# MENOS Applications

# Real-time Television Exchange

MENOS is a very flexible and efficient platform for the contribution and distribution of live television signals over satellite in professional broadcast networks.

Television content often originates at regional sites. This content is typically captured in high quality in order to allow editing and various processing steps. The captured content is then sent (contributed) to a central location, from where the content can be distributed to a number of national or regional broadcast centers. Content contribution is usually a point-to-point unicast transmission while content distribution is generally a point-to-multipoint multicast or broadcast diffusion.

Live TV sessions start with a user making a reservation. This can be performed on a web based interface from any MENOS terminal in the network. During the reservation process, the user defines the TV session and the quality required for the uplink, and receives a price proposal from the billing system. If the live feed is only intended to specific stations of the networks, the user can also indicate which set of stations are allowed to receive the signal.

At transmission time, the system will automatically configure the MENOS hub and the equipment at the uplink station. The transmission starts when the video source is turned on. The television signal is first transmitted from the uplink station to the MENOS hub. In the hub the content is multiplexed with other MENOS services in a single broadband signal that is distributed from the hub to all stations in the network. Authorized stations can receive the signal by manually joining the session on their own web-based user interface. This action will configure the receive equipment automatically.

In case a transmission is shorter or longer than first anticipated (i.e. live interview or live sports), then the session can be extended or reduced.

After the transmission the billing system will generate billing information.

All MENOS stations are equipped with broadband data connectivity and Voice over IP channels, so two-way communication is possible at any time during the TV transmission. This communication is typically used for technical coordination as well as interactivity with the content generation (interviews).

When television content needs to be contributed and distributed in real-time, sufficient network bandwidth has to be guaranteed throughout the transmission time and throughout the entire communication chain.

The bandwidth required for the real-time contribution and exchange depends on the content type. Adequate Fast News Gathering (FNG) quality can be provided with a typical 1Mbps bit-rate. Standard Definition TV (SDTV) profiles are in the 3-6Mbps range with High Definition TV (HDTV) profiles in the 8-20Mbps range, depending on compression standard, chroma quality and required production headroom.

The MENOS system automatically ensures that the capacity is reserved on the contribution and distribution links in order to guarantee the selected quality of the delivered content.

## Key features

- Intra-network TV sessions.
- Content protection and conditional access
- Low bit-rate Fast News gathering (FNG):
  + MPEG-4 AVC: SD 4:2:0 MP@L3
- Standard Definition TV (SDTV):
  + MPEG-2: 4:2:0 MP@ML, 4:2:2P@ML
- High Definition TV (HDTV):
  + MPEG-4 AVC: 4:2:0 HiP@L4, 4:2:2 Hi422P@L4, 8/10bit, 720p50/1080i
- Each SIT-TV can support contribution TV channel (1 video + up to 4 audio) and up to 5 reception decoding TV channels
- Two-way voice and data coordination channels during the transmission
- Billing of consumed services
- Local and Central Archiving

## Key Benefits

- Efficient usage of the space segment with DVB-S2 and VCM technologies
- Efficient usage of the available bandwidth by the multiplexing of services
- Easy-to-use terminals thanks to the automatic configuration of the equipment
- Easy reservation process for new contribution sessions
- Single-click process to join distribution sessions

