

How To Choose And Install An Intercom Or Door Phone System For Your Home Or Business.

Provided by IntercomsOnline.com

Purchasing a door phone or intercom system for residential or business use can be a daunting task without the right information. The right information is what you'll find in this guide. We'll help you make an informed purchasing decision...and help you get it installed.

There are what seems to be an endless array of systems to choose from. The purchaser is faced with decisions of whether to purchase wired or wireless; 2-wire, 4-wire, or Cat-5; video or voice only; full-featured or basic features only. You can even purchase systems that transmit and receive over your house or business power lines.

Which system is right for you depends on a number of factors that we will help guide you through.

When shopping for an intercom system you'll see both the terms door phone and intercom used. What's the difference between a door phone and an intercom? These terms are often used interchangeably, even in the same product description. For this guide, the term intercom will be used for systems inside a building that enable you to call from room to room.

A door phone is a system that enables you to receive "calls" from your front door or some other door on the outside of your building. When someone arrives at an outside door, they press a button that alerts one or multiple inside stations and then the people inside the building can talk to them by pressing a button on an inside station. Intercom systems may also have an outside intercom, or what we call a door phone.

There are also video door phones that enable you to actually see who is at the outside station as well. Video adds another layer of security to your door phone.

Another type of intercom is the baby monitor. These are one-way intercoms. You can listen to the baby but you can't talk back. These units are almost always wireless. You can even get video baby monitors that see in the dark.

Why Do You Need An Intercom?

If you've ever shouted across your house or business and have been frustrated by the lack of response, you know why you need an intercom system. An intercom allows people to communicate instantly with each other through the push of a button. Once you experience the benefits of an intercom system, you'll wonder how you got along without one.

Here are just a few of the benefits people experience with intercoms:

- Keep you from running up or down stairs just to tell your kids dinner is ready.
- Call your husband out in his workshop to tell him he has a phone call
- Use as a safety device for seniors who don't get around as well anymore
- Use to monitor a baby's or child's room
- Tell someone in the your store's back room to bring inventory upfront

- Call for additional help with customers in your store.

The uses for an intercom system are endless. They are an instant way to send a message, instruction, or to get help.

Why Do You Need A Video Door Phone?

A video door phone is a type of door phone that has a camera on the outdoor station and a display of some kind on the indoor monitor.

When someone presses the call button on your video door phone it activates its camera and alerts the indoor monitor. You then talk to them while you view their image. You can even press an open lock button if you have an optional electric door lock installed.



There are lots of good reasons to get a video door phone. If you've ever had your kids run to the door and open it to a stranger, you know one reason to get a video door phone. Kids love toys and they'll see the video door phone as another toy they can't wait to play with. So instead of running to the door, they'll run to the door phone monitor. That at least gives you time to make sure they don't open the door to a stranger.

For children who are old enough to be at home by themselves, and for you, a video door phone also enables them and you to conveniently and safely see who's at the door without opening it, or even getting anywhere near it.

Another great benefit is that you don't have to open the door to solicitors. It's so much easier to say "no thanks" to a good salesperson when they can't even see you!

The Technology Behind Intercoms And Door Phones

This section will help clear up some of the confusion you'll experience as you search for the right intercom or door phone system for you. Here we briefly cover the underlying technology behind each system and give you the positives and negatives about each one of them.

Power Line Carrier Systems

Power Line Carrier (PLC) intercom systems communicate using a very low FM frequency over your house's existing 110 volt AC house wiring that supplies power to receptacles and light fixtures. You just plug them in anywhere you have an outlet and they're ready to go.

While they sound like the ideal solution for basic applications, most users are typically not happy with these intercom systems.

These units are very susceptible to interference from both inside and outside the house or business. You may experience buzzing, poor audio, or they may work perfectly well for you. They are very low featured, but they are also very inexpensive. These systems are not recommended for most people.

2-Wire And 4-Wire Systems

In your search for an intercom system, you'll see a many systems listed as 2-wire or 4-wire. Years ago the differences between the two were significant.

