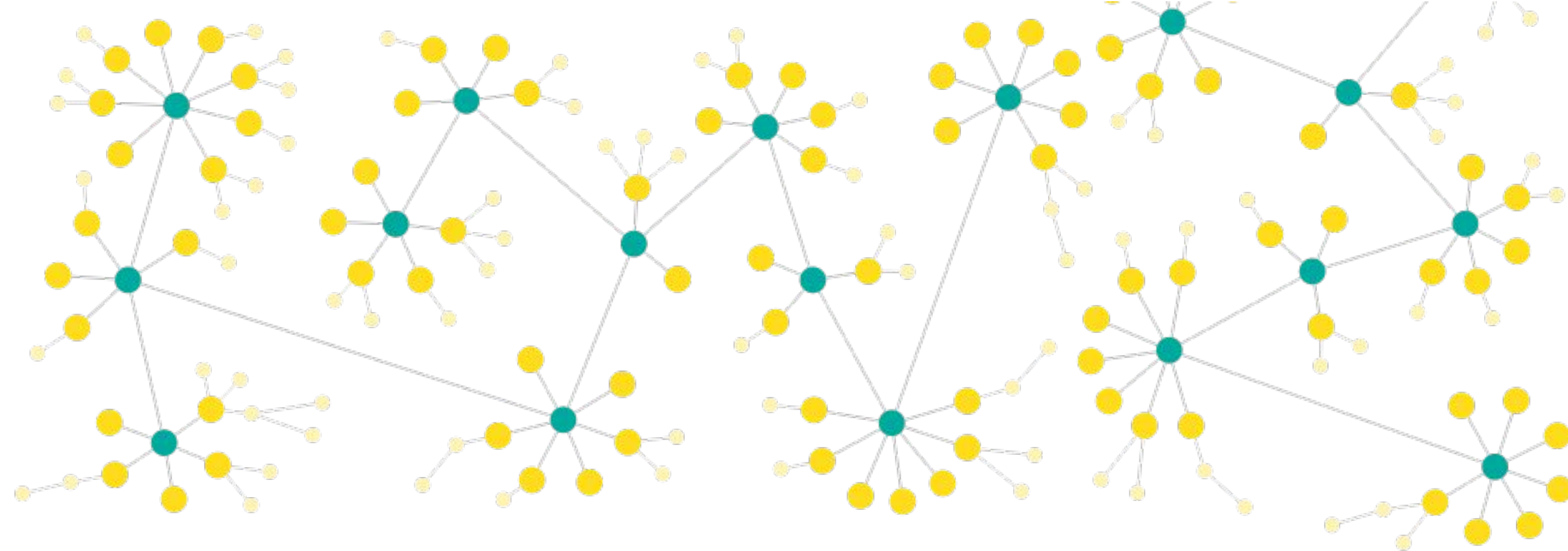
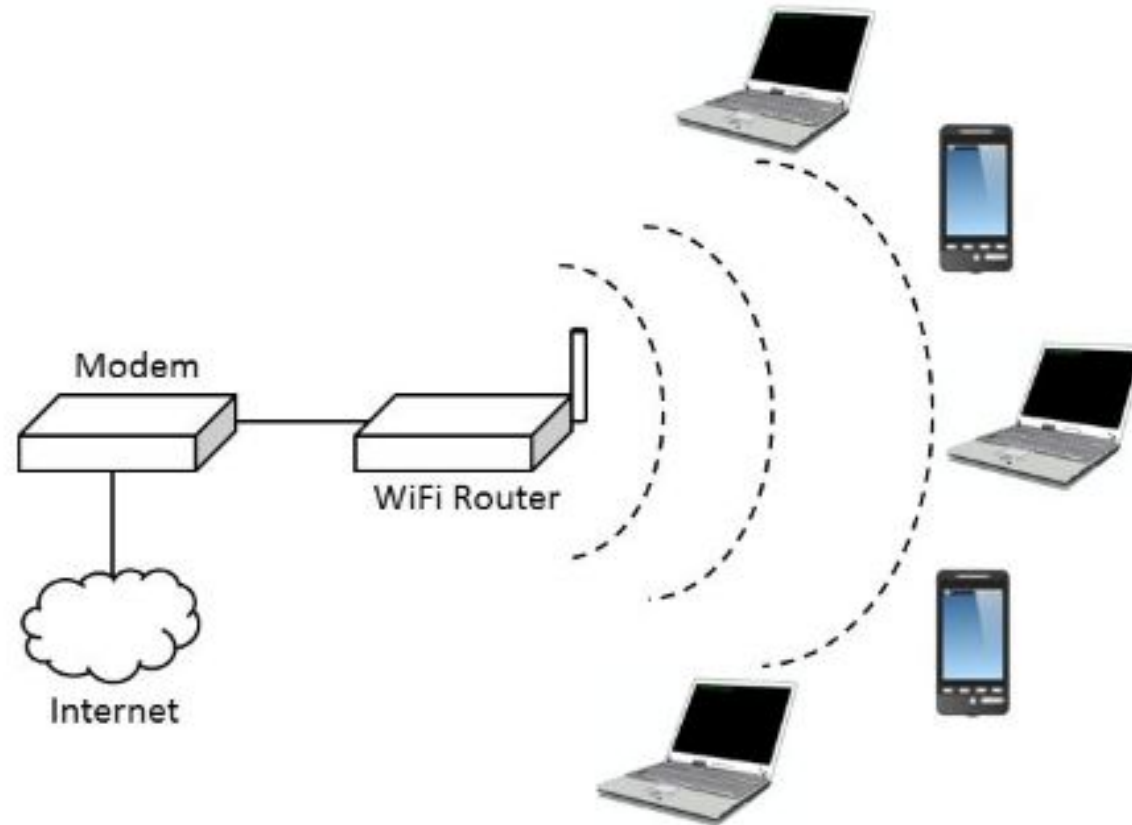




