ka9q-radio command/status protocol element types -

Type	Command settable?	Encoding	Units	Front end?
EOL	N/A	(none)		Y
COMMAND_TAG	Yes	Integer		Y
CMD_CNT	No	Integer	commands	Y
GPS_TIME	No	Integer	nanosec	Y
DESCRIPTION	No	String		Y
INPUT_DATA_SOURCE_SOCKET	No	Socket		N
INPUT_DATA_DEST_SOCKET	No	Socket		N
INPUT_METADATA_SOURCE_SOCKET	No	Socket		N
INPUT_METADATA_DEST_SOCKET	No	Socket		N
INPUT_SSRC	No	Integer		N
INPUT_SAMPRATE	No	Integer	Hz	N
INPUT_METADATA_PACKETS	No	Integer	packets	N
INPUT_DATA_PACKETS	No	Integer	packets	N
INPUT_SAMPLES	No	Integer	samples	N
INPUT_DROPS	No	Integer	packets	N
INPUT_DUPES	No	Integer	packets	N
OUTPUT_DATA_SOURCE_SOCKET	No	Socket		Y
OUTPUT_DATA_DEST_SOCKET	No	Socket		Y
OUTPUT_SSRC	No *	Integer		Y
OUTPUT_TTL	No	Integer	hops	Y
OUTPUT_SAMPRATE	Yes	Integer	Hz	Y
OUTPUT_METADATA_PACKETS	No	Integer	packets	Y
OUTPUT_DATA_PACKETS	No	Integer	packets	Y
AD_LEVEL	No	Float	dBFS	Y
CALIBRATE	Y	Float		Y
LNA_GAIN	Y	Integer	dB	Y
MIXER_GAIN	Y	Integer	dB	Y
IF_GAIN	Y	Integer	dB	Y
DC_I_OFFSET	N	Float		Y
DC_Q_OFFSET	N	Float		Y
IQ_IMBALANCE	N	Float		Y
IQ_PHASE	N	Float	radians	Y
DIRECT_CONVERSION	N	Boolean		Y

Type	Command settable?	Encoding	Units	Front end?
RADIO_FREQUENCY	Y	Float	Hz	Y
FIRST_LO_FREQUENCY	Y	Float	Hz	N
SECOND_LO_FREQUENCY	N	Float	Hz	N
SHIFT_FREQUENCY	Y	Float	Hz	N
DOPPLER_FREQUENCY	Y	Float	Hz	N
DOPPLER_FREQUENCY_RATE	Y	Float	Hz/sec	N
LOW_EDGE	Y	Float	Hz	Y
HIGH_EDGE	Y	Float	Hz	Y
KAISER_BETA	Y	Float		N
FILTER_BLOCKSIZE	N	Integer	samples	N
FILTER_FIR_LENGTH	N	Integer	samples	N
NOISE_BANDWIDTH	N	Float	dB-Hz	Y
IF_POWER	N	Float	dB	Y
BASEBAND_POWER	N	Float	dB	Y
NOISE_DENSITY	N	float	dBJ	N
DEMOD_TYPE	Y	integer	enum	Y (LINEAR)
OUTPUT_CHANNELS	Y	integer		Y
INDEPENDENT_SIDEBAND	Y	boolean		N
PLL_ENABLE	Y	Boolean		N
PLL_LOCK	N	Boolean		N
PLL_SQUARE	Y	Boolean		N
PLL_PHASE	N	Float	radians?	N
PLL_BW	Y	Float	Hz	N
ENVELOPE	Y	Boolean		N
FM_FLAT	-	Boolean		N
DEMOD_SNR	N	float	dB	N
FREQ_OFFSET	N	Float	Hz	N
PEAK_DEVIATION	N	Float	Hz	N
PL_TONE	N	Float	Hz	N
AGC_ENABLE	Y	Boolean		N
HEADROOM	Y	Float	dBFS	N
AGC_HANGTIME	Y	Float	sec	N
AGC_RECOVERY_RATE	Y	Float	dB/sec	N
AGC_ATTACK_RATE	Y	Float	dB/sec	N
AGC_THRESHOLD	Y	Float	dBFS	N

Type	Command settable?	Encoding	Units	Front end?
GAIN	Y	Float	dB	Y?
OUTPUT_LEVEL	N	Float	dBFS	Y
OUTPUT_SAMPLES	N	Integer	samples	Y?
OPUS_SOURCE_SOCKET	N	Socket		N
OPUS_DEST_SOCKET	N	Socket		N
OPUS_SSRC	N	integer		N
OPUS_TTL	N	integer	hops	N
OPUS_BITRATE	N	integer	bits/sec	N
OPUS_PACKETS	N	integer	packets	N
FILTER_DROPS	N	Integer	blocks	N
LOCK	N	Boolean		Y
TP1	N	Float		Y
TP2	N	Float		Y
GAINSTEP	Y	Integer		Y
OUTPUT_BITS_PER_SAMPLE	N	Integer	bits	Y
SQUELCH_OPEN	Y	Float	dB	N
SQUELCH_CLOSE	Y	Float	dB	N
PRESET	Y	String		N
DEEMPH_TC	Y	Float	ns	N
DEEMPH_GAIN	Y	Float	dB	N

