Unique Broadband Systems Ltd.

# DVB-T/ DTMB SFN Adapter

*Model: UNA 7000*

## Product Features

- *DVB-T or DTMB waveform support*
- *DVB-T waveform supports MIP insertions and hierarchical mode*
- *DTMB waveform supports SIP insertion*
- *SFN time and frequency synchronization*
- *Selectable ASI inputs and outputs*
- *Bit rates adjusted with transmission mode*
- *GbE transport stream input/output (optional)*
- *Dual channel operation (optional)*
- *Internal GPS (optional)*

## Description and Application

### Overview

For the operation of digital terrestrial TV networks (DVB-T or DTMB), where several transmitters broadcast the same programs on the same RF channel frequencies (Single Frequency Networks), the transmitters require precise frequency and time synchronization. The frequency (10 MHz) and time (1PPS) reference signals can be obtained from a GPS receiver at each transmission site.

The SFN Adapter fulfils the task of inserting "synchronization marks" (MIP or SIP packets) in a MPEG transport stream in full accordance with DVB-T and DTMB standards.

The basic functions performed by the SFN Adapter are:

- Insert a megaframe or second frame initialization packet (MIP or SIP) into an MPEG transport stream
- Adjust the bitrate of the transport stream to be synchronous with an external reference, and in accordance with the chosen transmission mode
- Provides signaling/mode data for the control of individual transmitters or modulators

Compliant with ETSI standards: EN 300 744 and TS 101 191
Compliant with Chinese standards: GB20600-2006, GY/T 229.1-2008

### MIP Insertion (DVB-T Mode)

MIP insertion occurs once per megaframe, with a time interval dependent on the selected guard interval.

The MIP indicates when the first packet in a mega-frame (Synchronization Time Stamp, STS) begins transmitting.

The time reference is an external 1 pulse per second signal, obtained from a GPS receiver.

### SIP Insertion (DTMB mode)

SIP insertion occurs once per second and is synchronized with the 1PPS signal from a GPS receiver. The SIP contains the transmission parameters for the modulator and the SFN maximum delay.

### Bitrate Adaptation

The SFN Adapter is provided with two serial (ASI) inputs that accept an MPEG transport stream according to DVB recommendations (188 or 204 byte packets). The output may be configured as either 188 or 204 byte packets for DVB-T mode. In DTMB mode, only 188 byte packets are supported.

Note: the maximum bitrate has to include the inserted MIP or SIP, which means the input net bitrate must be slightly lower than the output bitrate.

The SFN Adapter removes null packets from the input signal and inserts MIP or SIP packets. New null packets are then added to produce a precise output bitrate, which is required for the selected transmission mode (dependent on code rate, constellation and guard band). The maximum allowable net bitrate is governed by the selected transmission mode. As the transport rate is modified, the SFN adaptor performs PCR re-stamping.



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## Description and Application

### Hierarchical Mode (DVB-T mode)

Hierarchical modulation allows simultaneous transmission of two MPEG transport streams. The compromise between data rate and ruggedness can be set differently between the two virtual channels.

### Web Interface

This feature allows local and/or remote control of the UNA 7000 via an Ethernet interface and is based on an internal Web server.

The Web pages stored on the Web server are designed as a complete graphical user interface (GUI) for testing the status and setting the parameters of the network adapter. The Web pages are customized for each individual product option.

The Web Interface concept is popular as remote control only requires a standard computer with a network interface card (NIC) and a Web browser (Microsoft Internet Explorer, Firefox, etc.).

### SNMP Client

This feature allows remote control of the UNA 7000 in accordance with SNMP protocol (Get, Set and SNMP traps). This remote control feature is intended for systems solutions where it is desired to integrate the control of a range of SNMP compliant equipment in a common management system.

