DM648 Multi-Channel Streaming Server Demonstration

Getting Started Guide

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Revision History

Version	Date	Changes
1.0	14 May 2008	Original

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1. Demonstration Package Description

Ittiam's Multi-Channel Streaming Server demonstration on DM648 show-cases multi-channel capability using state of the art video codecs. This section will provide details of all the user aspects of this demonstration package.

1.1 Video Encoding Specifications

1.1.1 Encoding Mode

The encoder is optimized for best performance in multichannel streaming scenarios. Full frame rate is prioritized over quality in this mode with appropriate trade offs. Additionally, the encoding mode is CBR encoding for optimized bandwidth utilization for streaming.

1.1.2 Encoding Specifications

1.1.2.1 NTSC Input

Codec	H.264 BP
Num Channels	2 (D1) / 8 (SIF)
Resolution	SIF / D1
Frame rate	30
Bit rate	Configurable

Table 1-1: Video codec specification for NTSC input

1.1.2.2 PAL Input

Codec	H.264 BP
Num Channels	2 (D1) / 8 (CIF)
Resolution	CIF / D1
Frame rate	25
Bit rate	Configurable

Table 1-2: Video codec specification for PAL input

1.1.3 Encoding Resolutions

Two different encoding resolutions are allowed for the demos. The resolution of a particular demo will be indicated as appropriate in the course of this document. The following descriptions act as reference for those resolutions

1.1.3.1 D1

D1 would be interpreted as 720 x 576 pixels per frame for PAL inputs and 720 x 480 pixels per frame for NTSC input. Moreover, the frame-rates would be a maximum of 25 frames per second and 30 frames per second for PAL and NTSC respectively.

1.1.3.2 CIF and SIF

CIF would be interpreted as 352 x 288 pixels per frame for PAL inputs and SIF would be interpreted as 352 x 240 pixels per frame for NTSC inputs. Wherever CIF is specified without further elaborating on PAL or NTSC standard, it would appropriately translate to CIF or SIF depending on the standard. Moreover, the frame-rates would be a maximum of 25 frames per second and 30 frames per second for PAL and NTSC respectively

1.2 Application Specifications

The following modes are supported in the demonstration:

- H.264 codec:
  - 2 channels of D1 using two separate video sources.
  - 8 channels of CIF/SIF using eight separate video sources.
  - 8 channels of CIF/SIF using a single video source.

The following are the steps followed by the demonstration to achieve the above configurations:

1. Composite video input from 1, 2 or 8 cameras (depending on the configuration) connected will be captured at specified D1 resolution.

2. For CIF/SIF streaming the video input will be de-interlaced using a simple bob de-interlacing mechanism.
3. The captured channel will be encoded by 2 or 8 instances of the encoder (depending on the configuration) as per specifications mentioned in section 1.1.2.
4. The multiple encoded streams will be transmitted over multiple UDP ports after encapsulating them in standard RTP format.
5. In case of single video source mode, the same source will be used by multiple instances of the encoder for streaming multiple channels.

Note The de-interlacing method used is a simple bob de-interlacing. This is achieved by dropping a field and subsequently resizing it. This tool is a simple way to avoid display of interlaced content on the demo and does not ensure best quality de-interlacing.

1.3 Equipment Checklist

The following is the total set of equipments required for the demonstration setup.

1. PAL/NTSC camera with power adapters (Max 8).
2. DM648 EVM (1 No) and power adapter.
3. Network connectivity using a switch and Ethernet cables OR a cross-cable.
4. Laptop/PC with CCS and Quicktime or VLC player installed (1 No).
5. Shielded composite video cables for the camera to DVEVM connection (Max 8).
6. Blackhawk XDS560 Emulator and cables OR Spectrum Digital XDS510 USB.

Note Considering the requirements of multi-channel decoding and CCS running simultaneously, the PC/Laptop to be used should have a minimum configuration of 2 GHz (or 1 GHz dual core) CPU and 512 MB RAM. If not, then only a limited number of channels can be viewed at any instance.

1.4 Demonstration Setup

The setup is as described below:

1. NTSC/PAL camera with composite output (Max 8).
2. DM648 EVM (1 No) as the video server which will stream multiple video channels.
3. Laptop/PC (1 No) accomplishing the following:
    a. Hosting the software on PC for playback using Quicktime or VLC player.
    b. Hosting the CCS IDE to execute the application via the emulator.

4. 100 Mbps Ethernet network achieved via Ethernet switch or cross cable facilitating network connectivity between the EVM and a Laptop or PC.

