Knight School

New Communication Technologies

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Terminology

- Network
  - A combination of computers and other devices that are connected together (usually by cable) so that they can exchange information
  - *"Any device that sends or receives data can be part of a network."*
- Ethernet
  - A standardized way of connecting devices together to create a network
- TCP/IP
  - Transmission Control Protocol / Internet Protocol
  - Network protocol that is internationally accepted standard for networking

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What is TCP/IP?

- TCP/IP moves data across networks in small pieces called packets
- Each packet contains:
  - The IP address of the destination
  - The total number of packets that hold the data
  - The packet's sequence number
  - The data being transmitted
- Packets may not arrive at destination in order
- Individual packets for one may travel different destination
- TCP/IP reassembles the data at the destination

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What is TCP/IP?

- TCP/IP converts data into smaller pieces called packets for transmission over a network
- The packets are reassembled at the destination

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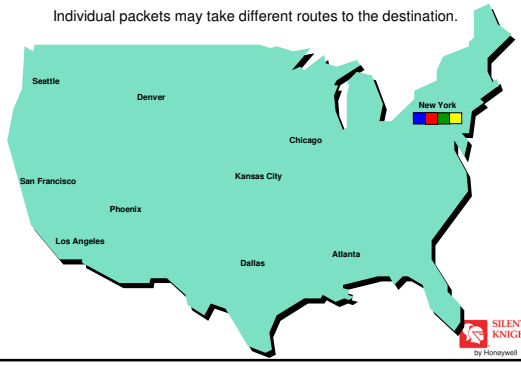
What is TCP/IP?

Individual packets may take different routes to the destination.



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Terminology

- **UDP**
  - User Datagram Protocol
  - Communications protocol that offers a limited amount of service in sending messages across an IP network
  - Used as an alternative to TCP when very small data units need to be sent
- **IP Address**
  - A set of numbers that identifies a host/node on a TCP/IP network
- **DHCP**
  - A protocol that allows for sharing IP Addresses.
  - A DHCP Server maintains a pool of shared IP addresses

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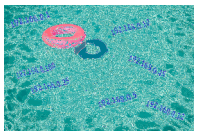
Dynamic Host Configuration Protocol

- A Host, configured for DHCP must request a TCP/IP address from the server
- If an address is available, the DHCP Server assigns it to the requesting host
- The host keeps the IP address until it logs off the network



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Terminology

- Subnet Mask
  - Defines which part of an IP Address is the Network ID and which part is the Host ID
  - Expressed as 4 fields separated by dots similar to an IP Address
  - Using the number 255. 255 in a field indicates that field is part of the network number in the IP Address

Example:

255.255.0.0 → Host ID

Network Number

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Terminology

- Hub
  - A multi-port repeater that has no built-in intelligence
  - Hubs simply broadcast incoming signals to all of their other ports
- Switch
  - Behaves like a hub
  - It sends it out only to the port that it knows the destination host is located
  - Reducing network traffic
- Router
  - Physical devices that join networks together
  - Software, called "Routing Tables" give the router the ability to filter both incoming and outgoing traffic based on the IP addresses of the senders and receivers

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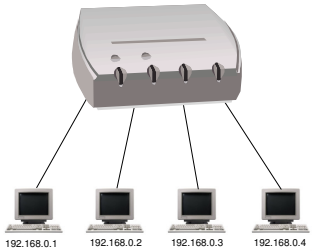
Hubs

- A hub simply retransmits (repeats) incoming packets to all of its remaining ports



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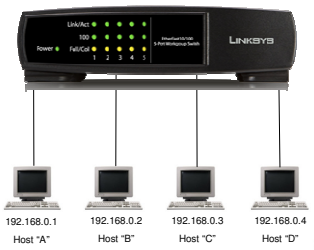
Switches

- A switch has the ability to remember the IP addresses of the devices connected to its ports



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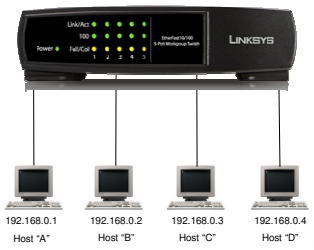
Switches