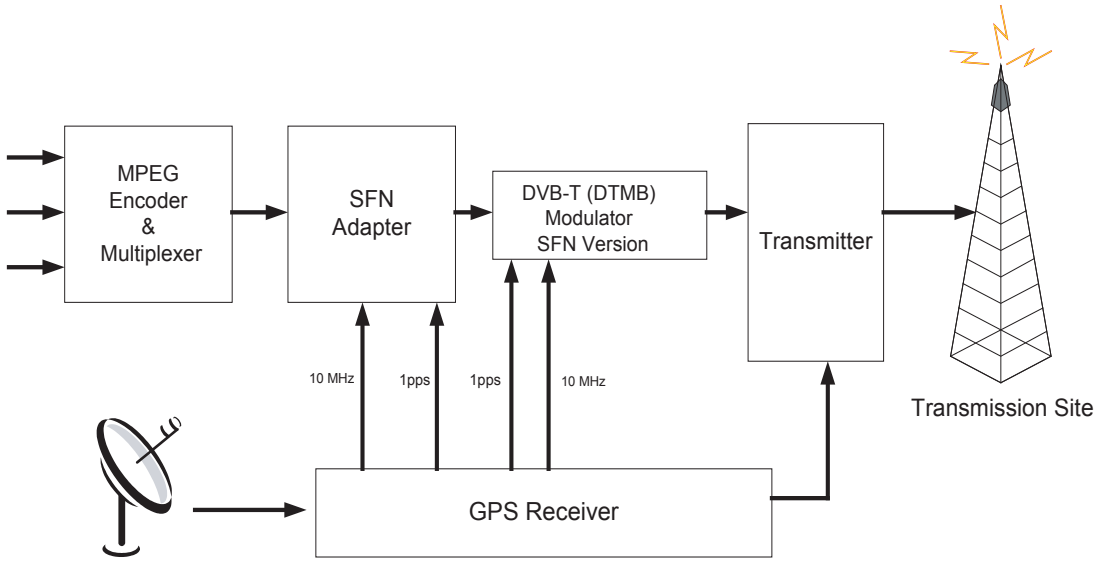
### GbE Transport Stream Input/Output (optional)

The IP-ASI/ASI-IP Bridge option allows the UNA 7000 to accept a GbE transport stream on either of its Ethernet ports and/or provide a GbE transport stream output (with MIPs) on either of its Ethernet ports according to Pro-MPEG Forum CoP #3 / SMPTE 2022.

### Dual Channel Operation (optional)

Dual Channel operation allows the UNA 7000 to process two transport streams, on separate logical channels (CH_A and CH_B), at the same time.

## SFN Block Diagram



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# DVB-T/ DTMB SFN Adapter

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Rear Panel

## Product Specifications

### DVB-T Signal Processing

| | |
|---|---|
| **Input monitoring** | • Transport stream presence<br>• Input Data overflow<br>• Sync 188 byte presence<br>• Sync 204 byte presence |
| **FFT Modes** | 2K, 8K |
| **Guard Intervals** | 1/4, 1/8, 1/16, 1/32 |
| **Code Rates** | 1/2, 2/3, 3/4, 5/6, 7/8 |
| **Constellations** | QPSK, 16-QAM, 64-QAM |
| **Channel Bandwidth** | 8 MHz, 7 MHz, 6 MHz, 5 MHz |
| **Hierarchical Mode** | Alpha - 1, 2 and 4 for 16-QAM and 64-QAM |
| **Max Delay (data)** | 0 - 1.0 sec, resolution 100 ns |
| **Signal Substitution** | Output transport stream is replaced with null packets and MIP in case of input data loss |

### DTMB Signal Processing

| | |
|---|---|
| **Input monitoring** | • Transport stream presence<br>• Input Data overflow<br>• Sync 188 byte presence |
| **FFT Modes** | 3780, Single Carrier |
| **Guard Intervals** | 945, 595, 420 symbols |
| **Code Rates** | 0.4, 0.6, 0.8 |
| **Constellations** | QPSK, 4-QAM-NR, 16-QAM, 32-QAM, 64-QAM |
| **Time Interleaver** | 240, 720 symbols |
| **Channel Bandwidth** | 8 MHz, 7 MHz, 6 MHz |
| **Frame Duration** | 500 us, 571.43 us, 666.67 us |
| **Sub-Carrier Spacing** | 2 kHz, 1.75 kHz, 1.5 kHz |
| **Max Delay (data)** | 0 - 1.0 sec, resolution 100 ns |
| **Signal Substitution** | Output transport stream is replaced with null packets and SIP in case of input data loss |

**Note 1**: The "10MHz" and "1pps" are inputs, except when the UNA 7000 is equipped with an internal GPS receivers, where they become Monitoring Outputs (high impedance).

