Chapter 1

Mi Casa, Cool Casa

In This Chapter

- Looking at a day in the life of your wired home
- Understanding what goes into a wired home
- Quantifying the benefits of a home network
- Outlining the requirements for a home network

If you stop the average person on the street and start talking about home networks, he or she would probably make references to ABC, CBS, NBC, and FOX, or mention the Home Shopping Network or some other cable network show. *Network,* until recently, has meant little else to most people.

But times, they are a changin'. The invasion of telecommunications into all aspects of life is creating a different meaning of the word *network.* Most people have had some contact with a network through their work environment — computer local area networks (LANs) in the office, control networks in factories, telephone networks in many mid-sized or larger businesses . . . heck, the Internet is a huge network.

You can think of networks simply as things that help you do your work. As you concentrate on printing a document, calling up a database, or checking out the price of a product online, the network is invisible (that is, until it's broken).

The network concept has begun to move from the workplace to the home, and smart home builders and remodelers (and forward-looking owners of otherwise perfect existing homes) are starting to think in terms of wiring (or *wirelessing*) their homes both to make use of a network today and to future-proof against upcoming requirements.

Before you go any further, do this little exercise (don't worry, we won't grade you): Write down all the things in your house that you think you may want to network. Be as creative as you can. Think about your lifestyle and the way your house is set up. When you finish, put the list aside and continue to read this chapter. Toward the end, we'll share our list with you.

Living in Your Smart Home

Your smart home can seep into all aspects of your life. It helps you do those day-to-day tasks that can take up so much time, such as opening the draperies, dimming the lights, and flipping on the Weather Channel to see whether the kids have a snow day. How far you go with your smart home depends on your lifestyle, budget, and tastes.

This section spends a virtual day in a fictitious smart home. Here's the scenario: You, the reader, are part of a family of six, plus the requisite pets (we prefer dogs). You and your spouse both work, and the kids range in age from 8 to 17.

Starting your day

Anyone with kids knows the importance of keeping on a schedule. Your home network helps you do just that, in style.

At first light, you wake to your home-controlled alarm — a stream of pleasant classical music coming over your home-audio network into your bedroom. After a preset length of time, the music fades out and the TV kicks on to your favorite local station, where you can get the weather and traffic reports and information about any school closings or delays. Down the hall, the kids awaken to the music of their choice.

In the kitchen, the coffeemaker starts brewing your morning caffeine requirements. Select shades and drapes throughout the house open to let the day's light stream in. It's winter, so the towel warmers and the radiant heat in the bathrooms' floors are turned on. The automatic pet door out back opens and lets the dog out for his morning constitutional.

By this time, you're already in the kitchen making school lunches. Being the nice person you are, you take a cup of coffee to your spouse, who is listening to National Public Radio in the bathroom. As you finish setting out breakfast for the kids, a glance at the upstairs monitors shows that two of your four kids are still in bed. Your eldest son is videoconferencing with his girlfriend on his computer. You punch the intercom and tell them all to get a move on.

As the children cycle into and out of the bathroom, the home-control system times their showers to make sure no one hogs the bathroom. The shower's water temperature is just to their liking, but that's hardly a surprise — it's the same setting they use each day this time of year.

As you sit down to breakfast, your spouse comes running through, late for the office. A printout of major headlines and personal stock standings sits waiting in the printer, having been created and downloaded from the Internet overnight.

Your spouse works down the street (we did tell you that you work at home, didn't we?), and your smart home knows that you both like a warm car when you get into a 15-degree garage, so the home controller starts the car 15 minutes before the scheduled departure time. Before your spouse climbs inside the toasty car, the home-control system gives a verbal reminder to put the bottles and cans next to the curb because today is recycling day.

As your spouse leaves the garage, your home-control system talks to your phone system and redirects all of your spouse's home-business line calls to the car phone. Once at work, a simple push of a speed dial button on the office phone dials in and redirects the calls again to your spouse's office.

