RTSP Media Streaming Server on Windows Embedded Compact 7(WEC7)

White Paper
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Abstract

WEC7 is latest addition in the series of Real Time Operating Systems (RTOS) from Microsoft targeted for time critical systems such as Industrial, Automotive Navigation Control and Medical diagnosis. Apart from the real time capabilities and ability to customize the OS footprint for a specific target system, WEC7 provides a host of multimedia features for solutions such as video capture, surveillance and analysis. This includes a generic camera interface known as CSI (Camera Sensor Interface), DirectDraw and DirectShow for media display or playback.

In the case of media streaming over network, WEC7 provides inbuilt support for HTTP Streaming which enables the media delivery over network browsers, but this will not be very efficient for the transmission of real time content. This paper describes a RTSP Streaming interface for WEC7 which enables streaming of media content in real time for RTSP complaint client devices.

RTSP, RTP and RTCP:

The Real Time Streaming Protocol (RTSP) is a network control protocol designed for use in entertainment and communications systems to control streaming media servers. The protocol is used for establishing and controlling media sessions between end points. Clients of media servers issue VCR-like commands, such as play and pause, to facilitate real-time control of playback of media files from the server or from direct media sources such as camera or microphones.

The transmission of streaming data itself is not a task of the RTSP protocol. Most RTSP servers use the Real-time Transport Protocol (RTP) in conjunction with Real-time Control Protocol (RTCP) for media stream delivery.

RTP takes care of delivery of real time video and audio data on either UDP or TCP port. In most cases UDP will be preferred in order to avoid the packet retransmission of TCP which may affect the real time delivery of media content.

RTCP will be used for QOS (Quality of Service) analysis and synchronization between video and audio streams.
Video Streaming Application

RTSP Media server interface was added as an extension to the WEC7 Camera Application which follows CSI interface of camera architecture. Freescale SABRE SDP platform is used as a test setup which is equipped with Omnivision OV5642 camera.

Data flow:

The YUV420 camera video data is compressed in H.264 format with i.MX6Q processors inbuilt VPU (Video Processing Unit) which is capable of performing Hardware encoding and decoding of variety of codec formats such as H.264, MPEG4 and MJPEG.

H.264 compressed video data is buffered and provided to the RTSP Media server for transmission on the LAN interface. The RTSP server provides a Streaming URL in the form rtp://<IP Address of Servermachine>:8554/Stream through which the real time video can be received and played back on any RTSP complaint Video players such as VLC player or MPlayer.

Below snapshots describes visualizing the video from the WEC7 platform viewed on VLC Player in real time.
Figure 3: Opening Media Session in VLC Player

Figure 4: Entering Streaming URL
Figure 5: Real Time Video Display from WEC7 Platform

Features

RTSP Media Server supports following features:

1. Multicast support for simultaneous media delivery to multiple client devices
2. Easy integration to the Media Sources such as Camera or Encoders.
3. Supports delivery of variety of video and audio Media formats such as H.264, MPEG4, MJPEG, AAC, WMV etc.
4. Video and Audio sub sessions in a single media session.

Applications

RTSP Media server demonstrated can be targeted for following applications:

1. Video Surveillance and Security systems
2. In-Vehicle infotainment and media connectivity
3. Portable Media Servers.

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