

How Cell Phone Services Work by Ann Meeker-OConnell

Technological advances have turned a simple two-way radio into a complex communication tool that millions of people use every day.

If you decide to get a phone, you will need to decide which wireless service provider and plan suits you. There are hundreds of ads on TV, in print and on the Web from different companies promising great deals on cell phones. You hear offers of free off-peak minutes, free wireless Internet access and no roaming charges. What does it all mean? How do you navigate through the maze of options available? There are hundreds of different cell phone service carriers around the world, but there are basics that you can learn and apply to your decision no matter where you live.

Understanding the Carriers

Cell phone service carriers come in all shapes and sizes. For example, Verizon has hundreds of thousands of employees and provides nation-wide coverage. At the other end of the spectrum there can be small local carriers with just a few hundred employees. Regardless of size and complexity, any carrier has to go through the same basic steps:

- The carrier must obtain a license from the FCC to transmit in an area. Cell phone spectrum is a very scarce resource that is generally purchased at auction.
- The carrier must erect cell phone towers. Particularly in large cities, this can be a real challenge!

The Basics

One of the first things you will need to figure out is how you want to use your cell phone. Here are some questions you might ask yourself:

- Do you want a phone just for emergencies, such as when you are stuck on the side of the road with a flat tire?

You should consider a pre-paid service or a plan with only a small number of minutes. Your choice will also hinge on whether you're broken down on a road 5 minutes or 5 hours from home. If you don't travel a lot, a plan with local coverage will be the best, but if you are a cross-country driver, get one with regional or national coverage.

- Do you spend a great deal of time traveling and need a phone that you can use regardless of where you are in the world?

You'll need a phone compatible with the GSM access technology used in Europe and a provider that can arrange international calls.

- Do you want your cell phone to replace your home phone?

You'll need to buy a plan with plentiful anytime minutes for all the calls you'll make and receive, and you'll have to go digital to get extra features like call waiting, voice-mail, caller ID and so on.

- Do you need to get e-mail on your phone?

With any digital plan, you'll be able to send and receive short text messages on your phone's LCD for an additional fee. For real e-mail messages, you'll need a digital, WAP-enabled phone in order to access the wireless Web.

- Do you want Web access through your phone so you can keep up with news or stocks anytime?

This feature again limits you to digital, WAP-enabled phones and a service provider who supports WAP.

You can get cell phone service plans that could answer any of these needs. You can evaluate the features and benefits of different cell phone service plans and consider how much you are willing to pay for service.

Here are the basic things you need to know about cell phone service plans as you begin shopping for one:

- The carrier must install an MTSO to coordinate all the towers.

- The carrier must establish roaming agreements with other carriers.

- The carrier must advertise and sign up customers and sell/service phones.

A cell phone carrier will typically invest hundreds of millions of dollars for city-wide coverage -- it is not a small project!

- The carriers in your area
- Analog vs. digital service
- Pre-paid plans vs. monthly contracts
- Plan coverage area
- Number and type of minutes

In the next few sections you will learn how to apply these basics to your choice of a cell phone service.

Finding a Carrier

The very first thing you'll need to find out is who offers cell phone service in the area where you live or plan to use the phone. In most major cities, you will find from five to 10 carriers, each with many different plans from which to choose. These are the companies that own and operate the equipment that transmits signals to and from your phone. Each carrier sells its plans directly to consumers and also allows hundreds of resellers, such as your neighborhood electronics store, to sign people up for service. The dizzying number of ads that you see are the result of all these different sources clamoring to sell you the same basic slate of plans.

To find out whether or not a particular carrier offers service where you are, you can call the carrier directly or visit its Web site. Once you have a list of carriers available, you should give serious consideration to the following plan basics.

Analog vs. Digital

Wireless phones are basically duplex radios that operate using either analog or digital signals. Analog has been around the longest and has the widest coverage. Analog phones operate in smaller cities and rural areas where digital service is not yet available.

Digital personal communications services (PCS) phones have the most limited service right now. Digital networks are growing fast in many of these areas, and since they were not the first in a given market, their per-minute rates tend to be lower. And, despite their limited availability, digital plans are a must if you plan on taking advantage of newer features, such as caller ID, voice mail, e-mail, or searching the Internet.