Back at home, you confirm that the kids caught the bus by using the video monitor in the kitchen, and then you get ready for work. You ask the home controller to put the house in your personal mode — in terms of temperature, music, lighting, drape settings, and anything else you may have set.

Getting down to work

You get a second cup of coffee and decide to work for a while in the sunroom. You tell the home controller where you are, and the controller transfers all your business calls to the extension near the table. Your laptop is wirelessly connected to your server and the Internet. You check your various e-mail accounts and voice mail and make a few conference calls on the multiline home-telephone system. While you're on one phone call, you turn on the TV to access the local online directory and navigate to the ordering page for that posh take-out shop down the street. Twenty minutes later, the delivery person arrives at the front door; you take your wireless two-line headset phone — conference call and all — to the door, where you tip the delivery person (you paid over the TV set) and retreat back to the sunroom for lunch.

For a midafternoon break, you head for the exercise room to work off some of that lunch. When you enter, you announce yourself to your voice-activated home-automation system, and it automatically sets the music and other environmental settings to your previously defined preferences. You sit down at your rowing machine, which has a large monitor that shows real-life settings of popular rowing locales.

Halfway through your workout session, a delivery person shows up at your door. An announcement that someone is at the door interrupts the music, and the nearest video display shows a picture of who it is. You don't want to stop mid-workout, so you reply that you are busy and ask him to leave the package inside the door. You prompt for the control system to unlock the front door, and watch as the front door unlocks itself and the delivery person places the packages in the foyer. He leaves, and you start rowing again along Boston's Charles River.

It's your turn for a temperature-controlled shower, where you listen to CNN from the TV set, via moisture-resistant speakers mounted in the bath. Squeaky clean, you go back to work. At 3:00, you have your first videoconference of the day from your office downstairs. While in the basement, you call up your home-control system and start the roast cooking in the oven.

The kids drift home in the afternoon and spread out across the house. While you access your corporation's data network, your kids take advantage of the computers. The youngest kids — twins — play multiplayer games on the home's high-speed Internet connection. Your eldest daughter logs onto the school's educational network to do research for the midterm paper due next week. And your son, when home from football practice, logs onto his school's network to collaboratively work with three others on a joint presentation for the next day. Instant messages, e-mails, and file transfers all flow with ease.

The home controller's voice enunciator reminds you that the roast should be done by now, and you head upstairs.

Dinner time

Meanwhile, at work, your spouse glances at the clock and remembers in a panic that the family needs groceries. A quick dial into the home LAN yields the grocery list on the computerized message board in the kitchen. On the way home, a phone call into the home controller redirects calls back to the car phone in case someone tries to call.

The magnetic driveway sensor tells the home-control system to announce your spouse's arrival. As your spouse enters the house from the garage, the home controller again redirects all calls to the home office, completing the day's cycle. As your spouse brings the groceries into the kitchen, you receive a kiss (sorry, not automated).

Ready to eat, you ask the home controller to set dinner mode in the dining room. A microphone in the light switch hears the command and dims the

lights and turns on the gas-driven fireplace. The home-control system selects some family-oriented music from the MP3 server and plays it over the in-wall speakers in the dining room.

After dinner, you start cleaning up as your kids race to their rooms to finish their homework. Later, they watch a TV special in the living room, while you take in an old Spencer Tracy movie in your bedroom. In the meantime, your spouse has a late videoconference in the home office downstairs with clients in Japan. Occasionally, you access the picture-in-picture (PIP) capability on your TV set to check around the house, making sure that no one is getting into any trouble. After the movie, you give a simple command to the home controller and the lights are dimmed, the temperature in select zones is lowered, shades and draperies close, nightlights come on, and the intercom goes into monitor mode for the youngest kids, in case they're sick during the night. (The sound from those monitors plays only in the master bedroom area.)

Peace at last!

With the kids asleep for the night, you decide to take a nice relaxing bath. You instruct your home-control system to prepare the bathroom — dim the lights, open the skylight, run the bath at your favorite temperature, turn off the telephone extensions nearby (route them to voice mail instead), and play your favorite album on the bathroom speakers.

