Chapter 1

Designing Your Digital Dream Home

In This Chapter

- Living in a digital dream home
- Designing or remodeling your home for the digital age
- Selecting contractors or wiring it yourself
- Collecting the necessary tools and test equipment

Aesthetically, a digital home is a warm, welcoming abode — a place where you love to spend time and enjoy life with your family and close friends. The digital home has just the right lighting in every space, whether that space is used for reading, computing, or a favorite hobby. A digital home is a place where technology enhances and eases your lifestyle and maximizes the enjoyment of your surroundings. A modern digital home is a habitat where elements of shape, infrastructure, and control combine to meet your needs with a maximum of convenience.

Functionally, a digital home is one that takes full advantage of the latest technologies for electronics, networking, communications, and electromechanical devices. The well-wired contemporary digital home also anticipates coming advances and adapts easily to future changes. Each digital home is unique, tailored to the needs and desires of the individual homeowner; yet a well thought-out digital home contains wiring and electronic equipment that meets accepted standards of construction and design.

Are you ready to start planning your digital home? This chapter shows you some of the benefits of a digital home and gets you started with the designing and planning process. We go over some of the features you may want to incorporate and help you decide whether you want to be your own contractor.

Living on Digital Easy Street

Close your eyes and imagine yourself in the ultimate digital home. It's Saturday and no one has to go to work or school. You are awakened to a sun-drenched morning by the quietly rising sound of a string quartet playing a classic movement by Tchaikovsky. As you enter the bathroom, the lights come up to a warm glow automatically. The sink water is instantly warm with the first twist of the 24-carat gold-plated faucet as you wash your face and take care of dental hygiene. After you emerge from your shower, the rack-warmed towels are an arm's reach away.

The kitchen welcomes you with the fresh wafting aroma of Tanzanian pea-berry coffee, and your favorite morning news show tunes in on the flip-down television screen the instant you enter the breakfast nook. After the news, you walk out to the patio and read the newspaper editorials. As you leave the kitchen space, the TV turns off automatically. It is a sunny morning but still a little chilly outside, so you press a remote control button to light the gas fire-place and kick on its built-in circulation fan. As the rising sun warms the morning air, you press another button to turn off the fireplace.

It's a nice morning, so you pull out your hand-held computer and type a few e-mails, which you send via your wireless network. Later, you use the PC workstation in your kitchen to copy some digital photos from your camera and send them to grandma in Arizona. While online, you check the local Doppler weather radar image to see if any clouds are in the area. There are none, so you decide to take a walk in the park.

When you return home in the evening, you find that the microwave has just cooked a light dinner moments before your return. Later, you watch a newly released DVD in your home theater. After the movie the auto-vac-bot begins its quest for stray popcorn fragments, gliding almost silently across the floor. Lights in rooms and hallways sense your presence and automatically turn on and off as you pass through, ready to turn in for the night.

The scenario presented here illustrates just some of the possibilities of the modern digital home. Your dream home may look a little different, but with proper planning the possibilities are virtually limitless. The next few sections help you start your plan for your own digital home.

Planning Your Digital Dream Home

It may seem easier to design and build your digital dream home from the ground up, but any home can be adapted to include modern wiring, controls, appliances, computers, and other technology. As you start planning your digital home, you need to consider several factors:

- **Budget:** What can you afford? Does your home have enough space for the features you want?
- **Features:** Make a list of the features you want.
- **Appliance locations and sizes:** Choose where you want certain appliances, and determine what size each appliance should be.
- **Outlets:** Determine the type, location, and number of outlets you need before construction begins.

Define your requirements in writing to help focus you and your contractor on meeting the design objectives. Page though this book chapter by chapter, taking note of the items you want to include in your own digital home. Also, go through each room in your home (or your home plan) and make a list of features you want in each of those rooms. Be specific in your plan, because it influences the wiring installed in each room.

Designing for new construction

When building new homes, contractors often tend to do things the way they have done them in previous homes. As the homeowner of a new house — or a do-it-yourselfer building your own home — it is absolutely critical that you

- Include your digital home plans in the design specifications.
- Communicate to everyone involved the need for neatness and attention to detail.

For example, wiring runs should be made so that they minimize *crosstalk* (interference between power supply wires and communication wires). Different wiring types should have adequate separation, particularly on long parallel runs.

The *NEC (National Electrical Code)* requires a minimum separation of 4" between communication cables and open conductor power wires. (*Open conductor* is a wiring system used prior to the 1950s and is often referred to as *knob and tube*

wiring.) To minimize crosstalk, however, we recommend at least 6" between communication cables and any type of power wires. More separation is better.

