Introduction to DVB-S2 Multistream

The migration from DVB-S to DVB-S2 introduced significant enhancements not only on the signal side, but also related to content. One improvement that the DVB-S2 standard offers is multistream technology, which allows operators to transmit several transport streams or IP streams via one satellite carrier in a transparent way. As soon as more than one stream is transmitted or received, a multistream device replaces several single stream devices, thereby reducing equipment costs.

How it works:
Multistream technology includes a mechanism in the underlying baseband frame structure that merges multiple transport and generic data streams. The modulator uses only the packets of one stream to fill a baseband frame and starts a new one for the second stream. The frames are then aligned sequentially for transmission. Using an 8-bit identifier in the baseband frame header, also known as an input stream identifier (ISI), the baseband frames are designated to a specific stream. Up to 256 transport and/or IP streams can be merged.

On the basis of the ISI, the demodulator is capable of separating each stream but without any clock reference. The burst-wise output collides with the requirements of the program clock references (PCR), which is used in transport streams. These transport stream internal timestamps are used for video and audio timing and only allow a jitter of 100ns, a number that cannot be reached by simply averaging the FIFO level. In case of multiple transport streams (MTS), multistream technology provides a further mechanism to achieve correct PCR alignment after reception. The input stream synchronization (ISSY) can append a 2-byte or 3-byte ISSY field to each transport stream packet, which contains a timestamp to guarantee an end-to-end constant bit rate. To ensure the demodulator is in sync with the modulator, the symbol rate clock serves as the reference for these timestamps. The demodulator recovers this clock from the signal and, leveraging the ISSY timestamps, releases each packet toward the output interface at an exact predetermined point of time. The PCR jitter stays within the specification.

The additional data overhead can be eliminated by null packet deletion (NPD), another feature of multistream technology. Null packets are used to fill a transport stream to a certain constant data rate and do not contain any user data. Since the demodulator can recover the data rate through the ISSY, there is no need to transmit all of the null packets. With the enabled NPD feature, the modulator will delete up to 256 successive null packets and append a 1-byte counter value to each transport stream packet signalizing how many null packets have been removed before its position. After reception, the demodulator immediately reinserts the corresponding number of null packets when unpacking the transport stream from the baseband frames. Depending on the stream's structure, a significant amount of additional bandwidth can become available through NPD. When used in combination with lower priority data like Web traffic, the signal is utilized in the most efficient way.

When it comes to notifying the demodulator about the adopted mode adaptation, each DVB-S2 baseband frame has a 10-byte baseband header, where the first byte MATYPE-1 contains the information about the content type. During the analysis of the baseband header, the demodulator has knowledge of whether ISSY and/or NPD were used in the modulator or what content is in the data field of the baseband frame. As already noted, the ISI is stored in the second byte (MATYPE-2 byte) of the baseband header.

Benefits of multistream technology:
With the introduction of DVB-S2 multistream technology, users can now combine multiple transport streams or digital data streams into a single satellite carrier, or a mix of both data types in the instance of DSNG. Furthermore, multistream offers several important user benefits. First, each stream is independently configurable with complete user control for choosing any number of streams. Second, multistream allows more features to be contained into a single device. Even externally fed baseband frames with proprietary content can be made part of the system, while still having traffic and signal

control as part of the same device. Finally, by using a single satellite carrier, operators can realize significant savings in bandwidth costs.