CELLULAR PHONES Essay, Research Paper

CELLULAR PHONES

Each day something like 30,000 people in the United States sign up for and start using a cellular phone. With a cell phone you can talk to anyone on the planet from just about anywhere (80% of the U.S. has coverage). A cell phone is really an extremely sophisticated radio. A cell phone is a duplex device which uses one frequency for talking and a second, separate frequency, for listening. A cell phone can communicate on 1,664 channels and operate within cells. They can switch cells as they move around.

Cells give cell phones incredible range. Someone using a cell phone can drive clear across a city and maintain a conversation the entire time. The way a cellular phone does this is the carrier chops up an area (such as a city) into cells. Each cell is typically sized at about 10 square miles (perhaps 3 miles by 3 miles). Cells are normally thought of as hexagons on a big hexagonal grid. As you move toward the edge of your cell, your cell’s base station will note that your signal strength is diminishing. Meantime, the base station in the cell you are moving toward, which is listening and measuring signal strength on all frequencies, will be able to see your phone’s signal strength increasing. The two base stations coordinate themselves through the MTSO, and at some point your phone gets a signal on a control channel telling it to change frequencies. This ?handoff? switches your phone to the new cell.

Roaming makes things a bit more interesting. In modern systems, the phones listen for a System ID (SID) on the control channel at power-up. If the SID on the control channel does not match the SID programmed into the phone, then the phone knows it is “roaming”. The phone also transmits a registration request and the network keeps track of your phone’s location in a database. This way the MTSO knows which cell you are in when it wants to ring your phone. As you move between cells, the phone detects changes in the control channel’s strength and re-registers itself with the new cell when it changes channels. If the phone cannot find any control channels to listen to it knows it is out of range and displays a “no service” message.

Cell phones suffer from a problem known as “cloning”. When your phone is “cloned” it means that someone has stolen your phone’s ID numbers and is able to make fraudulent calls on your account. Here is how cloning occurs. When your phone makes a call, it transmits two pieces of information to the network at the beginning of the call:

- A MIN (Mobile Identification number) – a 10 digit number derived from your phone’s number (both the MIN and SID are programmed into the phone by the dealer)

- An ESN (Electronic Serial Number) – a unique 32-bit number programmed into the phone when it is manufactured.

The MIN/ESN pair is a unique tag for your phone, and it is how the phone company knows who to bill for the call. When your phone transmits its MIN/ESN pair, it is possible for someone to listen, with a scanner, and capture the pair. With the right equipment it is fairly easy to modify another phone so that it contains your MIN/ESN pair, and now someone else can make calls on your account.