An Analog to Digital Converter (ADC) converts analog signals into digital binary signal. An ADC works by sampling the value of the input at discrete intervals in time. Provided that the input is sampled above the Nyquist rate, defined as twice the highest frequency of interest, then all frequencies in the signal can be reconstructed.

In the real world, every real quantity such as voice, temperature, weight etc exists in the analog state. And it cannot be processed by any digital device such as a computer or a cell phone.

**Analog To Digital Conversion Steps**

**Sample**

The sample block function is to sample the input analog signal at a specific time interval. The samples are taken in continuous amplitude & possess real value but they are discrete with respect to time.

The sampling frequency plays important role in the conversion. So it is maintained at a specific rate. The sampling rate is set according to the requirement of the system.

**Hold**

The second block used in ADC is the ‘Hold’ block. It has no function. It only holds the sample amplitude until the next sample is taken. The hold value remains unchanged till the next sample.

**Quantize**

This block is used for quantization. It converts the analog or continuous amplitude into discrete amplitude.

The on hold continuous amplitude value in hold block goes through ‘quantize’ block & becomes discrete in amplitude. The signal is now in digital form as it has discrete time & discrete amplitude.

**Encoder**

The encoder block converts the digital signal into binary form i.e. into bits.

As we know that the digital devices operate on binary signals so it is necessary to convert the digital signal into the binary form using the Encoder.

This is the whole process of converting an Analog signal into digital form using an Analog to Digital Converter. This whole conversion occurs in a microsecond.

**Application of ADC**

In the modern world of growing technology, we are dependent on digital devices. These digital devices operate on the digital signal. But not every quantity is in digital form instead they are in analog form. So an ADC is used for converting analog signals into digital signals. The applications of ADC are limitless. Some of these applications given below:

* Cell phones operate on the digital voice signal. Originally the voice is in analog form, which is converted through ADC before feeding to the cell phone transmitter.
* Images and videos captured using camera is stored in any digital device, is also converted into digital form using ADC.
* Medical Imaging like x-ray & MRI also uses ADC to convert images into Digital form before modification. They are then modified for better understanding.
* Music from the cassette is also converted into the digital form such as CDs and thumb drives using ADC converters.
* Digital Oscilloscope also contains ADC for converting Analog signal into a digital signal for display purposes & different other features.
* Air conditioner contains temperature sensors for maintaining the room temperature. This temperature is converted into digital form using ADC so that onboard controller can read & adjust the cooling effect.

In today’s modern world almost every device has become the digital version of itself & they need to have ADC in it. Because it has to operate in digital domain which can be only acquired using analog to digital converter (ADC).