



Installation Instructions and Wiring Diagrams

STOP!

Read these instructions and become familiar with the wiring diagrams before you begin your installation. Wiring schemes are different for twisted and non-twisted wire. Close attention must be paid to wire pairs for etherSPLIT to work properly.

etherSPLIT will NOT function properly with 10/100 Autosensing Switches/Hubs. Be sure to use ONLY 10BaseT Switches or Hubs.

Quick Tips for a Successful etherSPLIT Installation

1. Read the Instructions. Wire pairings are critical for proper operation and vary depending on type of wire used. Understanding of all the wiring parameters is advisable before undertaking an installation. Twisted wire installations will not follow normal TIA/EIA wiring schemes. Both twisted pair and straight non-paired cables must be connected with proper "pairing" as illustrated in the instruction.

2. Do NOT use flat ribbon cable (Gray Satin cable) in any installation or test. Flat ribbon cables, particularly those manufactured with RJ11 ends are not configured properly for use between etherSPLIT splitters (flat ribbon cable will work fine for the phone connection ONLY from the phone jacks on the splitters). Flat ribbon cable also will not conform to impedance matching requirements. While this type of cable may work for short distances, it will certainly fail on longer distances.

3. Be sure that your hub-end equipment is 10BaseT ONLY (10 Megabit per second). etherSPLIT will not function properly, if at all, using 10/100 Autosensing equipment on the hub end. By using 10BaseT equipment at the hub end, 10/100 autosensing NICs on the computer end will function properly because they will auto-configure to the 10Mbps hub equipment. Using 10/100 Hub equipment and configuring the user end NIC to 10Mb will generally not work well.

4. Locate the hub splitter as near to the end-user wall plate splitter as possible. If there is more than one wiring closet in a building, locate a hub/switch and the hub splitters in each wiring closet and then connecting each hub back to a central hub, preferably with Cat5 or fiber (or wireless where appropriate). It is also possible to use etherSPLIT to interconnect hubs using existing building wire if available. It is not advisable to use backbone cable or other wire to connect wiring closets with all of the hub splitters in one wiring closet. This may result in cable impedance mismatches that cause excessive reflections in the line resulting in high loss rates or inability to transfer data.

5. Do not mix wire types. In cases where hub splitters MUST be congregated in one wiring closet, with interconnects to other wiring closets (remember the 250 ft maximum rule applies!), be sure to use the SAME type of wire for the interconnect as is being used from the wiring closet to the tenant unit. For instance, mixing straight, four conductor non-paired wire with category 3 twisted wire will NOT work. Use the same type of wire installed in the building for cross connects from the punch-down block to the etherSPLIT hub splitter.

6. Keep runs under 250 ft. between the Wall Plate Splitter and the Hub Splitter Longer distances will work with some wire and equipment combinations, but its best to keep the runs short. Where distances between the tenant and the wiring closet exceed that distance, look for a junction box or riser access midway between that can be accessed. It is usually possible to locate an enclosure box at some mid-point where hub and splitter equipment can be located.

7. When working with garden-style (multi-building) apartments, plan on locating the hub/switch and etherSPLIT hub splitters on each building (in outdoor enclosures) by the telephone demarc, and interconnecting the buildings with Cat5 or fiber in conduits, wireless, or etherSPLIT (or DSL if distances exceed etherSPLIT) using existing phone wire back to a common wiring closet. Environmentally tolerant hub/switches may be used in outdoor NEMA enclosures with no problem.

8. Read the Instructions again.



Wall Plate and Hub Splitter Installation & Troubleshooting Guide

I. Planning

A. Site Survey

The first step in deploying etherSPLIT as part of a local area Internet access network is surveying the installation site for adequate access and wiring. For successful implementation, suitable wire is required between the tenant unit and wiring closet or demarcation point. For single-line phone's, four wire (or two twisted-pair) is required. For multi-line key or digital systems, or units requiring two analog phone lines, six wires (or three twisted-pair) are required. A quick acid-test is: two free wires (or one free pair) is required to install etherSPLIT.

Condition of the wire also may be an issue. It is recommended that a test be conducted with etherSPLIT splitters on the tenant and wiring closet end of a sample circuit in the building to assure that the condition of the wire is adequate. EtherSPLIT has tested well with virtually all categories of communication cable, twisted and non twisted (or "non paired" wiring).

On the wiring closet or demarcation end, an etherSPLIT line splitter will be installed between the wire going to the tenant unit and the telephone demarcation (punch down or wire wrap block). Adequate room must be available for the number of splitters needed as well as the Ethernet switch or hub for that location. Many buildings will have a wiring closet or basement, but some will have telephone demarcations on the outside of the building. In those cases, such as garden-style apartments, an outside enclosure with environmental attributes suitable for housing a hub or switch along with the etherSPLIT splitters will be needed. Adequate electrical service also will be needed at each demarc location.

B. Tenant Unit Planning

Given that only one etherSPLIT Wall Plate Splitter can be installed on any wire segment coming from the demarc, careful planning on the location within the tenant unit is needed. Typically, wire is looped from room to room and then run to the demarcation point (see Figure 3). Only one end-to-end connection between a Wall Plate Splitter and Hub Splitter can be established over a single wire segment. Location of the Wall Plate Splitter within the tenant unit needs to be made with thought toward typical computer usage. Multiple outlets are possible in a tenant unit by using a hub (connected to the Wall Plate Splitter) and running additional outlets from that hub to other rooms via baseboard, through the wall, or under-carpet cable techniques.

C. Interconnection

Once the wiring-closet or outdoor enclosure locations for the hub/switches and splitters are established, interconnection of the hub/switches to a central point will be required. EtherSPLIT also can be used to transport backbone Ethernet between hub locations if copper wire already exists. Use of two Hub Splitters, one on each end, may be employed for this purpose. If no wire exists, fiber or Category 5 cable can be used in existing conduits (check local electrical codes if using copper wire in electrical conduits). Wireless connections can also be established to a central point within the building or complex.

II. Installation

A. Wiring Closet

EtherSPLIT has been designed to allow installation of the Hub Splitter between the phone demarcation and the tenant wire without interruption of normal phone service when using straight, 4 conductor cable. When using twisted-pair wiring, a the phone circuit for Line 1 is split across pairs which will require re-wiring of the phone jacks in the tenant unit. A jumper can be placed in the circuit on the Hub Splitter end across Pins 1 and 4 of the etherSPLIT line which will allow for normal phone service to continue until the Wall Plate splitter is installed in the tenant unit (see Figure 2a.) This jumper will be removed when the Wall Plate splitter is installed and all other phone jacks have been rewired (See Figure 2b.) The line going to the tenant unit must be disconnected from the telephone demarc. RJ11 plugs are attached to the wire for

Figure 1a. Single Telephone Line Connection Scheme for Hub Splitter. The Hub Splitter is inserted between the telephone or PBX demarcation (usually a punchdown block) and the wire running to the tenant unit. The splitter has a jack for connection to a 10BaseT hub or switch via a standard Cat5 patch cable. This illustration shows hookup for a single-line telephone where the telephone line is connected to Pins 3 & 4 on the telephone interface of the Hub Splitter. The etherSPLIT interface plug (connected to the tenant cable) uses pins 1, 3, 4 and 6. Connection in this diagram are shown using non-twisted cable. When using twisted cable on the etherSPLIT interface (cable running to tenant unit), one twisted pair should be connected to Pins 1 & 3 (represented by the yellow and red wires), and one twisted pair connected to pins 4 & 6 represented by the green and black wires). See wiring diagrams in the appendix.