In voice communications there are half-duplex and full-duplex methods of transmission and receiving. Half-duplex communication is like push-to-talk "walkie-talkie" radios or CB radios. When you want talk to someone else with a compatible radio, you have to press a button to talk, let go, and then wait for a reply. The person on the other radio does the same to respond to you. Neither party can talk at the same time.

Full duplex communication is what a telephone uses. All parties on the call can speak at the same time.

Years ago 2-wire intercoms were half-duplex only. With only one pair of wires, they had to be used for both transmit and receive. When one party was talking, the wires were being used to transmit the voice to the other party. Then the wires were used to receive the voice from the other party, and vice versa. Some very basic intercom systems still use this method of half-duplex communication.

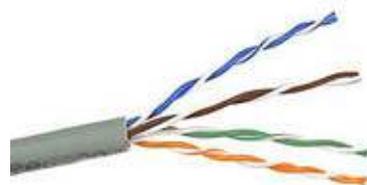
4-wire intercom systems were full duplex. Since there were four wires, one pair could be used for receive and the other pair to transmit.

New developments in technology made it possible for even two wire systems to have full-duplex operation. So the choice between two-wire and four-wire is more about whether or not you already have wire in place and how many conductors it has.

If you already have two wires in place, then it would obviously be better to choose a two-wire system. If you have to install wire, then you should always install a cable with more wires than you currently need. Then you'll be ready for future applications and you can choose any intercom system you want.

Cat-5 Systems

Which brings us to a third type of wired system: the Cat-5 system. Cat-5 is short for Category 5 and it is a specific type of bundled wires. It is typically used for



data networks and it consists of four twisted pairs of copper wire. It supports frequencies up to 100 MHz and speeds up to 1000 Mbps.

Intercom systems that use Cat-5 wiring communicate digitally between stations and therefore may offer more features. Cat-5 is usually used by the more expensive systems that are professionally installed. The use of Cat-5 is relatively new so there are fewer, but a growing number of choices for these systems.

But even if you don't install a Cat-5 system now, we recommend you install Cat-5 wiring and use that for your 2- or 4-wire system. Then you'll be ready if you want to upgrade later.

Wireless Systems

There are two major benefits of a wireless intercom system over the traditional wired intercom. The first is that installation is much easier since no wires have to be run between intercom units. The second is that you can easily move the units at any time.

With a wireless intercom system, you can be up and running minutes after you take them out of the box and power them up.

But with that ease of installation and convenience also comes some risk. There is risk of interference from other wireless and electrical devices. Other wireless devices near the intercom such as cordless telephones, wireless data networks, and remote audio speakers can interfere. Electrical devices such as motors can also cause noise.

There is also risk of other people hearing your conversations by picking up your conversation on a scanner, baby monitor, cordless phone, or a similar device on the same frequency. However, there are wireless intercoms that reduce or eliminate both of these risks.

The United States and Canada have several frequency ranges for wireless intercom systems and other wireless products. They are 49MHz, FM band (200KH - 270KHz), 900MHz, 2.4GHz, 5.8GHz, and MURS (150 MHz). There are also Power Line Carrier units that communicate over house wiring that are referred to as wireless intercoms.

49MHz

The 49MHz frequency was used by early cordless telephones and is still used by baby monitors and other low-end wireless products. Its range is short and conversations are not secure. It is also the most likely frequency to pick up noise from electrical devices. There are no known wireless intercom systems that use this band.

FM band (200KH - 270KHz)

You will find intercom systems that use the FM frequency. They may work well for you and they may not. It depends on what other transmitting and electrical devices are nearby. They are also not secure so anyone can listen to your conversations.

900MHz

900 MHz products were next to market. The 900 MHz radio frequency band is used only in North America, Australia, and Israel. When these products first came to market they communicated using analog technology. One problem with analog 900MHz products is that they allowed other people to hear your conversations if they had a device that is using the same frequency. Now most 900MHz products use digital spread spectrum which divides digital transmission across a range of frequencies so other devices can't eavesdrop on your conversations. Some wireless intercom systems still use 900MHz.

