ES Net features

ES Network (ES Net) is a high bandwidth (100 Mbps) IP based fire alarm network that supports up to 99 nodes and uses industry standard network technology and infrastructure for greater design and installation flexibility.

Network wide system upgrades from a single point

ES Net allows for software updates to be applied to all network nodes via a single download. The high bandwidth ES Net network can perform software updates to all 99 nodes from a single location at any node on the network in minutes, increasing system up-time and reducing business interruptions.

Simplex 4120 fire network migrations

ES Net installations can be integrated with existing 4120 networks using the TrueSite Workstation allowing a phased migration path for existing installations. In some cases existing network infrastructure and cabling may be reused to lower the migration cost of ES Net migrations.

Network appliance synchronization

Network synchronization of notification appliances is not supported over the ES Network; however, synchronization is provided for all notification appliance connected to a single panel or node.

Advanced diagnostics

ES Net provides advanced network diagnostic tools and reports that are easy to read. Detailed information about network communication health and status are available allowing technicians to pinpoint problems and reduce the time required to troubleshoot network communication issues.

Greatly increased bandwidth and traffic speeds compared to traditional fire networks

ES Net is an IP based network which has greatly increased bandwidth compared to traditional fire networks. Every node that is part of a network can be notified about network events.

Table 1: Typical ES Net traffic speeds

Media	Data traffic rate
Ethernet	100 megabits per second (Mbps), CAT5e or better
Fiber cable	100 Mbps (single mode or multi-mode fiber media)
DSL	2 - 12 Mbps depending on distance (with 18 AWG cabling) Maximum 2 Mbps in ULC mode

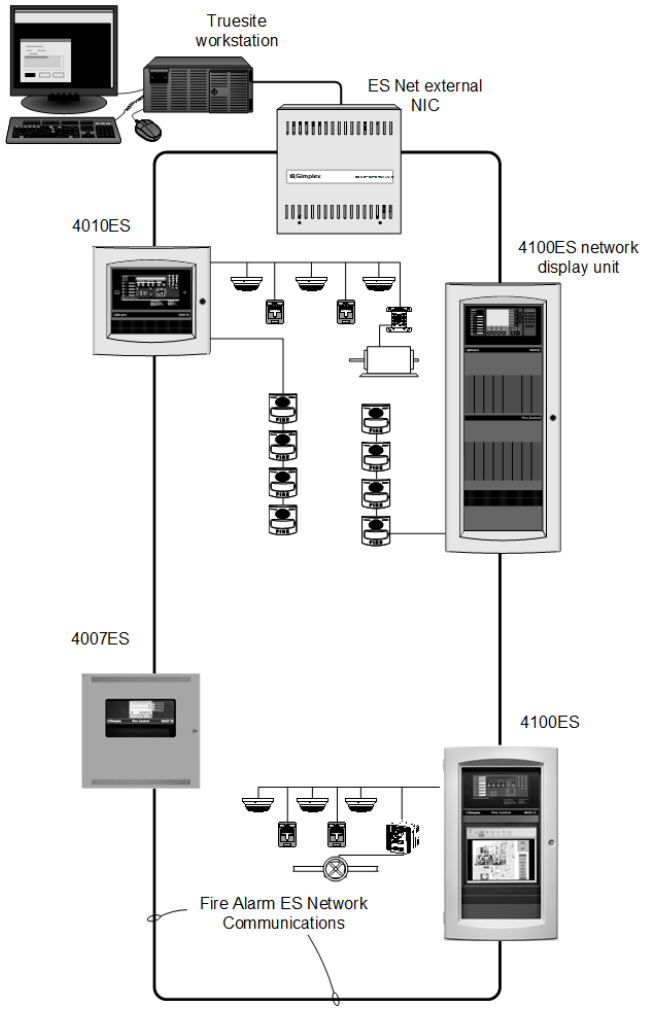

Figure 1: ES Net example

* At the time of publication only UL and ULC listings are applicable to ES Net network products. Additional listings may be applicable; contact your local Simplex product supplier for the latest status. Refer to Product Selection tables for specific UL and ULC listing details. Listings and approvals under Simplex Time Recorder Co. are the property of Tyco Fire Protection Products.

ES Net overview

ES Net fire panels provide extensive installation, operator, and service features with point and module capacities suitable for a wide range of system applications and large multi-site installations.

Supported panels and devices

- 4100ES, 4010ES and 4007ES series fire alarm control units
- 4100ES network display units (NDU)
- 4190 series TrueSite Workstations and Incident Commanders

ES Net network configuration

ES Net supports multiple Class X loops and/or Class B linear network topologies. See ES Net network multi-topology support.

Each ES Net node requires an ES Net Network Interface Card (NIC) to send and receive data on the network (in some cases optional network media cards may be required). The network can be configured to share information and control functions between nodes.

ES NICs on each node are connected in a point-to-point arrangement, providing security and fault-tolerance to the network.

Network resilience

ES Net is resilient to failures and can detect degraded and non-replicated paths between any two connected nodes.

Flexible network options

- Support for multiple Class X loops and/or multiple Class B linear network topologies.
- Ethernet communications with Cat-5e cable (or better) for runs of 328ft (100m) or less
- Fiber media communications with multi-mode or single-mode fiber connections providing increased noise immunity and longer distances for runs of up to 82,000 ft (25 km) with single-mode fiber
- Wired communications with a single wire pair between nodes using lower bandwidth DSL media cards for existing installations where Ethernet or fiber are not available, up to 15,000ft (4572m) with 18 AWG unshielded twisted pair wire

TrueSite Workstation and Incident Commander nodes

TrueSite Workstation or Incident Commander supports multiple ES Net loops of up to 99 nodes.

A TrueSite Workstation node can attach to (7) network loops in any combination of ES Net and 4120 loops.

An Incident Commander node can attach to (7) network loops; up to (5) ES Net loops and (2) 4120 loops.

Listings information

- UL 864, Fire Detection and Control (UOJZ), Smoke Control Service (UUKL), Releasing Device Service (SYZV)
- UL 1076, Proprietary Alarm Units - Burglar (APOU)
- UL 2017, Process Management Equipment (QVAX), Emergency Alarm System Control Units (FSZI)
- UL 1730, Smoke Detector Monitor (UULH)
- UL 2572, Mass Notification Systems (PGWM)
- CAN/ULC-S527 Control Units for Fire Alarm Systems (UOJZ7), Releasing Device Service (SYZV7)
- ULC/ORD-C1076 Proprietary Burglar Alarm Units and Systems (APOU7)
- ULC/ORD-C100 Smoke Control System Equipment (UUKL7)
- UL 1610 as Central Station Burglar Alarm Control Unit (AMCX)

ES Net software features

Network Programmer

ES Net communications allows technicians to build and download a network job from one location to all panels on the network in a single operation. Typical download time to a full ring of 99 nodes is 5 minutes or less (requires ethernet or fiber optics media).

IP file transfer

Executive and firmware updates are critically important on a fire panel network. The IP file transfer tool automatically discovers ES Net NIC cards connected to the ES Net network and suggests executive and firmware updates where applicable. ES panel runtime application and slave cards can be updated from anywhere on the network.

Network diagnostics

An advanced network diagnostic tool allows simple and accurate pinpointing of network communication issues, performance issues and faulty connections from any node on the ES network. Test reports can also be run for any panel from any point on the network.

