



IVS Front Panel



IVS Back Panel

HIGHLIGHTS

- 1-channel audio/video encode/decode streamer over TCP/IP
- Can be run in Encode mode; or Decode mode
- 30 frames per second, D1 resolution
- TI DaVinci™ DM357 Dual-Core DSP with ARM926
- H.264 BP, MPEG-4 SP, and MJPEG video codecs
- Supports unicast and multicast
- Supports audio mic interface and G.711 encoding
- 10/100 Ethernet TCP/IP compressed video stream
- RTP/RTSP over UDP/TCP
- Power-over-Ethernet 802.3af-compliant PD controller with integrated DC/DC converter
- Real-Time Embedded Linux
- Encoded audio/video stream can be decoded on any networked PC running software such as QuickTime or VLC Player
- Encoded audio/video can also be decoded with IVS and displayed on an attached monitor in decode mode.
- Browser-based utility allows configuration of settings and parameters
- RTP/RTSP over UDP/TCP transport
- Compact form factor
- 12V DC, 4.5W max
- RoHS compliant
- Available as evaluation unit or production license with fully licensable design

OVERVIEW

Nuvation's Intelligent Video Server (IVS) is a reference design for a 1-channel audio/video encode/decode streamer which can adapt a standard CCTV analog camera into an Internet Protocol (IP) streamer. The reference design features TI's DaVinci™ DM357 DSP with TI video codecs, G.711 audio codec, Embedded Linux, and a compact mechanical enclosure.

PACKAGES

- **Evaluation Units*** are intended for OEMs interested in evaluating the reference design for production license. Users can plug-and-play the IVS right out of the box, and experiment with different codec settings. Advanced users may experiment with reprogramming the DM357 with their own custom software builds.
- **Production Licenses*** are intended for full manufacturing and IP control including rights to make derivative products.

*Package details are listed on page 3.

SOFTWARE & DRIVERS

- Runs Montavista Linux with TI DaVinci™ driver support
- Encoder firmware application that encodes/decides audio-video streams in real-time
- Decoder comes with audio-video synchronizing mechanisms for proper playback
- *thttpd* lightweight web server runs a browser utility for easy camera configuration
- Driver support for USB, video, audio and UART RS-232 communication

