



## Case Study

# Enhancing Video Stream Interactivity with DVR and Annotation Features



In the evolving Unified Communications as a Service (UCaaS) domain, interactive video streaming is essential for effective collaboration and problem-solving. SpringCT delivered an innovative solution enabling users to annotate video streams in real-time, pause, rewind, and extract frames for enhanced fault detection and analysis. The solution catered to a customer who required advanced video handling capabilities, especially for identifying and addressing issues during live streams.

Using Kurento Media Server (KMS) with PlayerEndpoint, RecorderEndpoint and CompositeEndpoint, SpringCT developed a DVR-like feature for video streams. The implementation allowed live streams to be buffered, giving users playback control and a whiteboard canvas for annotations on paused frames.

## Product Features

The solution included the following key functionalities:

- **DVR Playback Controls**  
Users could play, pause, and rewind live video streams thanks to buffering.
- **Whiteboard for Annotation**  
A canvas overlay enabled users to draw or highlight specific areas of a paused video frame to identify faults or emphasize key points.
- **Frame Extraction and Save**  
Users could capture and save individual frames from the video stream for further review or reporting.
- **Seamless Integration with Video Streams**  
The solution allowed recorded video files to be played back on a virtual whiteboard, ensuring a cohesive user experience.

## Key Technical Achievements

- **Buffered Playback for Live Streams**  
Enabling DVR-like features on a live stream while maintaining low latency required efficient buffer management.
- **Annotation Synchronization**  
Ensuring that annotations aligned perfectly with paused frames on the whiteboard was critical for accuracy.
- **Resource Optimization**  
Managing resources for RecorderEndpoint and CompositeEndpoint to handle multiple concurrent streams without server overload.

## Technologies Used

- **Kurento Media Server (KMS):** Used RecorderEndpoint for recording live streams and enabling DVR functionalities, and CompositeEndpoint to mix media streams and overlay annotations.
- **Canvas API:** Provided the ability to draw annotations over video frames in real-time.
- **Buffer Management:** Implemented custom logic to buffer live streams and provide seamless playback controls.

- **HTML5 Video Player:** Enabled intuitive playback control with a responsive user interface.
- **Frame Extraction:** Leveraged WebRTC and image processing libraries to extract and save video frames as static images.

## Results

- **Enhanced Fault Detection:** Users could annotate video frames to highlight faults, significantly improving clarity and collaboration during troubleshooting.
- **Improved User Control:** DVR-like playback features allowed users to review live streams at their convenience, making analysis more effective.
- **Efficient Frame Capture:** The ability to extract and save frames simplified reporting and documentation processes.
- **Seamless User Experience:** The integration of video playback and annotation on a unified platform delivered a highly interactive and user-friendly experience.

## Conclusion

- SpringCT's innovative solution transformed how video streams are analyzed in the UCaaS domain.
- By integrating DVR capabilities and real-time annotation on video frames, the platform empowered users to identify and communicate faults effectively.
- The use of Kurento Media Server, PlayerEndpoint, RecorderEndpoint, and CompositeEndpoint ensured a robust and scalable implementation.