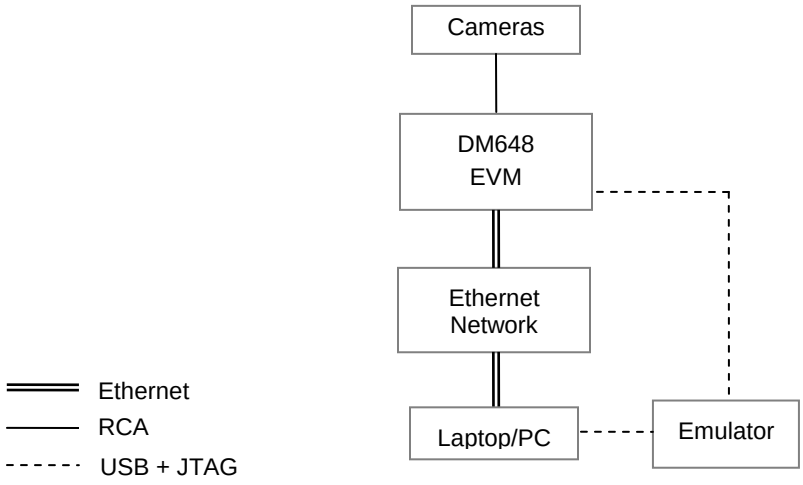

Figure 1-1: Demo setup

2. Demonstration Package Contents

The following table describes the demonstration package contents.

Directory	Files	Description
.		
	DSS648TI30-GSG.pdf	Getting started guide
.\app		
	EVMDM648.gel	System Initialization gel file
	DM648SVR_TI30.out	Demonstration executable
	Ittiam_DM648_Demo_Config.exe	Configuration tool for XML file generation
.\SDP_NTSC		SDP files for NTSC resolution
	NTSC_H264_SIF_1_33332.sdp to NTSC_H264_SIF_8_33388.sdp	SDP files for H264 8 channel SIF streaming
	NTSC_H264_D1_1_33332.sdp NTSC_H264_D1_2_33340.sdp	SDP files for H264 2 channel D1 streaming
.\SDP_PAL		SDP files for PAL resolution
	PAL_H264_CIF_1_33332.sdp to PAL _H264_CIF_8_33388.sdp	SDP files for H264 8 channel CIF streaming
	PAL _H264_D1_1_33332.sdp PAL _H264_D1_2_33340.sdp	SDP files for H264 2 channel D1 streaming

Table 2-1: Package contents

3. Installation and Execution

3.1 Installation Prerequisites

3.1.1 Software Installations (Not included in the package)

The execution of the DM648 multi-channel Video Server demonstration requires the following software to be installed.

1. CCS v3.38.3.2.
2. Blackhawk XDS560 USB Emulator drivers or Spectrum Digital XDS510 USB Emulator drivers.
3. Quicktime player (version 7.0.4 and higher) or VLC player (version 0.8.5 and higher). In addition, associate .sdp files to open with Quicktime or VLC.

3.1.2 CCS Setup

1. Launch CCS Set-up and configure CCS to operate with the appropriate emulators.
    a. In the available factory-boards pane, choose appropriate family.
    b. Choose the right emulator out of the list in the pane and drag it to “My system” icon on the system configuration pane.
2. Launch CCS for verification.

3.2 Board Settings and Connections

3.2.1 DIP Switch Settings for Beta DM648 EVM

1. SW2 bank
    a. Dip 5 – ON
    b. Dip 7 – ON
2. SW3 Bank
    a. Dip 1 – ON

b. Dip 2 – ON

c. Dip 3 – ON

d. Dip 4 – ON

e. Dip 6 – ON

3.2.2 RCA and Ethernet Connections

Figure 3-1 shows the video and Ethernet connectors required for the demonstration setup.

The 8 video RCA connectors are labeled in the diagram as V1-V8.

The Ethernet connectors are labeled E1 – E2. Any one can be used for connection.

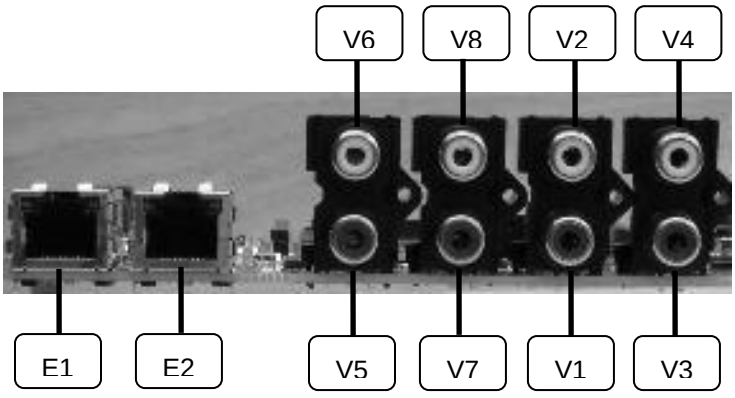

Figure 3-1: RCA and Ethernet connectors

3.3 Demonstration Configurations

The “Ittiam_DM648_Demo_Config.exe” is the configuration tool to generate the XML configuration file required for the demonstration. Following is the explanation of the parameters.