2.4GHz

After 900MHz came 2.4GHz frequency devices. 2.4GHz is used worldwide (Including in North America, Australia, and Israel). There aren't too many wireless intercoms available in this range except for video intercom systems.

But one of the problems with 2.4GHz wireless devices is that this is the frequency range used by WiFi wireless data networks (802.11B/G) in residential and business.

If you have a wireless connection to the Internet or other PCs in your house or business, this network could interfere with your wireless intercom system. However, the majority of people don't experience any problems in mixing 2.4GHz systems.

As an example, one of the problems users have experienced is their WiFi network resets every time they use their wireless intercom, which then causes the intercom to reset. Or they simply hear clicking noise on their intercom system.

If you do experience interference, the setup for the wireless data routers allows you to select the wireless channels the router uses to communicate. So if you experience problems you could try changing the channels.

But the problem with this is that many 2.4GHz devices use spread spectrum technology. That means they are changing frequency every second or less. They often use the entire 2.4GHz spectrum allocated to these products so changing the frequency on your wireless network will do no good.

5.8GHz

Now 5.8GHz products are starting to make their appearance. So far, about the only product available in this frequency range are cordless phones. 5.8GHz devices are totally compatible with 2.4GHz and other frequencies so no problems should be experienced in mixing these.

MURS - 150MHz

The 150 MHz frequency is a Citizens Band radio spectrum that is called the MURS service. MURS stands for Multi-Use Radio Service. This is a newly created service by the FCC in the United States. It is a low power, short range service in the VHF (Very High Frequency) 150 MHz Citizens Band radio spectrum.

The FCC does not require users of products for these bands to be licensed, but it does impose strict regulations on the types of products and services that may be supplied to consumers.

Previously the FCC came out with the Family Radio Service (FRS) in the 462 and 467 MHz spectrum in which you can find handheld units, but no intercom systems based on this service. MURS is similar to FRS but it has a power increase of four times that of FRS radio. And unlike FRS, you can add a larger or external antenna to improve range. If you want to put an antenna on top of your house, you can do it with MURS. Some antenna manufacturers claim an external antenna can increase the effective radiated power of a transmitter by a factor of 4. These MURS intercoms can transmit up to four miles, and perhaps more with an external antenna. These units are not secure, but there are fewer systems in use and few devices outside of a scanner to intercept this frequency.

Features

Below are a few features you'll find on some of the better intercom and door phone systems:

Handsfree: This feature enables you to press a button, let go, and then talk to a person at another station without having to hold a button down.

Memory: At least one system has a built-in 32 picture memory function that provides a date and time stamp to show you who was at your door even when you are not home. It's a little bit like a security camera attached to a digital video recorder.

Video Monitor: This feature allows you to monitor anything around the door phone camera. You'll press a Monitor button and the camera will activate without alerting anyone by the camera. Using this feature you can check on the kids playing in the yard, check so see who is at the front door even if they don't press the call button on your door phone, or observe the area if you suspect vandalism or some other crime.

Music: The larger, more expensive intercom systems have the capability of playing music over all the stations. So if you don't have your house wired for whole house sound this is one way to do it. The sound won't be stereo hi-fi, but it's better than no music at all.

Electric Door Opener: If you add an optional electric door opener to a door phone, most

systems will let you press a button to unlock the door remotely.

Door Phone Night Vision: Many video door phone systems use infrared LEDs to provide a picture on the inside monitor even at night. If the system has a color LCD, it will switch to a black and white image at night.

Installation Of Intercoms And Door Phones

If you decide you want to install a wired intercom system, then this section will help you do it. As long as you have a few tools and a basic understanding of how to use them, you should be able to install a system yourself (although having another person to help will ease the job significantly). We'll cover the tools you need, plus go over basic building construction and ways you can run the wires.

You don't need to be an electrician to run low-voltage wiring like intercoms use. There is nothing dangerous about it, as long as you exercise care when using the tools you need.