Some providers offer both analog and digital service to provide a wider coverage area. You can use both if you buy a dual-mode phone. These phones can switch from digital to analog on the fly if the digital signal is dropped. This means that you don't have to worry about losing important calls if you're traveling through an area with gaps in digital coverage, and you can still use the Web.

The two digital choices, digital cellular and PCS, use different frequency bands on the radio spectrum. In addition, service providers typically use only one of the competing

digital access technologies (CDMA, TDMA, iDEN or GSM). Which frequency bands are offered and which access standard is used by a carrier will limit your choice of phones. For example, some phones will work with CDMA, but not TDMA or GSM digital service. In fact, most cell phones can operate on only one frequency, and almost all are restricted to one access technology.

This is why most carriers have you choose a service plan before giving you a choice between two to six phones that all work with the service you selected. Tri-Mode phones are one way to overcome these limitations and ensure that you can use your phone if you are roaming in an area where the carrier uses a different digital access technology.

Pre-paid vs. Monthly Contract

Most service providers lock you into a fixed monthly rate that buys you a certain number of airtime minutes and other extra features that you add on. After you pass a credit check, you sign a contract committing yourself to the service for a certain period of time -- usually from 11 months to 3 years. The carriers, in return, offer free or steeply discounted phones and accessories when you sign up.

If you decide to cancel service, it will cost you! Most providers have an early termination penalty. This can range from a flat fee to a charge per month remaining on your contract. Also, if you break your contract, some carriers even make you give the phone back. Some consumer electronics stores levy their own early cancellation fine! It is a good idea to check into whether or not you can get a trial period of service to test out a plan. This gives you a limited window of opportunity to cancel service without any penalty if you find out that a provider just doesn't meet your needs. Otherwise, you'll have to wait until your contract is up to get a new deal from a different provider. There are also month-to-month plans (with no annual contract) that allow you to change the number of minutes and other provisions.

Pre-paid wireless is one convenient alternative to long-term contracts. Like pre-paid phone cards, these plans let you buy a chunk of airtime that you can draw from until it runs out. You can buy service in \$25, \$50 and \$100 blocks. Until recently, carriers offered these plans with little fanfare to those who didn't meet their credit requirements. The plans proved popular with some cell phone users who want to keep a close watch on their cell-phone expenses, however, and now are more widely available. These plans have a number of benefits including:

- No monthly fee
- No long-term commitment
- No credit check required to sign up for service
- No deposit to start service

- Features such as caller ID, three-way calling, call forwarding and the wireless Web are available from some carriers. (There is a per-minute fee that is subtracted from your account balance if you use these extras.)

There is also a downside to choosing pre-paid plans. First, you usually buy the phone without any special discount. The retail price for a cell phone depends on the features included! Some other disadvantages are:

- You pay more per minute.
- If you don't use the phone for an extended period of time, you lose the money in your account.
- You can't make collect calls, third-party billed calls, and calls to 500, 700, 855, 900 and 976 numbers.

If you're trying to stick to a budget, you should know that both monthly and pre-paid plans have "hidden" charges. With a monthly plan, these extras are added to your monthly bill, but with a pre-paid plan, they are simply subtracted from your account balance. Examples of these are:

- One-time fee activation fee charged to program the MIN and SID codes into the phone.
- Directory assistance costs up to 99 cents per call.
- Per-minute fee charged by land-based phone companies for terminating calls from cellular phones to regular phones (3 to 16 cents per minute). This fee is in addition to what you've already shelled out for your on-air minutes!
- Federal, state, and local taxes and other fees charged for monthly service.

Coverage Area

One of the most important decisions you'll make is where you want to use your phone. You'll see this referred to as a plan's "home service area" or "local coverage area." They both mean the same thing: the geographic area covered by your plan and your service provider. This area is very important to you and your budget! If you make or get any phone calls when you are physically outside of its borders, you will pay roaming charges in addition to using your plan's airtime minutes. These charges can be as high as 69 cents per minute and can really add up if you aren't careful.

Your coverage area can also determine whether or not you will see additional long-distance charges on your bill. Long-distance in wireless terms generally means a call made from within your carrier's local calling area to a number outside of it. However, a carrier's local calling area is not always the same as its local coverage area. With some plans, it is possible for two cities to be in the same local coverage area but in separate local calling areas! Long distance also refers to calls made while in roaming mode to a

number outside of that service provider's local calling area. In this case, your bill will include both roaming and long distance charges! Make sure that you understand what a carrier considers long distance before you sign up for any plan.