The network diagnostic tool supports multiple remote terminal sessions to ES panel nodes and provides information on network status and topology and attendance in the ES network. Historical port statistics such as operational parameters and errors for each port are stored for analysis. Error reporting and historical data on some error conditions is also available.

The network diagnostics tool diagnoses the following errors on the ES network from an ES panel or TSW:

- Link down
- Mis-wired links
- Ground fault
- Version control mismatch between nodes
- Extra node in network
- Duplicate node in network
- Missing node

ES Net and 4120 network comparison

The chart below may be useful for determining when to select ES Net vs 4120 network fire alarm products based on the key features of each network. For additional 4120 network equipment reference refer to data sheet ***S4100-0056*** and associated network product data sheets.

Table 2: ES Net and 4120 network feature comparison

Feature	ES Net	4120
High bandwidth IP based network (100 Mbps)	Yes	-
High speed download to all nodes	Yes	-
Advanced network diagnostics	Yes	-
Single connection download to all nodes	Yes	-
TSW, 4100ES, 4010ES, 4007ES and NSI node support	Yes	Yes
Legacy node support	-	Yes
Notification appliance synchronization over the network	-	Yes
Notification appliance synchronization within a panel	Yes	Yes
Maximum number of ES Net vs. 4120 network loops per TSW **Note:** TrueSite Workstation supports up to (7) ES Net loops, or up to (7) 4120 loops, or up to (7) loops total in any combination of ES Net and 4120 loops.	7	7
Class X network communications	Yes	Yes
Class B network communications (no T-tapping)	Yes	Yes
Class B network communications with T-tapping	-	-
Multi-topologies support	Yes	No
Physical bridge support	-	Yes
Multi-signal fiber modem support	-	Yes
TSW supports both dedicated fire alarm LAN and customer LAN connections	-	Yes
4100ES redundant CPU support	-	Yes
Supplemental traffic support	Yes	-

Basic ES Net network operation

Simplex fire alarm ES Net networks communicate information among distributed Simplex fire alarm control panels. Systems composed of similar capability panels can share information, or specific nodes can perform dedicated network functions. Illustrations on the following pages provide a summary of a variety of ES Net network applications.

Nodes

Each fire alarm system with direct communications on the network is defined as a node. Each node can be a large or small fire alarm control panel, Network System Integrator, TrueSite Workstation, TrueSite Incident Commander.

Communications process

When the network topology is automatically discovered, network messages are sequentially transmitted directly from one node to another. This ability to transmit messages directly, without the need to circulate through the entire network, makes the communication process more efficient when using the ES Net network.

Survivability

If a node goes off-line or if the connection between nodes either shorts, opens, or has any other form of communication problem, that section of wiring becomes isolated. In this instance, the ES Net network automatically reconfigures the network to use alternative paths, maintaining communication between nodes and notifying the network of the wiring faults. In the event of multiple wiring faults, the remaining nodes regroup and establish new, smaller sub-networks that maintain communications among the active nodes. When all the wiring faults are fixed, the network automatically reverts to its original configuration and clears the related network troubles.

Communications options

Figure 14 shows a multiple node network interconnected with a variety of communications means for reference.

- Ethernet and Fiber offer high bandwidth (100Mbps) network communications
- Fiber media communications support longer distances, are available for single or multi-mode fiber and only require a single fiber for node-to-node connections
- DSL communications use a single wire pair between nodes using lower bandwidth DSL media cards. Due to lower bandwidth, DSL is recommended primarily for retrofit installations where the existing wiring must be reused.

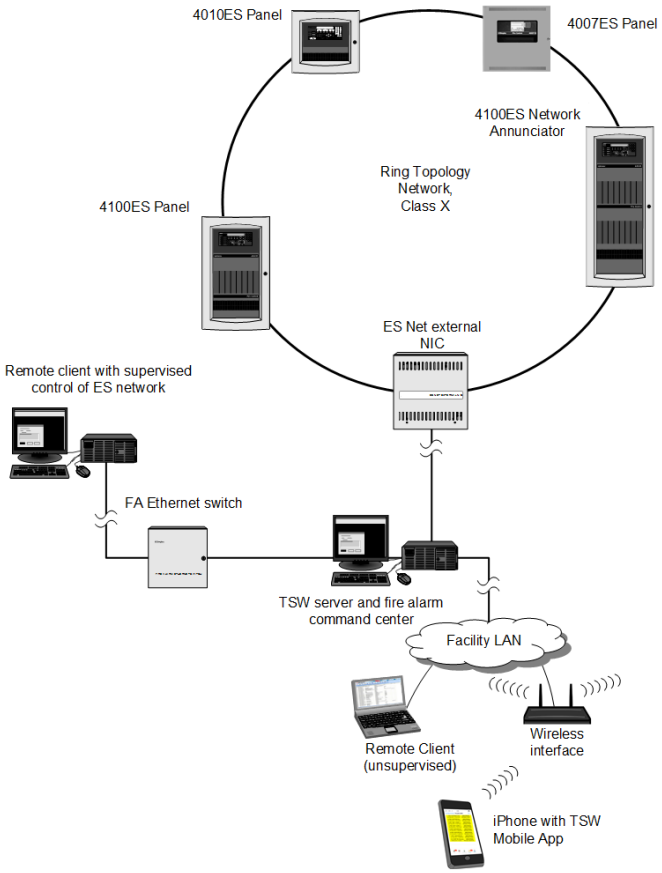

Figure 2: ES Net ring topology example

Note: Arrangement shown for reference only. Wiring pairs shown as one-line for typical reference only. The TrueSite Workstation PC has 2 Ethernet ports. The ES Net NIC connection uses (1) Ethernet port leaving (1) Ethernet port available for a connection to either an agency listed (dedicated) fire alarm LAN or a customer's LAN (not both). Refer to data sheet ***S4190-0018*** for additional information on fire alarm network Ethernet switches.

ES Net network multi-topology support

Depending on local code requirements regarding the use of redundant pathways for specific segments of a network, you can deploy and interconnect nodes on a single ES Net loop using the following:

- Class X topology
- Class B topology
- A combination of Class X and Class B using different topologies

Please refer to ***ES Net Operations and Troubleshooting Manual (579-1272)*** for more information about network configuration using multi-topology.