**Vezeték nélküli átvitelben
használt modulációs
eljárások (Wi-Fi)**

A Wi-Fi hálózat részei



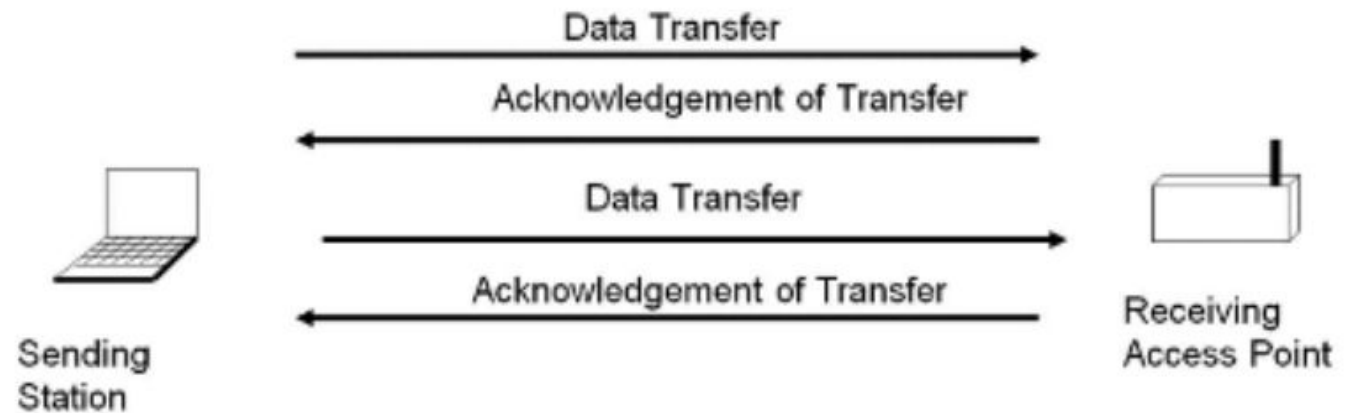
IEEE 802.11 szabványcsalád



IEEE szabvány	Megjelenés	Működési frek.	Max. seb	Hatótáv (belt.)	Hatótáv (kült.)
802.11	1997	2.4 GHz	2 Mbit/s	~20 méter	~100 méter
802.11a	1999	5 GHz	54 Mbit/s	~35 méter	~120 méter
802.11b	1999	2.4 GHz	11 Mbit/s	~38 méter	~140 méter
802.11g	2003	2.4 GHz	54 Mbit/s	~38 méter	~140 méter
802.11y	2008	3.7 GHz	54 Mbit/s	~50 méter	~5000 méter
802.11n	2009	2.4 GHz / 5 GHz	600 Mbit/s	~70 méter	~250 méter
802.11ac	2013	5 GHz	1300 Mbit/s	~140 méter	~350 méter
802.11ax	2018	2.4 GHz / 5 GHz	9600 Mbit/s		

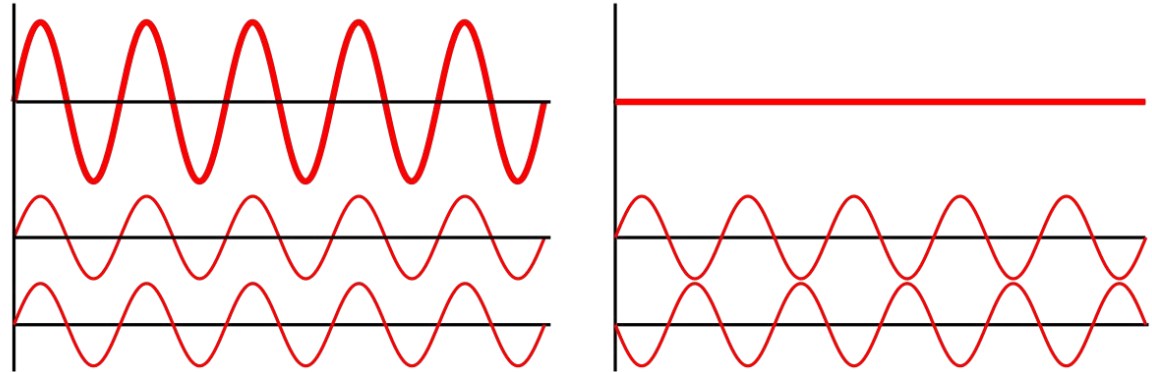
CSMA/CA

- Carrier Sense Multiple Access and Collision Detection
- CSMA/CD - Ethernet
- CSMA/CA - Wi-Fi



