T2
INTELLIGENT DIGITAL DISK RECORDERS

BUSINESS CASE

- **Three decks for the price of one – 1 record and 2 playout channels work independently and simultaneously.**

- **Versatile platform for ingest, transmission, replay, editing, and content management. Handles more video formats and frame rates than any other SD/HD recorder/player.**

- **Combines IT interoperability with VTR-like controls.**

- **Engineered to Grass Valley broadcast standards to withstand punishing live event & mobile production environments.**

Each of the three T2 intelligent digital disk recorder (iDDR) models (T2 Express, Pro, and Elite) brings full high-definition capture and playback to the video professional. Additionally, T2 iDDRs support real-time HD crossconversion and faster than real-time playlist rendering.

Grass Valley T2 iDDRs are complete and self-contained SD and HD audio/video playout centers. The front-panel transport controls have the look and feel of a traditional VTR, and its two output and one record channels support SD and HD content. The crisp, clear LCD front panel can display high-quality images and is complemented by a software application suite for managing and selecting media clips, clip editing and trimming, and playout—including playlist creation.

Featuring extensive rear-panel audio/video connectivity, T2 iDDRs can also accept files via USB 2.0, or by data transfer over a standard Gigabit Ethernet network. T2 iDDRs also accept media from other applications including Grass Valley HQ, XDCAM, P2, AVCHD, MPEG-2, QuickTime, TIFF, and TGA files.

Further, the T2 iDDR can be controlled by video production switchers, presentation mixers, and audio mixers—to create a powerful presentation system. Every T2 iDDR has two playout channels for independent editing and previewing, or for delivering content to two different display systems simultaneously, useful for edge-blending and displaying 3D content.

grass valley
A BELDEN BRAND

FULL-FEATURED FRONT PANEL

USB Ports | Control Buttons | LCD Touchscreen | Jog/Shuttle | Control Buttons

KEY FEATURES

- **True HD support — 720p, 1080i, and 1080p24**
- **Up/downconversion for a wider range of resolutions and application support**
- **Native import/playback for most standard formats (see list below)**
- **Multiformat support (transcoding to Grass Valley HQ AVI) for most standard and broadcast formats (see list below)**
- **Three decks for the price of one – 1 record and 2 playback channels work independently and simultaneously**
- **2-channel synchronized playback for key/fill rolls, edge blend displays, multi-screen, and 3D applications**
- **Embedded audio (8 channels per SDI connection)**
- **AES/EBU audio supported**
- **Easy-to-use front panel interface**
- **Workstation mode included as standard**

- **Simple on-the-fly editing, including trimming, mark in/out, basic transition effects, and insertion of placeholders for playlists**
- **New, robust design – engineered to withstand punishing live event and mobile production environments**
- **Integration support for third-party control (BVW, GPIO, and AMP)**
- **Ingest management including:**
  - **MXF XDCAM format support with closed caption data**
  - **Direct ingest to external media/ storage**
  - **User-defined clip names**
  - **Scheduler**
- **Import from Final Cut Pro in QuickTime format using the free Grass Valley HQ codec for Mac onto an exFAT HDD**
- **Fast playlist rendering speed (up to 10 times real-time)**
- **Supports 720p to 1080i real-time crossconversion**

- **File-based operation enhancements including:**
  - **FTP transfer rate limit to maintain playback performance**
  - **NTP Synchronization**
  - **Watch folder transfers**
- **Export a growing MXF (XDCAM) file via FTP**
- **Export to Sony XDCAM drive (U1/U2)**

APPLICATIONS

- **Events and staging**
- **Auditoriums**
- **Corporate A/V centers**
- **Educational facilities**
- **Broadcast display support**
- **Regional sports companies**
- **Switcher support for playback**

T2 iDDR Express (HDD)

