

Digital sound transfer

SecureStream Technology



SecureStream
Technology

Comfort Audio's unique digital sound transfer for outstanding performance

Since the middle of the seventies, when the first wireless hearing products were introduced, analogue radio technology has been used. Since then, engineers all over the world have been struggling with the problems analogue radio transmission technology suffers from: transmission noise, drop-outs, lack of secrecy, limited range, narrow bandwidth and poor dynamic range. To deal with these problems efforts have been made with existing digital technologies like Bluetooth or different types of signal processing for analogue radio technologies. This has not been very successful in terms of time lag, power consumption, sound quality and other functionality.

In 2007 Comfort Audio launched a completely new digital radio technology - SecureStream Technology (SST) which was the solution to meet demands of top performing wireless miniature systems.

All products in the Comfort Digisystem family are equipped with SST. The technology enables all transmitters and receivers in the Comfort Digisystem family to work very well with all kind of hearing aids as well as with cochlear implants.

SST Characteristics

- Tailored digital wireless transmission
- No radio transmission noise
- Eavesdrop secure
- No transmission delay (<0,5ms)
- Inbuilt antennas

SST compared to other small FM-systems

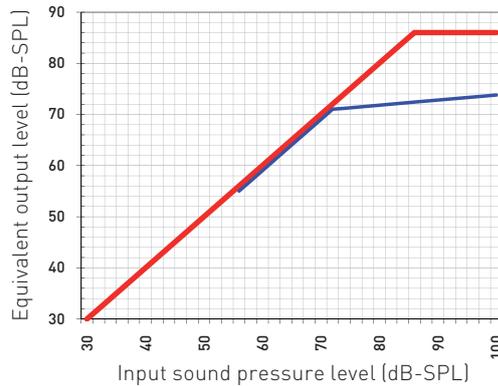
- Improved the linear dynamic range with up to 40 dB SPL
- Improved system audio bandwidth
- Less drop outs



Comfort Audio
HEAR THE FUTURE

Dynamic range SST compared with FM-technology

The diagram to the right shows the dynamic range for SecureStream Technology (transmitter *Digisystem Microphone DM10* with built-in microphone, together with receiver *Digisystem Receiver DH10*) compared with a typical FM-system with deviation designed for a micro-receiver. From the graph can be seen that there is a big difference where the Automatic Gain Control (AGC) cut-off is set: 86 dB SPL at the SST-system whereas only approx. 72 dB SPL at the FM-system. The higher AGC cut-off is possible thanks to the absence of transmission noise for the SST-technology.



— SecureStream Technology
— Typical FM system

In this configuration, the dynamic range of the SST-technology continues even below the input level of 30 dB SPL.

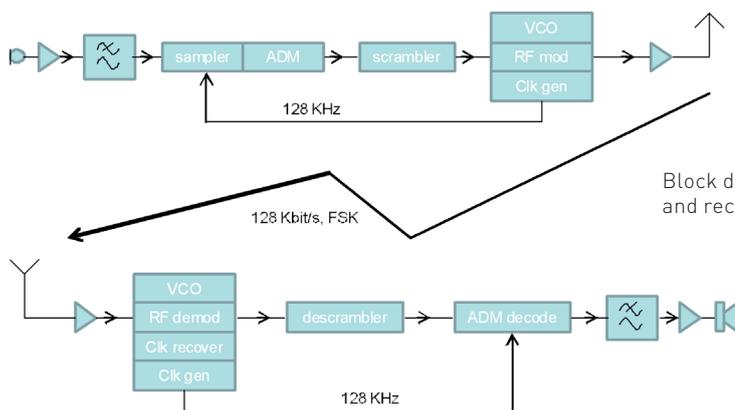
SST - Step by step

First, the analogue signal is sampled. The clock (Clk gen) which controls the sample speed is the same that controls the FSK (Frequency shift keying) –modulation. When the signal has been sampled from analogue to digital, it passes an adaptive delta-modulator which ensures a robust air transmission. Then, by “scrambling”, transmission is made eavesdrop-secure before the carrier frequency is modulated and sent to the receiver.

the received signal. After that, the signal is descrambled; now it can be used to reproduce the sound with a decoder for the adaptive delta-modulation. As you can see, the whole circle is synchronous: from the moment when the signal is sampled until the sound is recreated. This makes the SST-technology very robust.

When the radio signal reaches the receiver, it is demodulated and synchronized by means of

Furthermore, this technology provides the transmitters and receivers with very low energy consumption. SST stands for crystal clear sound, eavesdrop-secure sound transmission, in less than half a millisecond.



Block diagram for SST-transmitter and receiver.