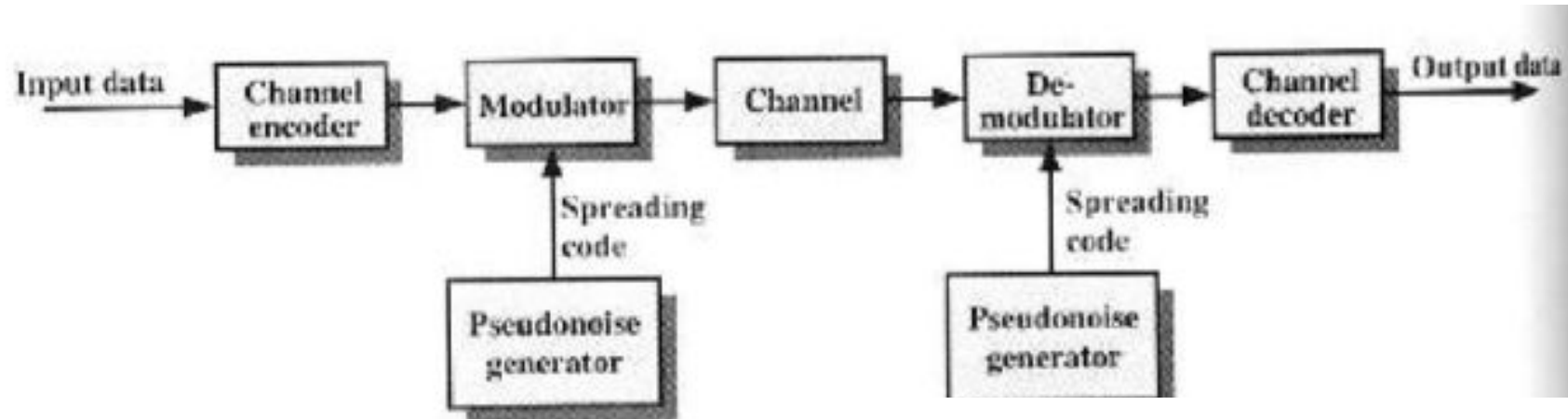
Gyakori problémák

- Interferencia
- Fading
- **Korlátozott sávszélesség**

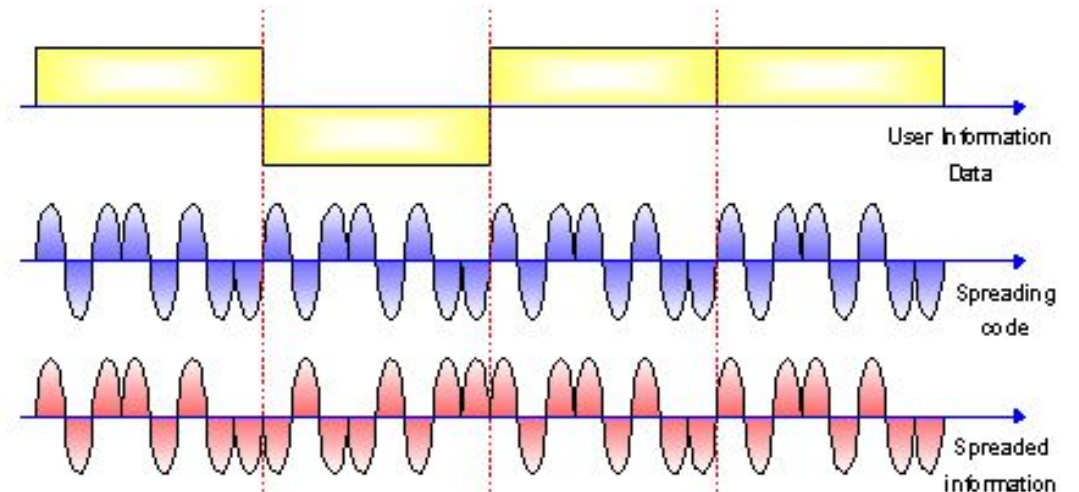