While lounging in bed watching the wide-screen TV, your spouse tells the home-entertainment system's *PVR* (personal video recorder, a hard-drive-based system that can record video digitally) to search the shows it has been archiving every day and play the most recent *Enterprise!* episode.

Your house is in off-hours mode. The dog is inside, and the doggy door is secure. All phones have muted ringing volumes; some don't ring at all. All drapes are closed. The temperature is lower to save energy when your family is tucked in tight under the covers. All security systems are now alert, looking for movement outside the house.

After your bath, you climb in bed and read for a while. You finish your electronic book and decide you want to read the sequel right away. You surf the Web from your TV set, find the book, buy it, download it to the home LAN and thus to your electronic book via a wireless connection.

Your dishwasher kicks on at midnight when the rates are low (you loaded it at dinnertime and turned it on, but the home controller activates it when rates drop). All night long, your home controller and its various sensors keep an eye on everything for you. You sleep peacefully.

The home-network revolution

What's brought about this progression of intelligent home networks into everyday life? One word: computers. And when we say computers, we don't mean only the PC sitting on a desk in a spare bedroom in 60 percent of American homes (although that's an important part of it). We mean also those little blobs of silicon that reside in so many things in your house, such as phones, televisions, refrigerators, and even the car in the garage.

Most of these systems are islands of computing power plugged into the power outlets of your home. The computer chips have no way of talking to each other or sharing the information that they gather and control. The network revolution — the home-network revolution — is taking place as these things begin to talk to each other. Imagine a refrigerator that talks to your electrical utility and goes into its power-hungry defrost mode when the electricity rates are lowest. Or suppose after a power outage that all your clocks reset themselves automatically because they're set to "network time."

Home networks aren't as advanced as the Jetsons' home, but they will be soon. And you'll be missing the boat if you build a new home or remodel your existing one without taking this kind of future into account. Although you can't know today exactly what will be connected to what (and how) tomorrow, you can design a wiring system for your home that will enable you to do the most you can today and be ready for tomorrow's needs.

What's in a Smart Home?

A smart home is a harmonious home, a conglomeration of devices and capabilities working according to the Zen of Home Networking. At the beginning of this chapter, we suggested that you make a list of all the things you might want to network. Following is our list. Notice that practically anything in your home can be, and ultimately will be, networked. That's the whole point of whole-house networking:

- **Household items:** Drapes and shades, gates, garage doors, door locks, doorbells, lights, dishwasher, refrigerator, heaters, alarm clocks, washer, dryer, microwave, coffeemaker, hot water system, air conditioners, central vacuum system, water controls (shower, sink, and so on), pool cover, fireplaces, toys, e-books, lawnmower, cars and other vehicles, piano, weather station, furniture

- **Audio and video:** Receivers, amplifiers, speakers, VCRs, CD players, DVD players, PVR players, TVs, WebTV devices, Apple TV devices, DSS dish, radios, remote controls, gaming consoles, cable TV devices, TV videoconferencing devices
- **Security:** Baby monitor, video cameras, surveillance monitors, motion detectors, smoke detectors, occupancy sensors, pressure sensors, infrared sensors, intercoms, voice enunciators
- **Phones:** Corded phones, cordless phones, 900-MHz phones, 2.4-GHz phones, 5.8-GHz phones, fax machine, answering machine, PDAs, screen phone, video phone, cell phones
- **Computers:** PCs, Macs, laptops, modems, scanners, printers, home servers

The key is getting information to and from each of these devices. That takes a network. Your home network is actually a collection of networks. Communications in and among different devices travel over various network layers, such as your home-telephone network, your computing network, your security network, your electrical communications network (yes, you can talk over your electrical lines, believe it or not), and so on. These collectively are what we call your *home network,* and you mix, match, and jump among these network layers as you communicate throughout your household.

