

# 802.11 PHYs

## Reference Sheet



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		Ratification Date	Clause in 802.11-2016	PHY Name	Frequency Band	Transmission	Modulations	Channel Width(s)	SISO   MIMO	MU-MIMO	Data Rates
									Spatial Streams		
802.11		1997	Clause 15	DSSS Direct Sequence Spread Spectrum	2.4 GHz	Spread Spectrum	BPSK (1 Mbps) QPSK (2 Mbps)	22 MHz	SISO	N.A.	1 - 2 Mbps
802.11a		1999	Clause 17	OFDM Orthogonal Frequency Division Multiplexing	5 GHz	OFDM	BPSK (1 Mbps) QPSK (2 Mbps) 16-QAM (24 & 36 Mbps) 64-QAM (48 & 54 Mbps)	20 MHz	SISO	N.A.	6 - 54 Mbps
802.11b		1999	Clause 16	HR-DSSS High Rate - Direct Sequence Spread Spectrum	2.4 GHz	Spread Spectrum	BPSK (1 & 5.5 Mbps) QPSK (2 & 11 Mbps)	22 MHz	SISO	N.A.	1 - 11 Mbps
802.11g		2003	Clause 18	ERP Extended Rate PHY	2.4 GHz	OFDM	BPSK (1 Mbps) QPSK (2 Mbps) 16-QAM (24 & 36 Mbps) 64-QAM (48 & 54 Mbps)	20 MHz	SISO	N.A.	1 - 54 Mbps
802.11n		2007	Clause 19	HT High Throughput	2.4 GHz 5 GHz	OFDM	BPSK (MCS 0) QPSK (MCS 1 & 2) 16-QAM (MCS 3 & 4) 64-QAM (MCS 5 - 7)	20 MHz 40 MHz	MIMO max. 4	N.A.	MCS 0 - 7
802.11ac	wave 1	2013	Clause 21	VHT Very High Throughput	5 GHz	OFDM	BPSK (MCS 0) QPSK (MCS 1 & 2) 16-QAM (MCS 3 & 4) 64-QAM (MCS 5 - 7) 256-QAM (MCS 8 & 9)	20/40 MHz 80 MHz	MIMO max. 8	N.A.	MCS 0 - 9
	wave 2							20/40 MHz 80/160 MHz		Downstream	
802.11ax		N.A.	N.A.	HE High Efficiency	2.4 GHz 5 GHz	OFDM & OFDMA	BPSK (MCS 0) QPSK (MCS 1 & 2) 16-QAM (MCS 3 & 4) 64-QAM (MCS 5 - 7) 256-QAM (MCS 8 & 9) 1024-QAM (MCS 10 & 11)	20 MHz 40 MHz 80 MHz 160 MHz	MIMO max. 8	Yes	MCS 0 - 11