- For Example, Host "A" which is connected to Port 1, sends a packet to Host "D" on Port 4



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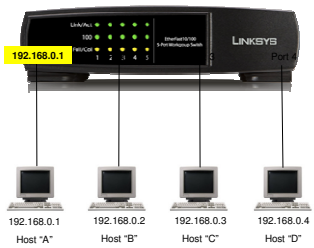
Switches

- The switch remembers the IP address contained in the incoming packet on Port 1
- It now "knows" where Host "A" is



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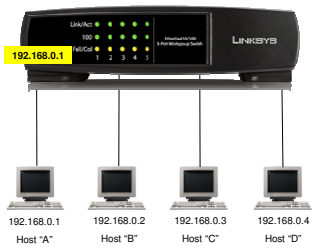
Switches

- The switch doesn't know where Host "D" is yet, so it acts like a hub and broadcasts the packet to all remaining ports



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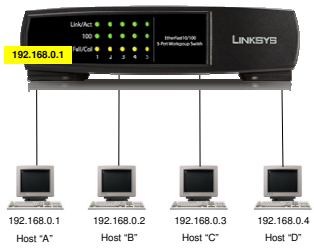
Switches

- Host "D" responds to Host "A" with a confirmation packet
- The switch already knows where Host "A" is, so it switches the packet directly to Port 1



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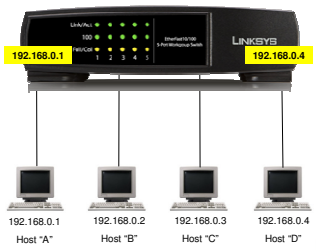
Switches

- The switch remembers the IP address contained in the confirmation packet on Port 4
- It now "knows" where Host "D" is



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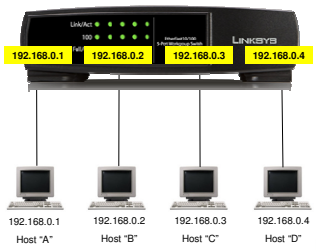
Switches

- This process continues until the switch has learned the IP addresses connected to all of its ports



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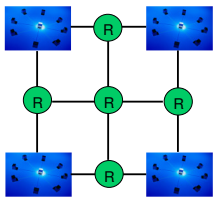
Routers

- Routers know about other routers on a network and can choose the most efficient path for packets to follow
- They are aware of multiple paths to move packets across a network to their final destination
- Packets are automatically rerouted based on network traffic, outages and other interruptions. This process is known as "Dynamic Rerouting"



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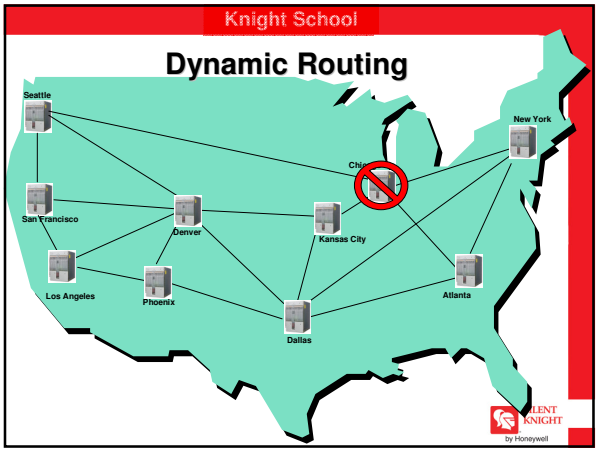
Dynamic Routing



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Terminology

- Firewalls
  - Provide protection of a network from unauthorized or malicious access

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New Technologies

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IP Communicator


Alarm

- Panel picks up Line 1
- DACT dails telephone#
- Sends Contact ID report

- IP Communicator encrypts message
- Encapsulates in UDP
- Sends via internet

- CMS Receiver
- De-encapsulated & de-encrypted
- Contact-ID transmission over the serial line
- Emulating a traditional receiver


Central Station's Router


Internet


Customer's Router

- Automation SW
- Alarm displays in less than 10 seconds!!!

