Quality of sound signal decreases each time we decrease the bit per sample.

For a 48000 sample/second sampling rate, bit rate is 48000\*8/1024=375 kbps.

If we tried to increase the precision of sampling (such as trying to sample amplitude of signals with floating point precision), more bits should have been stored.

For a pure sinusoidal signal with the formula y=100\*sin(2π2t) of 5 seconds with 48 kHZ sampling rate:

Mean of error signal for 8 bit quantization is 0.2369.

Figure : Original, decoded and error signals for 8 bit quantization

Mean of error signal for 6 bit quantization is 3.7631.

Figure : Original, decoded and error signals for 6 bit quantization

Mean of error signal for 4 bit quantization is 59.2653



Figure : Original , decoded and error signals for 4 bit quantization

Resulting number of bits for the same signal is:

For 8 bit quantization : 48000\*5\*8= 1920000 bits

For 6 bit quantization : 48000\*5\*6= 1440000 bits

For 4 bit quantization : 48000\*5\*4= 960000 bits