Home Networking and Video Distribution

A Central Wiring Panel (CWP) is the central hub or location that is the control center for a networked system. It contains multiple wires running to and from specified locations in the home and it also contains other fixtures inside of it. Note: the wiring described in this document is run in parallel (or using "home runs"). Some houses today, and almost all older houses, contain wiring run in series, not in parallel, and cannot be wired according to this document.

Main Wiring

There is a main phone line running from the street's phone pedestal to the phone junction box located on the side of the house that the local phone company connects your phone line up to. A Cat5 line is run from this junction box outside your house to the CWP. Any place in the house where there is a networking or phone jack, a Cat5 line is run back to the CWP. Cat5 Cabling is a 'wire' that contains 4 pairs of wires. These pairs of wire enable you to distribute phone lines and/or network computer paraphernalia together. There are two main types of Cat5 jacks: one for wires with RJ11 ends and one for wires with RJ45 ends. Your normal phone system uses RJ11 ends and jacks, whereas computer networking cables use RJ45 ends and jacks. RJ45 ends and jacks look similar to RJ11 ends and jacks except that they are larger. See figure 1 for examples.

There is a Coax cable line that is run from the cable pedestal at the street to the side of the house. A Coax line is also run from the CWP to the exterior of the house where the local cable company will connect it to the line coming from the cable pedestal at the street. Every place in the house that has a cable jack in the wall has a Coax line run from that location to the CWP. Coaxial Cables are wires that run your normal television signals and can transmit high speed Internet data via a Cable Modem.

Phone and Video Distribution Inside the CWP

The CWP can contain many distribution blocks (often referred to as 'Patch Panels') that serve different purposes. These can take on many different sizes and shapes depending on what function it performs, how many objects it controls, or even who the manufacturer is.

There are two main distribution blocks that almost every CWP contains. One is for the phone distribution and one is for the video distribution. The distribution block for the telephone system (the "Phone Patch Panel") accepts the incoming phone line from the exterior of the house and splits it and sends it to all RJ11 phone jacks. *See figure 2 for examples.* The other main distribution block is for distributing the cable television throughout the house. This distribution block accepts the incoming cable line and then has outlets that the cable lines (that go to each cable jack in the separate rooms) connect to. *See figure 3 for an example of a video distribution block.*

Computer Networking and High Speed Internet

In order to connect computers in a house or to share a high speed Internet connection you need to be able to network them together. This requires a network gateway; such as a hub, a router, or a switch. (These can all be found at various electronic, office, and computer retail stores.)

It is not required, but highly recommended for sake of ease, that you have a network distribution block. *See figure 4.* Every Cat5 cable from each room that is to contain a RJ45 network jack is connected into this network patch panel. Short "Patch Cables" or "Patch Cords" are used to connect the network patch panel to the network gateway. (The reason that the network patch panel is not required is because it is possible to just connect the Cat5 cables that come in from each RJ45 jack in every room straight into the network gateway. This is not recommended because it makes it more difficult to make changes or use the Cat5 cable for multiple uses.) By connecting all of the Cat5 cables in the network patch panel to the network gateway you have now "Networked" your house together. You have not connected to the Internet yet, but it is now possible to share files, etc. with other computers within your house that are connected to the RJ45 network jacks installed in your house.

Now, to share an Internet connection you need to install a modem and connect it into your network. There are two popular high speed Internet connection options available: Digital Subscriber Line (DSL) and

Cable. DSL is over your existing phone line and Cable is over your existing cable television line. While similar in a lot of areas, there are also some important differences that must be looked at. We will first look at DSL.

