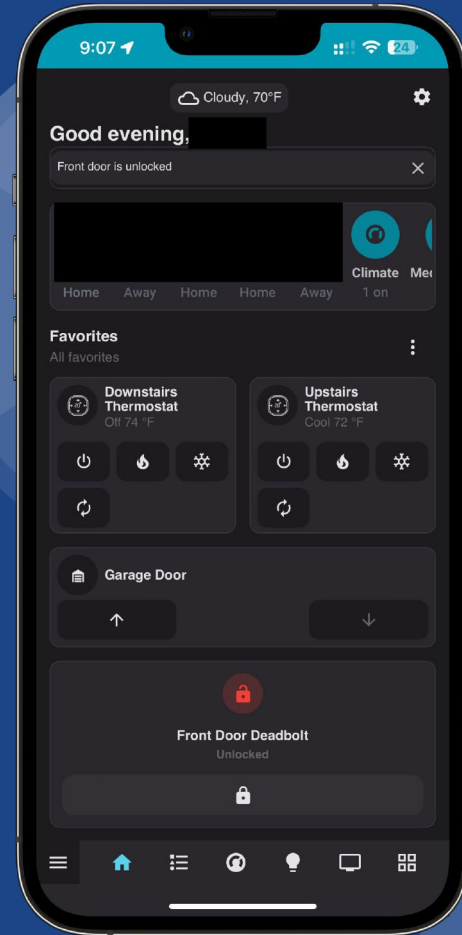


DIY Smart Home Pre Wire Guide

My personal take on a smart home's prewire.
Late 2022





Disclaimers

I want it to be apparent that these are my personal choices if I were to build a new home from scratch. I am not a licensed electrician or low voltage technician. Please don't copy my system, make one for your own needs and use mine for inspiration :)

Start off by choosing your control method. Cloud vs Local. I recommend Local. Then pick a hub, hardware and start programming the system.

Color coding the cable is just there if you want it, doesn't affect the functionality

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Important Terms

- Demarc - The place where the internet connection terminates in the home.
- Home Security - Usually referring to a security system and/or cameras of some sort.
- Home Networking - Refers to everything networking and Ethernet related.
- Home Automation - Refers to automating parts of the home or simply having a “smart home” (Smart devices that interact together and make an easier lifestyle)
- Home Audio - Refers to home stereo surround sound or multiroom audio.
- Home Video Distribution - refers to having all TV input sources centralized at the demarc and Ethernet/Fiber ran to each TV for video.
- Electrician Related - refers to anything that I think of that a electrician can wire. LEDs, Wire-nuts, Outlets etc.
- Wiring - 18/4 simply refers to 18 gauge 4 conductor wire, 14/2 refers to 14 gauge 2 conductor wire and so on.
- ISP = Internet Service Provider (Comcast, AT&T, Spectrum etc.)



Smurf Tube



- I'd HIGHLY recommend running smurf tubing to most of the locations where you have ethernet and also to the outside where the utility hookup is. Smurf tubing is a flexible type of hollow tubing or conduit that can be used to pull wires after drywall is up. This is easily the best way to futureproof your home.
- ½" Smurf Tube for 1-3 CAT6a, ¾" Smurf Tube for 2-4 CAT6a or Demarc, 1" Smurf Tube for 4-6 CAT6a, 1.25" for HDMI runs, or 4-8 CAT6a.
- Run your cables outside of the smurf tube – to leave it empty for future cables

Wiring for Home Security - Page 1

Mount a 20 or 28/30 inch enclosure at the demarcation / server room. Leave AT LEAST 6 ft of wire extra at the demarcation end and 18in at the equipment end. This will allow you to re-terminate it later and avoid issues. Cover with plastic wrap or a box cover to avoid getting these cables dusty and keep the look/aesthetic clean.





Wiring for Home Security - Page 2

- **Security Keypads:** Run (1) [18/4 stranded](#) from the security enclosure to each security keypad location. Place above the light switches for the room. Usually placed by exit doors and the master bedroom. Mount a 1-gang junction box at each keypad location.
- **Motion Sensors:** Run (1) [18/4 stranded](#) from the security enclosure to each motion sensor location. Each motion sensor can be placed in the corner of each room at a height of 7 feet or on the ceiling. Do not mount a junction box/bracket.
- **Glass Break Sensors:** Run (1) [18/4 stranded](#) from the security enclosure to each glass-break sensor location. Place at least 10-15 ft from windows if possible. Mount a junction box.
- **Door/Window Sensors:** Run (1) [18/4 stranded](#) from the security enclosure to each sensor location on the frame of each door/window. Do not mount a junction box/bracket.
- **Video Doorbell:** Run (1) [Red CAT6a](#) and (1) [18/2](#) solid to the doorbell location. Red CAT6a should terminate at the networking enclosure. 18/2 is for a normal doorbell chime. Mount a junction box.
- **Surveillance Cameras:** Run (1) [Red CAT6a](#) to each camera location. Red CAT6a should terminate at the networking enclosure. Mount a junction box.
- **Siren:** Run (1) [18/4 stranded](#) from the security enclosure to each siren location. Mount a junction box.
- **Water Sensor:** Run (1) 22/4 stranded from the security enclosure to each water sensor location.



