MISTRAL

Engineering the Intelligent Edge

Multimedia Live Streamer

Introduction

Live streaming refers to primarily audio and video content delivered in real-time, as events happen. With the phenomenal growth of internet, media compression techniques and high end media processing technologies, live streaming has become all pervasive; finding application in a wide variety of activities like medical electronics, home automation, media and publication, industrial automation, security and surveillance among others.

This case study showcases Mistral's capability in designing the software for an Android product with Full HD (1080P) H.264 AV streaming transmitter and receiver for a customer in Digital Multimedia and live video-casting domain.

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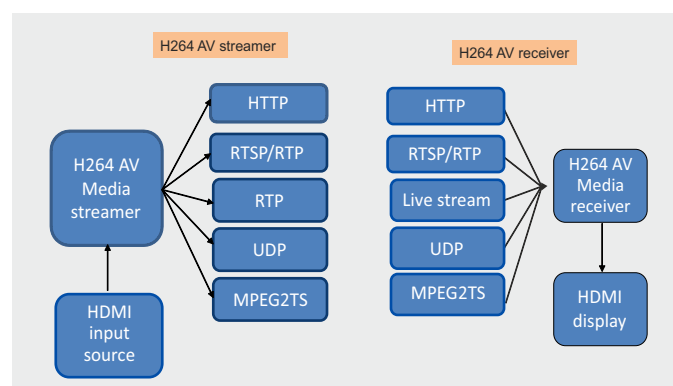
The Customer

The customer is a global leader in Digital Multimedia domain and automation for personal and enterprise solutions. The Customer provides a full range of equipment, subsystems, control systems and surveillance devices for Home and Office space environment.

The Requirement

Customer wanted a software solution for a compact, FULL high definition AV streaming and rendering device for use with a Digital Media system or other applications. The device had to be configured as AV transmitter or receiver and support up to 1920 X 1080 with 60FPS resolution as input. The AV receiver also had to support all possible high and low resolutions. The video transmitter had to support various transport protocols and media container and the AV receiver had to render the AV content to an HDMI Display panel.

The customer has comprehensive experience in Video streaming solutions based on G-Streamer framework on Linux. Based on the study and analysis done by them on different application frameworks in Linux, Android emerged as the ideal platform to be used for Next generation Video streaming solutions. Hence, customer entrusted Mistral with the task of building the software for Full HD H264 streaming transmitter and receiver based on Android version 4.2.2 (Jelly bean).

BLOCK DIAGRAM

Solution Provided

Mistral offered the customer an end-to-end solution by designing the software for Full HD H264 streaming transmitter and receiver over an IP network. The team developed the software for a Dual core ARM® Cortex™ - A15 SoC Dual-Core A15 based device developed by the customer that gives great performance and supported H264 and JPEG hardware encoder. Toshiba HDMI to CSI interface was used to support the input.

The ARM® Cortex™ - A15 based SoC consists of an Dual-Core ARM® Cortex™ for general purpose computing and ARM Dual Cortex-M4 Image Processing unit. Dual-Core PowerVR® SGX544™ 3D GPU in the SoC enables high end graphics resolution :

- FULL HD 1920 X 1080p 60Hz resolution as input source to device was achieved by using Toshiba HDMI to CSI interface
- Device supports interlace and progressive resolutions as input to device
- Encoding of multimedia content was achieved using AAC for Audio and H264/AVC for video
- Playback of multimedia content was achieved using Audio and Video with High performance Dual-Core Heterogeneous Multicore SoC
- Software support for RTP/RTSP/MPEG2TS/MJPEG transport protocols
- Software support for multiple rendering resolutions: 176x144, 352x288, 528x384, 640x360, 640x480, 720x480, 800x480, 800x600, 1024x768, 1280x720, 1280x800, 1366x768, 1440x900, 1600x900,1600x1200, 1680x1050, 1920x1080; at frame rates up to 60 FPS
- Software support for video (up/down) scaling
- Software support for video bit rate of 95Kbsp to 25Mbps.

The Challenges

Mistral successfully did the TOT for Android's platform architecture and development through onsite technical interaction with the customer's engineering team. Some of the significant implementations handled by the Mistral team are listed below.

- The ARM® Cortex™ - A15 based SoC A15 and Android AOSP (Android Open Source Package) does not support HDMI input, hence, Mistral emulated HDMI input as a camera and developed a camera driver in TI Ducati engine to support Toshiba HDMI to CSI interface

- The chosen version of Android did not have support for all output resolutions and was not validated with some of the streaming protocols. Mistral customized the Display & Camera CSI input resolutions to support all output resolutions as per customer requirement.

  - Mistral implemented RTP/RTSP/MPEG2Ts/MJPEG transport protocols from RFC reference which was used to transfer the AV content over the Ethernet
  - Mistral provided support on hardware abstraction layer and the respective framework components in Java Native Interface layer for the application developer to use API to interact with lower layers

- AV streaming supported with variable bitrate to stream over bandwidth (95Kbsp to 25Mbps), from low to high end devices.

Customer Benefits

- Leveraged Mistral's proven expertise in designing HDI (High Density Interface) solutions, camera sensor expertise and Android drivers, middleware and applications to architect, design & roll out the final product

- Mistral offered an end-to-end streaming solution on android platform to the customer addressing both the hardware and software aspects of the project which helped the customer to achieve a quick-turn around for the present and future designs with no compromise on quality

- The software can stream AV content to multiple receivers with various video resolutions, video scaling, bitrate and FPS (Frames per Second)

- H264 AV transmitter and receiver developed by Mistral supported 3rd party solutions like VLC, G-Streamer for streaming and playing.