

Modulation formats used in amateur radio

N1AL - June 4, 2009

Format name	Developer	Google Principal uses		Data rate (bits/sec)	Bit rate (bits/sec)	Symol rate (baud)	Modulation ("N-" means multi-carrier)	ITU clas. or BW	Filtering	Error handling
		nr. hits	Freq. Application							
ALE	MIL-STD-188-141, FED-	540	HF Data	375	375	125	8FSK	~2 kHz		FEC
AMTOR-A	G3PLX	489	HF Data?	53	114	114	FSK			ARQ
AMTOR-B	G3PLX	"	HF Data?	57	114	114	FSK			FEC (duplication)
AOR AMBE	AOR Corporation	95	HF Voice	2400	3600	50	36-QPSK?	~2250 Hz		FEC
APCO-25	APCO	405	VHF Public service	6800	9600	4,800	4FSK/QPSK	12.5/6.25 kHz		FEC
ATV	NTSC	584	UHF Full-speed TV	30 frames/s		525-line YC	AM-VSB/FM	6 MHz	VSB	
AX.25 packet		425	HF K2K	<< 300	300	300	FSK, 200 Hz			ARQ
		"	VHF APRS, DX clusters	<< 1200	1200	1200	AFSK, 1 kHz			
	G3RUH	"	V/UHF Satellite	<< 9600	9600	9600	FSK, 6 kHz	~15 kHz		ARQ
	G3RUH	"	V/UHF Satellite	<< 1200	1200	1200	PSK			ARQ
Chip64	IZ8BLY	68	HF K2K	21.1/37.5	300	300	DBPSK-DSSS			FEC (Walsh)
CLOVER-II	Hal Communications	800	HF Data	< 37.5-750	62.5-750	31.25	4-(2-16)DPSK/(2-4)DASK	500HJ2BEN/500HJ2DEN		FEC(RS)/FEC+ARQ
CLOVER-2000	Hal Communications	"	HF "	108-1994	500-3000	62.5	8-(2-16)DPSK/(2-4)DASK	2K0HJ2BEN/2K0HJ2DEN		FEC(RS)/FEC+ARQ
Domino	ZL2AFP	102	HF K2K	31/44/62?	31/44/62?	7.8/11/15.6	16FSK	158/223/316HJ2B		None
DominoEX	ZL1BPU	37	HF K2K	(<15.63)-86.13	15.63-86.13	3.9-21.5	18FSK	173-524 Hz		none/FEC
D-Star (DV)	JARL	468	VHF Voice & data	D:960 V:2400	4800	4800	0.5 GMSK/QPSK/4PSK	6 kHz	Gaussian/RC?	FEC
D-Star (DD)	JARL	"	UHF Data	72k-124k	128,000	128,000	0.5 GMSK/QPSK/4PSK	150 kHz	Gaussian/RC?	FEC
D-Star (backbone)	JARL	"	10 GHz Repeater links			10,000,000	GMSK	10.5 MHz		
Facsimile		760	HF image			120 lpm	FM, 1500-2300 Hz			
FDMDV	G3PLX/HB9TLK	215	HF Voice	1450	1450	50	15-QPSK	1K20J2E	Root Nyquist	None
FSK441	K1JT	326	VHF Meteor scatter	882	882	441	4FSK	~1800 Hz		
G-TOR	Kantronics	264	HF Data	35/75/115	80/160/240	100/200/300	FSK, 170/200 shift			FEC (Golay) + ARQ
Hellschreiber (Feld)	Rudolf Hell	553	HF K2K	2.5 char/s	122.5	122.5	ASK	150 Hz?		none
HSMM		296	2.4 GHz Data	<~6 Mb/s	1-11 Mb/s		DSSS	22 MHz		
		"	2.4 GHz Data	<~25 Mb/s	6-54 Mb/s		OFDM	22 MHz		
JT6M	K1JT	233	50 MHz Meteor scatter	77.9	116.8	21.53	44FSK	~950 Hz		
JT6S	K1JT	396	V/UHF Moonbounce	1.54	16.1	2.7	65FSK	~175 Hz		FEC (RS)
