Tom Curnin · Aug 25, 2020 · 8 min read

Pre-Wire: Everything You Need To Know About Your New Jersey Smart Home Pre-Wiring

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Bravo AV of New Jersey. Structured or Whole-House Wiring Approach

Pre-Wiring Your New Jersey Smart Home

Introduction

As you prepare to make a significant investment in audio, video, and network components, it is important that you use high-quality cables to avoid throwing high-definition signals down the drain. Audio and video cables must be engineered to transmit delicate signals over long distances without signal loss, impedance distortions, or noise interference. Everything about the construction of the cable makes a noticeable difference in performance. At Bravo AV, we believe you should put the best quality cable that fits your budget in the wall because once it is in the wall, it is not coming out, and running new wire later is very expensive.

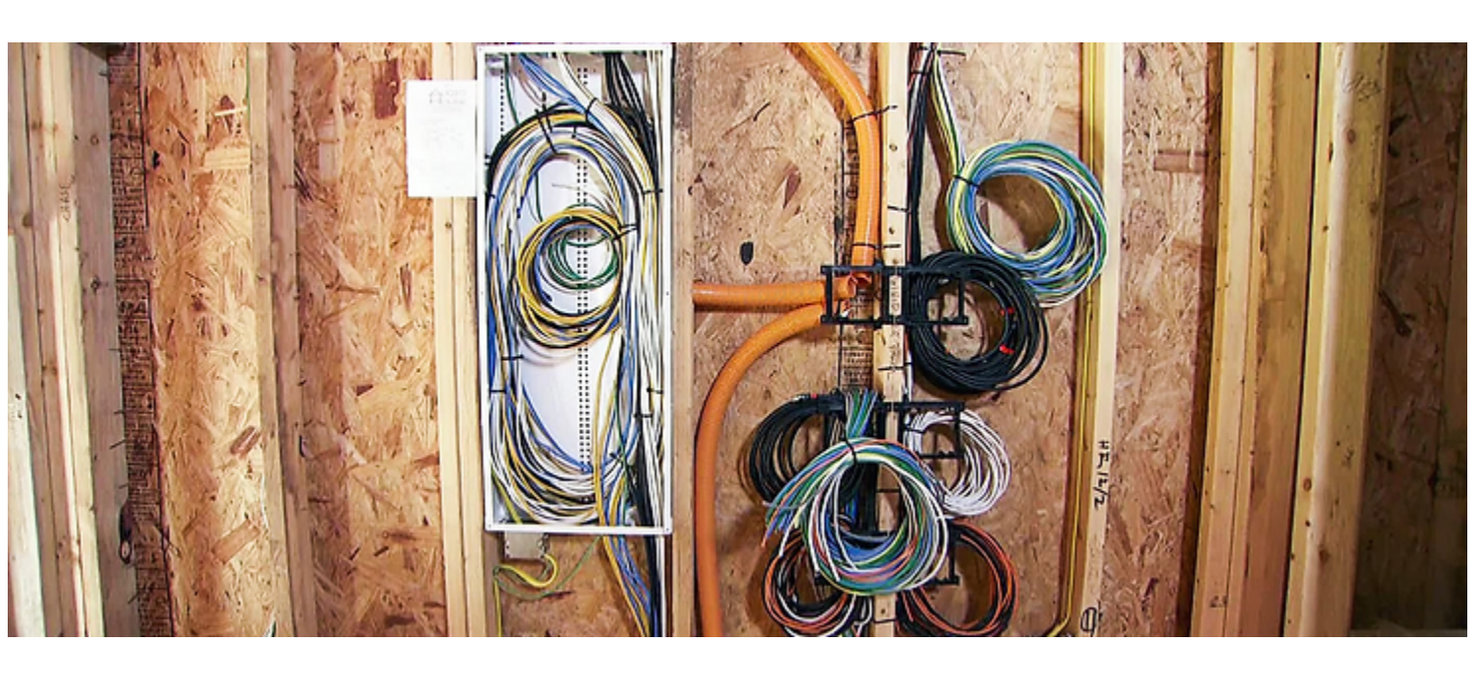
We have documented everything about Smart Home Wiring and Speaker Wire here

Quality equipment and cabling do a much better job of delivering the audio and video signals from the source to its destination without the signal's degradation. Better sound and pictures are a direct result of adding less noise and distortion.

