



Data Sheet

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# Sentric2

## High-definition Video Recorder Systems

### Features

- ◆ Standard configurations record and play up to four channels of 1080p60 HD video and audio in real-time at full frame-rate
- ◆ Records video uncompressed or with hardware-accelerated JPEG2000 or MPEG4 compression
- ◆ Full network integration supporting the transmission and receipt of video and control data over a Ethernet
- ◆ Provides comprehensive recording of metadata with video such as embedded GPS data or tagged events
- ◆ Built-in self-test and status monitoring
- ◆ Extensive customization capability such as adding more channels and different types of video input/output
- ◆ Supports composite and RGB analog and digital DVI video input
- ◆ Supports digital DVI output solid state or rotating disk storage
- ◆ Available in rugged and commercial-grade system configurations
- ◆ Available as a board-level assembly for integrating Sentric2 functionality into existing embedded systems

### VDS Features

- ◆ Integrated with Sentric2 for provides network distribution of captured or recorded video, audio and metadata
- ◆ Designed to support UDP, RTP and DEFSTAN0082
- ◆ Support for raw video and video compressed using JPEG2000, MPEG4
- ◆ Designed to minimize latency between sender and receiver
- ◆ Auto-discovery of remote Sentric2 configurations

### Overview

Sentric2 is a family of high-definition video recording systems that capture, compress and store multiple channels of high-resolution analog or digital video, composite TV, network video and audio in digital format. Named event markers and other operational data - such as location and time - can be stored within the Sentric2 video/audio recording as metadata.

At the heart of these systems is the Sentric2 core software that provides seamless integration between video capture and compression interfaces, video playback, storage interfaces and network control. With the addition of the optional VDS modules, Sentric2 systems become fully network integrated with the ability to send and receive video data between other Sentric2 systems.

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The Sentric2 family includes desktop and rack-mount systems and a conduction-cooled configuration for deployment in the harshest of environments, such as avionics bays and armored fighting vehicles. For integrating video recording, playback and distribution functionality into existing embedded systems there are Sentric2 card-level assemblies.

## Video Recording

Standard Sentric2 systems support up to four input channels, each of these can be composite, RGB or DVI. Customized Sentric2 systems can support more channels or alternative video standards.

Video is captured and optionally compressed at full frame rate, or at a user-selectable subset (for example, 10 frames a second).

Recorded video is stored locally on a mass-storage device (for example, a SATA solid-state disk or a RAID array) or optionally on a network-attached storage device.

In order to support indeterminate recording periods, Sentric2 systems can be configured to record in a circular buffer scheme so that old data is overwritten with new effectively allowing the system to record indefinitely.

Many defense and aerospace applications need the recorded video to have "context". Sentric2 systems facilitate the provision of context by allowing users to associate recorded video with metadata as it is recorded.

Examples of metadata include GPS location, time, and the status of other sub-systems within the overall platform. On playback the metadata is provided to the Sentric2 Replayer application for display or further processing.

## Video Compression

Sentric2 systems can record and replay raw or compressed digitized video. Compression is often required so that more channels and more hours of video can be stored. Sentric2 systems feature configurable compression ratios and quality settings in two of the most popular encoding schemes:

- ◆ JPEG2000 encodes each frame individually using an advanced algorithm that provides an optimum balance of video quality, compression and resilience to errors. Latency can be minimized using JPEG2000 as there is no dependence on other frames.

- ◆ MPEG4 / H.264 AVC is an encoding scheme found widely on modern computers and devices and offers the maximum compression ratio. MPEG4 achieves optimum compression by exploiting commonality between successive frames: this dependence can increase latency and mean that errors affect more than the affected frame. Its compression makes MPEG4 most suitable for many recording applications.

## Audio Recording

For applications where video is only half the story, Sentric2 systems can record and play back audio – this is synchronized with each video channel regardless of the frame rate at which video is being captured.

Standard configurations support two input channels and two output channels; additional channels can be added as a customization option.

## Playback

Sentric2 systems can replay multiple channels of video, even while recording. Playback takes advantage of hardware decompression of JPEG2000 or MPEG4 if the particular Sentric2 system supports it or uses the resources of the processor in the system for software decoding.

Speed of playback is a controllable parameter permitting high- or low-speed playback.

Navigating through the Sentric2 data store is facilitated by metadata-based searches and named chapter markers can be inserted into the video streams on record or playback enabling the user to navigate through recordings from event to event.

## VDS: Network Video Distribution

The VDS module for Sentric2 adds to Curtiss-Wright Controls Embedded Computing's Sentric2 systems the capability to record, playback and share video, audio and metadata over standard Ethernet networks: Sentric2 systems become sophisticated network resources.