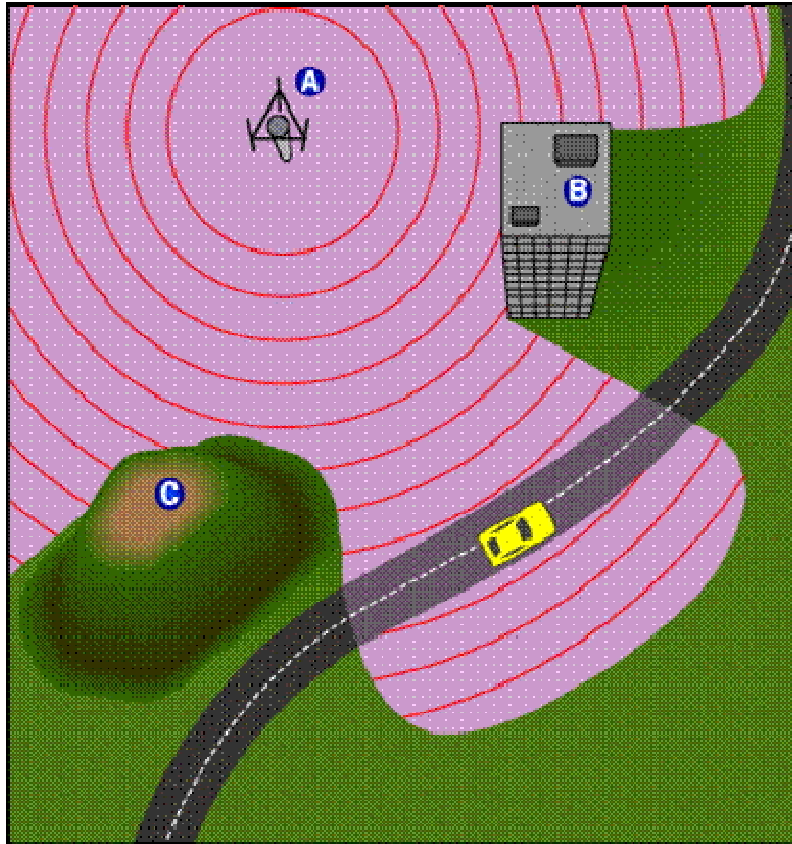
As you travel, the signal is passed from cell to cell. When you enter a cell covered by another company's MTSO, you are roaming. Roaming charges accumulate with each minute of your call.

You can avoid most roaming and long distance charges by carefully evaluating the home service areas of each plan and comparing them to where you'll make calls. Most services providers offer three different levels of coverage. These include:

- **Local coverage** -- These plans usually limit your service area to a particular metropolitan area. They typically provide more minutes per month than other coverage plans, but roaming and long distance charges are much higher. Some carriers now offer unlimited local airtime to lure customers. They recoup their costs by charging more per minute for roaming and by tacking on a per-minute airtime charge for calls made outside the local area.
- **Regional coverage** -- These plans enlarge your service area to include your entire state as well as selected surrounding ones. These plans cost more and also give you fewer airtime minutes per month than similarly priced local plans. Also, if you use more minutes than provided with your plan, you'll pay more per minute for that extra time.
- **National coverage** -- With a flat-rate national plan, you can use your monthly minutes anywhere in the United States where your carrier offers service with no roaming or long distance charges. Most carriers reach close to 95 percent of the United States with a combination of analog and digital service. National plans offer even less airtime per month than regional plans and are usually the most expensive option.

If you only plan to use your phone in one place, get a local coverage plan. However, if you travel a lot, you need a regional or national plan to avoid roaming and long-distance charges.

Pay close attention to each provider's coverage map before you select a plan. Look for roads you typically travel. Because digital coverage is still patchy in areas, you may find that your voice will "break up" in some spotty areas. With some plans, you may even drive in and out of your home service area as you travel through a city or county on your way to work! Each time you move out of your covered area, you will be hit with roaming charges.



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Cell phone transmission can be broken up by any large object, such as a building or a densely wooded area, that's in between you and a tower.

