

# Messenger 2 Transmitter – Camera-Mount (M2T-C)

**COBHAM**

The most important thing we build is trust.

## Applications

- Electronic News Gathering (ENG)
- Sports, Point of View
- Studio Wireless Links
- Mobile and Portable AV Applications

## Key System Features

- Built-in AVC / h.264 Encoder
- SD and HD formats up to 1080p
- Low Power Consumption (~15 Watts)
- Local Control plus Data Return Link
- Up to 2 Audio Channels
- User Data Support
- AES 128/256 Bit Security
- C-OFDM Modulation w/ Local Control
- Output Frequency: 1 to 7 GHz (In-Bands)
- High-Throughput 4K option for maximum link performance
- Rugged and Compact Portable Design
- Companion COFDM Receiver with Maximal- Ratio Pre-Detect Diversity reception



GMS introduces the Broadcast industry's first AVC / h.264 C-OFDM wireless Camera-Mount transmitter for transport of Standard (SD) plus High Definition (HD) audio/video streams!

The Messenger 2 Series (M2) product line incorporates many of the original "Messenger" product line capabilities with two major upgrades. The M2 series incorporates the AVC compression technology with one frame delay which replaces the MPEG-2 compression, and they cover all the SD and HD formats up to 1080P.

The Messenger 2 Transmitter – Camera-mount (M2T-C) accepts Standard Definition (SD) or High Definition (HD) 4:2:2 digital video or analog SD video and analog stereo audio inputs (Mic or Line level) or optional Embedded Audio(Future Option). The video is compressed according to the Advanced Video Compression (AVC) / h.264 specifications. The low-latency AVC Encoder supports the Baseline Profiles with resolutions from 480 to 1080 with support for either interlaced or progressive formats. The audio is compressed using MPEG Layer II compression. Low rate user data up to 38.4K Baud can be optionally supported. The audio, video and user data packets PES streams are multiplexed with basic service data to indicate the service name. The stream can be scrambled with AES scrambling system to provide protection in sensitive applications.

The 4K HIGH-THROUGHPUT OPTION enables user-selectable options to set bandwidths from 6 MHz to 16 MHz and to double the throughput of our standard M2T (Up to 63 Mbps!). Using 4K carriers and the 16 MHz bandwidth, the link can support HD operation with >12 Mbps while running QPSK and 1/2 FEC. This increases link robustness and provides an additional 13.5 dB increase in link margin ( >4.7 x increase in operating range! ) for the same throughput rate in a standard HD MPEG-2 DVB-T

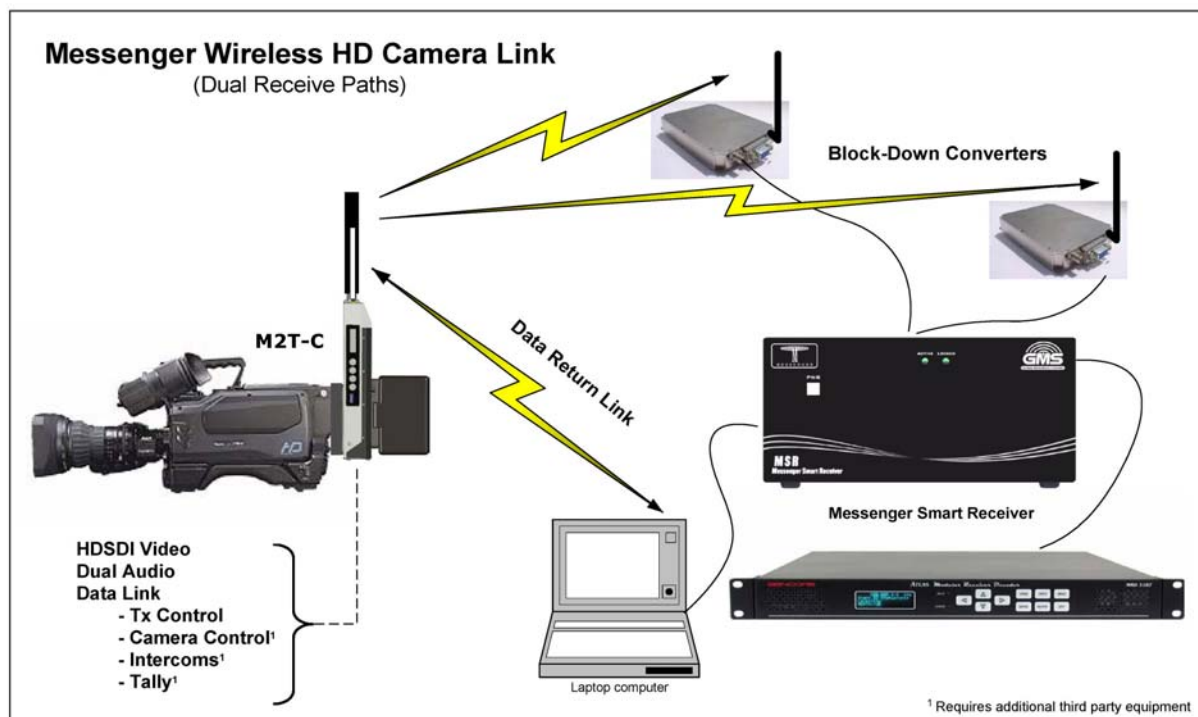
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system! With the HIGH-THROUGHPUT OPTION you can run with fully DVB-T compliant 2K carriers and bandwidths of 6, 7, or 8 MHz. When switched to 4K carriers user can select 12, 14 or 16 MHz bandwidth. The 4K HIGH-THROUGHPUT OPTION is also useful when transmitting multiple video streams through one transmitter. This option requires a special receiver configuration. Please contact GMS Sales for additional information.

