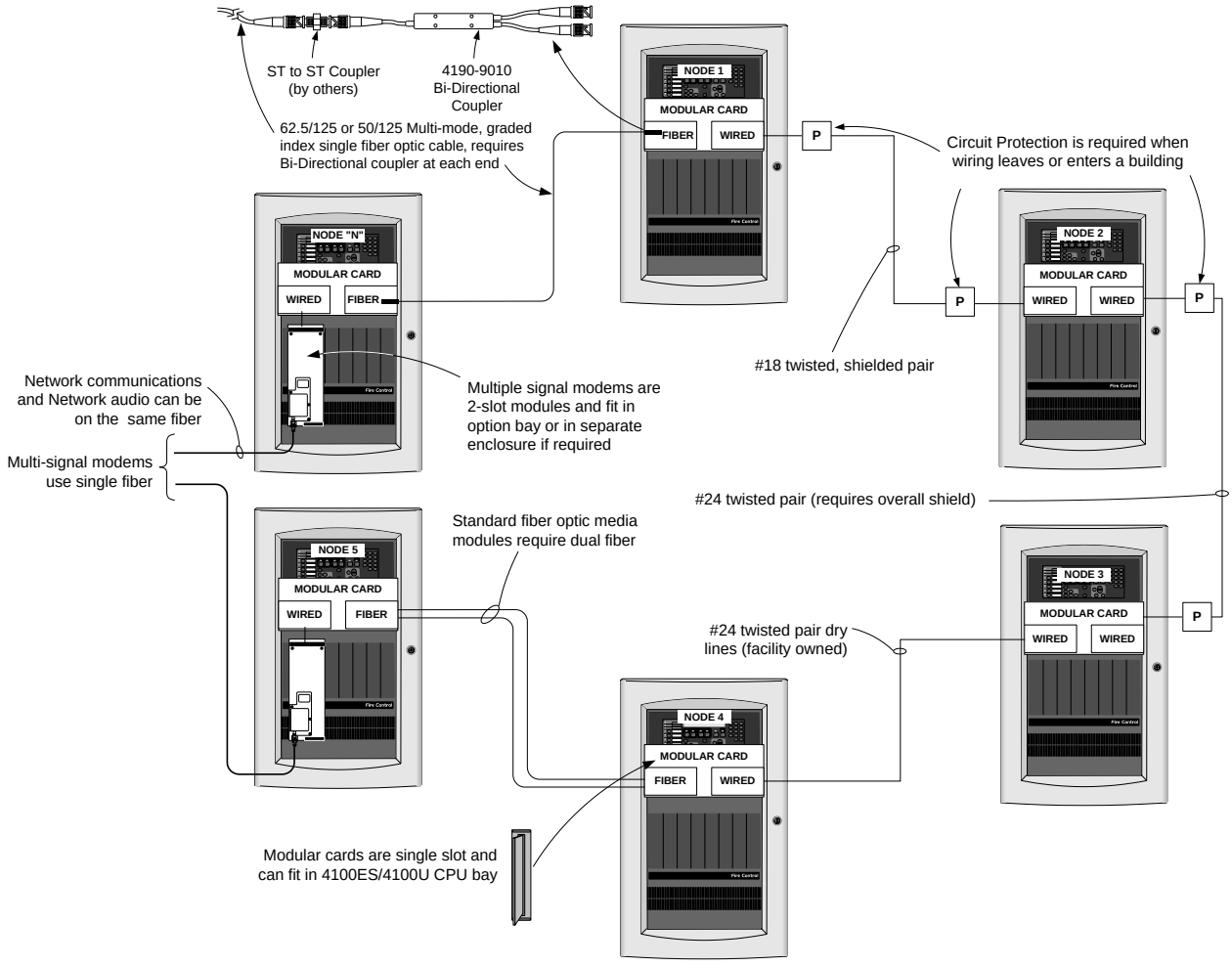
4010 and 4010ES Network Interface Modules