Class X network topologies

If local code requires redundant pathways on network segments, it is possible to configure a loop using the following topologies:

- Simple ring
- Multiple cascading rings using bridges
- Other ring-based topologies

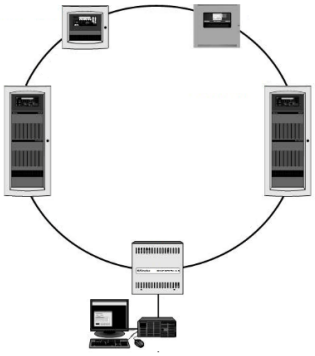

Figure 3: Simple ring topology

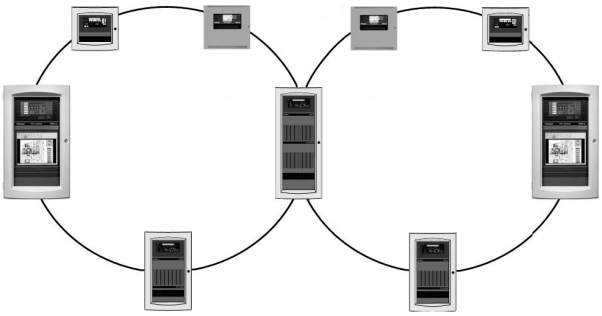

Figure 4: Multiple rings with central node topology

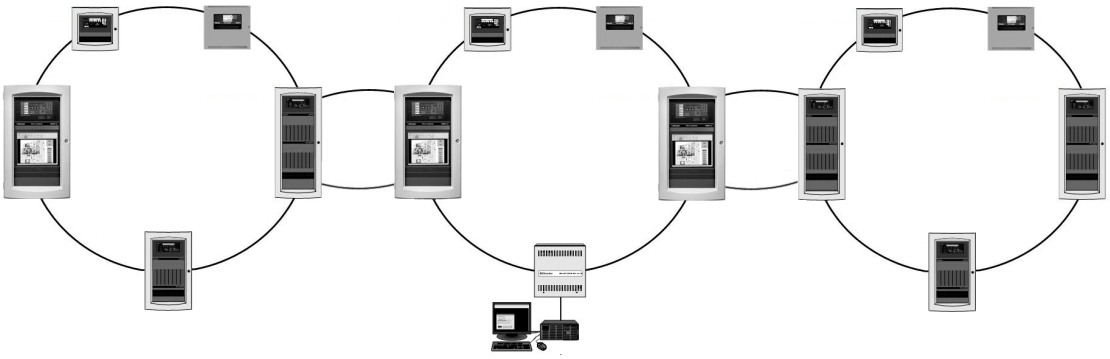

Figure 5: Bridged rings topology

Class B network topologies

If local code does not require redundant pathways on all network segments, it is possible to connect nodes without having redundancy in topologies using single run, spurs or in topologies that are combination of Class B and Class X.

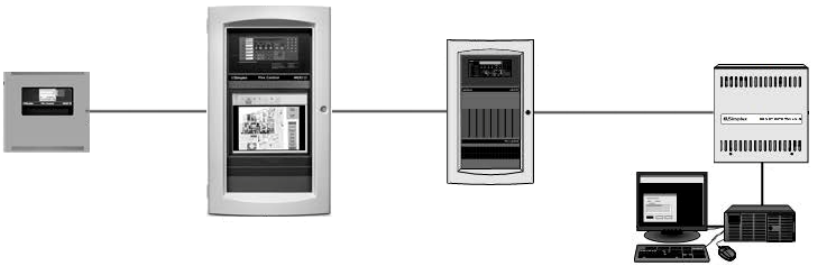

Figure 6: Single run linear network topology (no T-tapping)

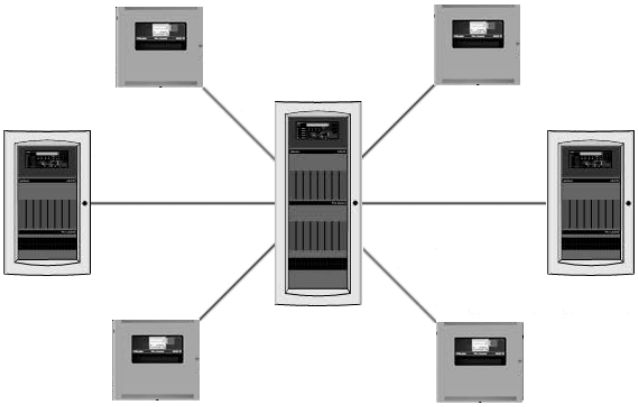

Figure 7: Simple star topology

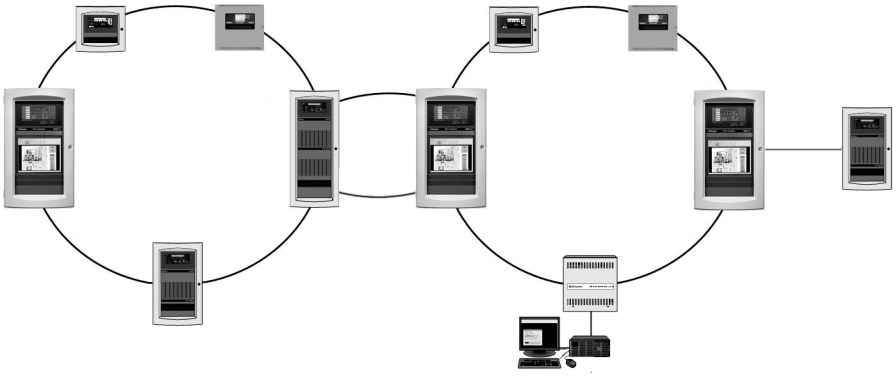

Figure 8: Bridged rings topology with spur

Multiple-loop network operation using a TrueSite Workstation or Incident Commander

ES Net network loop

Up to seven ES Net loops can be interfaced using the TrueSite Workstation or the Incident Commander.

4120 network loops

Up to seven 4120 network loops can be interfaced using the TrueSite Workstation for extensive network expansion or interconnection of existing, separate networks. Up to two 4120 network loops can be interfaced using the Incident Commander.

Multiple-loop 4120 and ES Net networks

A TrueSite Workstation node can attach to as many as (7) network loops; up to (7) ES Net loops, or up to (7) 4120 loops, or up to (7) loops total in any combination of ES Net and 4120 loops. An Incident Commander node can attach to as many as (7) network loops; up to (7) ES Net loops, or up to (5) ES Net loops and (2) 4120 loops.

Each network loop is connected to its own network interface card allowing the workstation to appear as a node in each individual loop. With the workstation as a network loop interface, information from all nodes on the network (up to seven loops) can be annunciated on a central workstation.

With a multi-loop network connection, the TrueSite Workstation and Incident Commander are member nodes of each network loop with up to 98 additional nodes per loop. This allows up to 686 total nodes and the TrueSite Workstation Server (687 total) to be interconnected.

Multi-loop operation features

Improved survivability

- Individual network loops operate independently
- In the event of loss of one or more loops, remaining loops continue to operate

Loop independence

New loops can be added without impacting existing loops.

Assists with phased-in system expansion

- Each loop can be installed as a stand-alone network allowing local node programming to evolve as required
- When construction or renovation reaches completion, loops can be consolidated for coordinated facility protection

Multi loop requirements

- Each loop requires a dedicated network interface card
- Supports up to seven ES Net loops, or up to seven 4120 loops, or up to seven loops total in any combination of ES Net and 4120 loops.