- RAID-0 (500 GB HDD x2)
- 1 TB data disk — 14 hours recording capacity (Grass Valley HQ: 150 Mb/s) — 36 hours of XDCAM HD422 @ 50 Mb/s
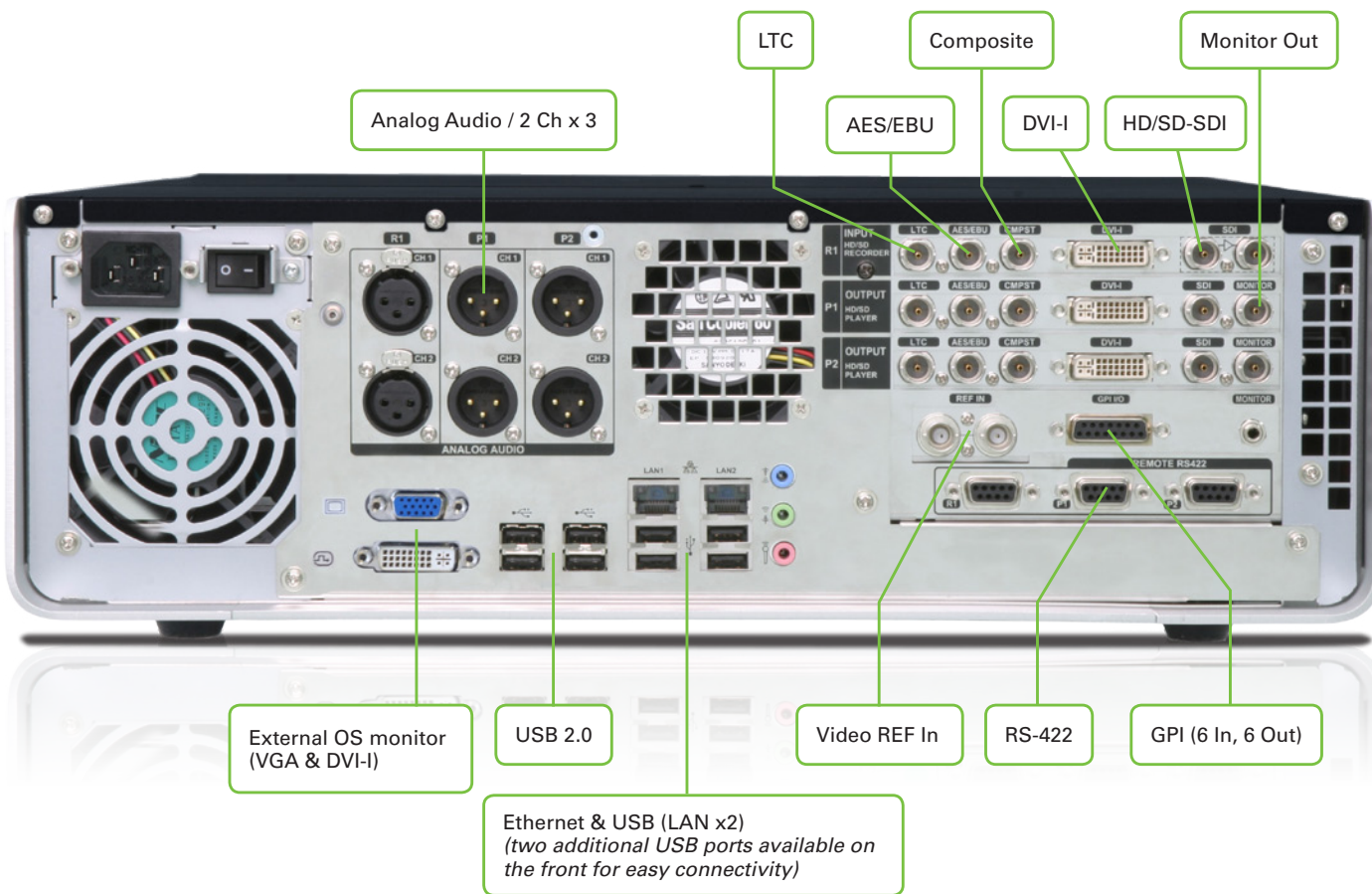
T2 iDDR Pro (HDD)

- RAID-10 (500 GB HDD x4)
- 1 TB data disk — 14 hours recording capacity (Grass Valley HQ: 150 Mb/s) — 36 hours of XDCAM HD422 @ 50Mb/s

T2 iDDR Elite (SSD)

- RAID-0 (480 GB SSD x2)
- 960 GB data disk — 14 hours recording capacity (Grass Valley HQ: 150 Mb/s) — 36 hours XDCAM HD422 @ 50Mb/s