The data transmitted with DSL is transmitted at the same time as your voice phone transmission. Because of this, filters are needed to stop interference. There are two ways of filtering: install a filter at every phone jack that a telephone is installed in the house or filter the phone signal in the CWP, with a DSL Filter Board, before it is even distributed to all of the phone jacks in the house. Each option depends on how you have your CWP set up. *See figure 5 for an example of a DSL Filter Board.* There are too many different setups that are possible for a CWP; therefore I am going to just explain one. You need to install the DSL Modem inside your CWP along with a DSL Filter. You need to change the way the CWP is setup from before a little bit. Instead of the exterior main phone line going into the phone patch panel, it must first go through the DSL filter board. From the DSL filter board, a line is run to the phone patch panel for distribution through the house with "filtered" phone line. There is also a line run from the DSL filter board to the DSL Modem. This line is not filtered and can therefore transmit the data to the modem. From the DSL Modem, a patch cable is run to the network gateway device's input port. The high speed Internet connection can now be shared and distributed throughout the house using the already installed network.

The data transmitted using a Cable Modem is transmitted at the same time as your cable television signal. One difference between DSL and Cable is that Cable does not require any filters; the data signal is at a different frequency than the television signal and can therefore be transmitted on the same line at the same time without causing interference. A Cable Modem can be installed anywhere in the cable television system where a computer is installed and needs the high speed Internet connection, but in order to share this high speed connection, it needs to be installed in the CWP. When the cable comes into the CWP from the exterior cable line it must be split. From this splitter it goes to the Cable Modem and also to the other splitter that distributes the signal to the rest of the house. (Please note: any time a cable signal is split, it is always possible that amplification may be necessary. Signal degradation is a problem that can be fixed using splitters that have an amplifier built into them.) The Cable Modem is now connected to Internet and needs to be connected to the whole house network in order to share this connection. Similar to the DSL Modem, the Cable Modem is installed in the CWP so that the Internet connection can easily plug into the network gateway device using a patch cable. The high speed Internet connection can now be shared and distributed throughout the house using the already installed network.

Wiring

A Cat5 cable can be used for up to four phone lines or, as is commonly used, for two phone lines and one network line. To install both a network RJ45 jack and two RJ11 phone jacks you need to run the wire so that two pairs (four wires) from the Cat5 cable run to the network patch panel to connect to the networking and to have the other two pairs (the other four wires) run to the telephone patch panel to be distributed to the RJ11 phone jacks in the rooms. The wiring for each of these is different and the documentation for the different items you install should be consulted for the wiring schematics.

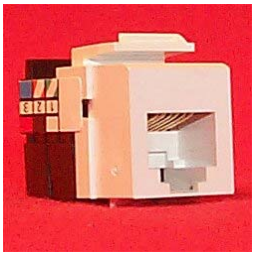
Information Links:

- Terminating RJ45 Jacks with the T568B Wiring Scheme:
http://www.levitonvoicedata.com/learning/animationplayer.asp?filename=channel_t568b_GM5e.swf
- "How To" for creating networking cables and connections:
http://www.ertyu.org/~steven_nikkel/ethernetcables.html
- Wiring a RJ45 Jack with only two pairs leaving two pairs for phone lines:
http://www.solwiseforum.co.uk/downloads/files/cat5wiring.pdf