Model	Description	Notes
4010-9821	Network Interface Module with fixed, wired media	For 4010 Panels
4010-9817	Modular Network Interface Module requires two media modules (below)	
4010-9902	Modular Network Interface Module, requires two media modules (below)	For 4010ES Panels
4010-9818	- Wired Media Module	For 4010-9817 (4010) or 4010-9902 (4010ES) Modules
4010-9819	- Fiber Optic Media Module	

Network Multiple Signal Modems Reference (refer to data sheet S4100-0049 for additional information)

Model	Fiber Type	Description	Application
4100-6072	Single Mode	Left-Port Fiber Modem Assembly	For direct mounting onto a 4100ES/4100U expansion bay; Fiber Modems are required to be ordered in pairs (Left-Port Fiber Modems communicate only to Right-Port Fiber Modems)
4100-6074	Multi-Mode		
4100-6073	Single Mode	Right-Port Fiber Modem Assembly	
4100-6075	Multi-Mode		
4190-9023	Single Mode	Right-Port Fiber Modem Assembly; for Expansion Cabinet Mounting	Select if required; one maximum
4190-9026	Multi-Mode		

Fire Alarm Network Example with Multiple Communication Media



Multiple Signal Fiber Modems

For Network communications, or local Control Panel equipment communications, Multiple signal fiber modems communicate a variety of system signal combinations to a single fiber optic cable. These modules are dual slot module sized and can be housed in external cabinets for connection to smaller control panels. Please refer to data sheet S4100-0049 for details.

Below is a summary of the distance specifications for the Multiple Signal Fiber Modems.

Multiple Signal Fiber Optic Modem Distance Specifications (see page 4 for additional module reference)

Compatible Fiber	General Note	Fiber backbone components must meet or exceed standard EIA/TIA 568-B (Electronic Industries Alliance/Telecommunications Industry Association)for maximum power losses; single-mode fiber is preferred; attenuation should be measured at 1310 nm
	Single-Mode	Nominal 9/125 µm
	Multi-Mode	50/125 µm or 62.5/125 µm graded index
Fiber Connector		Type ST
Allowed Fiber Connections		Three (3) external connections maximum per link (does not include connectors on modems)
Transmit and Receive Wavelengths	Left-Port Modems	Transmit = 1310 nm; Receive = 1550 nm
	Right-Port Modems	Transmit = 1550 nm; Receive = 1310 nm
Transmission Distances for **Single-Mode Fiber** (preferred fiber type; Modules 4190-6072, 4100-6073, and 4190-9023) **Note:** These examples provide a safety margin of 5 dB or greater; a 3 dB safety margin is generally acceptable		Maximum total attenuation = 15 dB **Example 1 (low loss fiber):** Assume fiber with attenuation of 0.34 db/km; a target distance of 35,000 ft (10.7 km); connector loss totaling 6 dB attenuation; calculate the safety margin: (10.7 km) x (0.34 db/km) = 3.68 dB fiber loss 15 dB - 3.68 dB - 6 dB = **> 5 dB safety margin** **Example 2 (higher loss fiber):** Assume fiber with attenuation of 0.6 db/km; a target distance of 25,000 ft (7.7 km); and connector loss totaling 5 dB attenuation; calculate the safety margin: (7.7 km) x (0.6 db/km) = 4.62 dB fiber loss 15 dB - 4.62 dB - 5 dB = **> 5 dB safety margin**
Transmission Distances for **Multi-Mode Fiber** (Modules 4100-6074, 4100-6075, and 4190-9026)		5000 ft (1.6 km) maximum distance Maximum total attenuation = 6 dB 50 µm or 62.5 µm GRIN (graded-index fiber)

Additional Network Product Reference

Subject	Data Sheet
Network Overview with Applications Reference	S4100-0055
Multiple Signal Fiber Optic Modems and Accessories	S4100-0049
Basic 4100ES Reference	S4100-0031
4100ES Network Display Unit (NDU)	S4100-0036
TrueSite Workstations	S4190-0016
4010ES Fire Alarm Control Panel	S4010-0004
4010ES Fire Alarm Control Panel (International)	S4010-0006
4010 Fire Alarm Control Panel	S4010-0001
Network Systems Integrator	S4190-0017
Physical Bridge Reference	S4100-0057
TCP/IP Physical Bridge Modules	S4100-0029

Fiber Optic Communications

Modular Network Interface modules accept either a wired or fiber optic media module. When using Fiber Optic media module 4010-9819, 4100-6057, or 4190-6037 or fiber optic communications use two multi-mode fiber optic cables; one for transmit, and the other for receive. Distances can be determined using the information and examples shown below. (Refer to individual product data sheets for module size and location information.)

