

Wireless Mobile Communication

Lecture 25

- CDMA

Topics to be Covered

- Spread spectrum
- Spread spectrum: FHSS
- Spread spectrum: DSSS

CDMA

- CDMA
 - Third generation system
 - Separates users by assigning them digital codes within a broad range of the radio frequency
 - First technology to use *soft-handoff*
 - Employs *spread spectrum* technique
 - Advantages
 - Improved capacity, coverage, voice quality, and immunity from interference

An Overview of Cellular Technologies

Cellular System Generation	Technology	Operating Frequency	Advantages	Disadvantages
First Generation	AMPS based on FDMA	800 MHz or 1800 MHz	<ul style="list-style-type: none"> ✦ Widest coverage including rural areas 	<ul style="list-style-type: none"> ✦ Poor security ✦ Not optimized for data ✦ Limited capacity
Second Generation	TDMA	800 MHz or 1900 MHz	<ul style="list-style-type: none"> ✦ Better security ✦ Higher capacity 	<ul style="list-style-type: none"> ✦ May experience an interruption during handoff
Third Generation	CDMA	800 MHz or 1900 MHz	<ul style="list-style-type: none"> ✦ Very high security ✦ Improved capacity ✦ Greater immunity from interference ✦ Soft handoff with no interruption 	<ul style="list-style-type: none"> ✦ Limited coverage at this time

Spread Spectrum Technique: FHSS

- Frequency Hopping Spread Spectrum (FHSS)
 - Resists interference by jumping rapidly from frequency to frequency in a pseudo-random way
 - Advantage
 - Increases the total amount of available bandwidth through the assignment of multiple hopping sequences within the same physical area
 - More flexible than DSSS
 - Application
 - In large facilities especially with multiple floors

Spread Spectrum Technique: DSSS

- Direct Sequence Spread Spectrum (DSSS)
 - Resists interference by mixing in a series of pseudo-random bits with the actual data
 - Advantage
 - If bits are damaged in transmission, the original data can be recovered as opposed to having to be retransmitted
 - Application
 - Is substituted for point-to-point or multi-point connectivity to bridge LAN segments
 - Limitation
 - Roaming capabilities are less robust

Spread Spectrum Technique: CDPD

- Cellular Digital Packet Data
 - Allows for a packet of information to be transmitted in between voice telephone calls
 - Enables data specific technology to be tacked onto existing cellular telephone infrastructure