Location – Where are you now?

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Location, Location, Location has been the real estate mantra for a very long time, indicating how important location is to the value of a property. This reference to location is to a fixed location. The location in question here is that of a mobile communicating device, such as your smartphone, the location of which may be constantly changing, as it would be if you are driving down a major interstate like I-75. Even if you are not flying down an interstate, your location can still be changing as you walk down the street to visit a neighbor. So, with your location possibly changing, how does your smartphone know where you are? And for that matter, how do the Apps on your phone know where you are at any given time?

First, why is your location important, anyway? One reason may be that you are using an App on your smartphone to find the location of the nearest restaurant. The App you are using to locate these restaurants needs to know where you are, so it can calculate the distance from you to the restaurants in its database and give you a list of nearby restaurants, usually ordered by increasing distance away from you. Or, you may want to navigate from one place to another, using directions from a mapping App on your phone (which is similar to how a dedicated GPS device in your car operates). For this kind of navigation, you need a precise location so the App can determine where you are on the map and give you directions to get you to your destination. (Or it may have to give you corrections; you may have heard “recalculating!” if you were using an older GPS device.) The precision is necessary to make sure you are in the right place for upcoming turns or lane changes. As you probably know, the Global Positioning System (GPS) is the only way you can get this kind of precise location. GPS is a space-based radio navigation system owned by the United States government and operated by the United States Air Force. It provides geolocation (geographic coordinates) and time information to a GPS receiver anywhere on the Earth where there is an unobstructed line of sight to four or more GPS satellites. There are 24 satellites in the GPS constellation. GPS, as a government project, was started way back in 1973, and became fully operational in 1995. The US government currently claims 4-meter (approximately 13 feet) accuracy for civilian GPS (but there are many variables involved that might affect this estimate).

Your location, or more precisely, the location of your smartphone, can be determined by one of three ways. GPS, as described above, is the first and the most precise method. It is the only way to determine location if you intend to navigate using a mapping/navigation App. The second way, which is much less precise, is via the Internet Service Provider (ISP). This is the way location can be determined if you are using Wi-Fi, in your own home or some other Wi-Fi location. (Of course, this location will be fixed; not subject to change.) The ISP knows approximately where you are because it knows where the ends of the cables that carry the internet to you are, and where the Access Points are geographically located, along with the IP addresses that have been

assigned. This technique may give a precision of maybe 75 meters (approximately 250 feet) or a few blocks in a relatively populated area, but this may be all the precision needed to find the nearest restaurant or gas station.

The third way to determine your location is used when you are actively using the cell phone towers. The precision of the measurement of location in this case is only around 600 meters (approximately 1/3 of a mile), but it is accurate enough for normal cell phone system operations. The cell phone system needs to know your location constantly because it must track your smartphone's transmitter's signal. It needs to know where your phone is, so it can electronically aim its antenna at your phone. Yes, when you are using the cell phone towers, your device's every move is being tracked. Without tracking, the cell phone tower would not be able to keep your device connected when you pass through the tower's area, and it would not know when to hand-off your connection to the next cell tower. (Remember the cell phone system is a collection of contiguous areas, each around a central cell tower, so if you travel down the interstate far enough, you will go out of one cell tower's area and into the next cell tower's area. At this point your connection must be moved to the next cell tower for you to continue your connection without interruption while travelling into the second cell tower area.)

Now that you know the three methods of location determination, you can more easily determine how to set the "Location" setting on your smartphone. As an example, on an Android device (OS 7.0), go to settings and then Location. Here you can set the Mode to "High accuracy", "Battery saving", or "Device only". High accuracy will use all the possible methods, Battery savings will use all but GPS, and Device only will only use GPS (the mode to use when navigating). If you are not navigating, then it is probably a good idea to use the Battery savings mode because the GPS receivers in your device use a lot of power, so it will affect your battery life, but if you need GPS accuracy then use either of the other modes. On an iPhone, you can turn Location Services on at Settings-Privacy-Location Services, and you can individually control which apps and system services have access to Location Services data. Knowledge is power, location is very important.