EXTENSIVE REAR PANEL CONNECTIVITY

LTC · Composite · Monitor Out · AES/EBU · DVI-I · HD/SD-SDI · Analog Audio / 2 Ch x 3 · External OS monitor (VGA & DVI-I) · USB 2.0 · Video REF In · RS-422 · GPI (6 In, 6 Out) · Ethernet & USB (LAN x2) *(two additional USB ports available on the front for easy connectivity)*

NATIVE IMPORT/PLAYBACK FORMATS

- AVCHD (H.264/AVC)
- AVI (DV, DVCPRO 25, DVCPRO 50, DVCPRO HD, Grass Valley HQ)
- GF (DV, DVCPRO 25, DVCPRO 50, MPEG-2)
- MXF (Grass Valley HQ, AVC-Intra 50, AVC-Intra 100, D10, DV, DVCPRO 25, DVCPRO 50, DVCPRO HD, MPEG-2)
- P2 (DV, DVCPRO 25, DVCPRO 50, DVCPRO HD, AVC-Intra 50, AVC-Intra 100)
- XDCAM (DV, IMX, MPEG-2)
- XDCAM EX (MPEG-2)

FILE FORMAT SUPPORT

Transcoding to Grass Valley HQ AVI

- AVCHD (H.264/AVC)
- AVI (Grass Valley HQX, Grass Valley Lossless, uncompressed)
- GF (DV, DVCPRO 25, DVCPRO 50, MPEG-2)
- MPEG-2
- MXF (Grass Valley HQX, Grass Valley HQ, AVC-Intra 50, AVC-Intra 100, D10, DV, DVCPRO 25, DVCPRO 50, DVCPRO HD, JPEG2000, MPEG-2)
- P2 (DV, DVCPRO 25, DVCPRO 50, DVCPRO HD, AVC-Intra 50, AVC-Intra 100)
- QuickTime (Grass Valley HQ, Grass Valley HQX, DV, DVCPRO HD, H.264, ProRes 422, ProRes 4444, JPEG2000, animation, MPEG-4, Photo JPEG, PNG, uncompressed)
- Windows Media (Windows Media Video)
- XDCAM (DV, IMX, MPEG-2)
- XDCAM EX (MPEG-2)
- Sequenced files (TGA ,BMP, JPG, TIFF, PNG, GIF)

Rewrapping MXF (OP-1a)

- GXF (AVC-Intra 100, AVC-Intra 50, D10 DVCPRO HD, DVCPRO50, DVCPRO 25, DV, MPEG-2)
- P2 (DV, DVCPRO 25, DVCPRO 50, DVCPRO HD, AVC-Intra 50, AVC-Intra 100)

IMPORT FILE COMPATIBILITY – TRANSCODE IMPORT

Container	Video Codec	Audio Codec	Native Import/ Playback	Transcoding (AVI (HQ))	Rewrap MXF (OP-1a)
AVCHD	H.264/AVC	Dolby Digital (AC-3), Linear PCM	Yes	Yes	—
AVI	Grass Valley HQ, DV, DVCPRO 25, DVCPRO 50, DVCPRO HD	Linear PCM	Yes	—	—
AVI	Grass Valley Lossless, Grass Valley HQX, uncompressed	Linear PCM	—	Yes	—
GF	DV, DVCPRO 25, DVCPRO 50, MPEG-2	Linear PCM (48 kHz, 16-bit/24-bit)	Yes	Yes	—
GXF	AVC-Intra 100, AVC-Intra 50, D10, DVCPRO HD, DVCPRO 50, DVCPRO 25, DV, MPEG-2	Linear PCM, A-law	—	—	Yes
MPEG-2	MPEG-2	MPEG-1 Audio Layer-2, Dolby Digital (AC-3), Linear PCM	—	Yes	—
MXF	AVC-Intra 50, AVC-Intra 100, D10, DV, DVCPRO 25, DVCPRO 50, DVCPRO HD, MPEG-2	Linear PCM, A-law	Yes	Yes	—
MXF	JPEG 2000	Linear PCM, A-law	—	Yes	—
MXF	Grass Valley HQ	Linear PCM	Yes	Yes	—
MXF	Grass Valley HQX	Linear PCM	—	Yes	—
P2	DV, DVCPRO 25, DVCPRO 50, DVCPRO HD, AVC-Intra 50, AVC-Intra 100	Linear PCM (48 kHz, 16-bit/24-bit)	Yes	Yes	Yes
QuickTime	Grass Valley HQ, Grass Valley HQX, DV, DVCPRO HD, H.264, ProRes 422, ProRes 4444, JPEG 2000, Animation, MPEG-4, Photo JPEG, PNG, uncompressed	AAC, Apple Lossless, MP3, ADPCM, A-law, U-law, Linear PCM	—	Yes	—
Windows Media	Windows Media Video	Windows Media Audio	—	Yes	—
XDCAM	DV, IMX, MPEG-2	8 channels AES3, Linear PCM, A-law	Yes	Yes	—
XDCAM EX	MPEG-2	Linear PCM (48 kHz, 16-bit)	Yes	Yes	—