The internal Data Return Link (DRL) provides a bi-directional serial data path (Up to 115.2 kBaud) that can be used for a variety of remote control and communications requirements including control of all of the M2T-C operating parameters and enables the addition of camera control, audio communication and many other special features.

A complete GMS Messenger 2 Camera Link for a typical wireless camera application includes the Messenger 2 Transmitter – Camera mount (M2T-C), the Messenger Smart Receiver (MSR), a SD/HD AVC Decoder and one or several external Block Down-Converters, as shown in the figure below. The M2T-C provides professional Audio/Video (A/V) interfaces and processing. All versions of the Messenger Digital Link family use a robust digital modulation system known as Coded Orthogonal Frequency Division Multiplexed (C-OFDM) that provides frequency diversity and powerful Forward Error Correction (FEC) algorithms.



The Messenger Smart Receiver (MSR) provides for Spatial Pre-Detect Maximal-Ratio Diversity Combining of up to six independent antennas per MSR to increase the Signal Strength, Signal-to-Noise Ratio and combat short delay spread multipath reflections found in indoor environments. There is a dramatic increase in the operating threshold when multiple high-gain antennas and Block Down-Converters (BDC) are used with the MSR, greatly enhancing link robustness when operating at the high data rates as required for HD transmission. The MSR outputs a transport stream simultaneously over ASI and SPI interfaces. External Audio/Video/Data MPEG Decoders are sold separately that support HD or SD AVC Decoding.

One of the biggest problems encountered in the transition from an analog to a digital A/V platform has been the inherent digital coding delay that in some digital systems are 1.5 seconds or more for HD. The M2T-C employs a specially designed 'Ultra-Low