Type	Meaning & Use	
EOL	End of option list	
COMMAND_TAG	generated by controller, echoed by server to confirm command	
CMD_CNT	Server count of received commands	
GPS_TIME	Nanoseconds since GPS epoch of 6 January 1980 00:00:00 UTC. Generated by front end, passed through 'radio'	
DESCRIPTION	Free-form description of front end (antenna, etc). Generated by front end, passed through 'radio'	
INPUT_DATA_SOURCE_SOCKET	Source IP and port of input data stream	
INPUT_DATA_DEST_SOCKET	Destination (multicast) IP address of source data stream	
INPUT_METADATA_SOURCE_SOCKET	Source IP and port of input metadata stream	
INPUT_METADATA_DEST_SOCKET	Destination (multicast) IP address of input metadata stream	
INPUT_SSRC	RTP stream ID of input	
INPUT_SAMPRATE	Sample rate of RTP input data stream	
INPUT_METADATA_PACKETS	Count of metadata packets received	
INPUT_DATA_PACKETS	Count of input data stream packets	
INPUT_SAMPLES	Count of input data samples	
INPUT_DROPS	Count of dropped RTP input packets	
INPUT_DUPES	Count of duplicated RTP input packets	
OUTPUT_DATA_SOURCE_SOCKET	Source IP and port of output RTP data stream	
OUTPUT_DATA_DEST_SOCKET	Destination (multicast) IP address and port of output data stream	
OUTPUT_SSRC	RTP stream ID of output stream	
OUTPUT_TTL	IP Time-to_live (hop count limit) of output data stream (not metadata, which can be different)	
OUTPUT_SAMPRATE	Sample rate of RTP output data stream	
OUTPUT_METADATA_PACKETS	Count of metadata packets sent	
OUTPUT_DATA_PACKETS	Count of RTP output data packets	
AD_LEVEL	Level at input of A/D converter (deprecated)	
CALIBRATE	Frequency calibration factor for tuner reference and A/D sample clock	
LNA_GAIN	Relative gain of analog input to receiver	
MIXER_GAIN	Relative gain of mixer in analog receiver/downconverter	
IF_GAIN	Relative gain of baseband analog amplifier in tuner just ahead of A/D converter	
DC_I_OFFSET	DC offset of I-channel A/D converter (only direct conversion front ends)	
DC_Q_OFFSET	DC offset of Q-channel A/D converter (only direct conversion front ends)	
IQ_IMBALANCE	Relative gain of I and Q channels (only direct conversion front ends)	
IQ_PHASE	Relative phase error of I & Q channels	
DIRECT_CONVERSION	Front end uses direct conversion with DC spike and 1/f noise that should be avoided	

Type	Meaning & Use	
RADIO_FREQUENCY	RF tuning frequency - center frequency for front ends, nominal (usually carrier) frequency in 'radio'	
FIRST_LO_FREQUENCY	Front end tuner frequency	
SECOND_LO_FREQUENCY	Digital down converter frequency, calculated from RADIO_FREQUENCY, FIRST_LO_FREQUENCY and DOPPLER_FREQUENCY	
SHIFT_FREQUENCY	Post-downconversion shift frequency, used primarily for CW	
DOPPLER_FREQUENCY	Doppler tuning offset	
DOPPLER_FREQUENCY_RATE	Rate of change of Doppler tuning effort	
LOW_EDGE	Lower edge of post-mixer filter (settable in 'radio' only)	
HIGH_EDGE	Upper edge of post-mixer filter (settable in 'radio' only)	
KAISER_BETA	Kaiser β factor for filter windows	
FILTER_BLOCKSIZE	(New) samples per FFT processing block	
FILTER_FIR_LENGTH	(Old) samples per FFT processing block, sets maximum length of FIR filter	
NOISE_BANDWIDTH	Noise bandwidth of filter, calculated as $10 * Log10(HIGH\_EDGE - LOW\_EDGE)$	
IF_POWER	Signal input power relative to unity	
BASEBAND_POWER	Signal power at filter output, relative to unity	
NOISE_DENSITY	Estimated noise spectral power density, N0	
DEMOD_TYPE	Demodulator type, enum: 0 = linear; 1 = FM/PM; 2 = Wideband FM with stereo demodulator	
OUTPUT_CHANNELS	mono (=1) stereo (=2); for front ends, 1 channel = real, 2 channels = complex (IQ)	
INDEPENDENT_SIDEBAND	LSB in left channel, USB in right channel - currently unimplemented	
PLL_ENABLE	Enable zero frequency (carrier tracking) phase lock loop	
PLL_LOCK	Indicate whether PLL is in lock (controlled by squelch threshold settings)	
PLL_SQUARE	Square feedback to PLL; use for DSB AM and BPSK. Implies PLL_ENABLE	
PLL_PHASE	Relative phase of PLL oscillator	
PLL_BW	Bandwidth of PLL loop filter	
ENVELOPE	Use envelope detector in linear demodulator	
FM_FLAT	obsolete (use deemphasis time constant)	
DEMOD_SNR	Estimated demodulator signal-to-noise; different algorithms for linear and FM modes	
FREQ_OFFSET	Estimated signal frequency error	
PEAK_DEVIATION	Peak deviation in FM demodulator	
PL_TONE	PL tone frequency (FM demodulator) - currently unimplemented	
AGC_ENABLE	Automatic gain control (Linear demod only)	
HEADROOM	Target output audio level, block average	
AGC_HANGTIME	Time delay before automatic gain increase on lowered signal (linear demod only)	
AGC_RECOVERY_RATE	Gain increase rate on lowered signal (linear demod only)	
AGC_ATTACK_RATE	Gain decrease rate (linear demod only) - currently unused	
AGC_THRESHOLD	Target demodulator output level on noise only	