Cables can contribute a great deal of noise and distortion to both the sound and the image due to the way the cable is designed (the type of copper, gauge, lengths) and how well the cable is shielded (designed to reject noise from outside interference). Reducing the noise anywhere within the system will increase the overall performance of the system.

General

All phone, computer, TV, and fiber cable(s) are "home-run" from various rooms throughout the house to a designated cable "headend" location in the basement. All cables will be run as far away as possible from high-voltage wiring and fluorescent fixtures to reduce interference. Our technicians will also ensure that the cables are not bent too sharply or pulled with too much force to avoid damaging the cable. All cables will be labeled at the headend and professionally terminated to maintain the transmission chain's integrity. Improperly terminated cables can lead to signal loss and therefore compromise audio and video quality. Below is BRAVO's approach to structured or whole-house wiring.



AV Headend

Bravo AV runs all these cables to one AV "headend" area. This is typically in the basement. Bravo AV will determine the basement "headend" location with input from the homeowner and builder. The builder should dry-lock (waterproof) the exterior walls and install ¾ inch plywood (painted black) to be used by BRAVO to mount equipment. Dry-locking walls and painting all other surfaces accomplishes two things: 1) prevents moisture transfer through the outer wall and 2) keeps concrete dust down, which could damage the electronics. This room should be well lit and adequately ventilated. Where possible, this room will be away from electrical panels. This design is to protect the gear and make future service easier. The headend will typically have at least two dedicated 20-amp outlets to power various equipment. Using Bravo AV two-step surge protection and power filtration methodology, these circuits are typically protected back at the electrical panel.

Conduits for the Future

BRAVO recommends that the builder install two or three strategically located, 2-inch PVC conduits from basement to attic to accommodate your future cabling needs. In addition to the basement to attic conduit runs, Bravo may elect to run conduit to the home theater, high-performance media room and/or the office.

Types of Cable

There are four main types of wire used in structured or whole-house wiring applications:
1) Coaxial cable for video transmission.
2) Category 6 or Category 7 cable for data transmission, i.e., computer networks and phones. For a discussion on the types of low-voltage category wire, please refer to our article *Classification of Low-Voltage Wire*.
3) Speaker wire. Please see Bravo AV's article on *Speaker Wire*.
4) Fiber. Fiber optic cable for future transmission speed needs. Typically, in residential applications, we use Multimode OM3 Fiber.

Use	Good	Better	Best	Professional
Phone	CAT 6	Belden CAT 6	Belden CAT 6	
Computer	CAT 6	Belden CAT 6	Belden CAT 6 bonded pair	AudioQuest CAT 7
Video Distribution	RG6 quad shield	RG6 quad shield swept to 3GHz	RG6 quad shield swept to 3GHz	Belden Broadcast Quality
Speaker Wire	16awg	14awg	Belden 12awg	Belden 10awg
Fiber	Multimode OM3	Multimode OM3	Multimode OM3	Multimode OM3
HDMI (1)	Chocolate	Carbon	Coffee	Diamond

(1) We use AudioQuest HDMI

What Bravo runs

Phone and Computer: CAT 6 is minimum. CAT 5 is obsolete
Videos Distribution: RG6 Coax Quad Shield minimum
Speaker Wire: 14 gauge minimum
Fiber: Multimode dual strand OM3

Types Of Wire Used For New Jersey Smart Home Experts

Digital Video Distribution

There is another type of cable commonly used for video distribution, called HDMI. HDMI is the global standard for connecting high-definition consumer electronics and PC products. It is the uncompressed, all-digital interface that delivers both dazzling quality and unmatched ease of use. HDMI transmits all types of audio and video through a single digital link. HDMI is an all-digital interface that requires NO conversion or compression. HDMI's typical residential application is to connect source devices, like a cable box, to the TV.