History of home wiring

Traditionally, homes have been wired for only two things: power and telephones. Add a few haphazardly run cable-TV outlets and some doorbells, and you have the sum of the wiring in most homes. Some people put in an alarm system or an intercom system, each with its own set of wires. The result is a house with an expensive bunch of wires that don't talk to each other and aren't good for anything else.

Even more important than the quantity of wires is the quality, especially when it comes to home automation and high-speed data services. Wiring systems that are inadequate for the needs of today's wired citizens occur not only in homes wired 50 years ago but also in many new homes. Older low-voltage wires (telephone and cable TV wires, for example) don't have adequate capacity for high-speed data use or for multiple lines. They don't go to enough places in the house, and they have no flexibility of configuration. When your needs change, you'll probably have to rewire.

Even electrical power cables may be inadequate (and not just because you don't have enough outlets) for home-automation and control systems to do such tasks as turn on lights and start the coffeemaker. These systems require a power system that is adequately isolated from interference and line noise, which is not the case in many homes.

Luckily, overcoming these problems isn't difficult — or even that expensive. All you need is a little knowledge and a good plan!

Home servers

Traditionally, you buy a lot of boxes for your house, such as VCRs, DVD players, and CD players. As the movement towards digital storage has blossomed, you find VCRs with hard disks and CD jukeboxes that can store hundreds of CDs. We call these boxes *servers* because they mimic the role of computer servers in a corporate environment.

There's a movement afoot to merge all of these servers into a *home server* that stores CDs, DVDs, games, software, and more and "serves" its content to devices that want to play that information. These also will access the Internet for easy access to online content such as iTunes (`www.itunes.com`) or YouTube (`www.youtube.com`). Gaming consoles such as the PlayStation 3 and Xbox 360 are trying to become such central repositories, and Microsoft has launched a new product called (not surprisingly) Windows Home Server (in beta at the time of this writing at (`http://connect.microsoft.com/WindowsHomeServer`). You'll also see home media centers in PC and standalone stereo gear that target the same market. Home servers will range in price from $400 to more than $25,000, depending on what and how much you are trying to store.

We think every home should have a home server of some sort. A home server makes finding things less difficult and creating backups easier, and certain programs such as iTunes run better when everything is in one place. Our approach to home networking in this book enables you to connect a home server whenever you decide to get one.

Why Network Your Home?

A network allows you to do a bevy of things. For instance, you can

- **Access the Internet from anywhere in your house:** A home network lets everyone share in the broadband wealth, so you can stop fighting over the one computer with the high-speed connection. What's more, by having a communications *backbone* (wiring infrastructure) in your house, you can let anything — from your TV set to your car — tap in and make use of that connectivity.
- **Remotely control your home:** After your home network is connected to your other networks, such as the Internet, you can suddenly do amazing things from almost any interconnected spot. The capability to control a device after it is hooked up to the network is limited only by the openness of the device itself. (In other words, the only limit is the degree of controllability of the device — your home's infrastructure won't hold you back.) Want to turn off the lights downstairs from the bedroom? Click your remote control, and out go the lights. Want to check the babysitter while you're at your neighbor's July 4th bash? Just use the neighbor's computer to log into your home's controller and check up on things. (You can even use your cell phone to do this!)

- **Save time:** Think about how much time it takes every day to open the shades, turn on the morning news, let the dog out, and so on. Wouldn't you like to do all that (and more) with one command? By programming these chores into task profiles, you can.
- **Save money on electronics:** With a true home network, you have to buy fewer devices to outfit your home. Instead of having a VCR hooked to every TV set, for instance, you can centralize this functionality and distribute the signal around the house through remote control as you need it. The same is true of almost any network-connected device, such as a DSS satellite receiver, PVR, and cable box.
- **Save money on communications costs:** By centralizing access to certain telecommunications services, you can cut monthly service costs. For instance, with a home-network backbone, both you and your spouse can connect to the Internet on separate computers while sharing one line and one account. What's more, you can share a high-bandwidth option — such as a cable modem, DSL link, or HughesNet-type satellite service — with the entire family.