Adding VDS to a system containing a video capture and compression card, for example the PMC-281, gives that system the means to serve video to VDS clients elsewhere on the system. The clients play or record the video and can



themselves be VDS servers that can share their recorded video store with other clients. Audio and metadata, if present in the video store, is also distributed with the video.

Sentric2 systems can be configured for video distribution with VDS instead of recording and this facilitates the implementation of diskless clients that serve or play-back network video.

VDS supports the transmission of raw video but more commonly compression is employed: JPEG2000 or MPEG4 compression support allows multiple HD video streams to be distributed over a standard gigabit Ethernet network.

To maximize the efficiency of network resources VDS supports multicast distribution so that the data only need be sent once to reach a multitude of clients.

For increased resilience if there are errors or congestion on the network VDS supports the real-time protocol (RTP) standard. RTP controls the flow of video data detecting if frames have been dropped or data from a frame is missing.

As part of Sentric2, VDS software provides a web or socket-based interface to allow interactive configuration from a browser or from an application by sending control messages in XML format.

## Network Control

Network control enables authorized users to control a widely distributed array of Sentric2 units from a single location regardless of location.

Providing there is a means to get a network connection to it a Sentric2 can be controlled by any browser-equipped computer. Alternatively, network control can be embedded into application code (to support user-defined front-ends for example) through the Sentric2 XML-based API.

An application that has been built using this API can execute on a Sentric2 system with full control over all recording, playback and network distribution functionality and with complete direct access to the video, audio and metadata that has been recorded.

Control via a network is provided regardless of whether the VDS option is installed and for standalone systems the identical control mechanisms (browser or XML API) are used through the internal "localhost" network (127.0.0.1).

## Configuration Options

The Sentric2 family comprises of a range of desktop, rack-mount and conduction-cooled configurations and board-level sub-systems for integrating Sentric2 functionality into existing embedded systems.

The core functionality of the Sentric2 systems has been designed so that specific configurations that are tailored to your application can be created with minimal redevelopment.

The Sentric2 API is scalable and consistent across both standard and custom configurations.

## Sentric2 Software Architecture

The Sentric2 application within each of these systems comprises a core management and data-transfer engine augmented with the modular components needed to drive the appropriate hardware interfaces and provide the capabilities required by a system. It is this modular architecture that makes Sentric2 systems so configurable and scalable.

Figure 2 presents a view of the Sentric2 software architecture.

The API and browser control hides the details of this application from the user by providing a consistent interface to the modules installed.