FHSS és DSSS

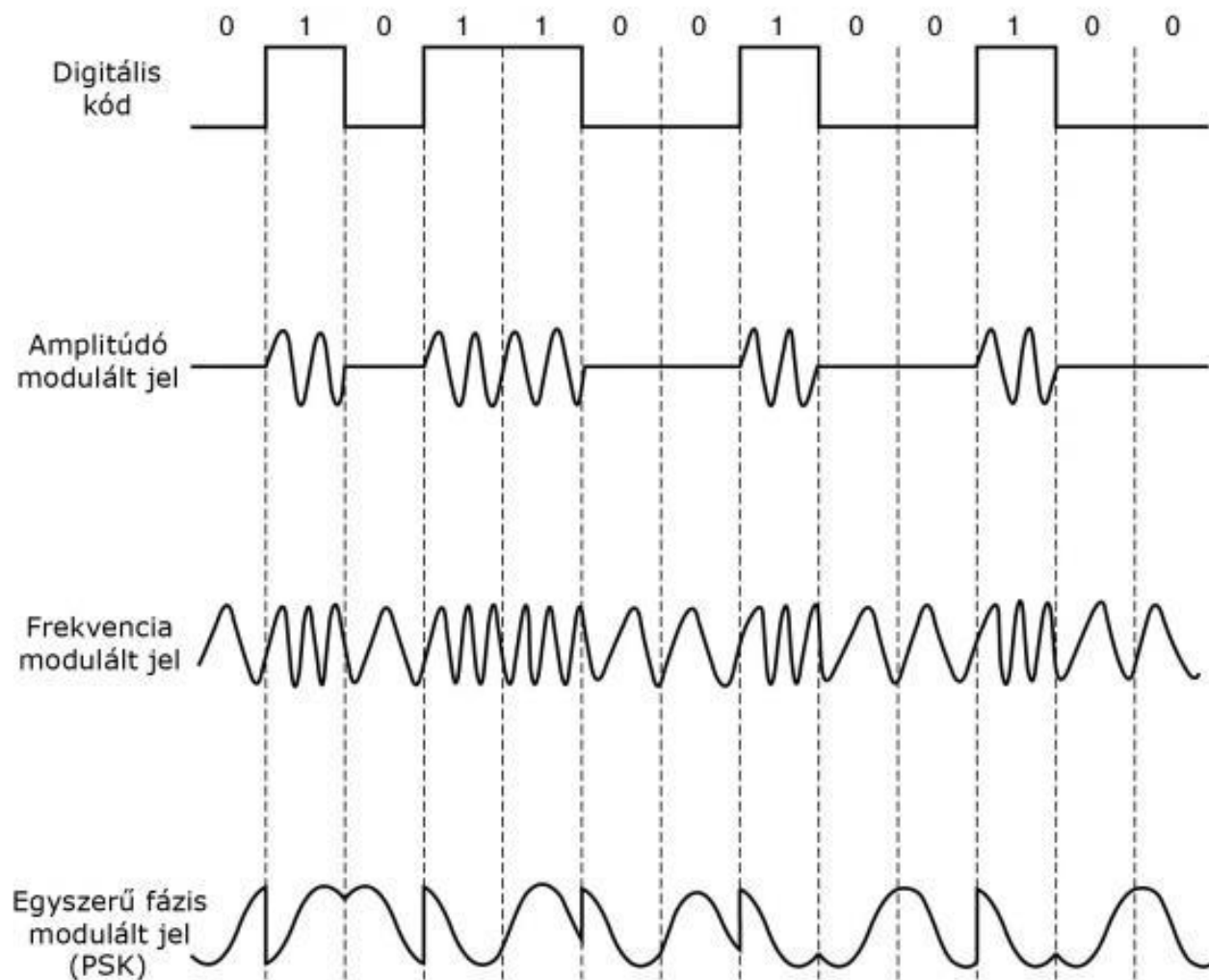
- Frequency Hopping Spread Spectrum



- Direct Sequence Spread Spectrum

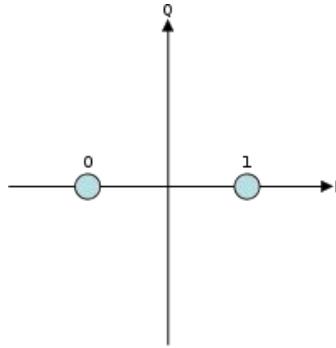