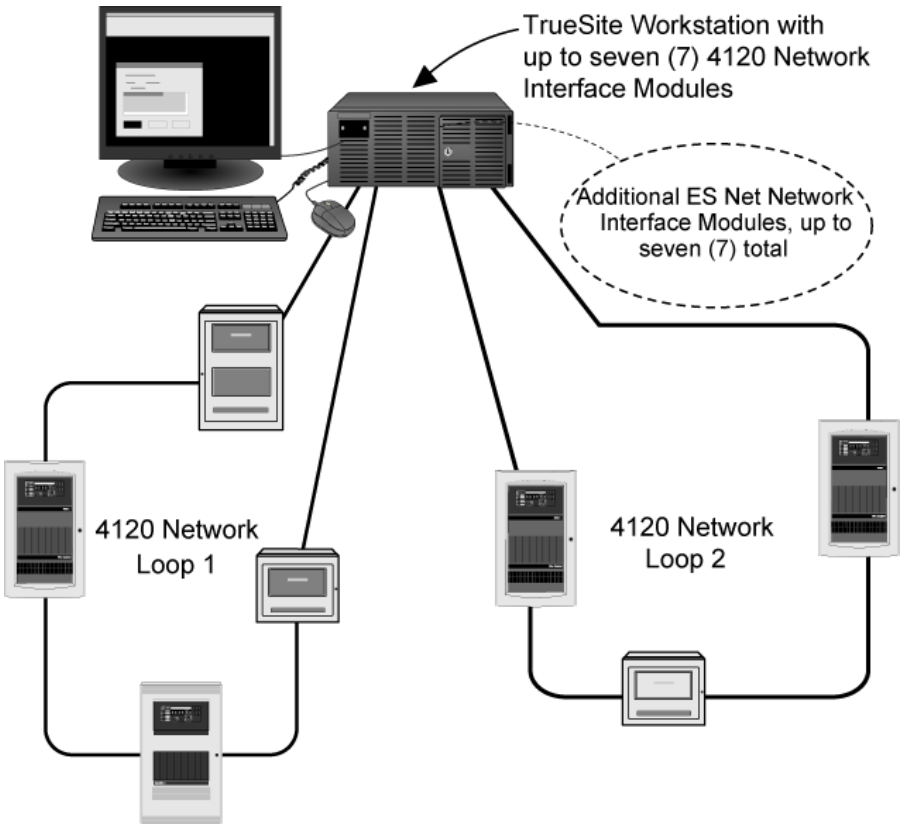

Figure 9: Typical interface of multiple network loops using a TrueSite Workstation

ES Net network high rise example

Fire alarm network principles apply equally to high rise applications, see Figure 10.

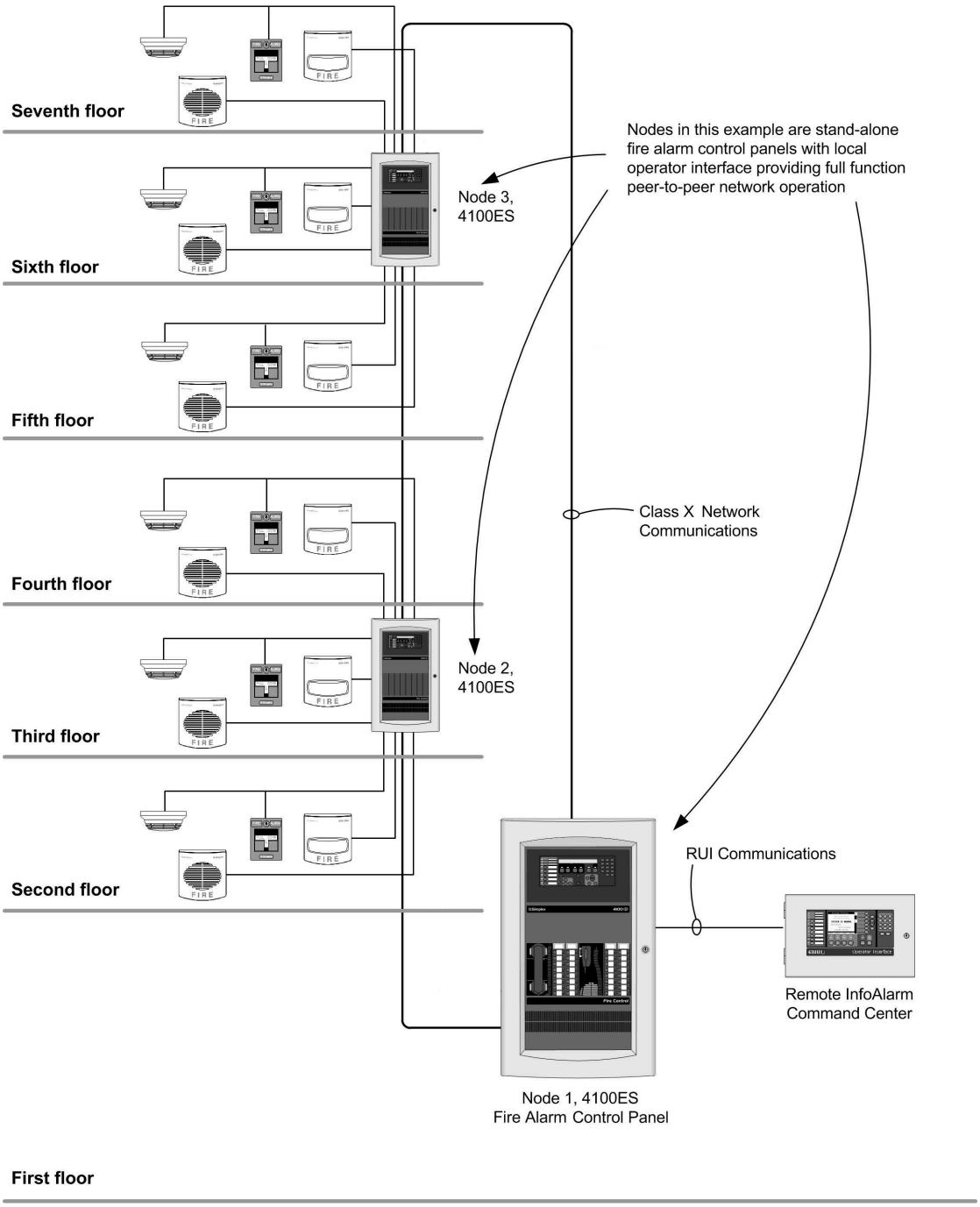

Figure 10: ES Net network high rise audio example

Multiple building ES Net network example

Multiple building/campus network

Figure 11 represents a multiple building/campus network with duplicate InfoAlarm Command Center network display unit (NDU) locations. The security office is the master command center in the event of an emergency. The facility maintenance building can take control if needed.

Network oversight

System activity recording occurs at both of the NDU locations with each capable of manually investigating and operating the same network points. Access to the operation is pass-code controlled such that only authorized operators have access to override the automatic operation.

Support for "in control" command centers

"In Control" network operation allows a prioritization to establish which command center is in control.

"In Control" functions include:

- Annunciation of which command center is in control
- Establishing whether command centers have equal access to control or are prioritized
- Allowing a "request control" command to be accepted where a specific command center takes control over other equal priority command centers – typically due to the location of the incident of concern