RJ45 Network End

RJ11 Phone End

RJ45 Network Jack



RJ11 Phone Jack

Figure 1

Two Types of Phone Patch Panels

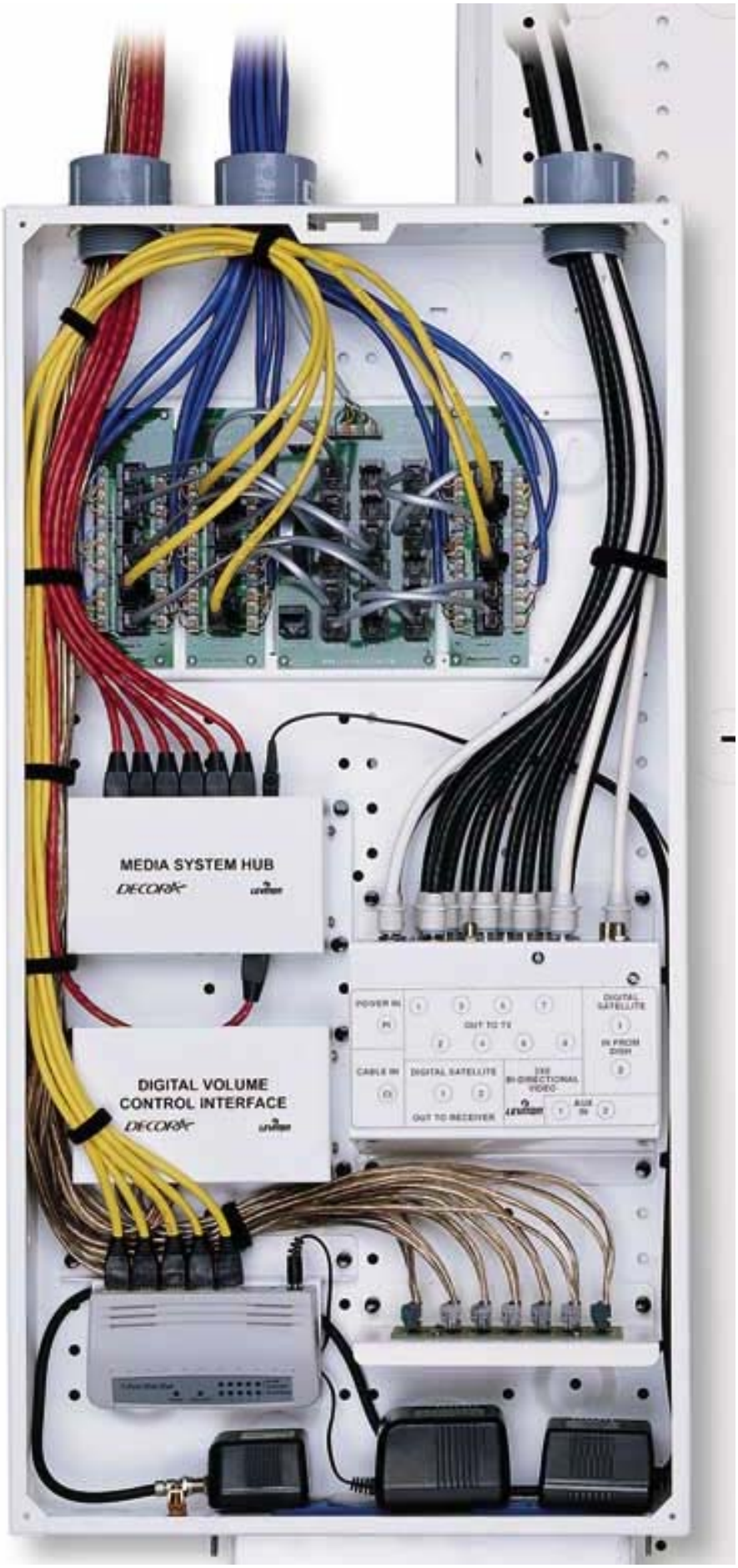
Figure 2

Video Distribution Block

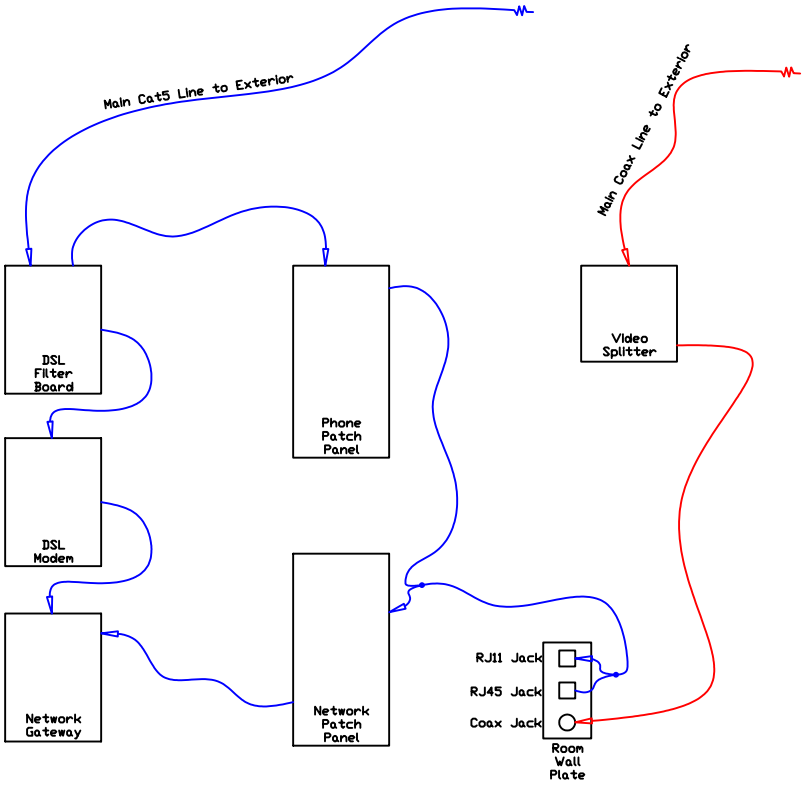