Home Security Equipment Recommendations

Consult your local security dealer to be sure - use my advice as a general guide.

Main Alarm System: [Elk M1](#) (automation focused home/use if you plan on having touch panels), [Honeywell Vista 20P](#) (for use with normal keypads) with an [Envisalink 4](#), [Konnected.io](#) is also a great option.

Cameras:

[4K Color Night Vision Camera](#)

[5MP Amcrest Color Night Vision Camera](#)

[4MP Amcrest Color Night Vision Camera](#)

[Amcrest 4K Bullet Camera](#) or [UniFi G4-Pro](#)

[Amcrest 4K Dome Camera](#)

[Amcrest 1440p Bullet Camera](#) or [UniFi G4](#)

[Amcrest 2K AD410 Doorbell](#), [UniFi G4 Doorbell](#) or [G4 Doorbell Pro](#)

NVR:

[Frigate](#) + Deepstack + [Home Assistant](#) for the techy. [UNVR](#) or [Amcrest NVR](#) for non-techy.



Honeywell pictured above

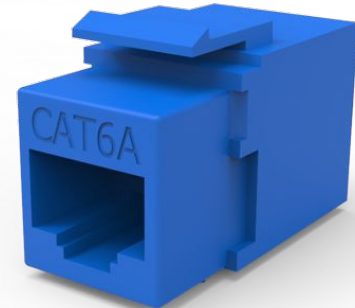


Home Networking



Example of Conduit
Credits: @SuddenlyEngineer on Discord

- Mount a 20-inch enclosure at the demarc. Leave at least 6 ft of wire at the enclosure side and 18in at the equipment side. Cover with plastic wrap to avoid drywall dust. My best advice would be: **Run as many drops of conduit as possible.** Cables will run outside the conduit so the conduit is empty. Cables will go into a rack out of the enclosure. **Label each wire as well!**
- **TV Prewire:** Run (2) [Blue CAT6a](#) for general networking to the networking enclosure from the tv enclosure. (This is for behind a wall mount TV)
- **Standard Data Location:** Run (2) [Blue CAT6a](#) for general networking to the networking enclosure. (User preference, General Rule add 1-2 to the amount you need for the future.)
- **Wireless Access Points:** Run (1) [Yellow CAT6a](#) to each wireless access point location. They should be spread out evenly on each corner of the home or centrally to maximize coverage.
- **Demarc:** Run a ¾ inch [Conduit](#) from the service entrance into the enclosure for the ISP.





Home Networking Equipment Recommendations

[Ubiquiti UniFi](#), [TP-Link Omada](#) or [Ruckus](#) are my go to systems. I'd recommend Wi-Fi 6 models to futureproof. If you're techy consider OPNsense or PfSense.



Home Automation

Shades: Mount a 42" enclosure at the demarc. Determine what brand you would like to go with and follow their wiring instructions. My general recommendation is: 16/4 Solid wire.

Automated Lighting/Humidity Fan: Run (1) White CAT6a to the ceiling of EVERY room for a multisensor. The multisensor has motion, humidity, temperature etc. and can be used to trigger other "smartified" things. I recommend using the [Aeotec Multisensor w/ recessor kit](#). Use a [POE to Micro USB Adapter to power these](#).

Garage: I recommend using a [Z-Wave Relay](#) and a tilt/door window sensor to control the garage.

Wall-Mount Tablet: Run (2) [Orange CAT6a](#) to each of the tablet locations. Mount a junction box.

LED Strips: Doing smart shades? Use the same in wall enclosure as the smart shades. Otherwise install a [28 / 30 in wall enclosure](#). Run [18/8](#) solid to the corners of each room/eave you want to wire from the enclosure. Be sure to label. Mount crown molding about an inch below the ceiling. Do NOT use a junction box.

Voice Assistant: Run (1) [Gray CAT6a](#) and (1) [14/4](#) to each voice assistant location from the network enclosure. *(This is really not needed anymore as most smart home speakers (Alexa/Google Nest) can connect to sound systems via a skill.)*

Thermostat: Run (1) [18/8](#) solid to each thermostat. Wire remote sensors in every room with [22/4](#) cable back to each thermostat. Mount a junction box. I recommend [Venstar](#) (for [remote sensors](#)) or [Honeywell](#) thermostats (w/o remote sensors.) If you plan on having wall mount tablets place all of the thermostats in a central location and use the tablets for control.

Lighting: I'd highly recommend [Lutron Caseta](#) or [Lutron RadioRA3](#) for lighting controls, it may seem like alot now, but Lutron is stupid reliable! If you want something cheaper check out [Zooz ZEN72 Z Wave 700 dimmers](#).