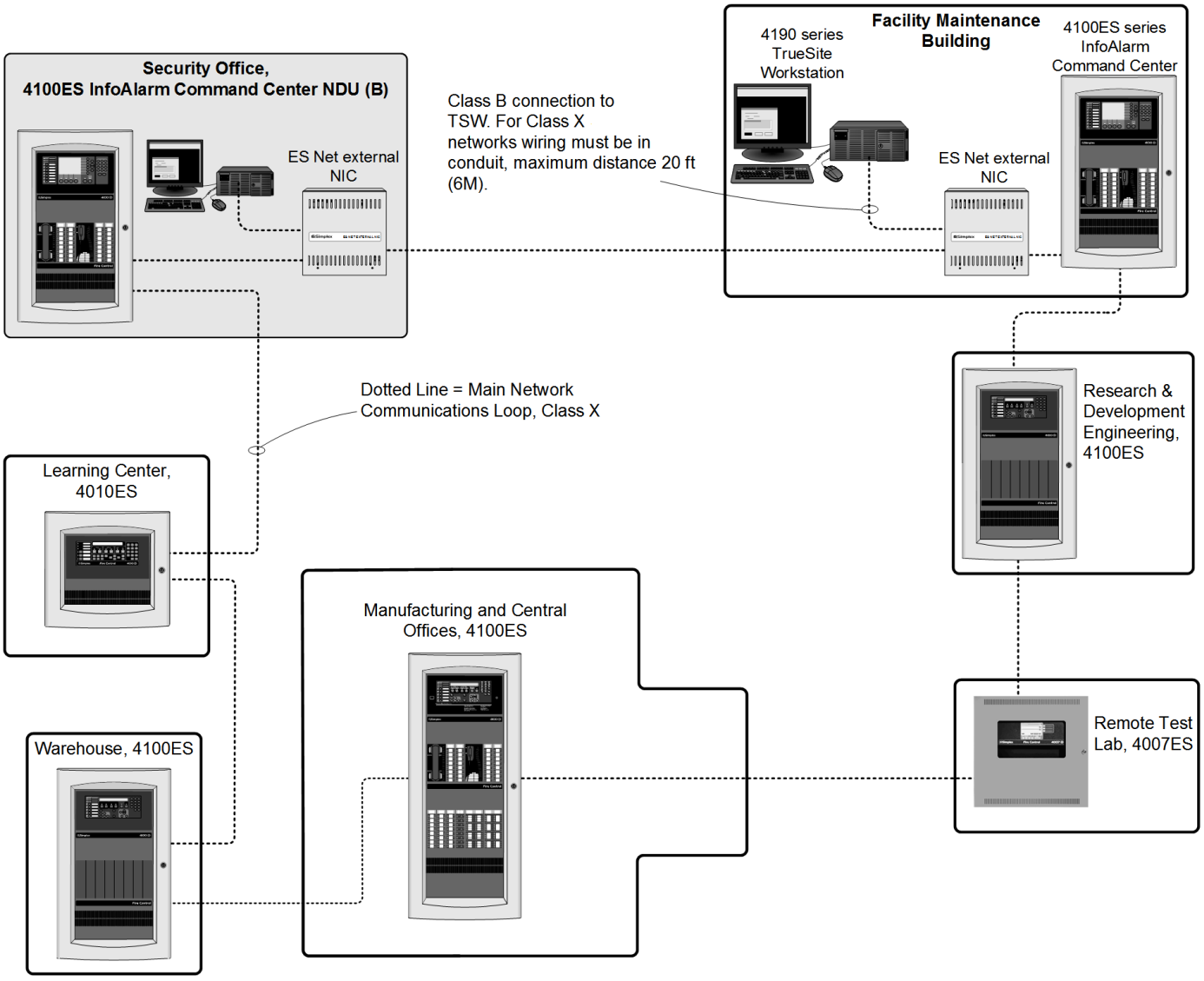

Figure 11: Multiple Building ES Net Network Application

Supplemental traffic support

With ES Net using only a fraction of the available bandwidth for fire traffic and control data, extra bandwidth is available for connecting third party or ancillary devices such as TrueSite Workstation Remote Clients or video systems. Fire related traffic is totally segregated from supplemental traffic to ensure highest priority for fire traffic and control data. Supplemental traffic is available only for Ethernet or fiber media and is limited to a maximum 80 Mbps but provides a robust channel using redundant network and is battery-backed to ensure the highest reliability.

Refer to ***ES Panel Programmers manual (574-849)*** for information about configuring supplemental traffic.