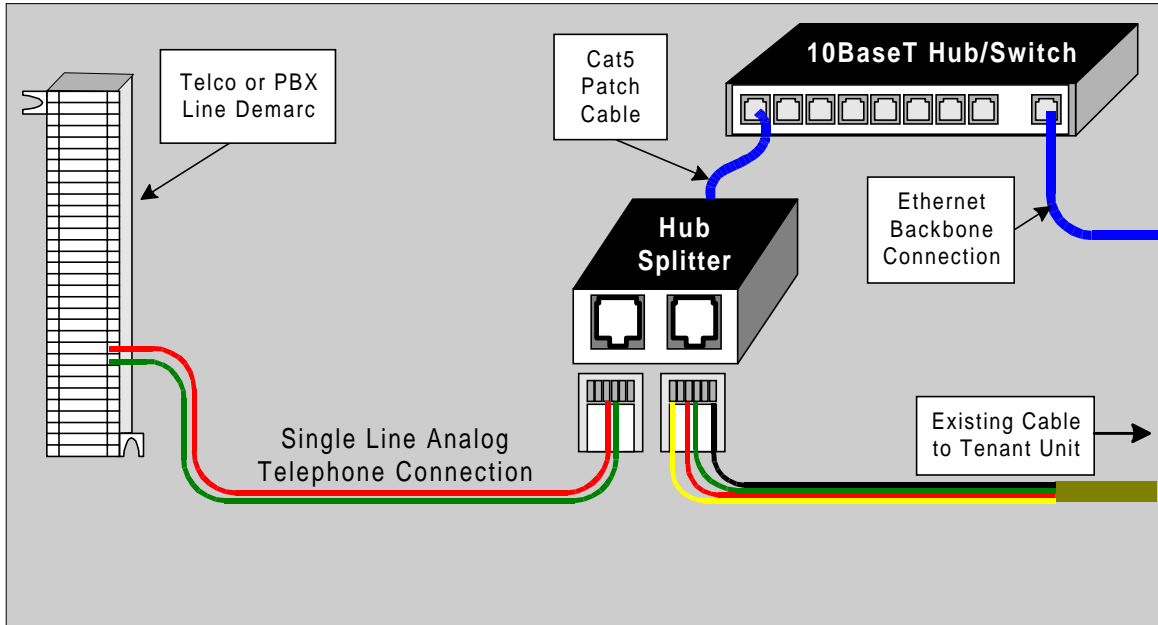
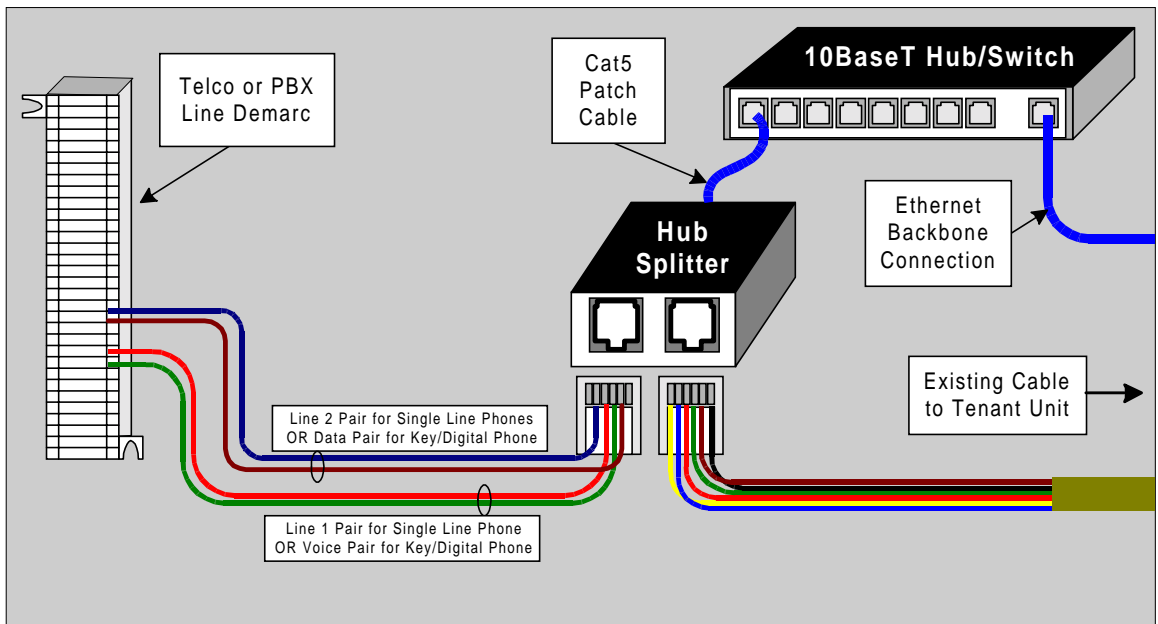


Figure 1b. Multi-Line Telephone Connection Scheme for Hub Splitter. Connection scheme is the same for single line phones with the exception that an additional pair of wires is connected on pins 2 & 5 for both the telephone interface jack and the etherSPLIT line jack. Note: These connections are simply passed through the splitter and do not affect the splitter operation in any way. These connection may be made external to the splitter. When using twisted cable to the tenant unit, follow the specifications outlined above and in the wiring diagrams in the appendix. One twisted pair should be used on Pins 2 & 5 represented by the brown and blue wires.



NOTE: Diagrams in these instructions show standard four-wire non-twisted cable. Refer to wiring diagrams at the back of these instructions for use of twisted cable.

Figure 2a. When using twisted pair cable, use of a jumper is required after installation of the Hub Splitter to restore phone service at the tenant end prior to installation of the Wall Plate Splitter. Additional phone jack outlets must be rewired at the time of Wall Plate Splitter installation (see Figure 2b). The jumper is removed when the Wall Plate Splitter is installed and all other Phone Jacks are rewired.