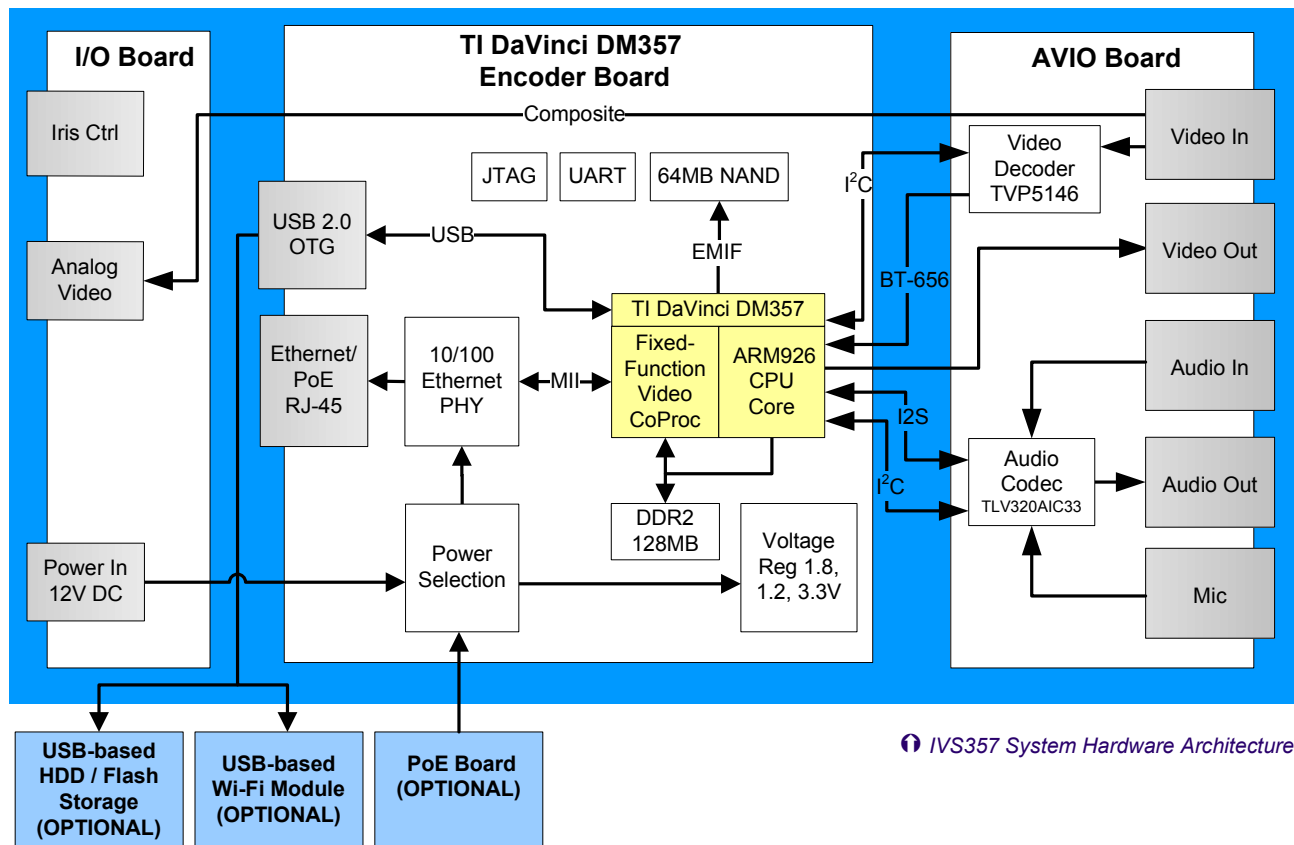
EXTERNAL INTERFACES

Front Panel:

- V-in: Video input (BNC)
- V-out: Video output (BNC)
- L-in: Stereo audio line input (1/8" jack)
- L-out: Stereo audio line output (1/8" jack)
- Mic: Microphone input (1/8" jack)
- PTZ: Pan/Tilt/Zoom (RS-232)

Back Panel:

- Ethernet (RJ-45)
- Analog Video - NTSC / PAL (BNC)
- USB 2.0
- Auto-Iris
- Joystick
- Two dip switches (can be SW-enabled)



SYSTEM ARCHITECTURE

An external video/audio source (eg. CCTV camera) can be connected to the IVS through to stream the video on a network. The source is connected through the IVS front panel. Video and audio connect directly to the AVIO board inside the IVS.

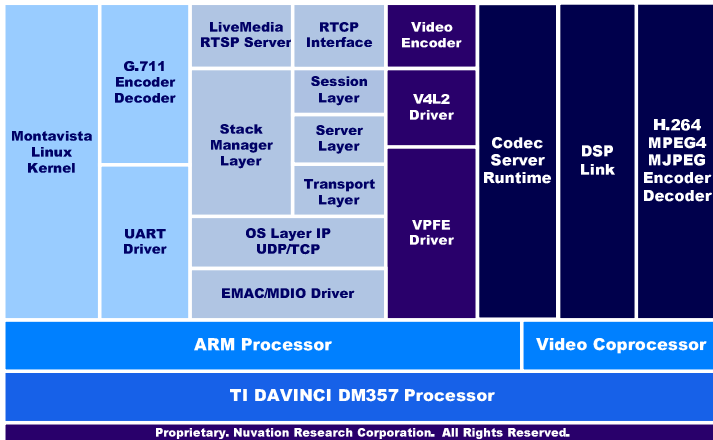
The AVIO board receives composite video through a BNC connector. Able to decode both NTSC and PAL video formats, a TVP5146 video decoder converts the video to 10-bit BT.656 and sends it to a TI DaVinci™ processor on the Encoder board. The video output connector passes NTSC / PAL analog video received from the DaVinci™ processor. Stereo audio input, output, and mic connections run through an audio codec, and on to a bi-directional I2S bus to the DaVinci™ processor. Both the video and audio codecs are controlled through an I²C interface.

Within the DaVinci™, the incoming BT.656 video stream is processed by the Fixed-Function Video Coprocessor. The Coprocessor encodes it with the chosen video codec and passes the data back to the ARM. The ARM then packetizes the data using the RTP/RTSP over UDP/TCP protocol and sends the stream to the Ethernet PHY chip for transmission over the network. This entire process is reversed when the IVS is set to Decode mode, encoded audio/video streams received on the Ethernet port are decoded and output as analog audio/video.