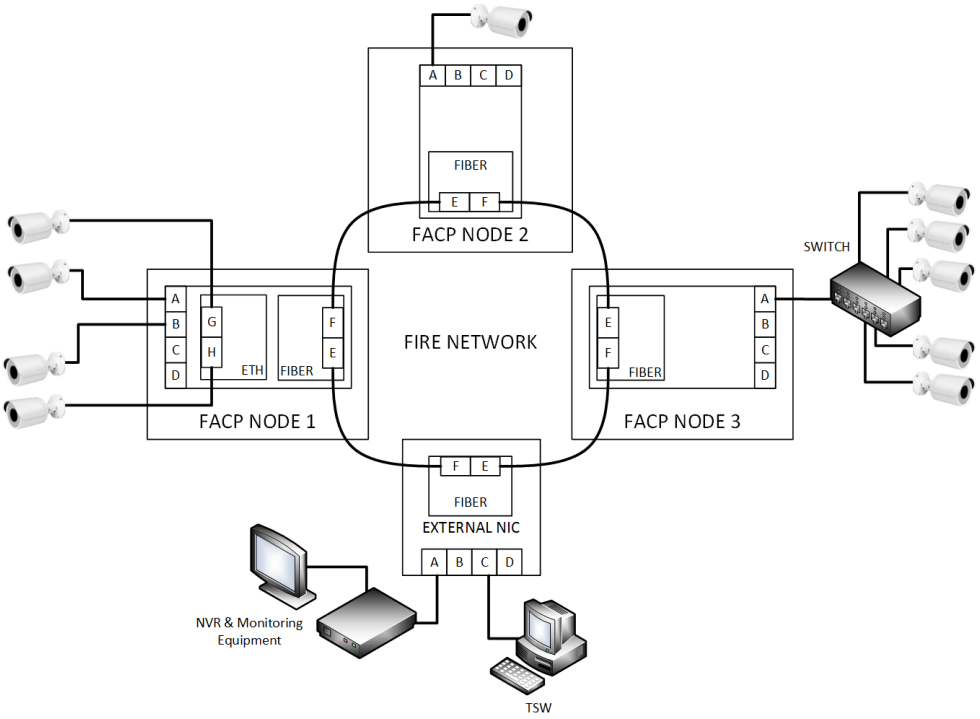

Figure 12: Example of video system using supplemental traffic

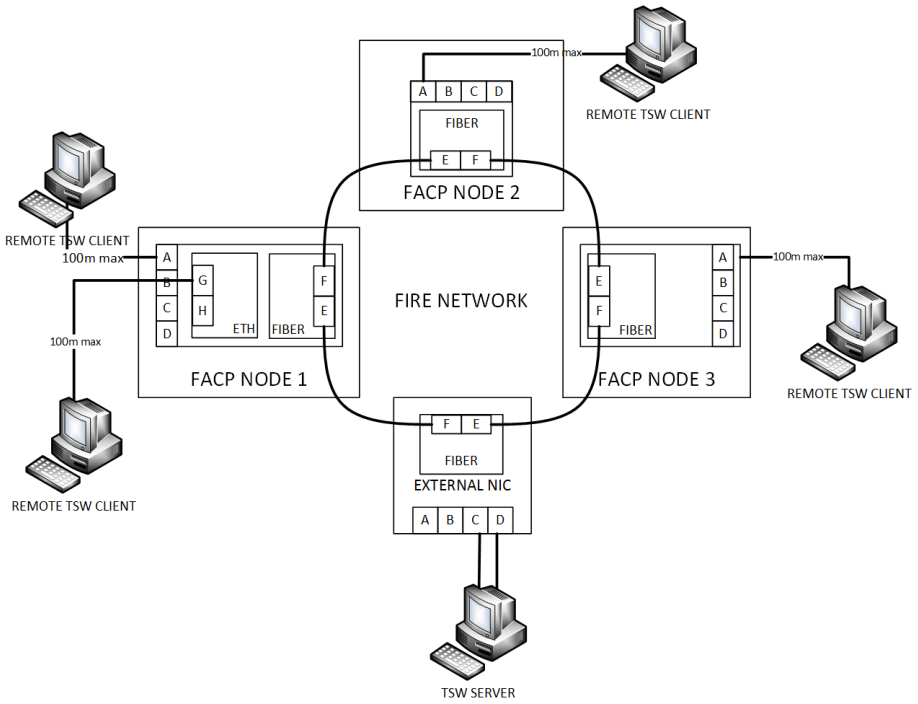

Figure 13: Example of Remote TSW Clients using supplemental traffic

Fire alarm network example with multiple communication media

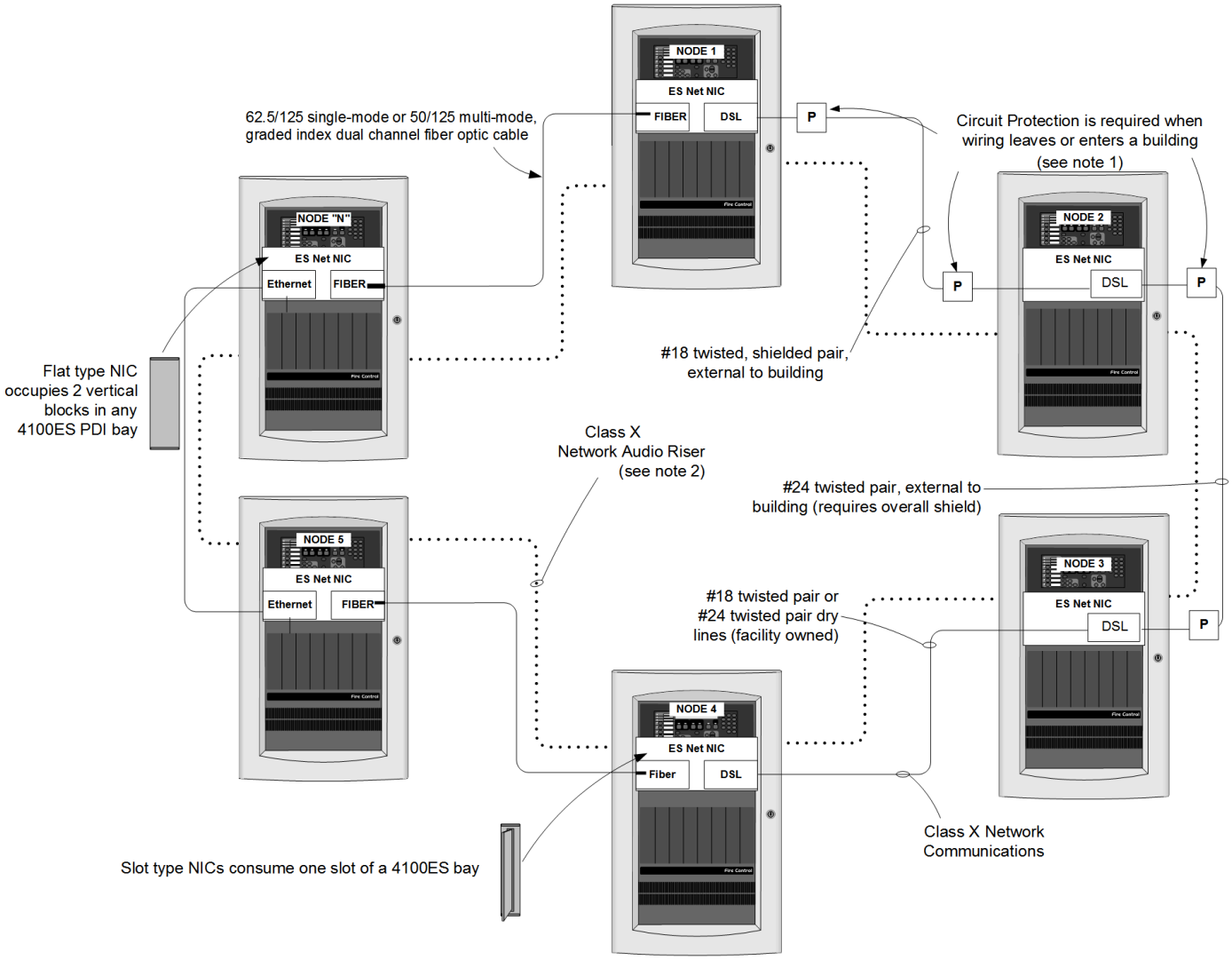

Figure 14: Fire alarm network example with multiple communication media

Notes:

1. Refer to NFPA 70 (NEC) or other applicable local codes for shielded wiring and protective device requirements when wiring enters and leaves a building.
2. For additional details on Network Audio requirements refer to data sheet *S4100-0034*.

ES Net NIC and media cards for 4100ES, TrueSite Workstation, or Incident Commander

Table 3: ES Net NIC cards for 4100ES, TrueSite Workstation, or Incident Commander

Model	Card Type	Description	Size	Alarm/Supv.
4100-6104	Slot - install to a single slot in a 4100ES bay	Mounts in 4100ES cabinet. Connects a 4100ES FACU, TrueSite Workstation, or Incident Commander to an ES Net Network. Supports Class B or Class X operation. Includes (4) built in Ethernet ports, install to a single slot in a 4100ES bay. Supports up to (2) additional media cards. Ports A and C can be configured for earth fault detection.	One slot of a 4100ES bay	120 mA
4100-6310	Flat - install to any (2) vertical block space in a 4100ES bay		2 vertical blocks	120 mA

Notes:

1. Network interface cards include built-in Ethernet network communication ports, order up to 2 optional media cards as required.
2. TrueSite Workstation connection is Class B. For Class X networks, TSW connection must be 20 ft (6 M) maximum in conduit.
3. For TSW or Incident Commander UL 1610 Central Station Burglar Alarm Control Unit applications use the 4190 series External NIC.
4. For vertical mounting of the ES Net Flat NIC in a 4100ES or expansion bay use the 4100-9834 ES Net Flat NIC Vertical Mounting Bracket. Refer to *Flat Type ES Net NIC Installation Instructions (579-1257)* for more information.

Table 4: ES Net dual channel media cards for 4100ES mounted NICs

Model	Media card type	Description	Size	Alarm/Supv.
4100-6306	ES Net NIC dual channel Ethernet media card	Select per network connection requirements; mounts on the supplied ES Net NIC; up to (2) media cards per slot type and flat type NIC. Dual Channel Media Cards provide 2 ports for input and output connections. Field connections require proper port pairing, refer to *579-1258 ES Net Dual Channel Fiber, Ethernet, and DSL Media Card Installation Instructions* for additional information.	N/A	20 mA
4100-6308	ES Net NIC dual channel single-mode fiber media card		N/A	135 mA
4100-6309	ES Net NIC dual channel multi-mode fiber media card		N/A	135 mA
4100-6307	ES Net NIC dual channel DSL media card		N/A	155 mA

Note: Order fiber media service kits for retrofit jobs where ST connectors are already installed. Refer to Fiber media card service kits for additional information.