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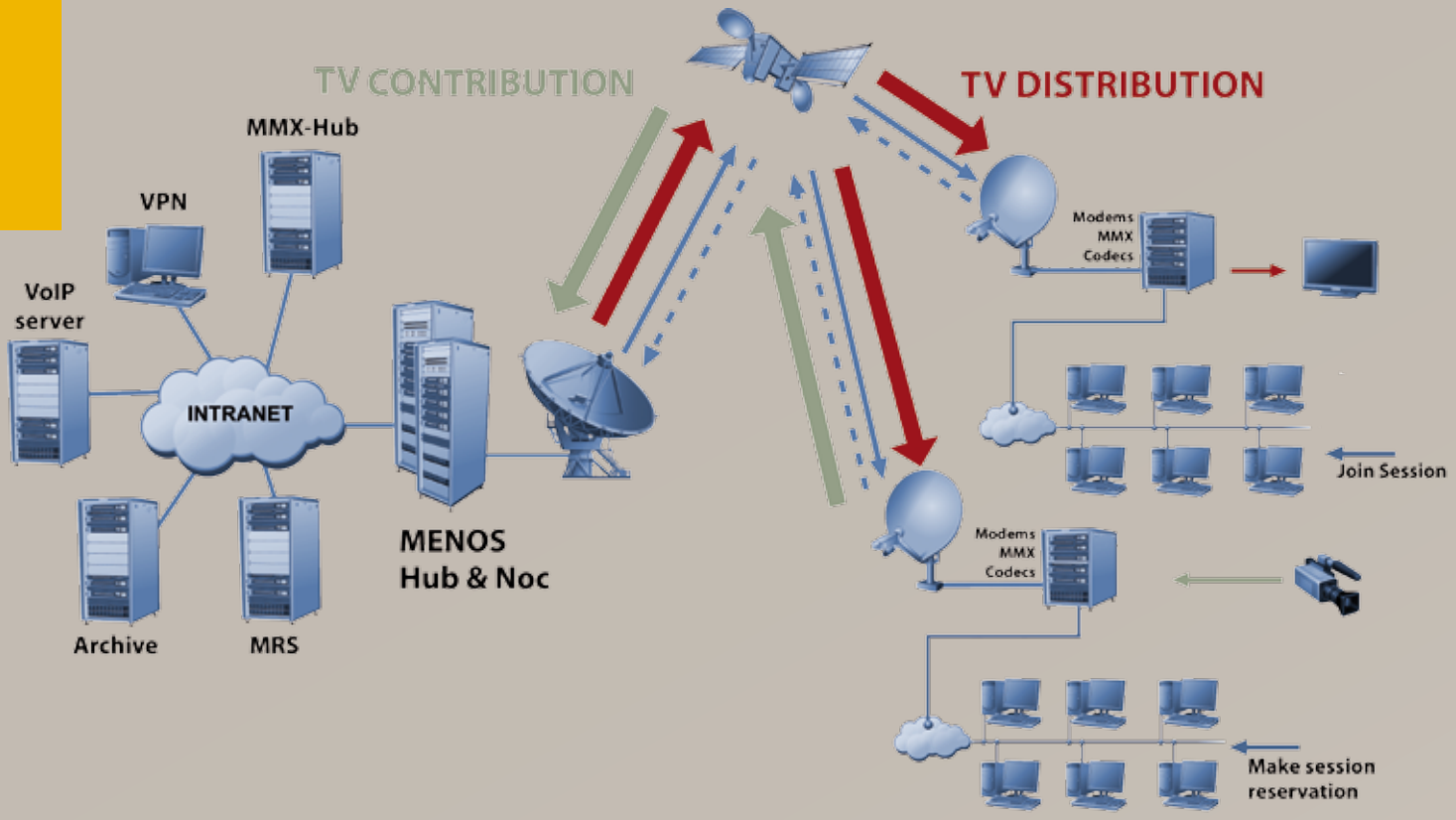


# Technical description

Real-time SD (3-6Mbps) and HD (8-20Mbps) television exchanges are implemented on the DVB-S2 subsystem of the MENOS network. This subsystem is based on dedicated SCPC (Single Channel Per Carrier) DVB-S2 return channels from the terminals to the Hub and DVB-S2 VCM multi-stream forward carrier from the Hub to the terminals.

Fast News Gathering (FNG) video is contributed via the MF-TDMA shared broadband IP access return channels with Quality of Service (QoS) mechanisms to ensure bandwidth and real-time guarantees

## Video Encoder

The video encoder is stand-alone equipment in the terminal that interfaces to the MMX. The video encoding depends of the terminal type. For Flyaway FNG SITs the encoding is MPEG-4 AVC SD 4:2:0 MP@L3. For Standard Definition SDTV SITs, the MPEG-2 standard is used with either 4:2:0 MP@ML or 4:2:2P@ML. For High Definition HDTV SITs, the MPEG-4 AVC standard is used in 720p50 or 1080i video modes with either 4:2:0 HiP@L4 or 4:2:2 Hi422P@L4 with 8-bit or 10-bit encoding depending on the quality profiles. The video channel supports up to 4 channels of embedded audio. The SD encoders have an SDI interface and the HD encoders have an HD-SDI interface.

## Video Decoders

Mutiple video decoders (defaults 3, max 5) are standalone equipment that interface to the MMX to decode multiple simulataneous exchanges. Different SDTV and HDTV versions are available, compatible with the above video encoding coding standards.
The decoders play out via SDI/HD-SDI interfaces

## MMX Streaming Client/Server Module

The MMX is the device that streams the video signal in IP format over the MENOS network. Contribution signals are streamed in unicast while distribution signals are streamed in multicast. The multicast session information is then periodically announced to the receivers. The receivers can then decide to join or not the session.

## Interface to Reservation System

The MENOS Reservation System (MRS) is used by the MENOS users in order to book the sessions. This reservation server guarantees that once a session for Live TV has been booked, the bandwidth required for the time of the session is committed. The reservation server therefore avoids any capacity overbooking. Once the session has been booked, the information is sent to the MMX.

## Interface to Archive Subsystem

During the reservation process it is also possible to indicate whether the content should be archived. If the user determines that archiving is required, the content is then directed by the MMX in the Hub to the archive as well. Metadata associated with the session/content also is sent to the archive by the MMX.

## Interface to Multimedia Virtual Network (conditional access) subsystem

During the reservation process it is possible to indicate which set of receivers are allowed to receive content. The signaling subsystem then indicates to the MMX in the Hub to encrypt the content before multicasting the content to the authorized SITs.


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