Subject: Re: Digital Sampling Question
Posted by Wayne Parham on Tue, 22 Nov 2011 07:18:36 GMT
View Forum Message <> Reply to Message

It's just a different method. The delta sigma method is a serialized conversion. The successive approximation method provides parallel digital output, whereas the delta sigma only provides a single bit stream.

A successive approximation A/D converter samples at twice the highest frequency needed, and each sample is given a number that sets the amplitude resolution, i.e. 8-bit, 12-bit, 16-bit, etc. If that width was 8-bits, then the entired dynamic range is represented in a range of 0-to-255, if 12-bit then it's 0-to-4095 and if 16-bit then the amplitude resolution is 65535. And again, the passband is limited to the Nyquist frequency, being about twice the sampling rate. So a successive approximation converter is pretty cut-and-dried.

The delta sigma A/D converter needs to sample much more rapidly, because it is effectively serializing the data as it converts. Instead of sampling at the Nyquist frequency and obtaining a byte or two-byte wide (parallel) representation of the amplitude, the delta sigma converter samples at a much higher rate and each sample is tested to see if it is higher or lower than the last. The analog signal is integrated and the input is compared to the integral during each sample. It's a very simple circuit that doesn't require precision - You basically just sample as fast as possible to get the most resolution out of it you can. But what you end up with is a pulse stream, a serial one-bit output.