

# How a cellular phone system works

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How a cellular phone system works Introduction Cellular phones are a marvel of modern technology. Millions of cellular phone users in developed countries can make calls across thousands of miles. They are a significant part of the contemporary lifestyle. However, not all users of cellular phones understand how they work. A cellular phone system operates under a combination of device security and refined radio technology (Wisniewski, 14).

## Discussion

### 1. Radio technology

Cellular phones operate through a large interconnected network, which enables them to receive and send radio signals to enhance communication. The secret behind the cellular system is the splitting up of a city into multiple cells. The cells can either take a hexagonal or circular shape. One cell can operate multiple radio towers. People can simultaneously use their cell phones due to the widespread frequency reuse within a city. The cells enable cellular phones to have incredible range as they can automatically switch as people move around. A cellular network's range is not limited as compared to that of a walkie-talkie (1. 1 miles) and a CB radio (4. 9 miles).

Figure 1: How cellular networks work (Wisniewski 26)

Frequencies also shift between cells when an individual is on a call while in motion. As a cellular phone moves away from its cell, change in signal strength is detected by the cell's base station. The next base station being approached detects the increasing signal strength. The two base stations in the two cells coordinate, through a Mobile-Telephone Switching Office, and the user is 'handed over' to the next cell automatically. The shift makes it possible for someone to drive across a city while using a cell phone, and

keep up a conversation for the entire period (Wisniewski, 36).

A cell phone differs from both CB radios and walkie-talkies, which are both half-duplex devices. It is able to use multiple frequencies, hence a full-duplex device. An individual can use one frequency for listening and a second frequency for talking. The multi-tasking capability of a cellular phone is that, two people on a call can talk simultaneously. The towers in these cells transmit a two-way frequency maximizing the capabilities of cellular phones as full-duplex devices.

Figure 2: Frequencies transmitted by radio devices

Nonadjacent cells can use the same frequencies severally since base stations and cell phones employ low-power transmitters, which ensure that transmissions do not go very far from a cell and the cell phones around it. Low-power transmitters have a stake at the shape of cellular phones since they ensure that the power consumption of the phone is relatively low hence a small battery. Similar frequencies must be one cell apart in order for nonadjacent cells to utilize them. Such a control measure ensures that there are no interruptions between calls whose signals employ a similar frequency. It is from this measure that a cellular network's power is derived.

## 2. Computer security

There are various standards and security measures that govern how cellular networks coexist with each other. The common cellular phone standards are CDMA and GSM. Security measures ensure that cellular phones contain specific valid data (service-subscriber key) for them to transmit or receive calls. Such data is stored on Subscriber Identity Modules (SIM). The service-subscriber key carries the verification key which determines the country and

network code (Tripathi, 47).

### Conclusion

The cellular phone system can be viewed as one of the most thought of technologies in the contemporary world. It has enabled and enhanced the delivery of information from ages, and it is constantly being improved to offer a smooth means of communication worldwide.

### Reference list

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