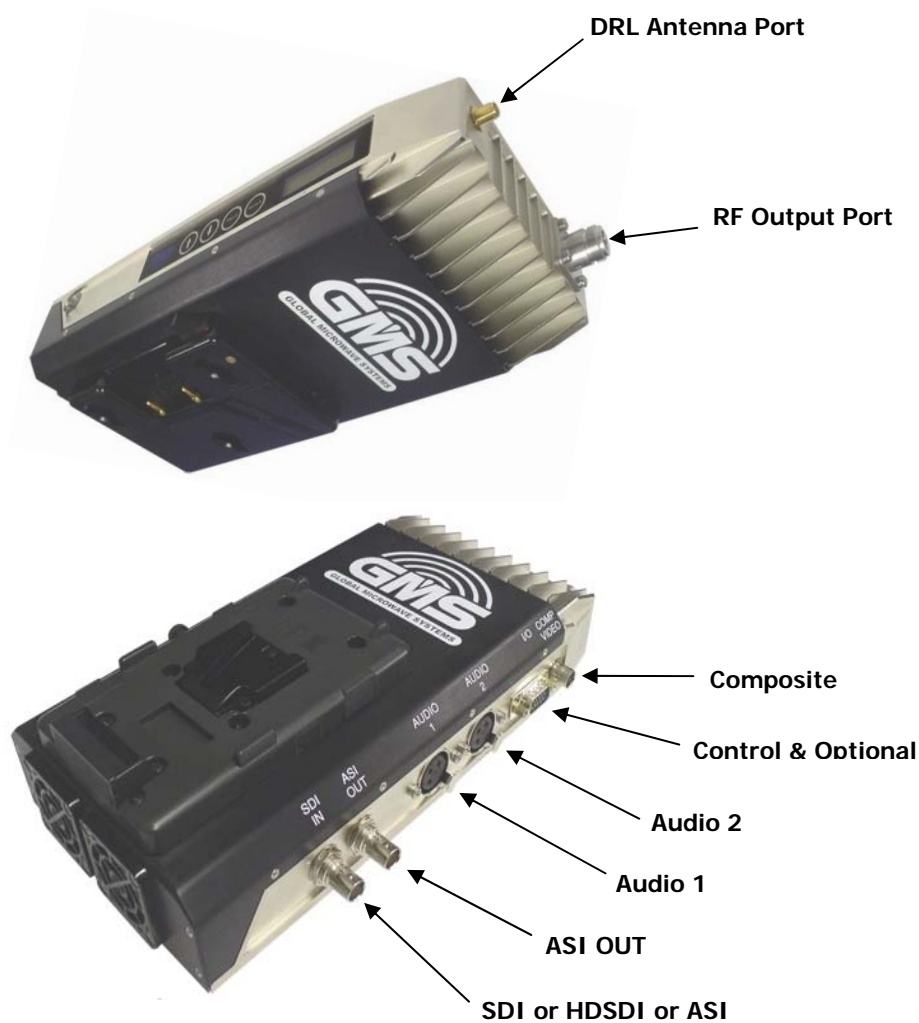
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Delay coding technology, which provides 44 mS (~ 1 frame) end-to-end system delay when using GMS's AVC Decoder with the M2T-C.

This ensures that the picture you see is what is happening *now!*  
Crucial for applications such as sports/news coverage!

## M2T-C Connectors



Specifications subject to change without prior notice  
Typical values shown unless min or max is specified  
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# Messenger 2 Transmitter – Camera Mount (M2T-C)



## Specifications:

### COFDM RF Output

Output Frequency: 1 to 7 GHz (In-Bands)  
Bandwidth: Selectable 6, 7, 8 MHz Standard  
6, 7, 8, 12, 14, 16 MHz Optional\*  
RF Output Power: Standard - Up to 200 mW  
2W available for L/S Band  
Connector: N-F

### Video Encoding (HD)

Interfaces: HD-SDI  
Standards: SMPTE-274M, -293M, -294M,  
296M  
Compression Standard: AVC / h.264  
(Per ISO/IEC 14496-10)  
Motion Est. Range: +/-192 Horiz., +/-128 Vert.  
Video formats/resolutions supported:

Format	Resolution @ Frame Rate
1080i	1920x1080 @ 23.98/24/25/29.97/30 fps
1080PsF	1920x1080 @ 23.98/24/25/29.97/30 fps
1080p	1920x1080 @ 23.98/24/25/29.97/30 fps
720p	1280x720 @ 50/59.94/60 fps

Variable GOP Structure: I-only and IP  
PsF supported by INTERLACED FORMAT  
Profiles supported: BP@HL  
\*\*Video bit rates: HDTV to 50 Mbps  
\*\*\*System Latency: <44mS (Ultra-Low Mode)  
Connector: BNC-F

### Video Encoding (SD)

Interfaces: SDI, Component, Composite or  
S-Video  
Standards: SMPTE-292M  
Compression Standard: AVC / h.264  
(Per ISO/IEC 14496-10)  
Motion Est. Range: +/-192 Horiz., +/-128 Vert.  
Video format standards: NTSC or PAL