A Cellular Tower
B Ten-story building

C High mountain
Coverage

You may need to do a little detective work to make sure that your phone will really work where you plan to use it! You can ask your friends, co-workers and neighbors about their experiences with different service providers and plans.

Number and Type of Minutes

Wireless service plans give you a certain number of airtime minutes to use each month. You'll pay a per-minute fee for any calls that you make over this limit, and most plans won't let you carry over leftover minutes to the next month. With cell phones, you pay for the calls you receive as well as the calls you make, so you will need to figure incoming calls in your allotted airtime minutes.

Minutes also come in different varieties. Most popular plans give you minutes that you can use at any time of day. These are conveniently referred to as anytime minutes. You'll also see companies still selling plans with blocks of airtime divided up into peak and off-peak minutes. Peak minutes come at a premium and can be used from 7 a.m. to 7 p.m. on weekdays. Weekends and evening hours are considered off-peak, and off-peak calls cost much less per minute. There aren't very many plans that restrict your calling by time of day anymore. Most companies push plans with only anytime minutes. Then, they offer huge blocks of cheap off-peak minutes as features that you can add to your plan. Sometimes, you can even get them free as a part of a promotional package when you sign up!

The Extras

Once you know your basic cell phone needs, you can decide which other bells and whistles appeal to you the most. Look for a provider and plan that offers most or all of them within your budget. Keep in mind that more upscale service plans often bundle useful features like caller ID or voice mail with your package. With others, you may be hit with an extra monthly charge. Some of the options available include:

- Call waiting -- You can receive a second call when you're already on the line with this feature. A beep or other tone lets you know that someone else is trying to get in touch with you.
- Call forwarding -- If you're going to be away from your phone or too busy to answer it, you can have your calls ring through to voice mail or to another phone number altogether.
- Free first minute of incoming calls -- This means that you can save airtime by quickly concluding incoming calls.
- Caller ID -- This service shows the number and, if available, the name of the person calling you on your phone's display. Since you pay when people call you, screening your calls can help you use your minutes wisely by avoiding unwanted calls. If you have a plan with first incoming minute free, this feature may be less desirable.
- Voice mail -- This feature is great for those who travel and/or those who are unable to remotely play messages from their usual home answering machine. Playing back voice mail may use up your regular minutes if you use your cell phone to call in for your messages. One way around this is to check your messages using a land-based phone!
- Text messaging -- With any digital phone, you can send and receive short text messages right on your LCD.
- Wireless Internet - This lets you connect to the Internet to surf the Web or send e-mail. You must have a WAP-enabled phone. If your phone can send and receive data, you can also use it as a modem for your computer.

The Last Step

After you have selected a carrier and service plan, the very last thing you'll do is to pick a phone. The features that you selected for your service plan will have narrowed down your phone choices. Basic phones are often provided for free. More feature-laden phones are often heavily discounted if you buy them at the same time as a service contract.

Often a wireless company will buy phones from a cell phone manufacturer, then resell them to you at a fraction of their original cost as an enticement for you to sign a contract with them. They are hoping you will exceed your monthly block of minutes or use the extra services they offer to recover the cost of the phone.

You can also find deals on phone accessories if you buy them with a service plan. For example, you can buy cell phone holsters to lessen the chance that your phone will be destroyed by water or other liquids. Other available accessories are:

- Faceplates
- Car power adapter
- Hands-free headset
- Hands-free speaker kit
- External car antenna
- Extra battery
- Battery charger

Also, you don't want to forget a surge protector for the cell phone battery charger. Be sure it uses metal-oxide varistors (MOVs). Zaps from nearby lightning can follow buried power lines via tree roots, and damage a connected cell phone battery charger.

The Benefits of Competition

As you shop for a cell phone service, you should keep your eyes open for sales and special promotions. The heated competition between carriers and the immense number of plans offered can mean bargains for you.

You can sign up for service at carrier-owned stores and Web sites, at specialty retailers, electronics superstores, and at online resellers. These sources have all sorts of different promotions on plans and phones. You may find the high-tech phone you want at a price within your budget just by shopping around. Some carriers also offer unadvertised specials on service plans. You might be eligible for a reduced rate or a group discount if you belong to an organization like the American Association of Retired Persons.

Look Out!