With a Bi-Directional Coupler (model 4190-9010) at each end, Network communications with the media modules will operate over a single fiber optic cable with some reduction in distance. Please refer to the coupler requirements and the specifications below for details.

4190-9010 Bi-Directional Coupler Requirements:

1. Use with Fiber Optic Media Board part number 566-376, or 565-261, revision "C" or higher.
2. Two 4190-9010 Bi-Directional Couplers are required per connection, one at each node.
3. The 4190-9010 is equipped with type ST connectors. To make type ST to type ST connections, an ST to ST coupler, by others, is required.
4. **ST to ST Couplers are available from:**
   Black Box, part # FO200
   Fiber Instrument Sales, part # F1-8101
   Newark Electronics, part # 95F2097
   (or equivalent)
5. Refer to Installation Instructions 574-492 for additional information. (4190-9010 cross references to part number 271-012.)

Modular Network Interface Media Modules Distance Specifications

Wired Media Module Communications Distances
(for Media Modules 4010-9818, 4100-6056, or 4190-6036)

Wire Size and Specifications	Data Rate (baud)	Distance	Distance Note
18 AWG Twisted, Shielded Pair (TSP); 58 pF/ft, 6.39 Ω/ft (190 pF/m, 21 Ω/m)	9600	17,000 ft (5.4 km)	Distance is with or without Isolated Loop Protector or Overvoltage Protectors
	57.6 k	10,000 ft (3 km)	
24 AWG Telephone cable with overall shield; 22 pF/ft (72.2 pF/m)	9600	12,000 ft (km)	
	57.6 k	7,000 ft (km)	

Dual Fiber Optic Cable Distance Reference
(Media Modules 4010-9819, 4100-6057, or 4190-6037, see notes below)

Fiber Type	MIFL	Power Margin	Maximum Distance	Budget
50/125 numerical aperture = 0.2	3 dB/km	3 dB	15,000 ft (4.57 km)	17 dB
62.5/125 numerical aperture = 0.275	3.75 dB/km	3 dB	15,000 ft (4.57 km)	21.4 dB

Single Fiber Optic Cable Distance Reference
(for Media Modules 4010-9819, 4100-6057, or 4190-6037 with 4190-9010 Bi-Directional Couplers; see notes below)

Fiber Type	MIFL	Power Margin	Maximum Distance	Budget	4190-9010 Coupler Loss	ST to ST Coupler Loss
50/125 numerical aperture = 0.2	3 dB/km	2 dB	7650 ft (2.33 km)	21.4 dB	-9.4 dB	-3 dB
62.5/125 numerical aperture = 0.275	3.2 dB/km		8200 ft (2.5 km)			-2 dB

Notes:

1. **Fiber Type**: Cable specifications are for 50 or 62.5 micron core with 125 micron cladding, multi-mode graded index fiber. Wavelength = 850 nm.
2. **MIFL:** Maximum Individual Fiber Loss. Numbers shown are for reference only, refer to specific cable for exact specifications.
3. **Distance:** Maximum distance is determined by the distance listed or by reaching budget value, whichever is shorter. Budget using 4190-9010 Bi-Directional Coupler is the same with either size cable because the coupler input cables are 62.5/125 fiber allowing launch power to be the same.
4. Dual Fiber optic distances are using 4010-9819, 4100-6057 or 4190-6037 media modules. Single fiber optic distances require using 4190-9010 Bi-Directional Couplers
5. Refer page 3 for Multiple signal fiber optic modem distance reference.