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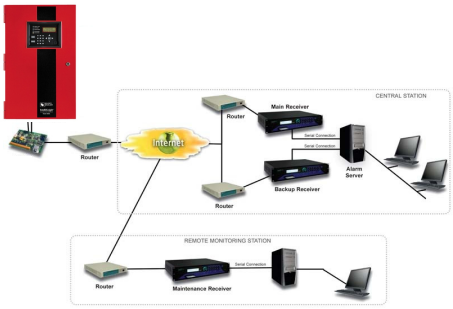
Current Network Architecture



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IP Communicator

- Connects to primary dialer output on panel
- Connects via Internet or Intranet with 512 bit AES encryption
- Communicates with compatible Teldat Corporation receiver
- Can be supervised every 90 seconds!


IP Communicator

Via Ethernet


IP Receiver

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Available Skus

- IP Communicator
  - IPDact-2 or 2UD
  - 2UD NOT available for the 5700
- IP Enclosure
  - IPENC

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UL and NFPA References

- The IP Communicator meets all requirements for a single communication line (no redundant communications required) under the 2002 edition of NFPA 72, section 8.5.4 and section 8.6.4 under the 2007 edition
- The following part of section 8.5.4 (from the 2002 edition) refers to Communication Integrity
- Each section describes how the IP Communicator meets or exceeds the requirement
- Note that although the numbered subsections have been incremented in the 2007 edition, the content has not changed

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UL and NFPA References

- 8.5.4.4.1 Any failure shall be annunciated at the supervising station within 5 minutes of the failure
  - The IP Communicator will do this within 90 seconds or less
- 8.5.4.4.2 If communications cannot be established with the supervising station, an indication of this failure to communicate shall be annunciated at the protected premises
  - The panel will go into "Trouble" in less than a minute indicating loss of IP connectivity
- 8.5.4.4.3 If a portion of the communications path cannot be monitored for integrity, a redundant communications path shall be provided
  - The communications path is supervised every 90 seconds for integrity therefore there is no need for a redundant communications path

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UL and NFPA References

- 8.5.4.4.4 Provision shall be made to monitor the integrity of the redundant communications path
  - There is no need for a redundant communications path per 8.5.4.4.3.
- 8.5.4.4.5 Failure of both the primary and redundant communications paths shall be annunciated at the supervising station within not more than 24 hours of the failure
  - Failure of the communications path is annunciated at the supervising station within 90 seconds

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UL and NFPA References

- 8.5.4.4.6 System units at the supervising station shall be restored to service within 30 minutes of a failure
  - A hot backup receiver is specified for the Central Station but any receiver can be restored via smartcard within 30 seconds
- 8.5.4.4.7 The transmission technology shall be designed so that upon failure of a transmission channel serving a system unit at the supervising station, the loss of the ability to monitor shall not affect more than 3000 transmitters
  - The Central Station receiver will monitor up to 3,000 units maximum

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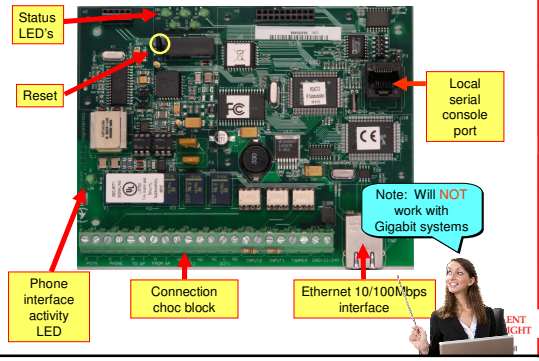
IP Communicator Connectors & Indicators



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IP Communicator LED Indicators

LED	LED #	On	Off
On	LD1	IP Communicator is powered up	IP Communicator is not powered up
A	LD2	UDP poll frame sent to the VALM	VALM acknowledged the poll frame
B	LD3	The alarm panel picks up the phone line	The alarm panel hangs up the phone
C	LD4	IP alarm sent	IP arm ack. received
D	LD5	Management call to the alarm panel established	Normal operation
	LD6	The IPDACT intercepted the phone line	The phone line relays are inactive