Figure 3

A Network Patch Panel
Figure 4

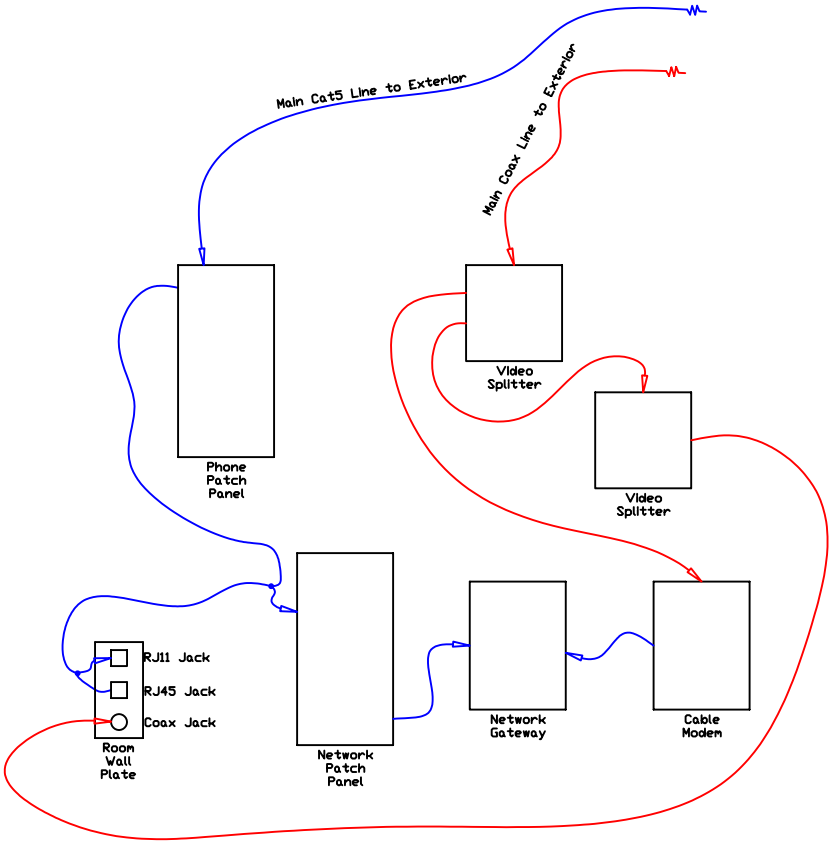
A DSL Filter Board
Figure 5



General Central Wiring Panel Example



DSL Modem Example to One Room



Cable Modem Example to One Room