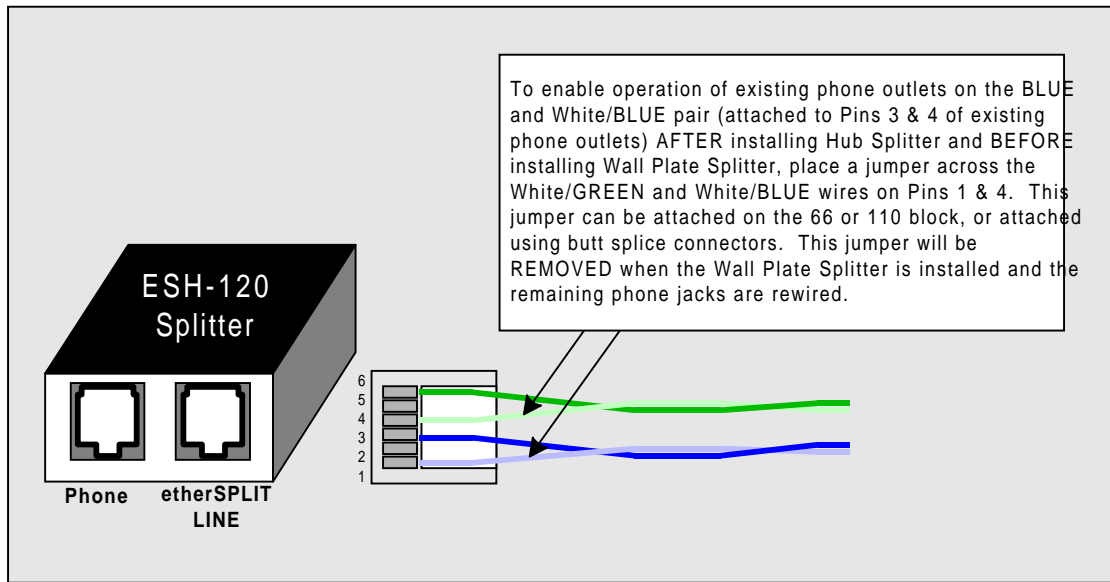
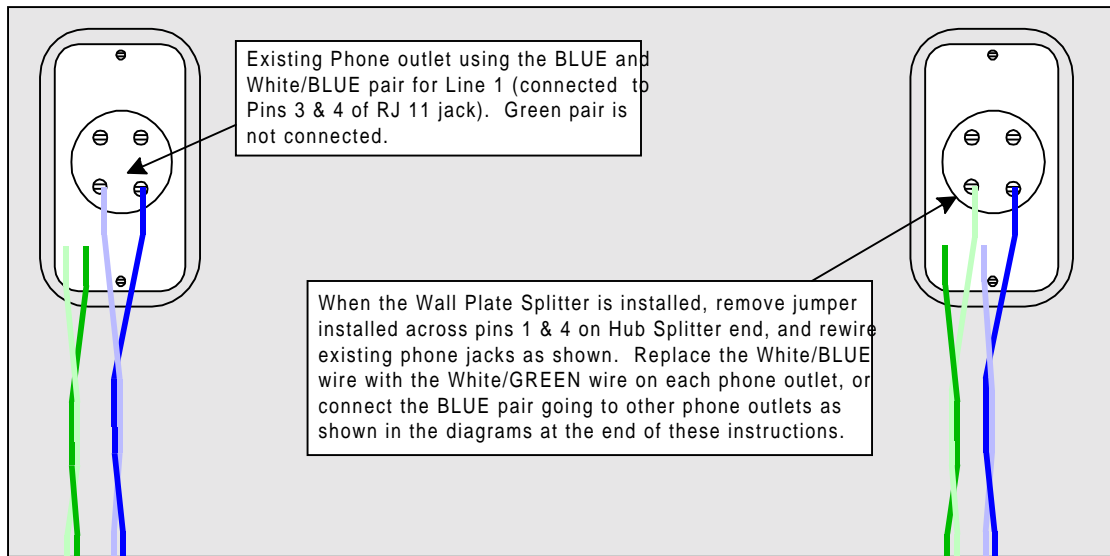


Figure 2b. When using twisted pair cable, existing tenant phone jacks must be rewired as shown. The White/BLUE wire is simply replaced with the White/GREEN wire on each jack (or the BLUE pair going to additional phone jacks is connected to the BLUE and the White/GREEN wires as shown in diagrams at the end of these instructions.) After each jack is rewired, the jumper illustrated in figure 2a is removed.



connection to the Hub Splitter. Once the Hub Splitter is connected between the tenant line and the phone demarc (a one or two minute operation), normal phone service is restored. By this method, all Hub Splitters can be installed prior to going to tenant units to install Wall Plate Splitters. This eases installation and troubleshooting without interrupting phone service.

See Figure 1 for details on wire connections for the Hub Splitter. Special attention must be paid to wire positions on the RJ11 plug if twisted cabling is used. Note: When working with analog phone circuits, use caution. Ring voltages (voltage sent over the line to ring a telephone) may approach 175 VAC peak. To avoid exposure to ring voltage while proceeding with installation, a shunt resistor can be placed across the telephone circuit to render the circuit in the "off hook" state which prevents the line from receiving calls (and therefore a ring signal). A 1/2 watt, 1K ohm resistor will be sufficient. As an alternative, if bridging clips are used on the punchdown block, these may be temporarily removed to isolate the phone line from the internal wiring.

B. Tenant Unit

It is recommended that all Hub Splitters be installed and that a working Ethernet network be established to each hub or switch prior to installation of the Wall Plate Splitters. This greatly eases signal checking and troubleshooting.

Once the best location for the Wall Plate Splitter has been established, remove the existing phone Wall Jack plate. There should either be one cable coming into the box (indicating it is the only cable or the last segment of a loop running in the tenant unit), or there will be two cables representing a loop (see Figure 2). To verify connectivity to the phone demarcation, use a Volt-Ohm Meter to check continuity of the cable. Checking the connection to the phone wall plate across pins 3&4 of an RJ11 (analog voice line) jack should show a reading of approximately 48 VDC (if a live phone line exists - be sure to reconnect the phone circuit at the demarcation prior to testing.). If there are two cables coming into the box, one cable should show voltage indicating it is the line going to the demarcation (while the other line goes to another telephone outlet – no voltage should be indicated). See Figure 4 for connection diagram of looped installations.

Once you have established a live connection on the cable (or determined which wire goes to the demarcation), you are ready to check continuity of the other two wires on the cable. Using the VOM, check the VOLTAGE between Pin 1 and Pin 6. This also should register a nominal voltage of about 48 volts (the same as between Pin 3 and Pin 4. Next, check the RESISTANCE between the wires on Pins 1 & 3 AND 4 & 6 respectively. A nominal resistance of under 10 ohms is expected (4-6 ohms is typical depending on gauge of wire and length of wire going back to the demarc and etherSPLIT Hub Splitter). If continuity is not established, it is likely that there is an interruption in the wire path within another outlet box in the tenant unit. Open other wall boxes with telephone outlets to trace the connection and repair any cut or disconnected wires as needed. Note: The two wires going to Pin1 and Pin6 on the etherSPLIT Wall Plate must NOT be connected to any other outlets. These wires may need to be disconnected from other phone outlets if two-line phone hookups were previously made. See Figure 4 for details.

Once continuity has been checked, connect the Wall Plate Splitter. Following the connection diagram for either two-wire or four-wire phone systems, crimp an RJ11 plug to the cable. You may need to use wire splices to connect wire going back out to another phone jack (See Figure 4). Plug the RJ11 plug into the

Figure 3. Typical MDU/MTU environments have looped communication cable from outlet box to outlet box.