ES Net NIC and media cards for 4010ES

Table 5: ES Net NIC cards for 4010ES

Model	Card Type	Description	Size	Alarm/Supv.
4010-6310	Flat	Connects a 4010ES FACU to an ES network. Supports Class B or Class X operation. Includes (4) built in Ethernet ports, supports up to (2) additional media cards. Ports A and C can be configured for earth fault detection.	2 vertical blocks	120 mA

Note:

1. Network interface cards include built-in Ethernet network communication ports, order up to two optional media cards as required.
2. For vertical mounting of the ES Net Flat NIC in a 4010ES or expansion bay use the 4010-9934 ES Net Flat NIC Vertical Mounting Bracket. Refer to *Flat Type ES Net NIC Installation Instructions (579-1257)* for more information.

Table 6: ES Net dual channel media modules for 4010ES

Model	Media card type	Description	Size	Alarm/Supv.
4010-6306	ES Net NIC dual channel Ethernet media card	Select per network connection requirements; mounts on the supplied ES Net NIC(s); (2) media cards per flat type NIC. Dual Channel Media Cards provide 2 ports for input and output connections. Field connections require proper port pairing, refer to *579-1258 ES Net Dual Channel Fiber, Ethernet, and DSL Media Card Installation Instructions* for additional information.	N/A	20 mA
4010-6308	ES Net NIC Dual Channel Single-mode Fiber Media Card		N/A	135 mA
4010-6309	ES Net NIC Dual Channel Multi-mode Fiber Media Card		N/A	135 mA
4010-6307	ES Net NIC Dual Channel DSL Media Card		N/A	155 mA

Note: Order fiber media service kits for retrofit jobs where ST connectors are already installed. Refer to Fiber media card service kits for additional information.

ES Net NIC and media cards for 4007ES

Table 7: ES Net NIC cards for 4007ES

Model	Card Type	Description	Size	Alarm/Supv.
4007-9817	Flat	Connects a 4007ES FACU to an ES network. Supports Class B or Class X operation. Includes (4) built in Ethernet ports, supports up to (2) additional media cards. Ports A and C can be configured for earth fault detection.	2 vertical blocks (only in Block L)	120 mA

Note: Network interface cards include built-in Ethernet network communication ports, order up to 2 optional media cards as required.

Table 8: ES Net dual channel media modules for 4007ES

Model	Media card type	Description	Size	Alarm/Supv.
4007-6306	ES Net NIC dual channel Ethernet media card	Select per network connection requirements; mounts on the supplied ES Net NIC(s); (2) media cards per slot type and flat type NIC. Dual Channel Media Cards provide 2 ports for input and output connections. Field connections require proper port pairing, refer to ***579-1258 ES Net Dual Channel Fiber, Ethernet, and DSL Media Card Installation Instructions*** for additional information.	N/A	20 mA
4007-6308	ES Net NIC Dual Channel Single-mode Fiber Media Card		N/A	135 mA
4007-6309	ES Net NIC Dual Channel Multi-mode Fiber Media Card		N/A	135 mA
4007-6307	ES Net NIC Dual Channel DSL Media Card		N/A	155 mA

Note: Order fiber media service kits for retrofit jobs where ST connectors are already installed. Refer to Fiber media card service kits for additional information.

ES Net external NIC and media cards for TSW

Table 9: ES Net external NIC for TSW product selection

Model	Enclosure	Description	Power	Current consumption
4190-9832	Red	Connects a TSW or Incident Commander to the ES Network. ES panel network supports Class B or Class X operation, TSW connections are Class B. Includes (4) built in Ethernet ports, supports (1) additional media card. Ports A and C can be configured for earth fault detection. Wall mount enclosure measures 10in x 10in x 2.5in.	120/240 VAC	75 mA max @ 120 VAC
4190-9833	Platinum		120/240 VAC	69 mA max @ 240 VAC
4190-9834	Red		24 VDC	120 mA nominal @ 24 VDC
4190-9835	Platinum		24 VDC	

Note:

1. The ES Net external NIC includes built-in Ethernet network communication ports, order up to 1 optional media card as required.
2. The 4190 series external NIC is required for TSW or Incident Commander UL 1610 Central Station Burglar Alarm Control Unit applications.

Table 10: ES Net dual channel media modules for external NIC

Model	Media card type	Description	Size	Alarm/Supv.
4190-9856	ES Net NIC dual channel Ethernet media card	Select per network-connection requirements; mounts on the supplied ES NIC(s); (1) media card per external NIC network interface card. Dual Channel Media Cards provide 2 ports for input and output connections. Field connections require proper port pairing, refer to ***579-1258 ES Net Dual Channel Fiber, Ethernet, and DSL Media Card Installation Instructions*** for additional information.	N/A	20 mA
4190-9858	ES Net NIC dual channel single-mode fiber media card		N/A	135 mA
4190-9859	ES Net NIC dual channel multi-mode fiber media card		N/A	135 mA
4190-9857	ES Net NIC dual channel DSL media card		N/A	155 mA

Note: Order fiber media service kits for retrofit jobs where ST connectors are already installed. Refer to Fiber media card service kits for additional information.

Fiber media card service kits

Table 11: ES Net fiber media card service kits

Model	Fiber type	Description
4100-6412	50/125 µm multi-mode	For use in retrofit jobs where fiber optic cables with ST connectors are already installed. Includes (1) ST to SC 18 in. (45.7 cm) fiber optic patch cord, (1) ST-ST coupler, (1) wire clamp, and (1) insulating sleeve.
4100-6413	62.5/125 µm multi-mode	
4100-6414	9/125 µm single-mode	

Note: Fiber optic media cards must be of the same type on each end of the fiber link. When replacing a media card with a different type, the card on the other end of the link must be replaced with a fiber optic media card of the same type.

DSL retrofit harness

Table 12: DSL retrofit harness

Model	Description
4100-6415	DSL Retrofit Harness. When upgrading a 4120 network panel to ES Net this harness is used to eliminate the need to relocate the existing network field wiring connections from the CPU motherboard to the DSL media card.

ES Net supporting software and firmware requirements

ES Net requires updated versions of the Network Programmer, ES Programmer and TSW Configurator software. Firmware and application software updates for ES Panels and ES Net NIC cards are also required.

Table 13: ES Net software requirements

Software	Required software version
Network Programmer	2.03 or above
ES Programmer	5.02 or above
TrueSite Workstation	5.04 or above
TrueSite Incident Commander	5.04 or above

Table 14: ES Net firmware requirements

Component	Required firmware version
4100ES panel	5.02 or above
4010ES panel	5.02 or above
4007ES panel	5.02 or above
ES Net NIC Application	1.03
ES Net NIC EOS	1.03

ES Net Ethernet specifications

Use the ES Net NIC built-in Ethernet ports or ES Net dual channel Ethernet media cards when the maximum distance between nodes is less than 328 ft (100 m).

Table 15: Ethernet media specifications

Maximum bandwidth	Maximum distance	Port type	Recommended cable
100 Mbps	328 ft (100 m) with Cat-5e cable	10 BASE-T/100 BASE-TX	CAT5e/CAT6 or better

Note: For UL 1610 TrueSite Workstation or Incident Commander system installations, the Ethernet circuit pathway to TrueSite Workstation or Incident Commander must also be in conduit, no greater than 20 ft (6 M) and located within the same secured room.