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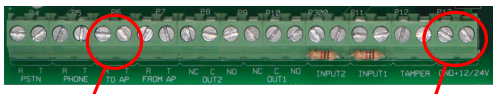
IP Communicator Connecting Block



To DACT Primary Phone Jack

To 24 VDC Filtered, Non-resettable Power

Careful not to flip the polarity

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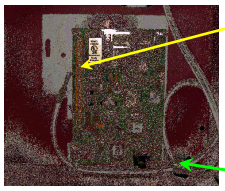
Installation



Use care when making the phone line connections at the IP Communicator. Thin wires can break easily.

Torroid

Note: The phone line connection at the IP Communicator is not polarity sensitive.

- Connect the wires of the supplied phone cord to the terminals labeled "TO AP" (P7)
- Loop cable through the supplied torroid
- Connect using 2 conductor wire, Tip to Tip, Ring to Ring

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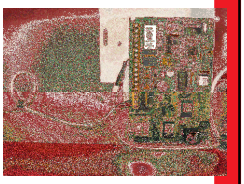
Installation

- Connect one end of power wires to the terminals marked "GND and "+12/24V (P12)
- Loop cable through the supplied torroid
- Connect other end to +24 VDC non-resettable power



CAUTION!
Failure to observe proper polarity of the power connection will result in catastrophic damage to IP Communicator!

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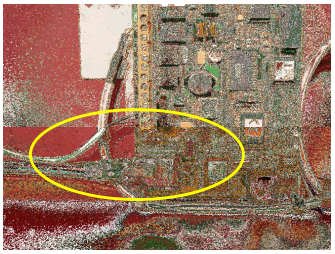
Installation

- Connect the IP Communicator to the customer's network using a CAT5 Ethernet cable



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Programming

- To program an IP Communicator, you will need the following:
  - Windows-based PC with any of the following:
    - 9-pin serial COM port
    - USB/Serial converter
    - Network Interface Card (NIC)
  - For serial connection: Serial – P/N ALMSC119
  - For Telnet (Ethernet) connection:
    - CAT5 RJ45 patch cable
    - CAT5 RJ45 crossover patch cable

ALMSC119 Serial Programming Cable

NOT INCLUDED

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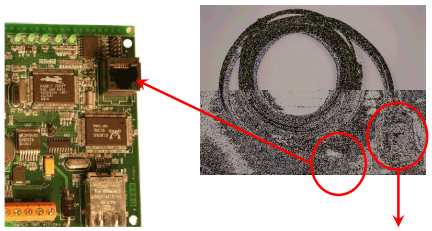
Serial Cable Connection



To PC serial connector

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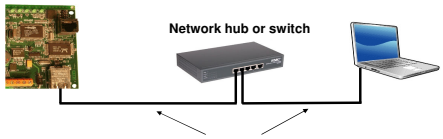
IP Communicator Programming (Telnet)
CAT5 Patch Cable Connection



CAT5 Patch Cable (straight-through)

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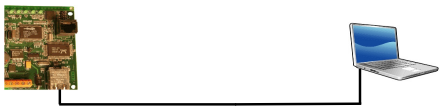
IP Communicator Programming (Telnet)
CAT5 Patch Cable Connection



CAT5 Patch Cable (straight-through) with crossover adapter

RJ45 crossover adapter

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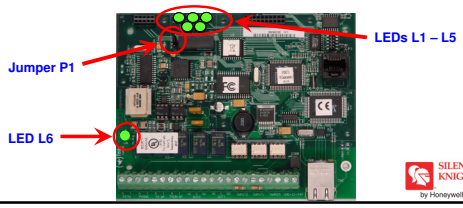
Returning an IP Communicator to Factory Default Settings

- Remove power to the IP Communicator
- Short jumper P1.
- Apply power to the IP Communicator
- LEDs L1 through L5 will light in succession and then start a second cycle
- During the 2nd cycle, remove the shorting jumper from P1
- DO NOT place the jumper P1, back onto the unit
- If successful, the LED's will cycle a 3rd time and LED L6 will be off