Modulációs eljárások - eddig

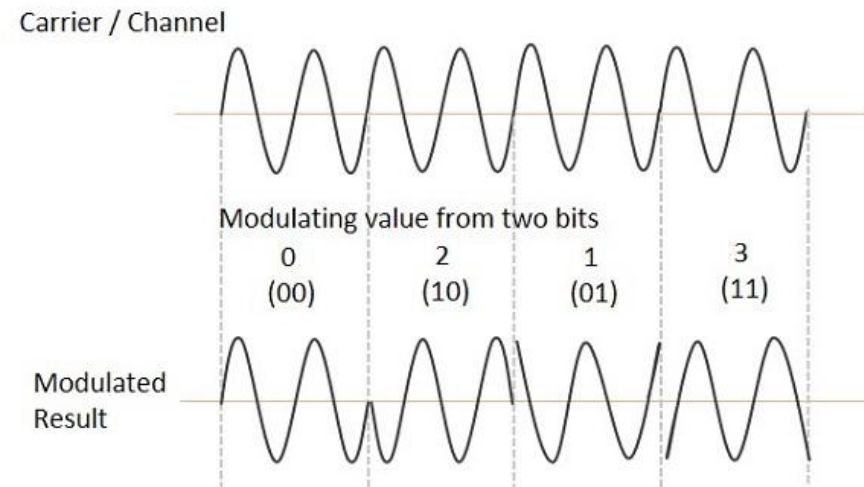
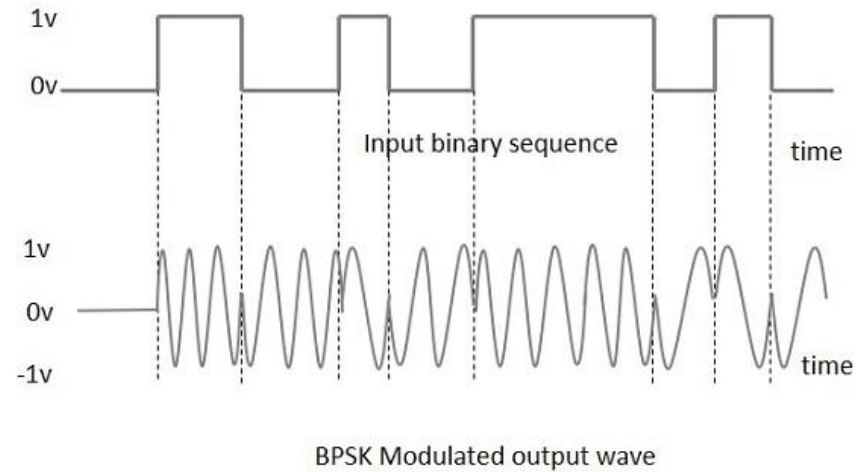
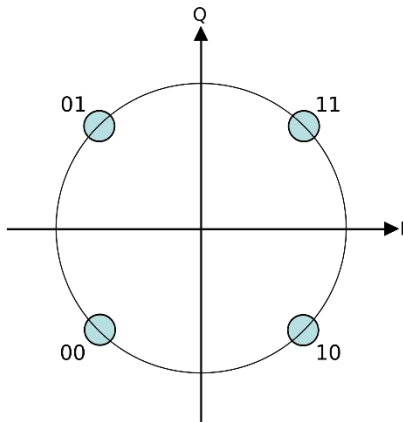