New Construction

If you're building a new house or business, then strongly consider wiring it for a wired intercom system, even if you think you want to do a wireless intercom. Somewhere in the future your wireless system could receive interference that renders it ineffective or even useless. There will never be an opportunity to run wires as cheaply or easily as there is when a building is being constructed.

Carefully think about how you will use the system. Try to consider where the most convenient place for stations will be. Will you be standing or sitting? Many hardwired systems are built in walls so for these you'll be standing. Many wireless systems and some wired systems have desktop units that allow you to be sitting.

Existing Construction

If you're planning on using a wired system for a pre-existing building, then considerable more work will be involved. Some 2-wire door phone systems claim you can just use existing door bell wiring. The problem with that is not on the door phone end of it, the problem is on the monitor side. Chances are your actual door bell is in a hall somewhere mounted near the ceiling.

If you don't want to stand on a ladder to use your door phone monitor, this obviously won't work for you. You could cut the door bell wires and connect a new wire to them, which would save you having to drill for the door phone. If you do use the doorbell wiring, you'll need to make sure you locate the power transformer for it and make sure it isn't still connected. Otherwise you could burn out your door phone.

If you don't want wires running on the surface of your walls where they are visible, then drilling and fishing the wires through the wall is required. This is not a task some people want to take on, but if you're a handyman, or handyperson, then maybe it will appeal to you. Otherwise you can hire an electrician or handyman to do it for you. Other people who could handle the job for you are heating/cooling contractors, telecommunications contractors, security system installers, and audio/visual equipment installers. Anyone who has experience in running low-voltage wires can do it.

But with a few skills we will teach you here, you can take on this project yourself.

Tools Needed

Running wires through your walls will likely require a few low cost tools you may not have. These are all basic tools you can buy from any Home Depot or building supply store, or borrow them from a friend.

First, you'll need a drill. You don't need an expensive drill. The drill needs enough power to drill through a 2x4 and a $\frac{3}{4}$ inch layer of plywood without bogging down. If you're running wires from an attic space, the drill will have to be able to drill through 3 inches since there are two 2x4s on top of each wall.



At least that's the way it is in newer construction. Older homes only have one, but the wood has probably become hard so drilling through it will likely be about the same for the drill. If you don't use a heavy duty drill, you'll want to let it cool down during usage because they can get very hot if you have a lot of holes to drill.

Next you'll need to purchase a wood boring drill bit that's $\frac{5}{8}$ to $\frac{3}{4}$ inch in diameter such as the ones shown. The spiral-like auger bit shown is the best type, but they can be a little expensive. The flat bit shown will do the job and if you'll just be doing a few holes, you may as well keep it cheap and buy the flat bit.



Once you have the holes drilled, now you'll need a way to get the wires run through them. If there is no insulation in the walls, you could just drop down a string with a weight attached, tape the wire to it, and then pull it up. Inside walls have no insulation, but exterior walls do (unless you have an older house in a warm area).

You can't drop a string through a wall that has insulation in it. If you are installing a door phone it will obviously be on an exterior wall. That means you need something stiff to force your way through the insulation. That's where the fish-tape like the one shown in red comes in handy.



A fish tape is a tool used by electricians to route new wiring through walls. A fish tape is a roll of highly durable tempered $\frac{1}{8}$ " wide spring steel that can be "fished" (guided) through the confined spaces within wall cavities.

Once the fish tape is pushed through the hole you drilled, the intercom wire is attached to the fish tape and then pulled through the wall. There is a loop at the end of the fish tape

you can push the intercom wire through, and then you want to use duct or electrical tape to securely fasten the wire to the fish tape. Nothing is more frustrating than pulling the fish tape through the wall only to find the wire has fallen off.

Fish tapes have a natural curvature which helps guide the tape. You can manipulate the reel part of the fish tape to move the end to where you want it to be. This is where having a friend on the other end can really help. While you're pushing the tape through the hole, your friend can be feeling for it and grab it once he does. In a minute you'll see where your friend or you will be pulling the fish tape to.