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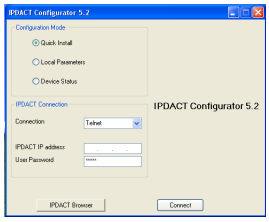
IP Communicator Configurator Tool



- Windows-based programming software
- Can program via serial or telnet connection
- Browser feature for telnet connection – queries connected network for IP Communicators

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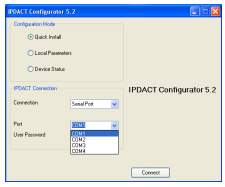
IP Communicator Configurator Tool



- Must use COM1 – COM4 for serial connection
- For Telnet connection, your laptop must have a static IP Address within the range of the default IP Address of the IP Communicator
  - 192.168.0.100
- Choose 192.168.0.nnn where nnn can be any number from 1 – 254 except 100

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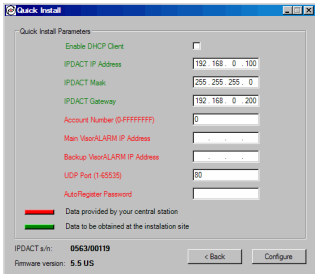
IP Communicator Configurator Tool



- Information must be obtained from the customer's IT Dept. and from the Central Station

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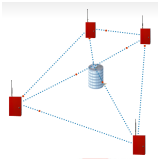
Long Range Radio

- Use a wireless mesh network
- There is a remote transceiver used to monitor or control a device such as an alarm panel
- Each transceiver relays its data to the central receiver via radio transmission
  - If the transceiver is too far to reach the central receiver directly, it simply hops the data to the next closest transceiver



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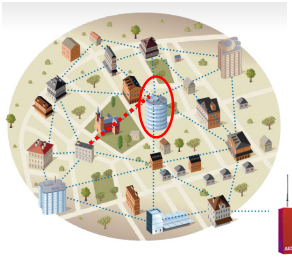
Long Range Radio

- The Central Receiver relays the data to alarm automation software for processing



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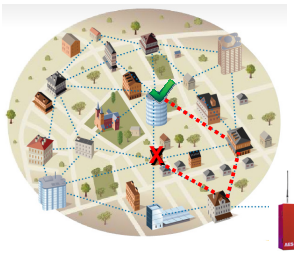
Long Range Radio

- If data can not be relayed via one route, the mesh network automatically selects the next best route from a choice of up to 8 available routes at any given time



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Long Range Radio

- The network dynamically and automatically adapts to changes in the network caused by
  - Weather changes
  - Obstruction changes
  - Addition or subtraction of other transceivers in the network
- Highly redundant & reliable

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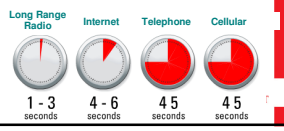
Advantages of Long Range Radio

- Plug and play addition of transceivers
- Can do remote self-diagnosis from Central Station
  - Reduce tech calls
- Save money on phone lines
- Proven technology that will not become obsolete
- Fastest current technology available



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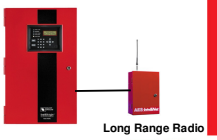
Installing Silent Knight with other Transmission Technologies

- Rev 10 panel
  - Use phone line 1
- Use Contact ID for reporting
- Program options to:
  - Disable phone line monitor on second line
  - Disable phone line two
  - Disable dial tone detection on line 1

IP Communicator

OR



Long Range Radio

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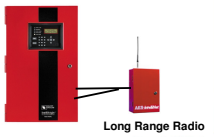
Installing Silent Knight with other Transmission Technologies

- Older than Rev 10
  - Tie phone line 1 & 2 together
  - Tip to tip
  - Ring to ring
- Use Contact ID for reporting

IP Communicator

OR



Long Range Radio

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Installing Silent Knight with other Transmission Technologies

- CANNOT use a phone line for backup
  - Can't mix technologies
  - Phone line not required by code with new technology
  - Either use DACT or use new technology

IP Communicator

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