Figure 1: Examples of Sentric2 systems





Figure 2: Sentric2's Modular Architecture

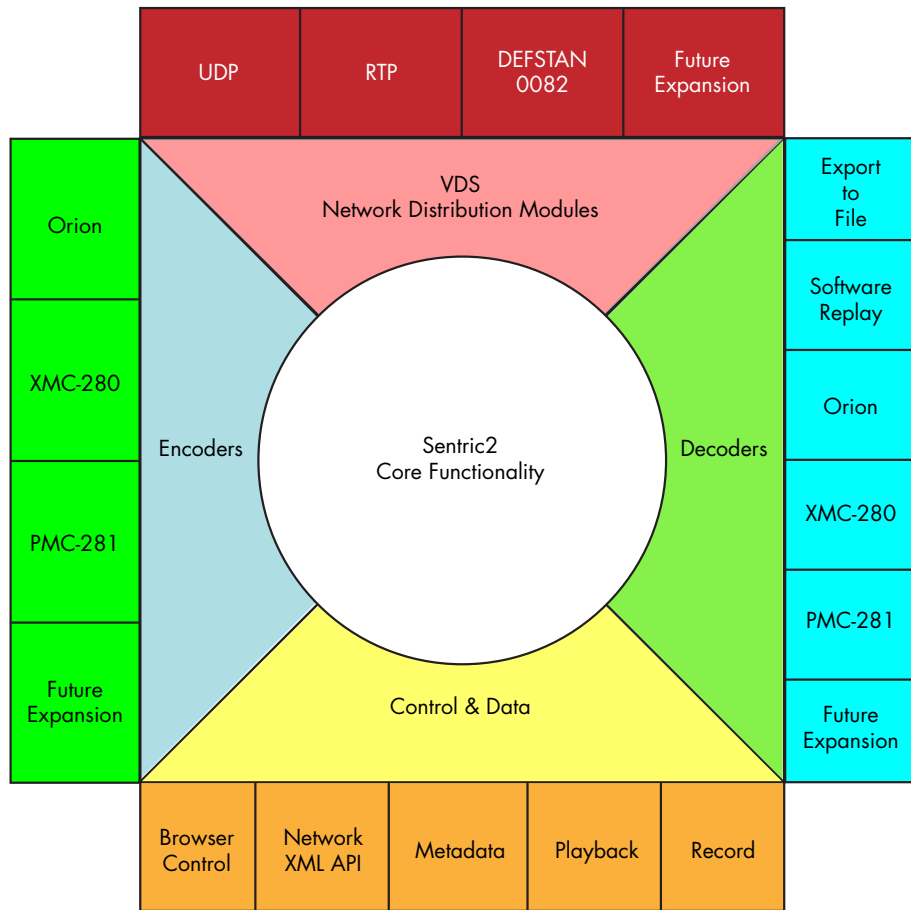


Table 1: Specifications

Feature/Capability	Standard	Customization Options	Notes
Form Factor	<ul style="list-style-type: none"> <li>- Desktop or rack-mount</li> <li>- Small form factor conduction-cooled LRU</li> <li>- 6U VME card assembly</li> </ul>	<ul style="list-style-type: none"> <li>- Alternative enclosures</li> <li>- 6U VPX card assembly</li> <li>- 3U VPX card assembly</li> </ul>	-
Environmental Grades	<ul style="list-style-type: none"> <li>- System units for laboratory and deployed (DO-160F) use</li> <li>- Level 0 card assembly</li> </ul>	<ul style="list-style-type: none"> <li>- Level 200 conduction-cooled card assembly</li> </ul>	-
Video Inputs	<ul style="list-style-type: none"> <li>- 0, 2 or 4 selectable from RGB, composite and DVI</li> </ul>	<ul style="list-style-type: none"> <li>- Additional interfaces and compression engines</li> <li>- Alternative video types</li> </ul>	No video input configuration for playback-only units or for systems that record only network video
Video Outputs	<ul style="list-style-type: none"> <li>- 0, 2 or 4 digital DVI outputs</li> </ul>	<ul style="list-style-type: none"> <li>- Additional interfaces and decompression engines</li> <li>- Alternative video types</li> </ul>	Host display capability can be used with software decoder options
Compression	<ul style="list-style-type: none"> <li>- JPEG2000</li> <li>- MPEG4 part 10/H.264/AVC</li> </ul>	-	-
Audio	<ul style="list-style-type: none"> <li>- Two stereo or four mono channels</li> </ul>	<ul style="list-style-type: none"> <li>- Additional channels</li> </ul>	-
Network Interfaces	<ul style="list-style-type: none"> <li>- Gigabit Ethernet</li> </ul>	<ul style="list-style-type: none"> <li>- Additional interfaces</li> <li>- Integrated Ethernet switch</li> </ul>	-



## Specifications

Standard Sentric2 systems are sold as complete integrated turnkey systems in one of two formats:

- ◆ Rack-mount or desktop unit (Level 0 and industrial specifications).
- ◆ Small form factor conduction-cooled chassis for deployment in harsh environments.

The specifications in the table are applicable to standard configurations with customization options shown where appropriate.

## VDS Specifications

- ◆ VDS supports any video standard supported by Sentric2 including:
  - CVBS (PAL/NTSC)
  - Analog RGB (including progressive, STANAG 3350, RS-343)
  - DVI-D digital video up to 1920x1200 / 1920x1080
- ◆ Compression
  - JPEG2000 compression
    - 4:4:4 and 4:2:2 video coding supported
    - Configurable compression ratio from visually lossless to highly compressed
  - MPEG4 compression
    - H.264 constrained baseline profile (CBP) up to L4.2 (MPEG4 Part 10/AVC)
    - 4:2:2 YUV video coding (down-sampled to 4:2:0)
- ◆ Distribution over Ethernet
  - Multiple video streams up to available bandwidth of network
  - RTP compliant
  - Designed to support DEFSTAN 0082
  - Multicast/unicast transmission using UDP protocol
  - Designed to minimize latency

- ◆ Decompression and display through Sentric2 core software
  - Hardware accelerated decompression or software playback
  - Supports full frame rate decompression
  - Standalone software replay tool for network client configurations
- ◆ Control
  - Web-based interface for system configuration
  - Socket-based interface for system configuration
  - Top-level API providing library support for all core functionality
  - Supported by all Sentric2-compatible systems including x86-based Wind River® GPP Linux® and Windows®

## Warranty

This product has a one year warranty.

## Contact Information

To find your appropriate sales representative, please visit:

Website: [www.cwembedded.com/sales](http://www.cwembedded.com/sales)

Email: [sales@cwembedded.com](mailto:sales@cwembedded.com)

## Technical Support

For technical support, please visit:

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