Phones

With today's multi-line, multi-function, intercom/speaker phones, we suggest running one CAT 6 phone line to each bedroom and multipurpose/high-use room to provide you with a wiring infrastructure capable of supporting an intelligent and reliable phone system. We generally do not run a phone line into formal dining rooms or other rooms used for formal entertaining. For large garages, we suggest one phone line. While almost everyone has a cell phone, the intercom feature and door station (door station allows you to talk to the person at the door from any phone in the house) of the phone system is invaluable in a big house. Using a regular phone system rather than your cell phone reduces your exposure to electromagnetic radiation from your cell phone.

Computers

We suggest one run to each room that may require a computer connection now or in the future. We run our basic computer network in CAT 6 with a minimum of 350 MHz bandwidth capacity. We can also install one or more runs for network printers and or other network devices. Using a networked printer, you can share a relatively expensive resource (e.g., a color laser printer) with everyone in the family. For an additional charge per run, we can install CAT 7 for even greater transmission capacity. With CAT 7 you will be better prepared for new technologies as they become available. With the amount of streaming content and the speed of today's computers, we strongly recommend CAT 7 wiring. CAT 7 is different from CAT 5 and CAT 6 in that is has a shield around each of the four pairs along with a shield around all four pairs. This is very helpful in reducing the negative effect of EMF noise.

Video Distribution

Prewire for Flat Screen TV With Backbox

We run an RG6 coaxial cable in your home, not the less expensive and less capable RG59, for better video distribution. We also use quality compression fittings rather than crimp-on fittings for better and more reliable connections. In conjunction with the RG6, we can also run a CAT 6 for communications to video services like Netflix or TIVO or future services. For the homeowner who wants both cable and satellite flexibility, we run a second RG6 cable.

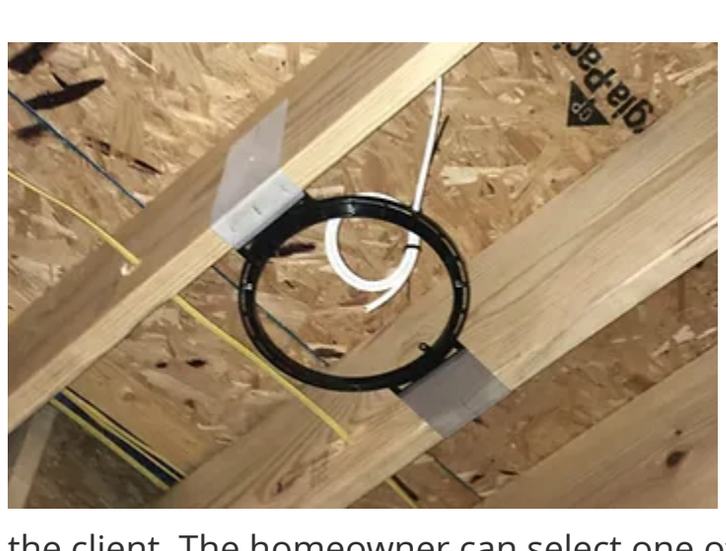
Speaker Cable

Speaker wire consists of equal numbers of electrical conductors insulated from each other, surrounded by a protective jacket. One conductor (or group of conductors) is referred to as the positive conductor (red), and the other is referred to as the negative conductor (black). Copper is the most common conductor metal.

For whole-house wiring (multi-room audio), four-conductor wire is most often pulled to reduce both the amount of cable used and the amount of labor. The color code for four-conductor wire is red (positive)/black (negative) for speaker one and white (positive)/green (negative) for speaker two.

Its purpose is to carry an electrical signal (voltage and current) from the amplifier (or the amplifier section of a receiver) to the speakers.

When selecting in-wall speaker wire, the most important factor is the actual amount of copper in the wire, referred to as gauge and abbreviated as awg. As the number goes down, the wire gets bigger. Typical speaker wire gauges are 16, 14, 12 and 10. With each decrease in gauge (bigger wire size) you will reduce resistance by approximately 50%. This is significant! We use either 14 or 12 gauge for multiroom audio. We use 12 or 10 gauge for home theater application. We use AudioQuest specialty speaker cable for demanding listening applications.