Smart Locks: [Yale Z-Wave Plus Locks](#) . [Schlage Z-Wave Plus Locks](#) or the [Schlage Encode Plus](#)

Fan Control: I recommend [GE Fan Controllers](#) (inwall) or [HomeSeer](#) (inwall), [Bond](#) is also an option.

Smart Remote: [YIO Remote](#) or [RTI](#)



*14 gauge wire is also fine



Home Audio



Run (1) [12/4](#) stranded to the first speaker in the set. Then run a 12/2 jumper to the next speaker.

Example: Run [12/4](#) to the bottom left speaker then a 12/2 to the top left speaker from the bottom left speaker. Then run [12/4](#) to the bottom right and a 12/2 jumper to the top right.

Pull (1) [12/4](#) stranded and/or [RG6](#) to each subwoofer from the network enclosure.

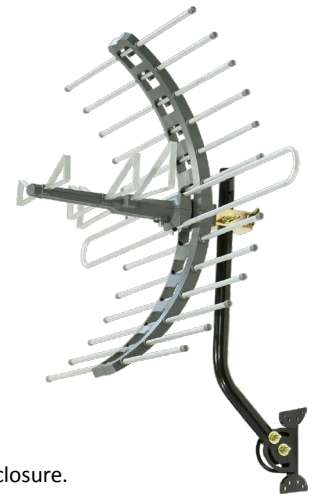
For in ceiling speakers/in wall use Rough In Brackets depending on your speaker size. Similar to [this](#).

Wire for more speakers than you need! Cover with blank faceplates unused areas.

Some good brands include: Klipsch, Sonance, Bose, JBL, Polk...



Home Video Distribution



- **TV Prewire:** Run (1) [Green CAT6a](#) or Fiber to every TV/Projector location from the networking enclosure.
- **Infrared Control:** Run (1) [Purple CAT5e](#) to each TV/Projector location you wish to control via IR from the networking/main enclosure.
- **Antenna Wire:** Run (2) [Orange RG6 cables](#) to the attic for a TV Antenna from the main enclosure.
- **TV Enclosure:** Use a [9" Enclosure](#) for each Wall-mount TV Location to hide wires. Mount this behind where you would mount the TV.
- **Cable TV Pre-Wire:** Run (1) [Black RG6](#) to each TV location from the networking/main enclosure.
- **HDbaseT:** HDbaseT allows your sources to be centrally located in your rack and the Green CAT6a will carry the video signal to televisions. You will need to use an HDbaseT Matrix if you want to do this method of video signal. [HDbaseT example matrix from Amazon](#) I'd recommend running a [Fiber Optic HDMI cable rated for 4K @ 120hz](#) instead if you want to futureproof. Run a smurf tube alongside.
- **Satellite Prewire:** Run (2) [Orange RG6 cables](#) to the roof for a satellite dish to be installed.



Electrical Related



- **Outlets:** I recommend [Eaton Decorator Commercial Grade Outlets](#) when applicable. (heavily used areas)
- **Switches:** My recommendation is [Eaton Decorator Switches \(Commercial\)](#) for non-smart switch locations.
- **Wall plates:** Use [Eaton PJS Screwless](#) Wall plates.
- **Wire nuts:** Use [Wago 221 Wire Nuts](#).
- **Outdoor outlets/Switch covers:** Use [Taymac ML500W](#) outdoor covers.
- **Recessed Lighting:** [Use Halo recessed lighting](#) throughout the house (6in)
- **Fireplace:** Run (1) [18/4](#) to the under the fireplace to control the fireplace with a relay.
- **Electrical Boxes/Brackets:** [Use screw on boxes](#). This greatly increases the security to the wall or ceiling.
- **Dedicated Circuit:** Run a dedicated 20-amp circuit to the demarc enclosures and racks. Also another dedicated 20-amp if you plan to run lots of addressable led strips/shades.
- **Electric Vehicle Charger:** Run a dedicated 40-amp circuit to where the charger will be.

Smart Appliances

- Prewiring for this category isn't very prominent yet, but I believe it is still important to prepare for the future. So I'd recommend running a small conduit (pick a size yourself) to each appliance location from your rack for future cabling. If you want smart appliances, Samsung, LG, Bosch and some others have good systems compatible w/ Home Assistant. Avoid Whirlpool
- Smart Water Heaters are a thing 😊





Hub Recommendations

- [Home Assistant](#) (techy, somewhat steep learning curve but a lot of integrations and flexibility) (Use Z-Wave JS 2 MQTT for Z-Wave & Zigbee2MQTT for Zigbee)
- [Hubitat](#) (simpler, but less integrations and less overall features.)
- [Homebridge](#) + Homekit (simple, lots of integrations, but limited to Apple Homekit features)

Z-Wave Controller:

<https://www.amazon.com/Z-Wave-Stick-Assistant-HomeSeer-Software/dp/B07GNZ56BK/>

Zigbee Controller: <https://itead.cc/product/sonoff-zigbee-3-0-usb-dongle-plus/>



Need help knowing what you should do?

Click the button below to join.