Remodeling an existing residence

Homeowners often undertake remodeling projects involving one or two rooms. If you're planning a project, consider rewiring and including additional elements that can take advantage of newer technology.

The demolition and removal of old wiring, fixtures, and equipment is an added cost to consider when undertaking a remodeling project. If you abandon wires because they cannot be fully removed, take extra care to ensure that those abandoned wires cannot be accidentally reenergized later. To do this, cut the wires off flush with the box surface they protrude through, or cut them off in a few places along their route.

When planning your remodeling project, schedule the work so that one trade is not too far ahead of or behind the others. If you're working with a contractor, make sure he takes this into account. For example, the rough-in wiring must be done and the boxes mounted before new drywall is started. Pay close attention to the timeline and to job dependencies.

Completing single-focus projects

You may not have the time or budget to build, remodel, or upgrade your entire home to accommodate a digital lifestyle all at once. Instead, you may want to focus on one living space or one project at a time. Perhaps you have become serious about getting all the value possible from your home computers and want to build a home network to share Internet connections, printers, and fax services. Or maybe you're not satisfied with only two separate smoke alarms in the whole house. Situations like this make for perfect single-focus projects. You can complete many a project without major destruction and reconstruction. We show you some of these projects in Chapters 11 and 17.

Regardless of your project scope, include

- Starting with the floor plan, then onto the fixture, appliance, and furniture layouts, in that order, to determine where the wiring infrastructure will go.
- Separating different wiring types.
- Planning routes for power and communication cabling before drilling.

- Specifying exact locations for appliances, utilities, services, and outlet boxes.
- Planning racks, shelves, and mountings.
- Purchasing or gathering the required tools and equipment.
- Accounting for any job dependencies and the necessary work sequence.
- Determining how your plan alternatives affect the overall budget.
- Visiting the site often to ensure your plans are being implemented properly.

Choosing the Contractor — or Being Your Own

When using a professional contractor, the most important thing (besides writing the check) is knowing what you want included in your home and articulating your needs accurately to a reputable builder or contractor. Defining the work is the same whether you decide to go the do-it-yourself route or hire a contractor. And, of course, you need to choose a competent contractor.

Selecting a contractor

"How," you wonder, "can I be sure I am choosing the right builder or contractor for my project?" Thanks for asking! Table 1-1 offers some of the things to consider asking or finding out about your prospective contractor.

Table 1-1 Interviewing a Prospective Contractor

Question	*Answer You Want*	*Why*
How long have you been in your business or trade?	Since the earth cooled.	Generally, you want to hire a contractor with some experience in the business. Proceed with caution if the contractor has fewer than four years' experience.
Do you have worker's compensation and liability insurance?	Yes.	If he doesn't have insurance and his workers are injured on your premises, you may become liable.

(continued)

Table 1-1 ***(continued)***

Question	*Answer You Want*	*Why*
What's your experience with similar projects?	I've done jobs similar to this one.	When a contractor has done a job similar to your project before, his learning from experience should benefit your project.
Can you provide industry, trade, and customer references?	You betcha.	If others speak well of the contractor's work and performance, you are more likely to get your project done to your satisfaction.
Can I see examples of prior work?	Uh huh.	This one really separates the ho hum contractors from the ones whose attention to detail is unparalleled. If the contracting firm is willing to show you prior work and let you be in the same space as prior customers, you can expect a great finish on your project as well.
Are you a member of a professional organization or trade association?	Yep.	You would prefer a contactor who's learning from others in the trade and makes a contribution to the greater good.
What's your community involvement?	I'm heavily involved.	Having a contractor willing to giving something back shows that she is concerned with more than making a profit and realizes that all the work she does benefits the community.
Can I inspect your vehicle? (Okay, you don't really ask this.)	Huh?	What's the general appearance of the contractor's equipment, vehicles, tools, and employees? If the things you *can* see aren't up to par, those things you *can't* see after installation have little chance of being done in a neat, orderly, and workmanlike manner.

Question	*Answer You Want*	*Why*
Do you have all the required licenses?	Oh yes.	States differ in what type of work requires a license. The license process is designed to provide some level of assurance that the license holder will do work that is safe and up to current building and electrical codes.
Has anyone ever complained about your work?	No. (Or "Yes, once, and we solved the problem.")	You don't want to be the next in a long string of complaints. Choose a contractor who stands behind his work and satisfies his prior customers.
Where are your positive attitude and amiable manner?	You could ask outright, but you're likelier to see the answer just by watching.	The lack of a can-do attitude can mean a number of things, none of them good. If you want to fight, you hire a boxer; your contractor should be amiable and respect you as a valued customer.