### Control Interfaces

| | |
|---|---|
| **Front Panel** | LCD display and cursor/ execute keys |
| **Ethernet Interface** | 2 Connector: RJ45<br>Speed: 10/100/1000 Base-T |
| **USB Interface** | Connector: USB Type B |
| **RS232 Interface** | Connector: 9-pin SUB-D Male |
| **RS485 Interface** | Connector: 9-pin SUB-D Female |
| **CLI (Command Line Interface)** | Connector: USB (HyperTerminal) or Ethernet (HyperTerminal and Telnet) |
| **Web GUI** | Internet Explorer, Firefox, etc.<br>Connector: Ethernet |
| **SNMP Control Interface** | Connector: Ethernet<br>Note: MIBs are provided |
| **Alarm Relays** | Connector: RS232 and RS485<br>2 Dry Contact Alarm relays, triggered by any major alarm. |

### Signal Inputs

| | |
|---|---|
| **MPEG Transport Stream** | 2 ASI inputs: BNC (F), 75 Ω |
| **GbE Transport Stream (Optional)** | 2 Connectors: RJ45<br>Protocol: Pro-MPEG CoP #3 |
| **10 MHz (Note 1)** | Connector: BNC (F), 50 Ω<br>Frequency: 10 MHz<br>Level: 0 dBm to 15 dBm |
| **1 PPS (Note 1)** | Connector: BNC (F), 50 Ω<br>Frequency: 1 PPS<br>Level: TTL<br>Trigger: Positive transition |

### Signal Outputs

| | |
|---|---|
| **MPEG Transport Stream** | 2 ASI outputs: BNC (F), 75 Ω |
| **GbE Transport Stream (Optional)** | 2 Connector: RJ45<br>Protocol: Pro-MPEG CoP #3 |
| **Clock Reference - 10 MHz (Note 1)** | Connector: BNC (F), High Impedance<br>Frequency: 10 MHz<br>Level: 10 dBm, ± 2.5 dB sinewave |
| **Time Reference - 1 PPS (Note 1)** | Connector: BNC (F), High Impedance<br>Frequency: 1 PPS<br>Level: TTL<br>Trigger: Positive transition |



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# *DVB-T/ DTMB SFN Adapter*

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## Product Specifications

### Power Supply

| | |
|---|---|
| **Voltage** | 100 - 240 VAC |
| **Frequency** | 50 - 60 Hz |
| **Power Consumption** | max. 45 VA |
| **Harmonic Correction** | EN61000-3-2 |

### Environmental

| | |
|---|---|
| **Operating Temperature** | 0°C to +50°C (+32°F to +122°F) |
| **Storage Temperature** | -30°C to +70°C (-22°F to +158°F) |
| **Relative Humidity (operating/storage)** | max. 95% |
| **Cooling** | Temperature controlled fan to assist natural convection |

### Mechanical

| | |
|---|---|
| **Size** | 1 U of 19" wide cabinet |
| **Dimension (W x H x D)** | 48.3cm x 4.39cm x 42.7cm (19" x 1.73" x 16.8") |
| **Weight** | 6 kg (13 lbs) |
| **Transport and Storage** | Vibration acc. to IEC Publ.68 |

### ETSI Compliance

| **Essential Requirement R&TTE Directive 1995/5/EC** | **Standard / Specification** |
|---|---|
| **Safety** | EN 60950-1: 2001, A11: 2004 First Edition |
| **Health** | Not applicable. No antenna. |
| **EMC** | EN 301 489-1 V1.8.1 |

### CE Compliance

This equipment is CE Compliant.

CE



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