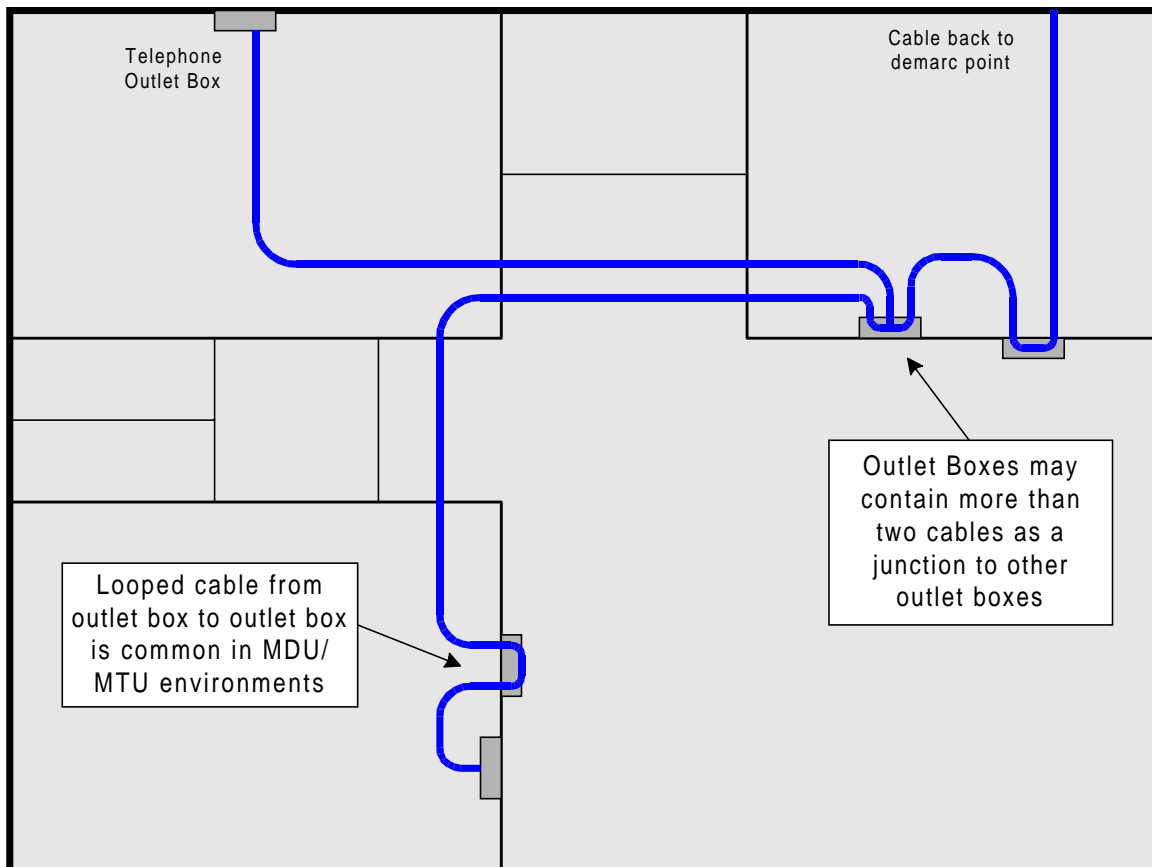
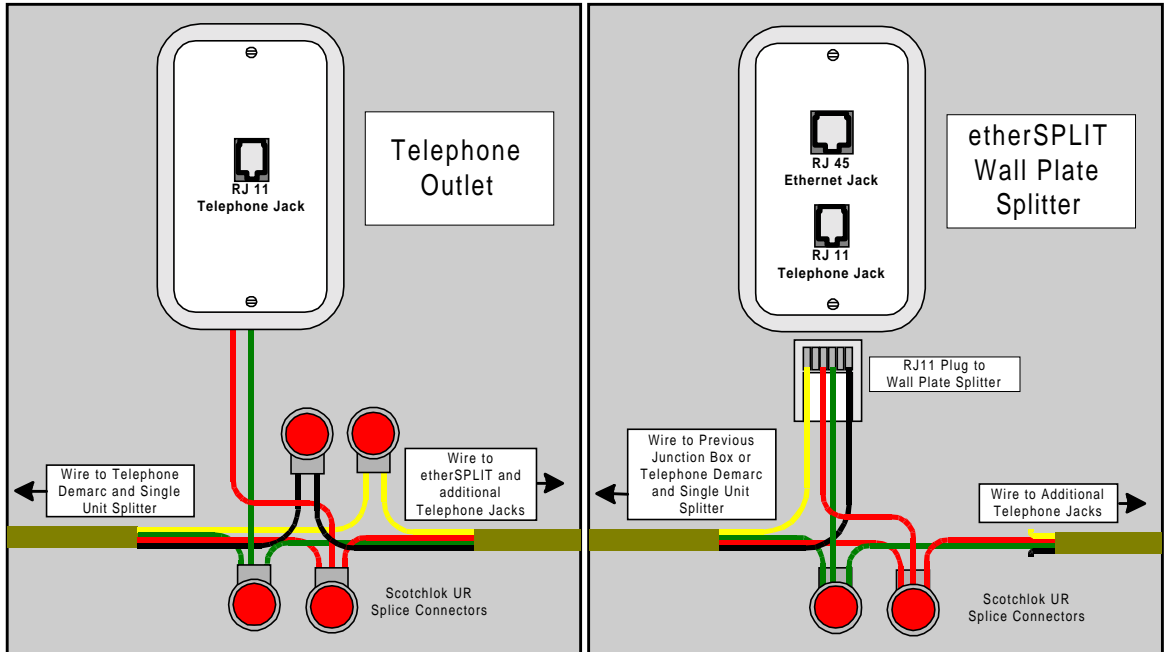


Figure 4. Single Line Phone installation using etherSPLIT Wall Plate Splitter and additional telephone jacks.

The left panel illustrates connection of a single phone jack ahead of an etherSPLIT Wall Plate Splitter within a looped wire installation. Note that the black and yellow wires (connected to Pin 1 and Pin 6 of the splitter system) may not be connected to any other jacks within a loop. The right panel illustrates connection of the Wall Plate Splitter within a loop. The black and yellow wires connected to Pins 1 and 6 terminate at the splitter. The red and green wires connected to Pins 3 & 4 carry the voice circuit and may be extended to other telephone jacks in the loop. When using twisted wire, be careful to follow the same guidelines illustrated in Figure 1 for the Hub Interface as well as the wiring diagrams in the appendix. For multi-line phones or key/digital phone systems, the additional wire pair (represented by the brown and blue wires in Figure 1) will be connected to pins 2 & 5 on the Wall Plate Splitter, or may simply run to additional phone jacks.



NOTE: Diagrams in these instructions show standard four-wire non-twisted cable. Refer to wiring diagrams at the back of these instructions for use of twisted cable.

etherSPLIT interface jack on the back of the Wall Plate. When the Wall Plate splitter has been connected, you are ready to check Ethernet connection as well as telephone connection. Plug a telephone into the phone outlet on the Wall Plate Splitter to check for dial tone. It is also recommended to connect an Ethernet-ready computer (a laptop is ideal) to the Ethernet port and “ping” the local gateway on the Ethernet network to verify proper operation. Once connections have been established, secure the Wall Plate Splitter to the wall. Installation is complete.

III. Avoiding Line Noise or Crosstalk

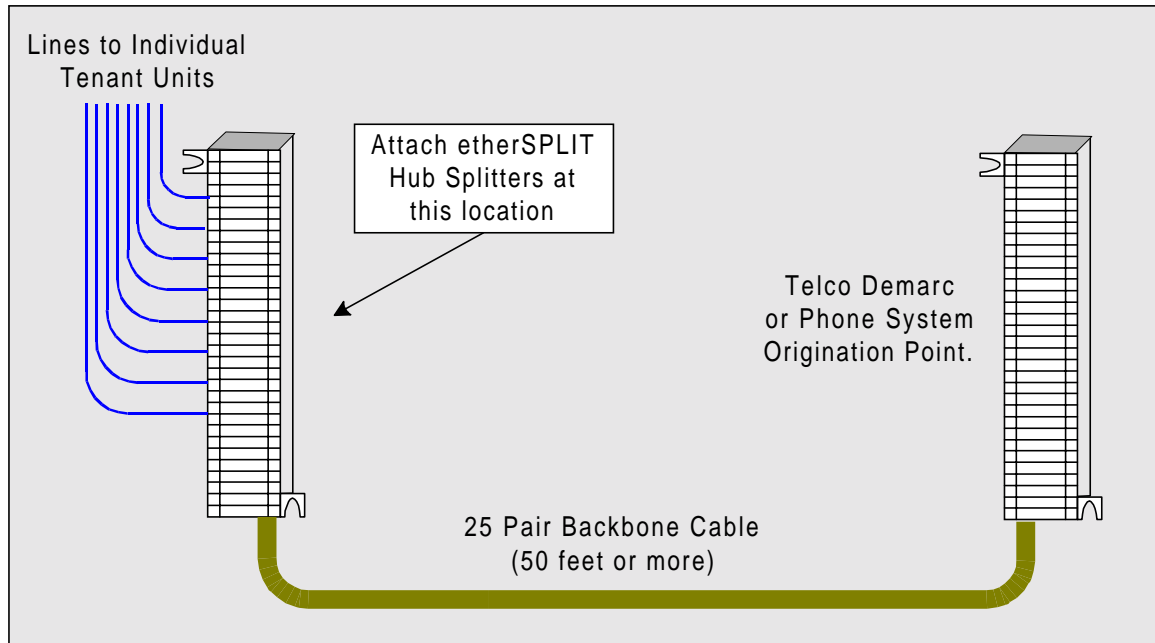
Voice crosstalk (where you can hear very faint noise or conversations from other voice lines) is a possibility even with twisted wire within an etherSPLIT installation. The voice circuit is split across the paired wires when using etherSPLIT. This will only be an issue if numerous lines are running in a tight bundle such as when 25 pair backbone cable is used for an extended length (50-100 feet). In a situation like this, the tenant wires which radiate out to each tenant unit are connected at a punchdown block to a 25 pair backbone cable which runs down line to the telephone demarc. With installations like this, it also is possible to generate network line noise that interferes with normal Ethernet operation. To avoid any voice crosstalk or line noise, the etherSPLIT splitters should be connected upstream at the final punchdown block where the tenant cables begin to radiate out to individual units. See Figure 5.