MFSK16	ZL1BPU/IZ8BLY	435	HF K2K, data	31.25	62.5	15.625	16FSK	316HF1B	None	FEC (conv)
MT63	SP9VRC	635	HF K2K	35/70/140	320/640/1280	5/10/20	64-DPSK	500/1k/2k Hz		FEC (Walsh)
Olivia	SP9VRC	589	HF K2K	8.75/17.5	78.13/156.25	15.63/31.25	32FSK	500/1k Hz		FEC (Walsh)
PACTOR-I	DL6MAA/DF4KV	592	HF Data, Winlink email	51.2/128	100/200	100/200	FSK, 200 Hz			ARQ
PACTOR-II	Spec. Comm. Systems	"	HF "	100-700	200-800	100	2-DBPSK/PI-4DQPSK/8,16DPSK	500 Hz	Nyquist	ARQ/FEC (conv)
PACTOR-III	"	"	HF "	85-2722	200-3600	100	(2-18)-DBPSK/DQPSK	2K20J2D	Nyquist	ARQ/FEC (conv)
PSK31	G3PLX	592	HF K2K	31.25	31.25	31.25	PSK	60H0J2B	Cosine	None
"	G3PLX	"	HF K2K	31.25	62.5	31.25	QPSK	60H0J2B	Cosine	FEC (conv)
PSK63/125		417	HF K2K	62.5/125	62.5/125	62.5/125	PSK	120/240 Hz	Cosine	None
"		"	HF K2K	62.5/125	125/250	62.5/125	QPSK	120/240 Hz	Cosine	FEC (conv)
Q15X25	SP9VRC	166	HF K2K?	1250?	2,500	83.33	15-QPSK	2K00J2D		ARQ/FEC
RDFT (SSTV)	KB9VAK	80	HF Image	~736		230?	8-9PSK	~1850 Hz		FEC (RS)
RTTY (ASCII)		350	HF K2K	233	300	300	FSK			None
RTTY (Baudot)		251	HF K2K, contests, DX	30.3	45.45	45.45	FSK, 170 Hz	~300 Hz		None
RWOP	W0RW	37	HF K2K	75/150/300	75/150/300	75/150/300	FSK, 850 Hz	1K06F1B/1K17F1B/1K32F1		FEC
SSTV (traditional)	W0ORX	578	HF Image	8 s/frame			120-line B/W FM, 1200-2300 Hz	1.5 kHz		
SSTV Martin M1	Martin Emmerson	666	HF Image	114 s/frame			240-line RGB FM, 1200-2300 Hz	1.5 kHz		
SSTV Scottie S1	Eddie Murphy	638	HF Image	110 s/frame			240-line RGB FM, 1200-2300 Hz	1.5 kHz		
SSTV VIS		221	HF Image	23.1	33	33	FSK, 200 Hz			
Throb	G3PPT	444	HF K2K	10/20/40 wpm			1/2/4 9FSK/2-9FSK	72/144 Hz		
WinDRM	HB9TLK	213	HF Voice				COFDM (n-QAM)			
WINMOR	KN6KB	135	HF Winlink email		62.5-3750	31.25/62.5	(1-15)-QPSK/16QAM/4FSK	200-2000 Hz		ARQ/FEC (RS)
WSPR (MEPT-JT)	K1JT	231	HF-VHF Weak signal	0.45	2.93	1.46	4FSK	6 Hz		FEC (conv)

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Notes: Google hits 1/2/2009 on: "<format_name>" "amateur radio"
Some results used additional search term(s) to eliminate false hits

K2K" "Keyboard to Keyboard"

"Bit rate" is raw bits as transmitted, ignoring any coding

Data rate" includes the effect of FEC and ARQ but not data compression (Huffman, varicode, etc.)

The less-than symbol "<" indicates the effects of ARQ are unknown or hard to compute