Format	Resolution @ Frame Rate
576i	720x576 @ 25 fps (PAL)
480i	720x480 @ 29.97 fps (NTSC)

Variable GOP Structure: I-only and IP  
Profiles: BP@ML  
\*\*Video bit rates: to 50 Mbps  
\*\*\*System Latency: <44mS (Ultra-Low Mode)  
Connectors: BNC-F, p/o DB-15F

### Audio Encoding

Analog Audio Inputs:  
Dual, Line-Level or Mic-Level, Single-Ended or Differential,  
Clip Level 12dB  
Input Impedance: 600 Ohms (Line), 2 kOhms (Mic)  
Standards: SMPTE-272M, -299M  
Digital Audio: Embedded \*\*\*\*\* (2-channel)  
Compression Standard: MPEG Layer II  
Bit rates: 256 kbit/s/ch  
Sampling Frequency: 32 kHz, 44.1 kHz, or 48 kHz  
THD: < 0.1 % max.  
Response: 20 Hz to 12 kHz, +/- 0.25 dB  
Crosstalk: >55 dB min  
S/N: >60 dB RMS  
Connector: XLR-F (Qty 2)

### Transport Stream

Standard: per ISO/IEC 13818-1  
Packet Size: 188 byte  
Bit Rate: Automatically set from active service settings.  
ASI Output  
Connector: BNC-F  
ASI Input  
Connector: BNC-F (same as SDI/HD-SDI in)

### Modulation

Modulation Type: COFDM w/QPSK, 16QAM, or 64QAM

### Standard: DVB-T compliant

FEC: 1/2, 2/3, 3/4, 5/6, 7/8  
Guard Intervals: 1/32, 1/16, 1/8, 1/4  
Spurious: -50 dBc  
COFDM Carriers: 2k Carriers

### High Throughput Option

FEC: 1/2, 2/3, 3/4, 5/6, 7/8  
Guard Intervals: 1/32, 1/16, 1/8, 1/4  
Spurious: -50 dBc  
COFDM Carriers: 4k Carriers

# Messenger 2 Transmitter – Camera Mount (M2T-C)



## Data Return Link (DRL)

Frequency: 902-928 MHz  
Modulation: FHSS  
Output Power: Up to 1 W, adjustable  
115.2 kBaud, Full Duplex  
Interface: RS-485C via DB-15F (RS232C  
Converters Available)

## Scrambling Option

Type: 128/256 Bit Advanced Encryption  
Standard (AES)  
Key Storage: User Controlled, Local or Remote  
Implementation: Everything except TS Header  
Requires DDPC with AES Option on RX Side

## User Data Option

Protocol: RS-232C, Asynchronous, 8 Bits, No  
Parity, 2 Stop Bit (with continuous data)  
Data Rate: Selectable, Up to 38.4 kBaud  
User Data PID: Selectable  
Connector: p/o DB-15F  
Requires DDPC with AES Option on RX Side

## Physical

Dimensions (Less Connectors):  
10.5" (L) x 5.25" (W) x 1.85" (H)  
26.67 cm x 13.34 cm x 4.7 cm  
Weight: 3.7 Lbs (1.68 kilograms)

## Environmental

Operational Temperature: -10 to 65 deg C  
Humidity: Up to 100% non-condensing

## DC Power

DC Voltage Range: 9 -15V  
\*\*\*\*Power Consumption: 15 Watts  
Power supplied via battery connector or through DB-15F  
connector: DB-15F Pins 14, 15 (+Vcc), Pins 12, 13 (GND)

## Control

M2T-C can be controlled locally via internal control panel or  
remotely through USB-1 control ports via a MS Windows-based  
control application. DRL can also be used to control the TX  
remotely.

\* With 4K High-Throughput Option

\*\* C-OFDM modulator limits high end of bit rate to 32 Mbps or  
64 Mbps\*.

\*\*\* End-to-End System Latency Delay is Decoder dependent

\*\*\*\* When Data Return Link is off.

\*\*\*\*\* In development (Future Option)