IV. Troubleshooting Guide

Q. There are two pairs of wire running into each tenant unit. Both (four wires) are connected to the telephone demarcation. It appears two telephone lines are connected but I can only get voltage across one of the pairs. Can I still hook up etherSPLIT?

If voltage is only present across one of the pairs, then the other pair is a “dead line” meaning it is not connected at the telephone central office. You don’t need to leave the dead line connected. This leaves

Figure 5. Installation of Hub Splitters behind 25 pair backbone cable.



the “one free pair” available allowing you to hook up etherSPLIT on a four-wire configuration. However, if both telephone lines are active, and there are no free wires, your tenant would have to make a decision to terminate one phone line in order to get Ethernet access.

Q. I have made all the proper connections and tested them with a Volt-Ohm meter but cannot get an Ethernet connection to “ping”. The connection lights on both the hub and the computer are lit. What’s the problem?

If connection lights are indicating proper connection on both ends, the possible problems include:

- 1) Faulty network backbone connection to the hub which will not allow for the ping request to make its way to the router. First check by connecting the laptop computer you are using to check the connection directly to the hub (preferably to the same port the splitter is connected to). If you still cannot ping, try a different port. If still unsuccessful, either the laptop is configured incorrectly or there is a faulty backbone connection. Start from the front of your system and go back until you find the fault.
- 2) If you are able to ping directly from the hub, but not from the wallplate splitter, and both lights are lit, the possible problems include excessive wire length, poor wire condition, or excessive noise on the wire from impedance mismatch. You can check the actual length of the run with a Time Domain Reflectometer. If the run is exceeding 300 feet or run is on the “threshold” of 250-300 feet, using very high quality patch cables on both ends of the connection can help to cure some of the probable noise problem. If the wire running to the tenant unit is straight four wire (station cable – not twisted), switching the wires on pins 1 and 3 OR 4 and 6 may cure the problem (the proximity of each wire to each other within the jacket can cause differing line impedances between particular “pairs”).

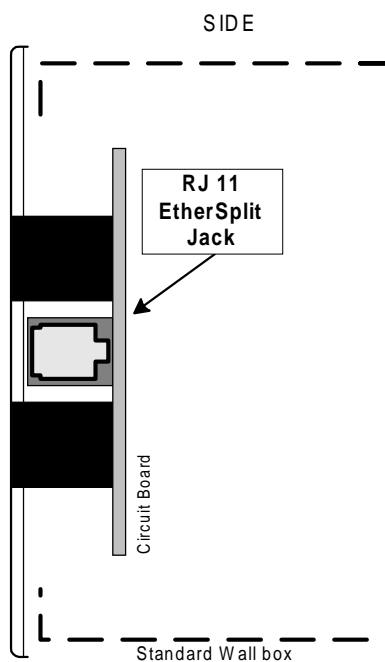
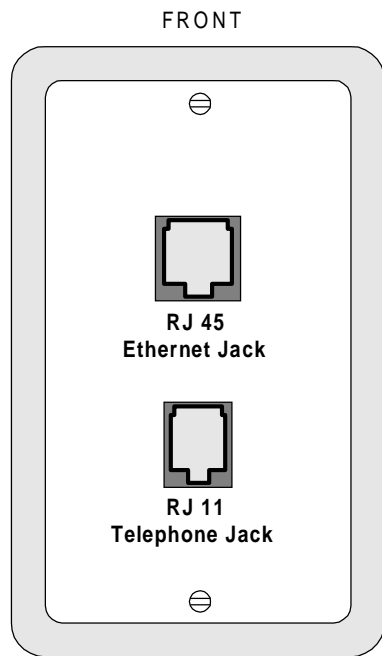
Q. All connections have been made and I have a connection light on the computer, but not the hub (or visa versa). What’s the problem?

A single connection light indicates that the wire on either Pin1 or Pin6 of either splitter is not connected properly. Double check continuity (using the resistance setting on a VOM) between Pins1 & 3 AND Pins 4 & 6 respectively with the telephone system DISCONNECTED from both splitters. This should indicate a bad connection. If a bad single conductor is the problem, switch to another free wire (if available).

Q. I am using my Ethernet cable test unit to check the connection end-to-end but cannot get any of the connection lights to show a good connection. Is this OK?

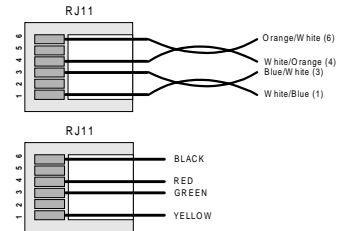
etherSPLIT does not maintain straight-through conductivity on the Ethernet 10BaseT ports from one end to another. Most cable test devices are merely checking conductivity (continuity) from one pin to another through the cable, thus these devices cannot be used to check for proper installation. You will need to use a VOM to check resistances and voltages as outlined in the instructions.

Wall Plate Splitter ESW275

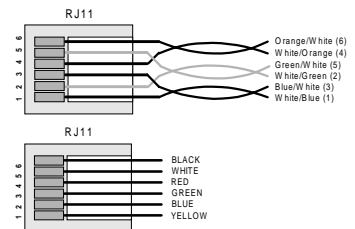


etherSPLIT™ Interface Jack

Single Line Phone (4 Wire)

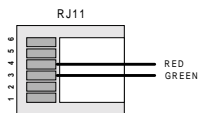


Multi Line Phone (6 Wire)

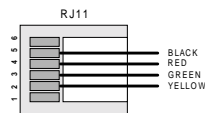


Telephone Jack (RJ11)

Single Line Phone
(2 Wire)

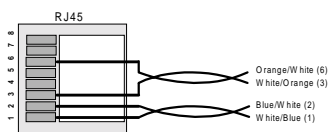


Multi Line Phone
(4 Wire)



Ethernet Jack (RJ45)

Standard IEEE 802.3 10BaseT
(2 twisted pair)



The etherSPLIT™ Wall Plate Splitter consists of an RJ45 Ethernet jack, and an RJ11 telephone jack integrated into a standard 2 by 4 1/8 inch faceplate that fits standard wall boxes. The Wall Plate jacks are affixed to a small circuit board that includes an RJ11 etherSPLIT™ jack behind the faceplate.