SPECIFICATIONS

T2 iDDR Configurations
1 SD/HD input, 2 SD/HD outputs

Video Input

Format Support Types: High-definition, standard-definition

Connections: SD/HD SDI, analog component (Y-Pb-Pr), DVI-I, composite

Recording Format: AVI-Grass Valley HQ, 4:2:2, XDCAM HD422 (50 Mb/s), HD (25 Mb/s), IMX, DVCAM

Beginning with SP1, T2 can record directly in XDCAM format

Bit Rate: Up to 200 Mb/s

Resolutions SD/Frame Rate: 720x576i50, 720x486i59.94

Resolutions HD/Frame Rate:
1920x1080i59.94, 1920x1080i50, 1920x1080p24, 1920x1080PsF24, 1920x1080p23.98, 1920x1080PsF23.98, 1440x1080i59.94, 1440x1080i50, 1440x1080p24, 1440x1080PsF24, 1440x1080p23.98, 1440x1080PsF23.98, 1280x720p59.94, 1280x720p50

Video Outputs

Format Support Types: High-definition, standard-definition, computer

Connections: SD/HD SDI (one for each playback channel), analog component, DVI-I (one for each playback channel, except RGB), composite

Playback Format (Native Import/Playback):

- AVCHD – H.264/AVC
- AVI – Grass Valley HQ, DV, DVCPRO 25, DVCPRO 50, DVCPRO HD
- GF – HD I-Frame only (100 Mb/s), HD Long GOP (50 Mb/s), DVCPRO 50, DVCPRO 25, DV, MPEG-2
- MXF – Grass Valley HQ, AVC-Intra 100, AVC-Intra 50, DVCPRO HD, DVCPRO 50, DVCPRO 25, DV, D10, MPEG-2
- P2 – AVC-Intra 100, AVC-Intra 50, DVCPRO HD, DVCPRO 50, DVCPRO 25, DV
- XDCAM – HD422 (50 Mb/s), HD (35 Mb/s, 25 Mb/s, 18 Mb/s), IMX, DVCAM
- XDCAM EX – HD (35 Mb/s, 25 Mb/s)

Bit Rate: Up to 200 Mb/s per channel

Resolutions SD/Frame Rate: 720x576i50, 720x486i59.94

Resolutions HD/Frame Rate:
1920x1080i59.94, 1920x1080i50, 1920x1080p24, 1920x1080PsF24, 1920x1080p23.98, 1920x1080PsF23.98, 1280x720p59.94, 1280x720p50, 1280x720p23.98

Computer Resolutions: 1280x1024, 1024x768, 800x600, 640x480

Audio Input

Analog Audio: 2 channels, XLR connections
Digital:
- AES/EBU (2 channels), BNC connections
- Embedded audio on SDI, HD, or SD (8 channels)

Recording Format: 24-bit, PCM, 48 kHz sampling (20-bit PCM for SD-SDI)

Audio Output

Analog Audio: 2 channels per output video, XLR connections
Digital:
- AES/EBU (2 channels), BNC connections
- Embedded audio on SDI, HD, or SD (8 channels)

Recording Format: 24-bit, PCM, 48 kHz sampling (20-bit PCM for SD-SDI)

