Simplex®

Fire Alarm Network Reference

Network Communications,
Options and Specifications

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
- Fiber optic links are point-to-point continuous (unswitched) connections between Fire Alarm Network nodes
- 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:

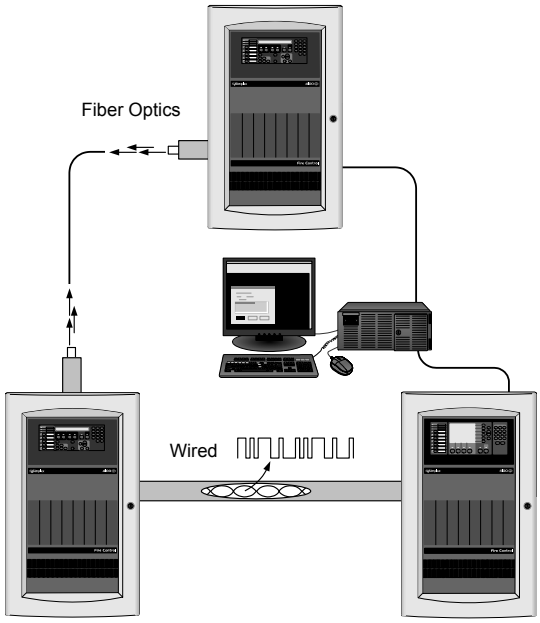
- Provides isolated earth detection
- Compatible with Simplex isolated loop and overvoltage protectors
- Electrical characteristics are similar to RS-485

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, 4007ES, 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

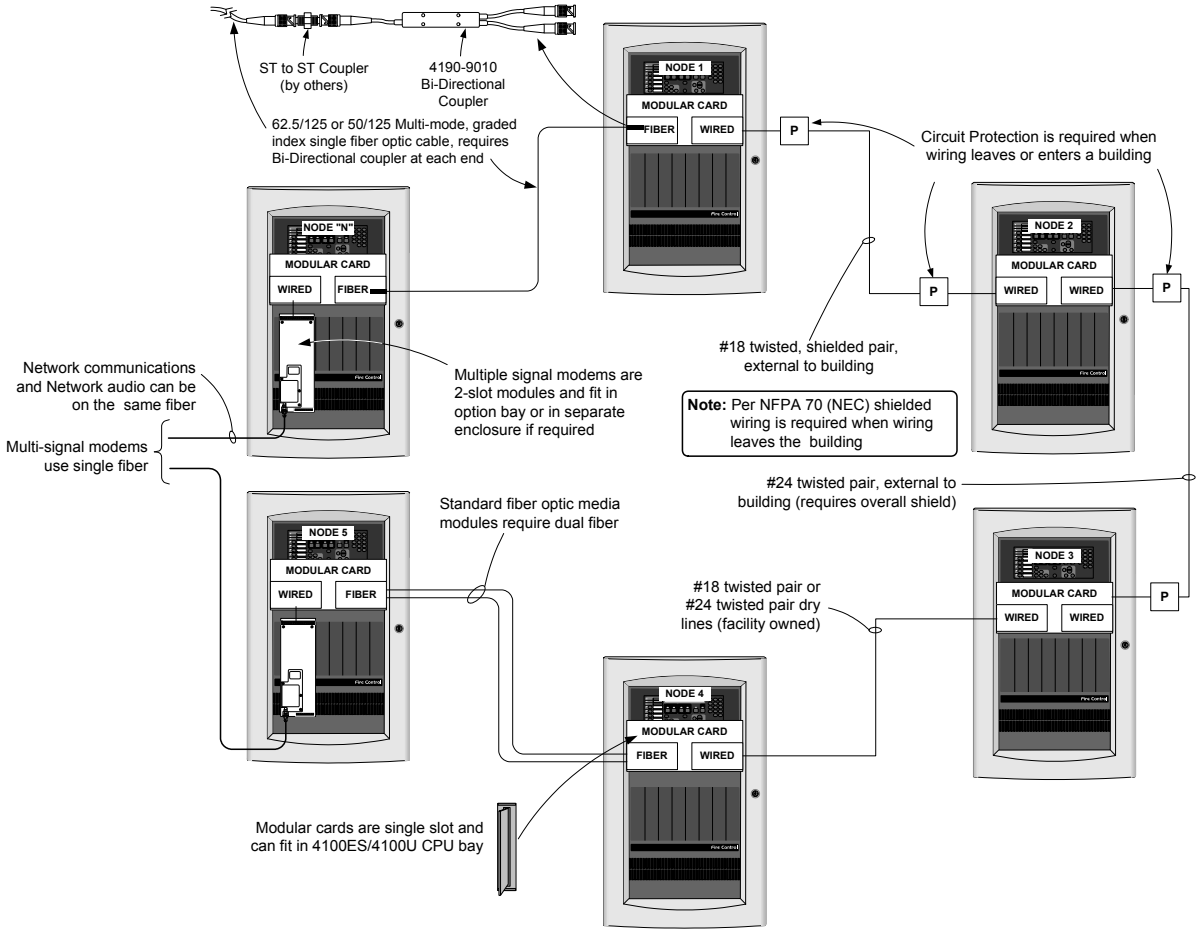
Network Interface Modules for Fire Alarm Control Panels and TrueSite Workstation