Existing telephone wire coming into the wall box is crimped to a six-pin RJ11 plug as illustrated above depending on type of wire or phone configuration used. The crimped connector is plugged into the RJ11 etherSPLIT™ Interface jack on the wall plate. The wall plate splitter is then screwed to the utility box in the wall.

Single line, two-wire phone circuits require a four-wire (or two-pair) etherSPLIT™ connection. Multi-line four-wire key-phone systems require a six-wire (or three-pair) etherSPLIT™ connection.

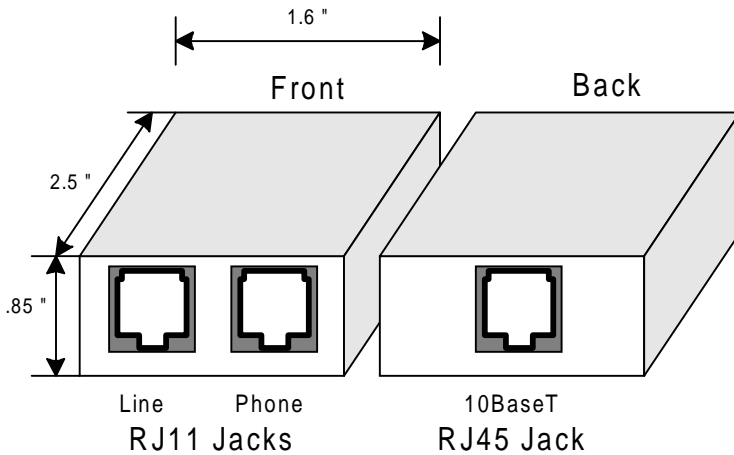
Specifications:

Face Plate Color: White
Jack Color: Black
Size: 2 W x 4 1/8 H x D
Connectors:
RJ11 2 or 4 wire Telephone
RJ45 2 pair 10BaseT Ethernet
RJ11 4 or 6 wire etherSPLIT™ Interface
Mounting: 2 screws (included) to standard wall utility box.

etherSPLIT™ Connection Requirements:

Wire Size/Type: 22-28 ga. Straight or Unshielded Twisted Pair (UTP)
Category 1 through 6
Cable length: 250 ft. maximum from wall plate to hub interface
Connection type: RJ11 plug connects to back of wall plate
Interface: etherSPLIT™ single unit Splitter required to connect to standard 10BaseT hub or switch
Data Specifications: IEEE 802.3 10BaseT Ethernet (10 Mbps)
Power Requirement: None

Single Port Hub Splitter



The etherSPLIT™ Single Unit Splitter is a compact unit for connecting an etherSPLIT line to a standard 10BaseT Ethernet hub or switch. The splitter has three jacks: an RJ45 Ethernet jack for connection to any standard 10BaseT hub or switch, an RJ11 telephone jack for connection to the telephone company line demarcation or building PBX, and an RJ11 etherSPLIT™ interface jack for connection to an etherSPLIT™ Wall Plate Splitter via the building's existing phone cable.

Existing telephone wire in a building is used to connect between the etherSPLIT™ Single Unit Splitter and each etherSPLIT™ Wall Plate Splitter. Single line, two-wire phone circuits require a four-wire (or two-pair) etherSPLIT™ connection. Multi-line four-wire key-phone systems require a six-wire (or three-pair) etherSPLIT™ connection. Standard RJ11 crimp plugs are used on each end of the connection for ease of installation.

The splitters may be mounted directly to a wall, shelf, or standard 2U 19 inch blank rack plate an aluminum mounting bracket. Up to 18 splitters can be accommodated in one bracket, and brackets may be stacked for maximum density.

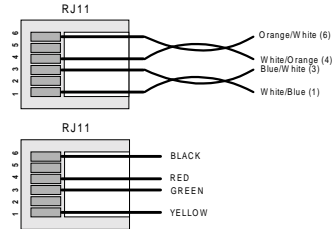
Specifications:

Case Color: P.C. Bone
 Jack Color: Black
 Size: 1.6W X 2.5D X .85H
 Connectors:
 RJ45 2 pair 10BaseT Ethernet
 RJ11 2 or 4 wire Telephone
 RJ11 4 or 6 wire etherSPLIT™ Interface
 Mounting: Mounting to wall or rack plate with ganged mounting bracket

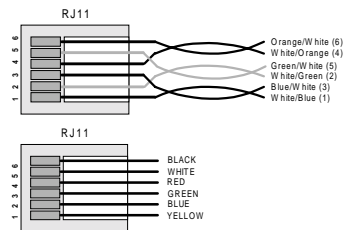
etherSPLIT™ Connection Requirements:
 Wire Size/Type: 22-28 ga. Straight or Unshielded Twisted Pair (UTP)
 Category 1 through 6
 Cable length: 250 ft. maximum from wall plate to hub interface
 Connection type: RJ11 plug connects to back of wall plate
 Interface: etherSPLIT™ Wall Plate Splitter required on user end with telephone and Ethernet interfaces
 Data Specifications: IEEE 802.3 10BaseT Ethernet (10 Mbps)
 Power Requirement: None

etherSPLIT™ Interface Jack

Single Line Phone (4 Wire)

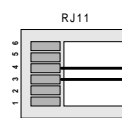


Multi Line Phone (6 Wire)

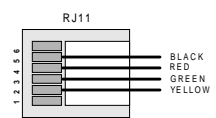


Telephone Jack (RJ11)

Single Line Phone (2 Wire)

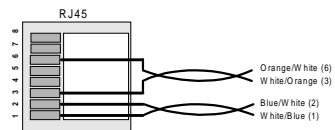


Multi Line Phone (4 Wire)

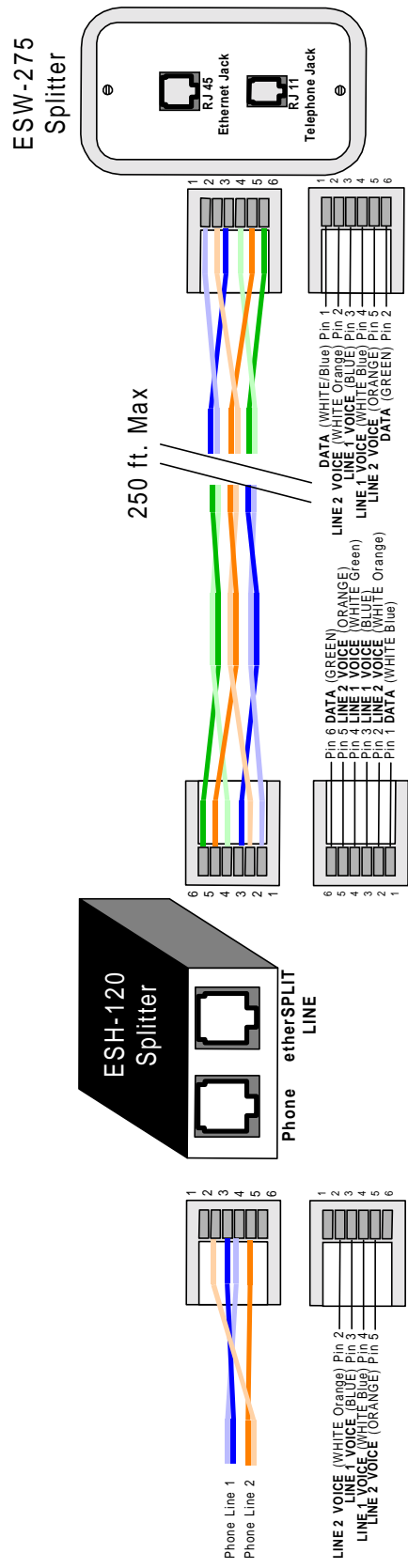


Ethernet Jack (RJ45)