Export File Compatibility

Export: Grass Valley HQ, MXF (XDCAM HD422 (50 Mb/s), HD (25 Mb/s), IMX, DV)
Transcoding to Grass Valley HQ AVI:
- AVCHD (H.264/AVC)
- AVI (Grass Valley HQX, Grass Valley Lossless, uncompressed)
- GF (DV, DVCPRO 25, DVCPRO 50, MPEG-2)
- MPEG-2
- MXF (Grass Valley HQX, Grass Valley HQ, AVC-Intra 50, AVC-Intra 100, D10, DV, DVCPRO 25, DVCPRO 50, DVCPRO HD, JPEG2000, MPEG-2)
- P2 (DV, DVCPRO 25, DVCPRO 50, DVCPRO HD, AVC-Intra 50, AVC-Intra 100)
- QuickTime (Grass Valley HQ, Grass Valley HQX, DV, DVCPRO HD, H.264, ProRes 422, ProRes 4444, JPEG2000, animation, MPEG-4, Photo JPEG, PNG, uncompressed)
- Windows Media (Windows Media Video)
- XDCAM (DV, IMX, MPEG-2)
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- Sequenced files (TGA ,BMP, JPG, TIFF, PNG, GIF)

Rewrapping MXF (OP-1a):
- GXF (AVC-Intra 100, AVC-Intra 50, D10 DVCPRO HD, DVCPRO50, DVCPRO 25, DV, MPEG-2)
- P2 (DV, DVCPRO 25, DVCPRO 50, DVCPRO HD, AVC-Intra 50, AVC-Intra 100)

Control

Protocol: BVW (pre-roll/post-roll, variable control in sync mode, audio monitoring with variable speed), GPI, AMP (Advanced Media Protocol) for Indigo A/V Mixer and external control software

Connections: RS-422 (9-pin D Conn per channel), Ethernet

Technology

Connections: Gigabit Ethernet, USB 2.0, VGA, DVI-I
Storage Capacity:
- Express: 1 TB (RAID-0, 500 GB HDD x2), Approx. 14 hours of HD @ Grass Valley HQ (150 Mb/s) – 36 hours XDCAM HD422 @ 50Mb/s
- Pro: 1 TB (RAID-10, 500 GB HDD x4), Approx. 14 hours of HD @ Grass Valley HQ (150 Mb/s) – 36 hours of XDCAM HD422 @ 50Mb/s
- Elite: 960 GB (RAID-0, 480 GB SSD x2), Approx. 14 hours of HD @ Grass Valley HQ (150 Mb/s) – 36 hours of XDCAM HD422 @ 50 Mb/s

Service Pack: Updated for Service Pack 1.3 (March 2014)

Physical

Dimensions: 550x430x140 mm (21.6x16.9x5.5 in.)
Weight: 15 kg (33 lbs.)
Operating Temperature: 5°C to 35°C (41°F to 95°F)

Options and Accessories

Rackmount Kit
SNFS Option: Required to connect the T2 to a K2 SAN using the SNFS file system. This option is only supported by Service Pack 1.1 or later.

Note: The T2 can connect to a K2 SAN via FTP without this option.

Note: The T2 Elite/Pro/Express's built-in display may sometimes have dead pixels, or always-on pixels.This is a specification within the liquid crystal display, and will not be considered as a fault or defect of the product. Also, If the T2 is connected to an external monitor, any dead or always-on pixels will depend on the specification of the external monitor.

ABOUT GRASS VALLEY

The new Grass Valley keeps broadcasters, content owners, and service providers future-ready as they navigate the changing landscape of television. With the most comprehensive collection of workflow solutions in the industry, Grass Valley delivers end-to-end television production and content distribution workflows that enable the efficiency and flexibility broadcasters need to stay competitive today—while offering technological foresight they need to keep pace with consumers' desires for more content on more devices. Grass Valley, headquartered in Montreal, leverages the collective expertise and depth of the Grass Valley Group and Miranda Technologies, each having been acquired by St. Louis-based

Belden Inc. Belden delivers a comprehensive product portfolio designed to meet the mission-critical network infrastructure needs of industrial, enterprise and broadcast markets. With innovative solutions targeted at reliable and secure transmission of rapidly growing amounts of data, audio, and video needed for today's applications, Belden is at the center of the global transformation to a connected world. For more information visit www.belden.com.

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