1. Source IP: IP address of the board on which the server is running

   If source IP is not entered then DHCP will be enabled.

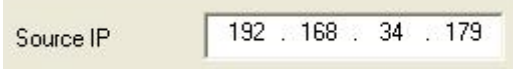

Figure 3-2: Source IP Address setting

Note If the DHCP fails then the demo will not execute.

2. Destination IP: IP address of the point to stream

Figure 3-3: Destination IP address settings

The source and destination IP addresses have to be in the same subnet 255.255.255.0.

3. Destination Port: Port number of the destination machine

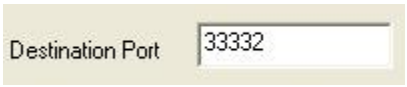

Figure 3-4: Destination port number

The destination port number has to be 33332 in order to use the SDP files provided in the package directly. If port number needs to be changed, refer to section 3.5 for modifications required to the SDP files.

4. Video Quality: Bitrate and Framerate values entered in the boxes shown in figure Figure 3-5 apply to all channels when Best Video Quality is selected.

Figure 3-5: Best video quality settings for all channels

For High video quality the Bitrate and Framerate values can be entered in the boxes for each channel as shown in Figure 3-6.

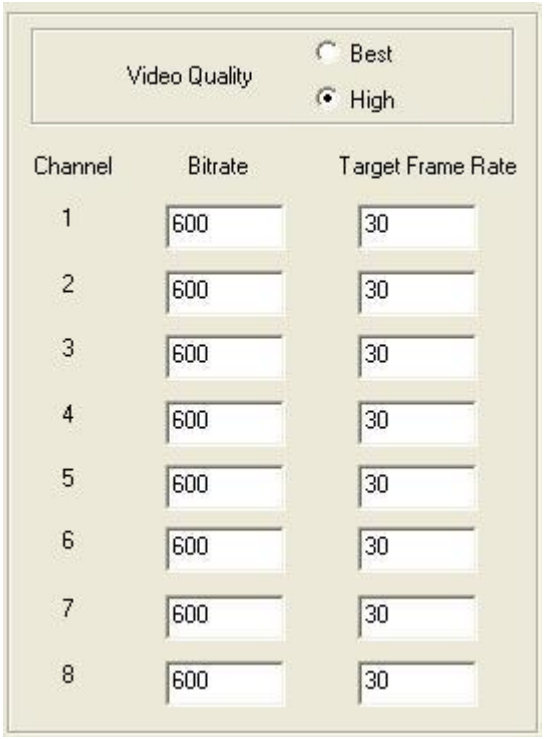

Figure 3-6: High video quality settings for each channel

5. Video Input: Select either single source or multiple sources. Single source setting results in a single camera input being encoded by 8 or 16 encoder instances. Multiple sources setting results in each encoder instance using a separate camera input.

Figure 3-7: Video input source

6. Video Standard : Choose the camera type between NTSC and PAL

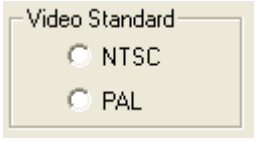

Figure 3-8: Video standard

7. Number of Channels: To select the encoder configuration as described in section 1.2.

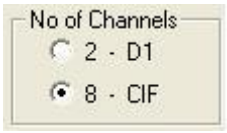

Figure 3-9: Encoder channel configurations

8. On clicking the “GenerateXML” button, the configuration tool checks whether the data entered is correct. If the data is incorrect, it displays a message providing information about the incorrect parameters set. If all the parameters are entered correctly then the configuration tool requests the path and file name to save the XML file. Enter the file name without any extension. The extension “.xml” is taken automatically by the tool.
9. On clicking “Reset” button all the parameters are set to default values.
10. On clicking “Close” button the configuration tool closes.

Note The demonstration requires the XML file to have the name “server_config.xml” and to be in the same folder as the demo executable file (“app” folder in the package).