You might be ahead of the pack and already have a single broadband link to share with everyone at home. But if your connection is like ours, it can go down a lot. We're seeing the movement towards homes with *two* broadband connections (one as a backup). Being able to have the kids do homework and mom and dad do their necessary browsing is starting to become mission-critical. So a home network will help you share this backup line too!

- **Save money on your home expenses:** A wired home can turn back those thermostats when you're away on vacation or cuddled under your blankets at night. It can turn lights off automatically, too. Over time, you may save a surprising amount in heating, cooling, and electricity costs.
- **Save money on the future:** At different times in your life, you may find yourself changing the way you use certain rooms — a guest room becomes a nursery or the garage becomes an office, for example. Changes like these can be expensive if you try to bring your network along for the ride. Instead, have a flexible home-network design — one that's futureproofed for all sorts of contingencies — and save money down the road.
- **Be more flexible and comfortable with your technological assets:** A home network frees you from being tied to one spot for one activity. For instance, when working late at night, you might want to move the laptop to a comfy recliner instead of a damp basement office. And you can with a distributed means to access the Internet — and therefore your centralized e-mail, calendar, and contact database. The latest home networking technology will route your HDTV signals around your house, freeing your TV set to be anywhere a wireless signal can reach!

- **Lose more fat:** A smart home won't stop you from eating chocolate cake, but it will spice up the exercise room. You can run Internet access, CNN, or exercise videos over your home network to help you keep pace and pass the time on a treadmill or bicycle. And, with Internet access, you can access many of the neat new software programs that combine with new exercise equipment to provide passing scenery or live competitors as you row, row, row your rowing machine!

What Does It Take to Network Your Home?

Okay, so you have the big picture: A networked home is a happy home. What does it take to get there? Surprisingly little, or surprisingly a lot. (Can you tell we make good consultants?) It depends on whether you do baby steps or go whole hog.

You can make a home network based on the existing wiring in the walls or using the airwaves in your house, with wireless options. No cost for infrastructure there. Is it as powerful as an installed system? No, but for many it will do the trick.

Alternatively, you can install a whole system from scratch. The cost varies, just like the cost of building a house. The more you put in, the more it costs.

We've used both approaches, wired and wireless. We put investment upfront into our transport layer — the wiring and connectivity in the walls — and less on the things we connect to that layer, to give us more flexibility as things change. For instance, at Danny's house in Maine, rather than design for a big 32" TV, he left the living room unfinished because he knew that the price of flat-screen plasma TVs would plummet. He waited patiently for prices to drop. He's still waiting. So is his wife.

Table 1-1 shows you some of the rough costs for getting into a smart home, with reasonable expectations set forth in this book. These are the costs of the components and the installation — you'll have some additional ongoing costs for services such as Internet and cable TV and for your computing hardware.

Table 1-1 The Cost of It All!

Expense Area	*Low*	*Midrange*	*High*	*Obscene*
Wired infrastructure	$1000	$2500	$4000	$6000
Wireless infrastructure	$50	$150	$200	$500
Home theater (TV + surround)	$1000	$3000	$25,000	$200,000
Whole-home audio	$1000	$2000	$6000	$30,000
Phone system	$150	$500	$1000	$2000
Intercom system (standalone)	$100	$500	$1000	$2000
Data system	$50	$150	$500	$1500
Security system	$200	$500	$2000	$20,000
Home automation	$50	$1000	$10,000	$30,000
Total	***$3600***	***$10,300***	***$49,700***	***$292,000***

In this book, you'll go through the following process of thinking smartly:

1. Finding out all you can about your options
2. Putting your thoughts on paper
3. Figuring out the costs of your desired options
4. Refining your thoughts based on cost
5. Getting help where needed
6. Installing the systems in a methodical and somewhat structured process
7. Adding all the cool devices that put your smart home to use
8. Sitting back and enjoying yourself. (We'd like to stress this one, but the reality is that you'll enjoy your smart home for a moment and then go back to the first step and start over, because you'll want more.)

We provide detailed steps as well as more budgeting information in Chapter 4.