These questions will help you start evaluating a contractor or builder, but may not include everything that is important to you, so add to it if needed. High-quality builders, remodeling contractors, and electrical contractors are proud of the work they do and are not offended if you check them out. Do your homework so you won't become the next horror story on the pages of contractor dissatisfaction.

Show me the cost

Get an estimate from more than one contractor if you lack trusted recommendations, especially on expensive projects. An estimate considerably lower than another is usually a red flag; the lowest estimate may not be the best choice. The chosen contractor should give you a written contract detailing the work to be done. Avoid the contractor who says, "Oh, I didn't know you wanted x, y, and z done, too. That's going to cost an arm and a leg." Know his schedule before you sign — when he will start and when he expects to finish.

Find out what your state laws are regarding worker's compensation. If the contractor on your project doesn't have insurance, you may become liable for any on-the-job injuries experienced by workers on your project.

Being your own contractor

Doing major construction work is not for the timid . . . well, not for the *too* timid, anyway. If you already have the skills and some experience, the decision to be your own contractor may be easier. If this is your first construction or remodeling project and you are willing to learn, the knowledge you gain will lead to increased confidence tackling future projects as well. The bottom line is this: Can you cheerfully take full responsibility for the outcome? If so, then you are ready to begin.

Adequate preparation is often the only thing that separates the professional from the do-it-yourselfer. One expects a professional electrician or network installer to come to a job site equipped with the time, talent, tools, pieces (screws, nails, brackets, and the like), and important parts needed to get the job done in one quick visit. The do-it-yourselfer, on the other hand, usually has to run to the hardware store often for special tools or extra parts.

Careful planning can prevent delays. Visualize yourself doing the work one step at a time. Collect all of the tools and equipment you need beforehand, along with the components, wire, hardware, and other things you need to finish the task. Use your project plan to make a list of the things you need, and check the items off the list as you buy them.

Gathering Tools and Equipment

You're going to need a lot of tools — some basic, some specialized — to complete your project. Some of these tools are worth owning so they're readily available for minor repairs. You may want to rent more expensive, seldom-used power equipment, especially in the case of specialty tools like heavy-duty cement saws or core drills. The following sections list some of the hand tools, power tools, and test equipment that you need as you build and maintain your digital home.

Hand tools

Acquiring more hand tools is usually a good thing, because they typically get used a lot. Before you become your own contractor you will need to own or have access to a basic issue of hand tools, including

- 8" diagonal wire cutter
- 9" lineman's pliers
- Stubby and long-handled screwdrivers for each of the following sizes: #2 phillips, ⅛", ¼", and ⅜" flat-blade
- Wire stripper
- Cable stripper
- Hack saw and assorted blades
- Hole saw
- RJ-45 (Ethernet cable) crimper/cutter
- RG-6 (coaxial TV cable) crimper
- Bubble level
- Folding ruler and tape measure

Power tools

In addition to a basic set of hand tools, you need some power tools. Power tools can be expensive, but the ones listed here are used so frequently that you should own them.

- **Drill:** Look for a drill that can make it through 2" × 4" framing and 2" × 8" floor joists. A right-angle power drill is best because the right angle gives you leverage against the twisting action, making drilling easier and safer.
- **Hammer drill:** This comes in handy when mounting service panels and backboards to masonry or concrete. If you don't want to invest in a hammer drill, you can also use a .20-caliber power fastener.
- **Circular saw:** Find a saw with comfortable grips for both hands so you can easily control the cut.
- **Rechargeable battery-powered screw gun:** This tool is handy for drilling screws to quickly mount junction boxes and other items. Make sure you have an assortment of driver tips, including a lot of extra Phillips head tips; they are used most frequently.
- **Reciprocating saw:** With a reciprocating saw and carbide blades, many tough cutting jobs become no more difficult than cutting cold butter.
- **Expendable items:** Shop for drill bits, assorted machine bits, and ¾", 1", and 1½" ship augers. To drill though floor joists purchase 1½", 2", and 2½" self-feed bits. You also need extra hack saw blades, work gloves, eye protection (goggles or a clear face mask), HEPA dust mask and filters, and a fully stocked first-aid kit.

Test equipment

You need a multimeter, and need to decide between digital and analog:

- **Digital multimeters** come with a selector switch to measure AC/DC voltages, ohms, or low-amperage currents. This version is inexpensive and popular.
- **Analog multimeters** come with a selector switch for measuring voltage, ohms, and current. Analog makes a better troubleshooting tool, partly because you don't have to constantly digest the changing digits.

You also need these goodies:

- Neon test light
- Low-voltage test light/continuity tester
- Category 5 network cable tester