Using a fish tape is much easier in an un-insulated wall. If the wall cavity is filled with thermal insulation, it becomes much more difficult, but you can always find that tape in the wall somewhere. If your friend has his hand in the wall he or she can feel for movement and then grab the tape before you push it way past where you want it.

If the building you want to install the wired intercom system in has the sprayed in foam insulation, you better go with a wireless system because you won't likely be able to push the fish tape through the wall.

There is one other tool you can buy or not, but you will need some way to cut a small hole in the drywall. The drywall saw shown is one way to do this. You could also use a heavy serrated kitchen knife or even a utility knife. The drywall saw produces a nice clean cut though.



The reason you have to cut a hole in the drywall is not to run the wire through, but to get your hand inside the wall to grab the fish tape. The chances of guiding the fish tape through a little hole are almost zero.

So what we do is cut a hole the size of a standard electrical outlet box, which is about 3 1/2" x 2". That's big enough to get your hand through. Then when you are done running the wire, you have three choices for the hole:

1. Patch it using drywall repair techniques
2. Install a standard retrofit electrical outlet box and cover it with a blank faceplate
3. Install the intercom station over the hole to cover it up

Of course the last two are the easiest. You can go to any building supply store and purchase an electrical box that has little flip up tabs that tighten against the back side of the wall. Then when you cover it up with a faceplate that has no holes (except for the two screw holes) it looks like it is there for some future expansion. You should always try to line it up with the other light switch or electrical outlets so it doesn't look out of place.

If you choose to install the intercom station over the hole you want to make sure the hole is right next to a wall stud. That way you have something to mount the intercom station to. To use this method, you'll need to make sure the intercom station is wide enough to

mount to the center of the stud, and still cover the hole you cut.

Some intercom monitors/stations are built into the wall so you'll already need to cut a hole for these. Or you may be able to mount the station directly to the retrofit electrical box you installed.

Before you start drilling and cutting you have a decision to make. There are two ways you can run the wire: through the attic, or through the basement or crawlspace. If your house or business is sitting on a cement slab, you're obviously going to have to go through the attic or above the ceiling tiles in a business.

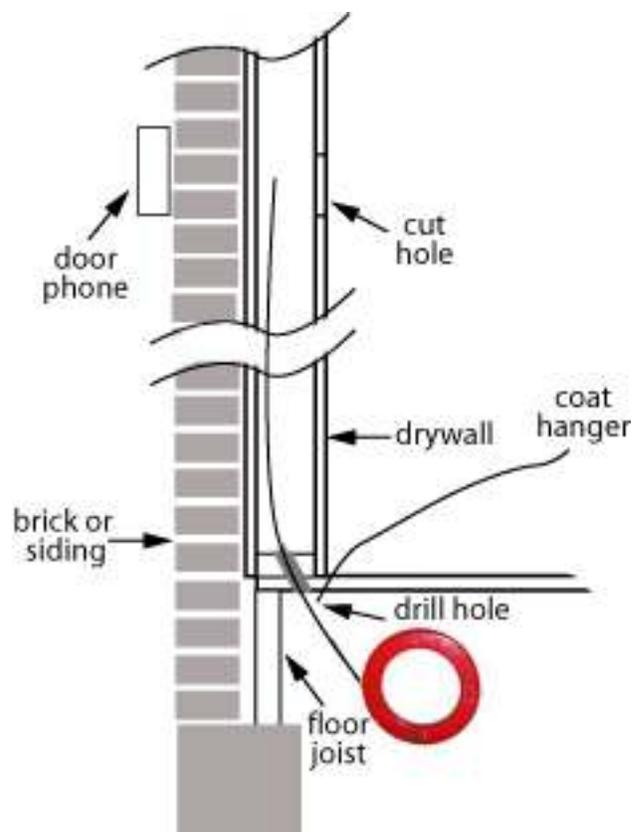
The two diagrams below give you detail on how the wiring will be done. The diagram with the bricks is an outside wall, but an inside wall uses the same techniques.