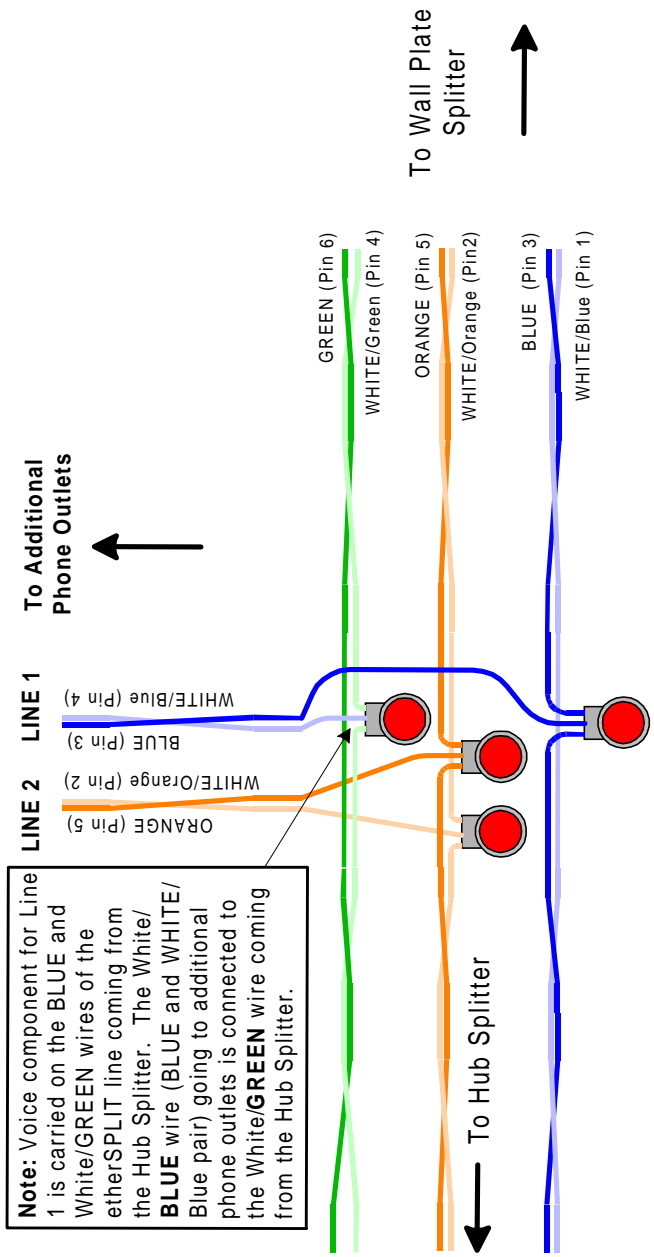
Standard IEEE 802.3 10BaseT (2 twisted pair) Straight Patch Cord connection to 10BaseT hub or switch



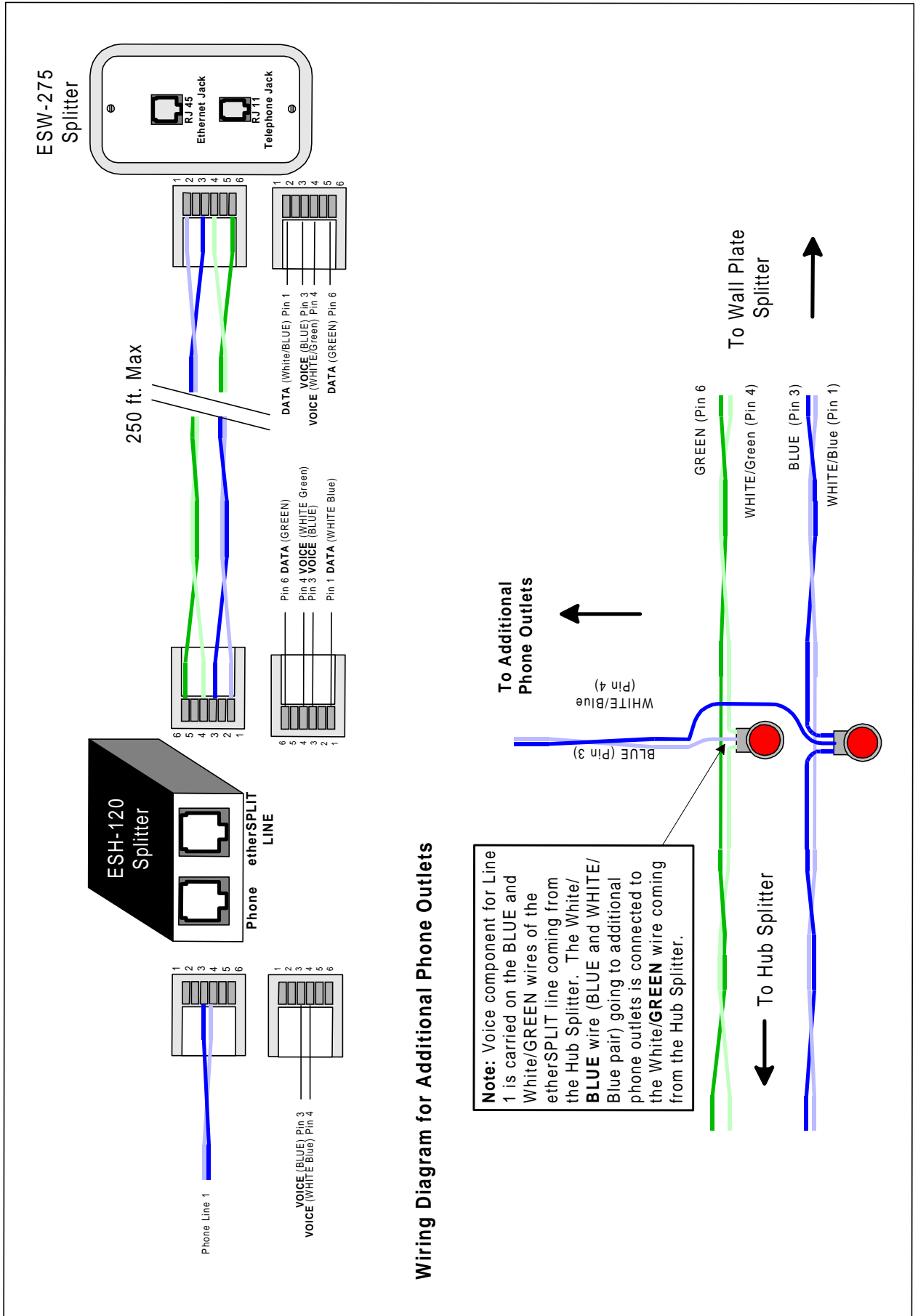
3 Pair Category 3 Twisted Wire Wiring Diagram - 2 Phone Lines