In new construction and remodels where the ceiling has been removed, we install a new construction bracket (NCB) to receive the speaker. This allows the sheet rockers to finish neatly up to the NCB. Origin Acoustics has a unique product that allows Bravo AV to install either a 6" or 8" speaker into the NCB. This provides tremendous flexibility to the client. The homeowner can select one of 6 speakers ranging in price from $500/pr to $2,800/pr. No other manufacturers offer this flexibility. This is in line with our philosophy of treating each room's sound requirements (quality of speaker used) independently from other rooms in the house.

Fiber Cable

It is Bravo AV's position that fiber should be used as an approach to future-proofing your home in addition to running the necessary cabling for your existing telephone, cable, satellite, and networking systems. Therefore, our design contemplates strategically located fiber runs in the house to be used for future technologies.

What Bravo Runs

Phone and Computer: CAT 6 is minimum. CAT 5 is obsolete
Videos Distribution: RG6 Coax Quad Shield minimum
Speaker Wire: 14-gauge minimum
Fiber: Multimode, dual-strand OM3

AV Headend

This room must be clean, ventilated and well lit. This is to protect the gear and make future service easier. The headend will typically have at least two dedicated 20-amp outlets to power various equipment.

Overall Summary

The type and quality of wire that go into to your house can greatly affect the overall performance of the system. It is comparatively cheap to run a cable when the walls are open rather than later when the walls are sheetrocked and closed up. You also want to have an overall design that meets today's needs and gives you some extra capacity to meet the demands of the future.

CABLING TERMS

AWG (American wire gauge): The diameter of a wire. The higher the number (gauge) the smaller the diameter. Speaker wire is typically 10-16 awg.

Bandwidth: In audio, the range of frequencies within which a device operates. In video, the range of frequencies passed from the input to the output.

CATV (Community Antenna Television): An RF distribution system that distributes television broadcast programs, original programs, premium programming,, and other services using a network of coaxial cable.

Coaxial Cable (Coax): A popular transmission medium usually consisting of one central wire surrounded by a delicate insulator and encased in either a wire mesh or an extruded metal sheathing. Also, a concentric cable consisting of a center conductor, a dielectric, and a shield. Coax used for most MATV and CATV work has a characteristic impedance of 75 ohms. RG59, RG6 and RG11 are all types of coax cable.

Headend: An electronic control or distribution center for networks (e.g., phone, LANs, CATV, CCTV or audio) where incoming signals may be rerouted, amplified, converted, or processed. The headend may include antennas, amplifiers, demodulators, modulators, processors, splitters, and other related equipment.

Home Run: A cable run that goes directly for a given location in the house to the headend.

LAN (Local Area Network): A data communications system confined to a certain area. The area served may consist of a single building, or a cluster of buildings.

Patch Panel (Splice Block): A device that consolidates cables in a central location, allowing for easy changes.

Prewire: The installation of cables and wires during a new home's construction done before the sheetrock phase. It includes the AC electrical wiring, as well as the low voltage home systems cabling. Some of the home systems that require prewiring are security, home theater and entertainment, phones, door-phones, PC and internet networks, surveillance cameras, driveway vehicle detection, communicating thermostats, motorized window treatments, entry systems, and irrigation systems.

RJ-11 connector: The modular phone jack/plug commonly used at the two ends of telephone cords and also used for modem, FAX and other computer peripheral connections.

RJ-45 connector: The modular jack/plug commonly used at the two ends of computer network.

Run or Drop: A length of cable or wire that is run from a room to the headend location.

Splitter: A signal divider that splits an incoming signal into multiple output signals, as would be required to supply multiple TV sets from a common antenna. Without the impedance balancing provided by a splitter, the supply of multiple loads from a common antenna compromises signal strength. In doing so, splitters reduce the signal power available to each output. As a result, a distribution amplifier may be a better solution for a larger number of receivers or for weaker signal conditions.

For additional resources, please visit our page on Smart Home Wiring and Speaker Wire here, with articles like this on everything you need to know.

Bravo AV is proud to be an HTA (Home Technology Association) Certified Installation Firm and professional A/V experts. Tom Curnin, the owner of Bravo AV, is a CEDIA Professional Designer, a certified THX Level 1 home theater professional and a member of the Home Acoustic Alliance trained to Level II. You can contact Tom directly at (908) 953-0555 or through email at Tom@BravoAV.com.