Modulációs eljárások - eddig

- Binary Phase Shift Keying



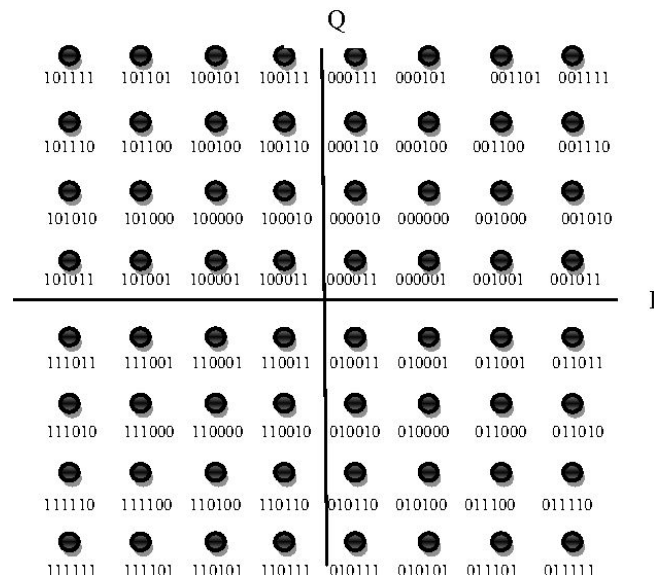
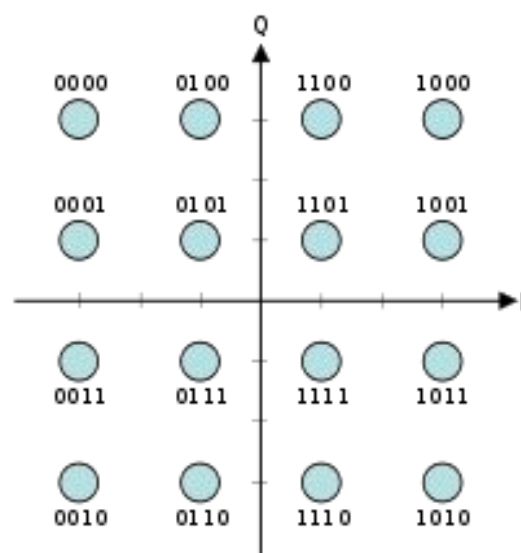
- Quadratic Phase Shift Keying



