

Digital Microphones:

Digital microphones have been around for long, but with DANTE and other networking platforms, they have become much more popular these days, so i thought i shine a light on this today. Different versions of digital microphones have been available since the early 90's and most of them with a AES 3 interface inside, so that they could be connected via standard XLR cable for short distance and with 50 Ohm wave resistance cable on longer runs, Those can be used on any gear, that has an AES EBU interface on the input. In the times of DANTE, a digital interface has become more popular, but of course it raises questions about quality and performance and we need to learn to judge what is good and what not in the digital world.

One of the things that is a big difference between a regular analog microphone and a digital microphone is the preamp and the dynamic range. In an analog signal path the mic preamp has a wide range of settings and can be manually set to an optimal position in the curve of the microphone, but of course if done wrong it can also greatly limit your dynamic range and capabilities. Once set, the analog gain is fixed and that is also the way we like it for easy reference and stability. In a digital microphone, all this has to be done within the mic before you even get any access to the mic signal and this can be a challenge and you are fully at the mercy of the digital circuitry, that is applied in your microphone of choice.

Historically of course the first versions of Digital microphones all work with AES 3 standard protocol and this is a two channel digital signal. This means it is particularly interesting for stereo applications or for applications where two channels of audio can be used in other creative ways, such as for beamforming. In a digital microphone all this can be done inside the microphone itself, which in the analog world would require a ton of external processing power.

Another set of features that make a digital mic quite attractive is RFI Immunity (Radio Frequency Interference) and in today's environment, this can often be critical. Once the microphone signal is digital it is way less sensitive to RF interference than any analog signal and this means the signal will stay clean, once it comes out clean from the microphone.

Last but not least the dynamic range of a digital microphone can be quite impressive and this is typically achieved through "Gain Ranging". What is this? Since you do not have access to a mic preamp setting in a digital microphone, within the microphone there will be separate discreet signal paths with different pre amplification settings. In the circuitry there will also be a comparator element that will then choose from those different discrete signal paths, so that you always have the ideal dynamic range of your microphone. In high end modern digital consoles, this concept of parallel discrete audio paths has also been implemented and one particular famous example is the STAGETEC TRUE MATCH pre amp inputs on the STAGETEC consoles. Through the design of the Mic preamp, those consoles achieve dynamic ranges previously unheard of.

Then after any kind of Preamp design you still have to convert the signal from analog to digital and here you will also find a huge limitation block, since A/D Converters that allow a higher dynamic range, become exponentially more expensive with higher resolution. So for many applications where a mic might just be used for speech and voice, all this might not be so critical, but if you are attempting to make high end recordings of classical content, the sky is the limit for the amount of money that you can spend on quality. Just because something is "DANTE" capable, it does not mean that before anything becomes digital, you are in the best of worlds and as much as a digital microphone is plug and play these days, you still have to understand and care about those details and know where your chosen model stands with regards to RFI immunity, Dynamic Range, Signal to Noise and other parameters. I wish you happy shopping