Type	Meaning & Use	
GAIN	Demodulator gain (constant for FM, variable for linear)	
OUTPUT_LEVEL	Output level, frame average	
OUTPUT_SAMPLES	Output sample count	
OPUS_SOURCE_SOCKET	Source IP address and port number of Opus transcoder	
OPUS_DEST_SOCKET	Destination (multicast) IP address and port of Opus transcoder output data stream	
OPUS_SSRC	RTP stream ID of Opus output stream (same as input stream)	
OPUS_TTL	IP Time-to_live (hop count limit) of Opus output data stream	
OPUS_BITRATE	Target bitrate of Opus-compressed audio	
OPUS_PACKETS	Opus encoder output packets	
FILTER_DROPS	Number of block drops by output stage of filter	
LOCK	Will ignore frequency tuning commands	
TP1	General purpose test point #1	
TP2	General purpose test point #2	
GAINSTEP	Front end analog gain, arbitrary units, hardware specific	
OUTPUT_BITS_PER_SAMPLE	Number of significant bits in sample (e.g., 8, 12, 16)	
SQUELCH_OPEN	Squelch opening threshold (FM, synchronous AM)	
SQUELCH_CLOSE	Squelch closing threshold (FM, synchronous AM) - must be less than or equal than SQUELCH_OPEN	
PRESET	Set demodulator mode - configured by modes.conf on 'radio'	
DEEMPH_TC	Deemphasis time constant (0 = off), FM only	
DEEMPH_GAIN	Static gain correction when de-emphasis used to maintain subjectively equal loudness	

Type			
EOL			
COMMAND_TAG			
CMD_CNT			
GPS_TIME			
DESCRIPTION			
INPUT_DATA_SOURCE_SOCKET			
INPUT_DATA_DEST_SOCKET			
INPUT_METADATA_SOURCE_SOCKET			
INPUT_METADATA_DEST_SOCKET			
INPUT_SSRC			
INPUT_SAMPRATE			
INPUT_METADATA_PACKETS			
INPUT_DATA_PACKETS			
INPUT_SAMPLES			
INPUT_DROPS			
INPUT_DUPES			
OUTPUT_DATA_SOURCE_SOCKET			
OUTPUT_DATA_DEST_SOCKET			
OUTPUT_SSRC			
OUTPUT_TTL			
OUTPUT_SAMPRATE			
OUTPUT_METADATA_PACKETS			
OUTPUT_DATA_PACKETS			
AD_LEVEL			
CALIBRATE			
LNA_GAIN			
MIXER_GAIN			
IF_GAIN			
DC_I_OFFSET			
DC_Q_OFFSET			
IQ_IMBALANCE			
IQ_PHASE			
DIRECT_CONVERSION			

Type			
RADIO_FREQUENCY			
FIRST_LO_FREQUENCY			
SECOND_LO_FREQUENCY			
SHIFT_FREQUENCY			
DOPPLER_FREQUENCY			
DOPPLER_FREQUENCY_RATE			
LOW_EDGE			
HIGH_EDGE			
KAISER_BETA			
FILTER_BLOCKSIZE			
FILTER_FIR_LENGTH			
NOISE_BANDWIDTH			
IF_POWER			
BASEBAND_POWER			
NOISE_DENSITY			
DEMOD_TYPE			
OUTPUT_CHANNELS			
INDEPENDENT_SIDEBAND			
PLL_ENABLE			
PLL_LOCK			
PLL_SQUARE			
PLL_PHASE			
PLL_BW			
ENVELOPE			
FM_FLAT			
DEMOD_SNR			
FREQ_OFFSET			
PEAK_DEVIATION			
PL_TONE			
AGC_ENABLE			
HEADROOM			
AGC_HANGTIME			
AGC_RECOVERY_RATE			
AGC_ATTACK_RATE			
AGC_THRESHOLD			

Type			
GAIN			
OUTPUT_LEVEL			
OUTPUT_SAMPLES			
OPUS_SOURCE_SOCKET			
OPUS_DEST_SOCKET			
OPUS_SSRC			
OPUS_TTL			
OPUS_BITRATE			
OPUS_PACKETS			
FILTER_DROPS			
LOCK			
TP1			
TP2			
GAINSTEP			
OUTPUT_BITS_PER_SAMPLE			
SQUELCH_OPEN			
SQUELCH_CLOSE			
PRESET			
DEEMPH_TC			
DEEMPH_GAIN			