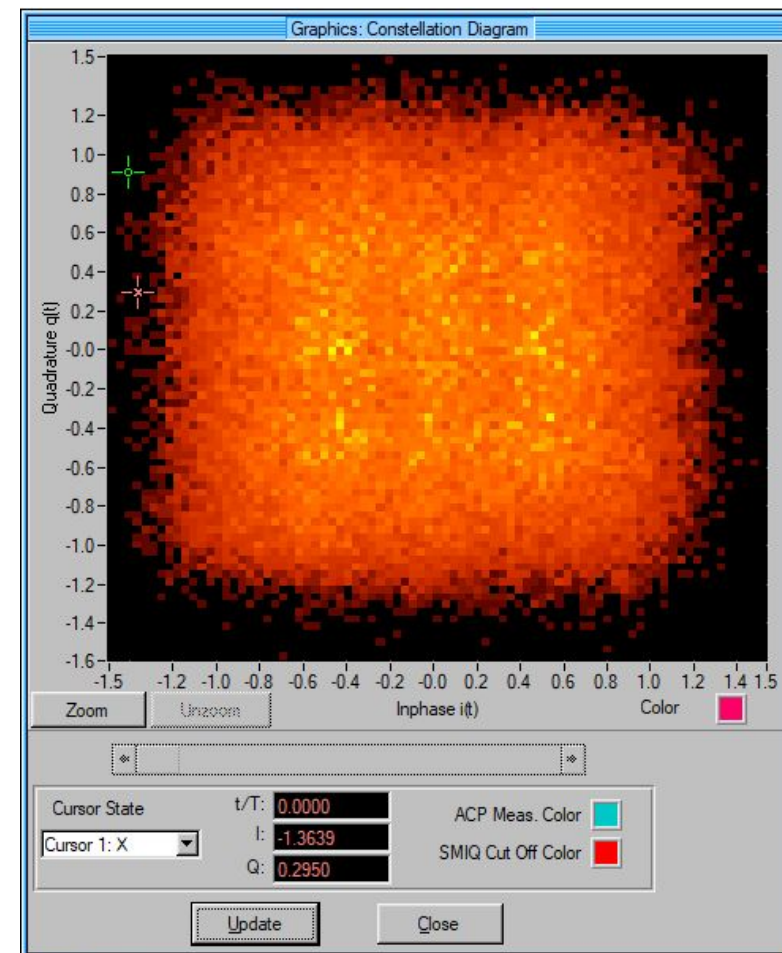
Modulációs eljárások - keményebbek

- M-ary Orthogonal Keying
- Complementary Code Keying
- Pulse-position Modulation – Cycle-Code Shift Keying
- **Quadrature Amplitude Modulation**
- Orthogonal Code Division Multiplexing
- **Orthogonal Frequency Division Multiplexing**

QAM



- Zajra érzékeny
- Többutas terjedés, fading



OFDM

