

# Soccer now even clearer at Sky Deutschland

Two additional UHD channels have gone on air using Rohde & Schwarz technology. In addition to Hollywood blockbusters (on demand), pay TV provider Sky Deutschland now also broadcasts selected UEFA Champions League and German national league (Bundesliga) matches live in UHD. Rohde & Schwarz products are used throughout the entire production chain – from ingest and storage to playout and the headend. Rohde & Schwarz and system integrator Qvest Media planned and implemented the project.

## Production chain

Fig. 2 outlines the UHD transmission chain. The live signal that is fed in via video routers is processed by an R&S®VENICE 4K video server and saved as a native UHD file to the video server and also to a central R&S®SpycerBox Ultra. From there, Sky's playout control system copies it directly to the SSD memory of two additional R&S®VENICE 4K servers responsible for playout. One of these two servers runs as an active standby to ensure maximum operational reliability. The

R&S®VENICE units convert the signal to HD in realtime during ingest and playout to support the HD infrastructure that is still the standard used by studios and viewers alike. The R&S®CLIPSTER mastering station is an additional system component. It is used to convert the interoperable mastering format (IMF) data mainly received from international distributors to the Sky proprietary format. Like the R&S®VENICE 4K systems, R&S®CLIPSTER directly accesses the central storage of R&S®SpycerBox Ultra TL.

Fig. 1: As the use of UHD-ready TV sets becomes more widespread, this format also becomes interesting for content providers.



## UHD workflow at Sky Deutschland (excerpt)

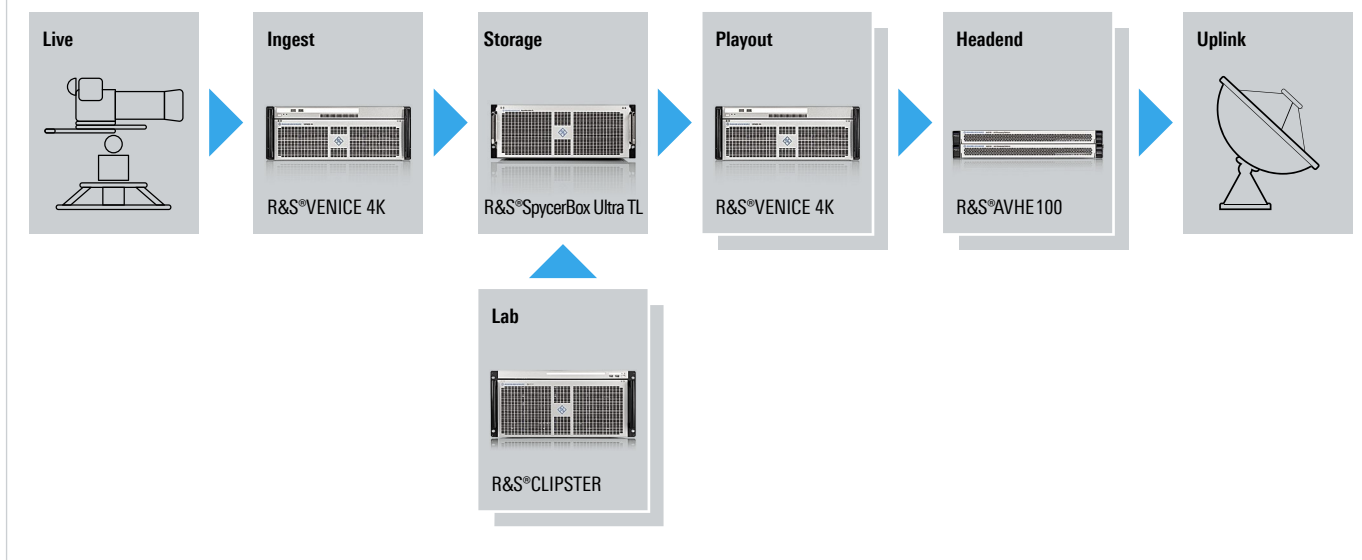


Fig. 2: Sky Deutschland's entire UHD signal processing chain is equipped with Rohde&Schwarz components.

### Encoding and multiplexing

Within the Sky Deutschland system, the uncompressed UHD video signal from the R&S®VENICE 4K playout servers is transferred at a rate of 12 Gbit/s to the R&S®AVHE100 head-end, which prepares the data for the satellite uplink. Transmission takes place via four 3 Gbit/s SDI lines (3G-SDI) that are still common in studio equipment. Each line transports the image signal of one HD quadrant (1080p50) of the UHD image. The R&S®AVHE100 recombines the quadrants into UHD images (3840 × 2160) and feeds them to the video encoding process. In the future, the data of the currently separate four lines will be transmitted over high-performance IP networks at up to 12 Gbit/s (SMPTE 2022-5/6 or AIMS).

Broadcasting of UHD programs via the currently active satellites (DVB-S2) requires stronger data compression than for HD material. That is why only the high efficiency video codec (HEVC, H.265) has been standardized as a compression format for distribution to consumer electronics devices. The quality-critical process of compressing 12 Gbit/s to approximately 20 Mbit/s as well as coding of the audio data and many other necessary processing steps have to take place in real-time.

In anticipation of future virtualized process chains, the R&S®AVHE100 already relies fully on purely software-based processing modules that run on standard hardware. The HEVC encoder used is an integrated solution from the Fraunhofer Heinrich Hertz Institute (HHI) in Berlin, Germany. This encoder surpassed the competition in terms of quality in extensive benchmark tests. The consistent use of software modules on the R&S®AVHE100 makes it possible to flexibly respond to future customer requirements.

For secure 24/7 operation, Sky Deutschland also decided on 1+1 system redundancy for the headend in this project to prevent broadcast interruptions due to failures or servicing. R&S®CrossFlowIP technology ensures that the upstream satellite uplink is provided with a valid signal at all times.

### Reception

Owners of a UHD receiver and a Sky subscription have been able to access the two additional channels, Sky Sport Bundesliga UHD and Sky Sport UHD, since mid-October 2016.

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