- Your first bill may be a lot more than you expect! The charges will include one-time fees, such as:

1. Activation fee - This covers programming the carrier's SID and other information into your phone.
2. Current month's service charge - Wireless companies bill a month in advance. This means that the monthly service charge on your bill covers your plan minutes and features for the coming month.
3. Cost of the phone - If you splurged on a feature-laden phone, you'll pay for it now.
4. Cost of any accessories you added, such as a headset.
5. Deposit - If you pass a carrier's credit check with less than flying colors, you may have to pay a deposit to cover their losses if you can't pay later on.

- The charges for your first month of services are prorated!

Your first bill will include a prorated charge for the current month of service. For example, if you sign up for service 10 days before the month's end, you'll be charged about a third of the normal monthly fee. However, the number of plan minutes you get in the first month will also be reduced accordingly. In the example above, if your plan gives you 60 anytime minutes per month, you only have 20 of them available to you. If you go through your normal allotment of 60 monthly minutes during your prorated month, you will be charged for 40 minutes of time over your limit.

- The regular monthly charges for cell phone use may be numerous!

You'll be charged for this stuff every month:

- Service for the coming month - Cell phone service providers bill a month in advance.
- Roaming or long distance - These will appear if you make any calls while roaming or to a number outside of your local calling area.
- Land-line use - Land-based phone companies charge wireless carriers a fee to terminate any call made from a cell phone to one of their land-based (such as your home phone) lines. The carriers then pass this cost on to you, in the form of a per minute fee.
- Taxes and fees - National, state and local taxes and fees may apply. Depending on where you live, these fees can account for close to 10 percent of your monthly total!
- The meter starts running from the minute you punch in a number and hit the send button on your phone until you end your call. This means that you pay for each ring while you wait for someone to answer!
- You may be charged for busy signals if you stay on the line for more than 30 seconds!
- Time is indeed relative -- most service providers charge you for a full minute of airtime whether you use 6 seconds or 60!

FAQ

- If I buy a service plan, can I buy two phones to share the same plan?

This depends on your provider. Family plans let you share a pool of minutes with multiple people for an additional monthly fee. Each phone used in a pooled minute plan must have a unique phone number. Very few providers will let two cell phones share one number. Most follow one plan, one phone number and one phone rule.

- What's the difference between a cell phone and a mobile phone?

Mobile phones are a specific kind of cell phone. They are larger phones made to be installed permanently in a car, so they are perfect for people who only plan on using their phone while driving. They actually draw their power from your car's battery.

- Why do I have to go through a credit check to get a cell phone?

Carriers spend a significant amount of money to get you to sign up for a plan. They discount phones, accessories, and they offer airtime minutes and other freebies in hopes that you will use their service. Like you, they want to make sure that they are making a sound investment by making sure that you can pay for all the services you pick.

- What if I move from one city to another?

You'll have to contact your service provider to see what their policy is. If they offer service in your new location, you'll probably be able to just transfer your service contract. You may have to pay a small fee for this service. If they don't serve your new location, it's up to them whether or not you will have to pay a cancellation fee.

- I want a cell phone, but I'm worried about my privacy. Can I be tracked if I use one?

Yes, you can. Wireless companies were required by the government to make the location of a cell phone signal easy to pinpoint. In the case of emergencies, this lets emergency personnel quickly reach someone in trouble. But many businesses want to get this same information from your wireless provider. They want to offer coupons and advertisements for various services and products to you depending on where you are at any given moment. Imagine idling in your car by the mall and receiving an e-mail on your cell phone advertising products from one of the stores inside! One wireless trade group, the Cellular Communications and Internet Association, is encouraging the FCC and the Federal Trade Commission (FTC) to come up with a policy for this kind of tracking. They believe that consumers should have to give permission to their wireless provider before they can be tracked in this manner.

Cool Facts

- When you turn on your cell phone, you won't hear a dial tone. They don't use them.
- Cell phone users outside of the United States have plans that make the calling party foot the bill for airtime. The Federal Communications Commission is exploring a similar system for U.S. carriers.

- Even the wireless Internet is under attack by hackers. Some companies offer anti-virus software for cell phones to prevent attacks by viruses.
- You can donate your old cell phone to The Wireless Foundation, and it will reprogram it and give the cell phone to a victim of domestic violence.