Note: Earth fault detection is available on port A only.

ES Net fiber media specifications

Use ES Net dual channel fiber media cards when a fiber-optic cable is required to link nodes.

Table 16: ES Net dual channel fiber media card specifications

Specification		Rating	
Compatible Fiber	Single-mode	Nominal 9/125 µm	
	Multi-mode	50/125 µm or 62.5/125 µm graded index	
Power		135 mA @ 24 VDC	
Port type		100BASE-BX bidirectional fiber optic port	
Fiber connector		Type SC	
Transmit and receive wavelengths	Single-mode media card	Port A: Transmit = 1310 nm, Receive = 1550 nm Port B: Transmit = 1550 nm, Receive = 1310 nm	Optical launch power; -9dBm (126uW) minimum, -3dBm (501uW) maximum
	Multi-mode media card	Port A: Transmit = 1310 nm, Receive = 1550 nm Port B: Transmit = 1550 nm, Receive = 1310 nm	Optical launch power; -8dBm (159uW) minimum, 0dBm (1000uW) maximum
Transmission distances for single-mode 9/125 µm fiber		Maximum distance = 82,000 ft (25km) Maximum total attenuation = 22 dB	
Transmission distances for multi-mode 50/125 µm and 62.5/125 µm fiber		Maximum distance = 16,400 ft (5km) Maximum total attenuation = 18 dB	

Table 17: ES Net fiber media distance and optical power specifications

Fiber type	MIFL	Power margin	Safety margin	Maximum distance	Power budget	Coupler/splice loss
Multi-mode 50/125 or 62.5/125, numerical aperture = 0.275	1.5 dB/km @ 1300nm	15 db	-3 dB	16400 ft (5 km)	18 dB	.75dB max for each mated pair connection, .30dB max for each fusion splice
Single-mode 9/125, numerical aperture = 0.2	1 dB/km @ 1310nm	19 db	-3 dB	82000 ft (25 km)	22 dB	

Fiber media notes:

1. **Fiber type** cable specifications are for 50 or 62.5 micron core with 125 micron cladding multi-mode graded index fiber or 9 micron core with 125 micron cladding single-mode fiber
2. **MIFL:** maximum individual fiber loss. Numbers shown are industry standard reference; refer to specific cable for exact specifications.
3. **Distance:** The maximum distance between nodes is determined by the total loss from the transmitter to the associated receiver (fiber loss, connector loss, splice loss and power margin), or the maximum distance listed, whichever is smaller.
4. **Power Budget:** Use attenuation measurements at the following wavelengths: Multi-mode @ 1310nm, Single-mode @ 1550nm

Table 18: Fiber media environmental specifications

Operating temperature	Humidity
32 °F to 120 °F (0 °C to 49 °C)	10% to 93% relative humidity at 90 °F (32 °C)

ES Net dual channel DSL media specifications

Use DSL dual channel media cards for retrofit applications, or where Ethernet or fiber optic media are not available. DSL only supports 2 to 12 Mbps data rates, 2 Mbps maximum in ULC mode. High bandwidth 100 Mbps data rates and features such as high speed network downloads require Ethernet or fiber optics.

Table 19: ES Net dual channel DSL media wiring and distance specifications

Wire size and specifications	DSL link data rate (baud)	Max distance without isolated loop protector or over-voltage protectors	Max distance with isolated loop protector or over-voltage protectors	Max distance for ULC mode with over-voltage protectors
18 AWG, unshielded twisted pair	2 Mbps minimum, 12 Mbps maximum	15,000 ft (4,572 m)	13,000 ft (3,962 m)	9,000 ft (2743 m)
18 AWG, shielded twisted pair		3,000 ft (914 m)	2,000 ft (609 m)	2,000 ft (609 m)
24 AWG, unshielded twisted pair		10,000 ft (3,048 m)	8,000 ft (2,438 m)	5,000 ft (1524 m)
24 AWG, shielded twisted pair		8,000 ft (2,438 m)	6,000 ft (1,829 m)	4,000 ft (1219 m)

Note: DSL media is recommended for retrofit installation and where only copper cable is available to link nodes. 18 AWG unshielded, twisted pair cable is recommended for all installations. Shielded cable and circuit protection is required when wiring leaves the building. Use 2081-9044 over-voltage protectors when wiring leaves the building.

Note: To meet requirements for UL/ULC 1076 Proprietary Burglar Alarm System Units (APOU/APOUC) or UL 1610 Central Station Burglar Alarm Control Units (AMCX) with DSL media, shielded cable is required for all DSL circuit pathway connections.

Table 20: ES Net dual channel DSL media card electrical specifications

Current consumption	Maximum bandwidth	Maximum distances	Port type
155 mA maximum at 24 VDC	Up to 12 Mbps (up to 2 Mbps in ULC mode)	Up to 15000 ft (4572 m) with 18 AWG, unshielded cable (up to 9000 ft in ULC mode with over-voltage protectors)	SHDSL

Table 21: ES Net dual channel DSL media card environmental specifications

Operating temperature	Humidity
Operating temperature 32 °F to 120 °F (0 °C to 49 °C)	10% to 93% relative humidity at 90 °F (32 °C)

Acceptance test requirements for fiber optic installations

An initial acceptance test of each fiber link shall be performed in accordance with NFPA 72, Chapter 14 Inspection, Testing, and Maintenance (or other applicable local code) requirements. A fiber link is defined as all fiber segments, including patch cords, which create a fiber path from one fiber media board to another. Test result data must meet or exceed ANSI/TIA 568-C.3 (or newer) Optical Fiber Cabling Components Standard related to fiber optic lines and connection/splice losses and the manufacturer's published specifications.

1. OTDR Launch and Receive cables of appropriate length shall be used. If a single cable is used, each link shall be tested in both directions.
2. Multi-mode fiber links shall be measured at 850 nm and 1300 nm.
3. Single-mode fiber links shall be measured at 1310 nm and 1550 nm.

Additional ES Net network reference

Table 22: Additional ES Net network reference

Subject	Data sheet
4007ES Panels with Conventional Notification	*S4007-0001*
4007ES Panels with Addressable Notification	*S4007-0002*
4010ES Panels with Conventional Notification	*S4010-0004*
4010ES Panels with Conventional Notification (INTL)	*S4010-0006*
4010ES Panels with Addressable Notification	*S4010-0011*
4010ES Panels with Addressable Notification (INTL)	*S4010-0012*
4100ES Basic Panels with SPS Power Supplies	*S4100-0031*
InfoAlarm Command Center with SPS Power Supplies	*S4100-0045*
Building Network Interface Card (BNIC)	*S4100-0061*
NDU with SPS Power Supplies for ES Net	*S4100-0077*
4100ES Basic Panels with EPS Power Supplies	*S4100-0100*
InfoAlarm Command Center with EPS Power Supplies	*S4100-0101*
NDU with EPS Power Supplies for ES Net	*S4100-0104*
TrueSite Workstation	*S4190-0016*
Fire Alarm Ethernet Switches for TrueSite Workstation	*S4190-0018*
TrueSite Incident Commander	*S4190-0020*
TrueSite Graphic Annunciator	*S4190-0022*
TrueSite Graphic Annunciator Incident Commander	*S4190-0023*
Truesite Mobile Client	*S4190-0024*