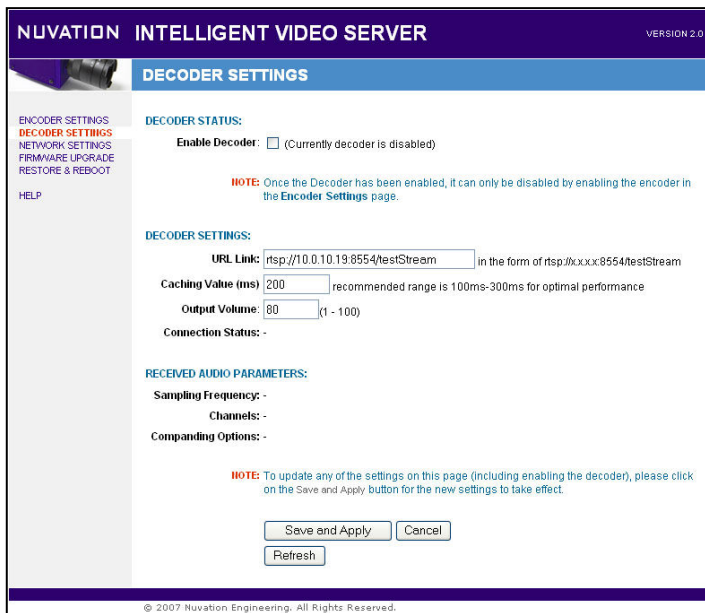
A web server running on the ARM within the DaVinci™ allows users on the network to configure IVS settings through a browser utility.

SYSTEM COMPONENTS

- AVIO Board
 - Video in and video out BNC connectors
 - Audio line in, line out, and mic connectors
 - Pan/Tilt/Zoom control, RS-232 connector
 - Video decoder TVP5146
 - Audio codec TLV320AIC33
- TI DaVinci™ DM357 Encoder Board
 - TI DaVinci™ DM357 with C64x+ DSP and ARM926E
 - 2 banks of DDR2, 128MB
 - 64MB NAND Flash
 - UART Port
 - JTAG Port
 - 10/100 Ethernet MAC routed to Ethernet PHY board
 - USB 2.0 routed to OTG connector on IO board
 - No blind or buried vias
 - RJ-45 Ethernet
 - USB 2.0 OTG (SW configured as USB master)
 - Includes connector for optional PoE board (ordered separately)
- I/O Board
 - NTSC/PAL video pass-through, BNC connector
 - Power in, 12V
 - Auto-Iris
 - Joystick
 - Dip switches



IVS Software Architecture



Browser Utility Screen Shot

TI DAVINCI™ DM357 SOFTWARE

- Pre-programmed codecs:
 - H.264 BP encode/decode
 - MJPEG encode/decode
 - G.711 encode/decode
- IVS is pre-programmed with embedded Linux 2.6 with real-time extensions, running on a ARM926 co-processor within the DaVinci™
- MPEG-4 SP is pre-programmed in the DM357 and can be brought out to the browser UI controls with design customization
- Alarm IO, PTZ, and other features can be added with design customizations

VIDEO COPROCESSOR SOFTWARE

- The Fixed-Function Coprocessor runs the complex algorithms required to encode the raw video into the various video codec formats
- The ARM is responsible for managing the digital video interface, audio encode/decode,s and the web server

BROWSER UTILITY

Included browser-based utility enables users to changes settings, test parameters, update camera software, and change IP and MAC addresses. Served from the ARM coprocessor within the DaVinci™, the following groups of parameters can be configured:

- Encoder Settings
- Decoder Settings
- Network Settings
- Firmware Upgrade
- Restore & Reboot

EVALUATION UNIT PACKAGE

The evaluation unit package includes:

- IVS with H.264BP encoder and MJPEG codec
- Camera lens
- Ethernet cable and DC power adapter
- Nuvation-optimized Linux Board Support Package
- IVS Browser Utility
- Quick Start Guide (QSG)
- Technical Reference Manual (TRM)

DIMENSIONS

- L: 4.25" (108mm), H: 1.7" (43mm), W: 1.8" (47mm)

PRODUCTION LICENSE PACKAGE

Licensees receive entire design source code package:

- Design schematics
- Bills of materials
- Layout databases
- Linux source code
- Hardware and software specification documents
- Enclosure CAD mechanicals
- Manufacturing instructions

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