Product	Model	Description	Notes
4100ES/4100U	4100-6078	Modular Network Interface for Master Controller	Requires two media modules (below)
	4100-6061	Modular Network Interface for Redundant Master Controller	
	4100-6056	Wired Media Module	Mounts on 4100-6078 or 4100-6061 Network Interface; also used with Network System Integrator
	4100-6057	Fiber Optic Media Module	
TrueSite Workstation	4190-6060	Network Interface with fixed, wired media, PCI slot card	
	4190-6061	Modular Network Interface, PCI slot card	Requires two media modules (below)
	4190-6036	Wired Media Module	Mounts on 4190-6061 Network Interface
	4190-6037	Fiber Optic Media Module	
4010	4010-9821	Network Interface with fixed, wired media	
	4010-9817	Modular Network Interface	Requires two media modules (below)
4010ES	4010-9922	Modular Network Interface	
4010/4010ES	4010-9818	Wired Media Module	Mounts on 4010-9817 or 4010-9922 Network Interface
	4010-9819	Fiber Optic Media Module	
4007ES	4007-9810	Network Interface Card; Modular Network Interface	Requires two media modules (below)
	4007-9813	Wired Media Card	Mounts on 4007-9810 Network Interface Card
	4007-9814	Fiber-Optic Media Card	

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)

Important Installation Note: An initial acceptance test of each fiber link shall be performed in accordance with NFPA 72, the *National Fire Alarm and Signaling Code* using an OTDR (Optical Time Domain Reflectometer)

Compatible Fiber	General Notes	1. Fiber backbone components must meet or exceed standard EIA/TIA 568 (Electronic Industries Alliance/Telecommunications Industry Association) for fiber network performance 2. Single-mode fiber is preferred. 3. Multi-mode attenuation shall be measured at 850 nm and 1300 nm. 4. Single-mode attenuation shall be measured at 1310 nm and 1550 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	Single Mode Fiber	No Limit	
	Multi-Mode Fiber	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	Launch power = 250 µW (-6 dBm)
	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
4007ES Hybrid Fire Alarm Control Panel	S4007-0001
4007ES Fire Alarm Control Panel	S4007-0002
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 746-109, 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, 4190-6036, or 4007-9813)

Wire Size and Specifications	Data Rate (baud)	Distance	Distance Note
18 AWG Unshielded Twisted Pair (UTP); maximum of 58 pF/ft, (190 pF/m) between conductors; shielded cable is allowed; **see note below**	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 Unshielded Twisted Pair (UTP); maximum of 22 pF/ft (72.2 pF/m) between conductors; overall shielded cable is allowed; **see note below**	9600	12,000 ft (3.65 km)	
	57.6 k	7,000 ft (2.13 km)	

Note: Shielded cable and circuit protection is required when wiring leaves the building

Dual Fiber Optic Cable Distance Reference
(Media Modules 4010-9819, 4100-6057, 4190-6037, or 4007-9814 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)	20.4 dB

Single Fiber Optic Cable Distance Reference
(for Media Modules 4010-9819, 4100-6057, 4190-6037, or 4007-9814 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	6560 ft (2.0 km)	20.4 dB	-9.4 dB	-3 dB
62.5/125 numerical aperture = 0.275	3.2 dB/km		7215 ft (2.2 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, 4190-6037, or 4007-9814 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.