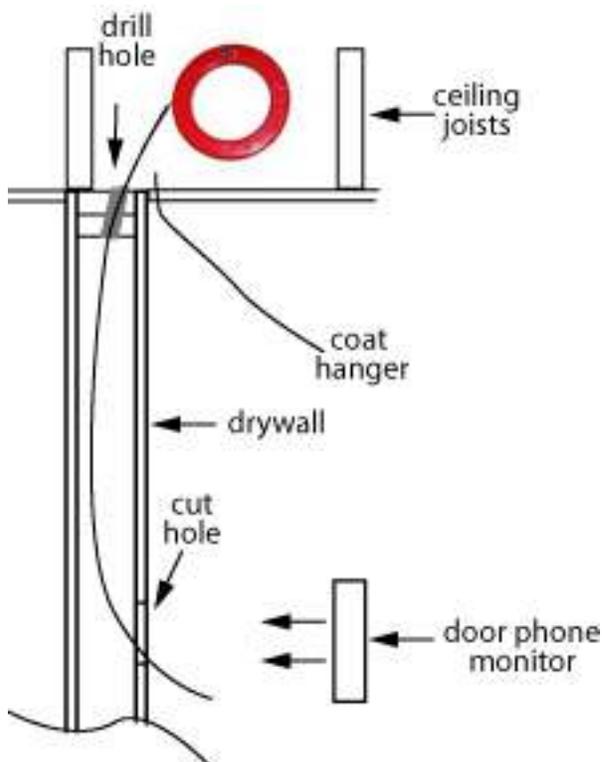
One thing you'll notice in the two diagrams is a cut up and straightened coat hanger. The sole purpose of the coat hanger is to help you identify where you want to drill the hole for the intercom wire. When you're crawling through an attic or crawlspace it's hard to figure out where you need to drill...and you don't want to drill through the middle of the floor or ceiling.

So once you locate where you want to install the stations, you either drill a small hole the size of the coat hanger through the floor or through the ceiling (you can actually just punch the coat hanger right through the ceiling if you push it with a pliers). You want the coat hanger to be directly above or below where you want the station to be so it will be easier to guide the fish tape to the desired destination.

If you're going through the ceiling, put the coat hanger through close near where the wall meets the ceiling. When you remove the coat hanger later you'll just put a little dab of spackling compound to fill the tiny hole (or even white toothpaste).

If you're going through the floor, drill the coat hanger hole right under the baseboard or as close to it as you can. If the room is carpeted, you don't have to worry about repairing the hole. If you have hardwood, just a little dab of the same color wood filler will make the hole nearly invisible. Sometimes you won't even need to do that and you still won't see it.





So you insert the coat hanger through the hole about a foot and then go into the attic or crawlspace to find it. Once you find it, you'll probably see some nails sticking through the floor to show you where the wall you're about to drill through is located.

Now you simply take your drill with the wood boring bit and drill about 2 inches from the coat hanger towards the wall and you'll be right inside the wall. Simple as that!

Now you get your fish tape out, push it into the wall, tape it securely to the fish tape, pull it through the wall, and then you're ready to follow the installation instructions that came with the door phone or intercom system. You'll also need some sort of wire strippers to

prepare the wires to connect to the terminals on the intercom. You can use a knife, but this is not the preferred method as a kicked wire will sometimes break when bent.

If you're installing an outside door phone to a brick building, you'll also need a concrete drill bit that can go the depth of a 3 ½ inch brick plus at least ½ inch of whatever they used behind the brick. A 4 ½" long ¼" diameter drill bit should do the trick (there is still some shank left to go in the drill so the actual bit should be longer).

You don't drill through the brick itself. You want the wire to come out a mortar joint which is much easier to drill through. You'll also need some screw anchors that go in a ¼" hole so you can mount the door phone to the brick.

So while running the wires for an intercom system can be a dirty job, it's not extremely difficult once you know the little secrets you've just learned.

There's nothing like the feeling of accomplishment you get from doing a project like this yourself. In fact, once you do it you may want to take on even more low-voltage wiring projects around the house!