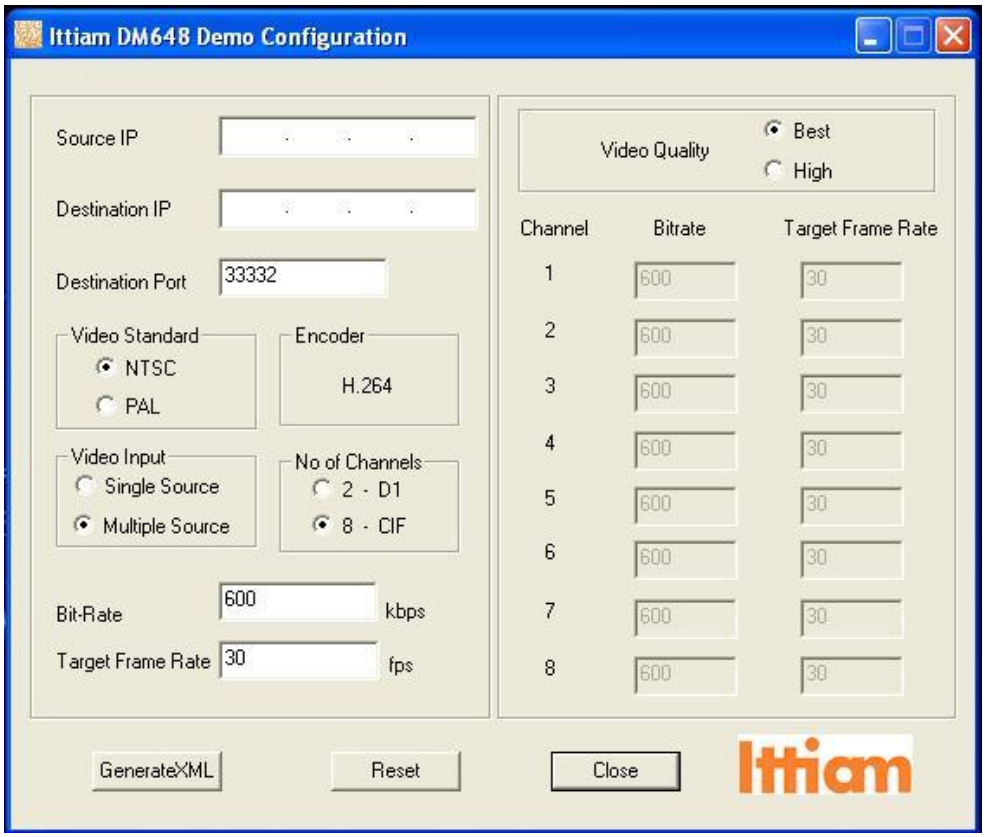

Table 3-1: Ittiam_DM648_Demo_Config

3.4 Demonstration Execution Instructions

Execute the following steps in strict order to run the application. If any of the steps fail, subsequent steps should not be executed:

1. Ensure that the board switch settings are done as per section 3.2.1.
2. Plug-in the video sources into the video input ports of the EVM (Refer to section 3.2.2 for composite connections on the EVM).
3. Connect the Ethernet port on the EVM to the same network as the PC//Laptop.
4. Connect the JTAG header of the emulator to the EVM.
5. Power up the JTAG USB emulator (this step only for Blackhawk XDS560 emulator, not required for Spectrum digital XDS510 emulator).
6. Connect the Emulator to the PC/Laptop via USB.
7. Power up the EVM.
8. Launch CCS on the PC/laptop.
9. Remove the connected gel file under the Project pane.
10. Load the gel file from “/app” folder in the demo package
11. Connect the EVM target on to CCS (Menu - Debug->Connect/Alt+C).
12. Ensure that clock initializations messages are displayed in the message window of the CCS after the gel file is loaded as part of the “connect” command.
13. Launch the configuration tool “Ittiam_DM648_Demo_Config.exe” in the “/app” folder in the demo package to generate the XML configuration file. Refer to section 3.3 for more details on using the tool.
14. Double click on all the appropriate .sdp files on the PC/Laptop to open with Quicktime / VLC player.
15. Load the demonstration executable “DM648SVR_TI30.out” from CCS.
16. Run the executable.
17. The QuickTime / VLC players should now play out the video captured by the cameras.
18. For Quicktime player, once the video starts appearing on the screen, change the play out speed of each of the windows to reduce delay (Window -> Show A/V Controls -> Set Playback speed to 3X).
19. To stop the application, halt CCS and close all the Quicktime / VLC windows.
20. To continue to another camera setup or to dismantle the setup, disconnect the EVM target (Menu - Debug->Connect/Alt+C) and do the reverse steps of steps from step 7 to step 2 in that order.

3.5 Optional: Changing the Destination Port Number

It is recommended to retain the destination port number as 33332 in the configuration tool since the sdp files in the package are configured for port numbers starting 33332. If any other port number is entered then all sdp files have to be updated. Start with the first channel's sdp file and change the port number in line 9 (m=video {port number} RTP/AVP 96) to the required port number. Go to the next channel's sdp file and enter the port number adding 8 to the port number entered for the previous channel. Repeat this for sdp files for all remaining channels.

Ex : Channel 1 sdp file line 9 - m=video 33332 RTP/AVP 96

Channel 2 sdp file line 9 - m=video 33340 RTP/AVP 96

3.6 Trouble-shooting

1. If no print messages come after running the demo executable do the following:
    a. Reload the program and run again.
    b. If reloading also results in no prints at the demo, then power cycle the setup.

3.7 Support Contact

For further queries or issues, please contact: VS-support@ittiam.com