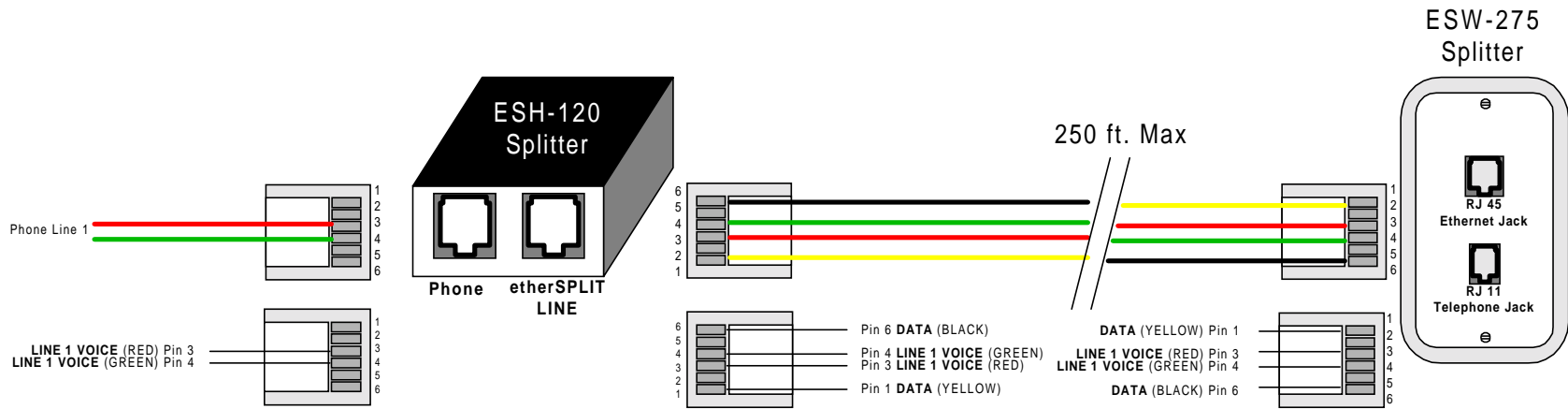
Wiring Diagram for Additional Phone Outlets



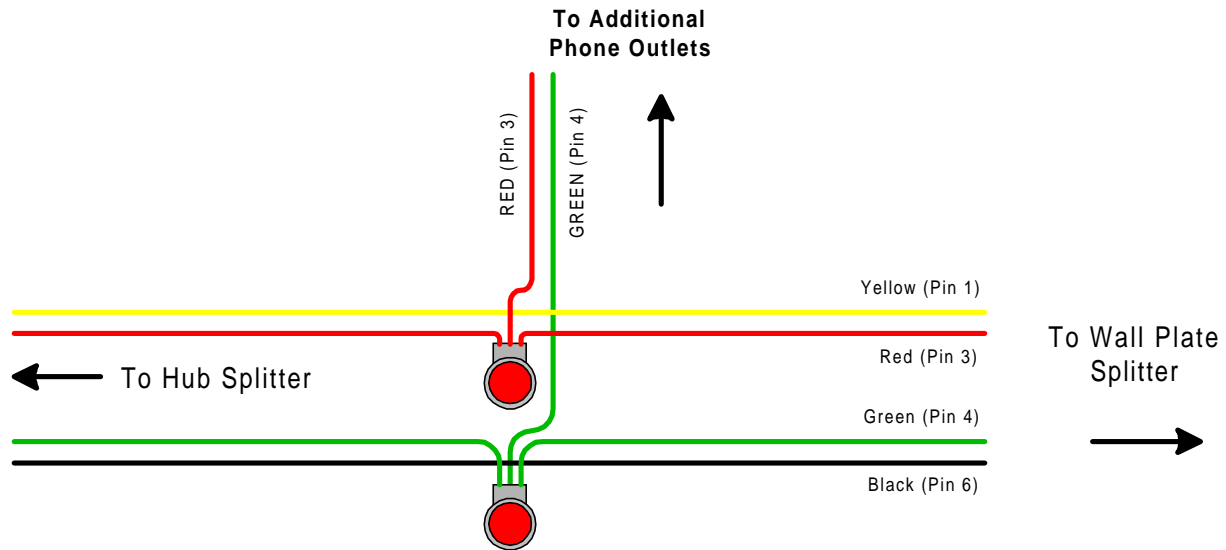
2 Pair Category 3 Twisted Wire Wiring Diagram - 1 Phone Line



4 Wire Category 1-2 Non-Twisted Wire Wiring Diagram - 1 Phone Line



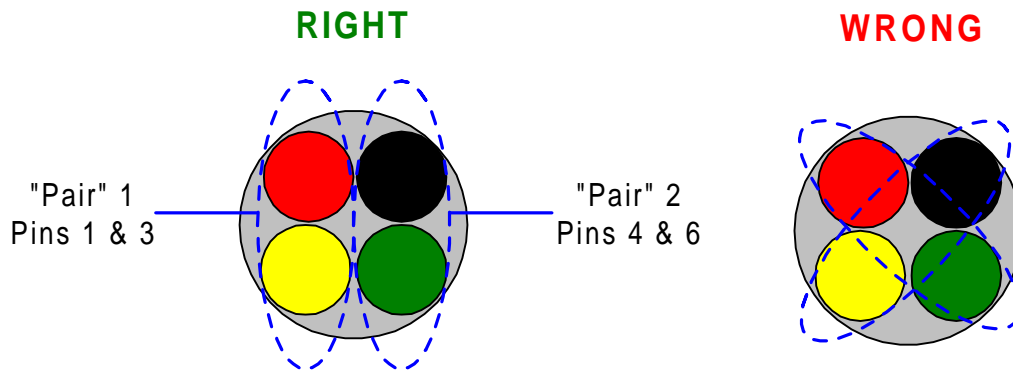
Wiring Diagram for Additional Phone Outlets



Wire “pairing” of non-paired, straight wire

Non-twisted (non-paired) Category 1-2 wire must still be “paired” properly for maximum performance of etherSPLIT systems. The following diagram shows the end view of typical four-wire telephone station cable or alarm-type wire. Wire pairings on Pins 1 & 3 and Pins 4 & 6 must be made using adjacent wires for best performance. “Crossing” the “pairs” will result in increased cross-talk and reduced signal performance, or no signal performance on longer runs.

Actual wire colors are not important. Proximity of wires within the jacket is what matters. Some non-paired, straight wire cable may have more than four conductors. Choose the conductors that have two wires adjacent to each other, and are separated the most from another “pair” of adjacent wires. For this reason, flat ribbon cable (gray satin cable) will not work. Generally speaking, the conductors on pins 1 & 3 will be separated by a conductor on Pin 2 which alters the characteristic impedance of that cable “pair”.



Troubleshooting / Technical Help

Before calling for technical help, please read all of these instructions thoroughly. Answers to the most common problems are found within the text and illustrations of this document

When you do call, please have all of the following information available:

1. When/where etherSPLIT was purchased (invoice date and number).
2. Make and Model of Hub or Switch being used. If connection is being tested between two computers, make sure a crossover Ethernet cable is being used on one end, and that NIC cards are manually set to 10Mbps.
3. Make/Model of NIC on computer.
4. Type of wire being used between Hub and Wall Plate splitters (i.e. Category 3 twisted, straight 4 conductor non-paired, etc.).
5. Length of wire between splitters.
6. Color code of wire conductors used for the etherSPLIT connection. You will need to know what wire color is connected to which pin of the etherSPLIT connection on both ends. (i.e. Solid yellow on Pin 1, Solid Red on pin 3 etc. or White/blue stripe on Pin 1, Blue/white stripe on Pin 3 etc.)
Note: the majority of etherSPLIT test problems are resolved with proper wire pairings to the proper pins. Review the diagrams and instructions before calling.
7. Telephone connection. Does the telephone connection work or not?
8. Ethernet Symptoms. i.e. Link light, but no data; slow data transfer; dead signal, etc.

For technical help:

email: info@etherSPLIT.com

telephone: 979.694.3593 (10am to 5pm CST)